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U.S. Army Garrison - Hawai'i

Mākua Marine Resources Supplemental Study-Human Health Risk Assessment

February 2015

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Executive Summary

A supplemental Human Health Risk Assessment (HHRA) was conducted to characterize potential human health risks from exposures to consumption of marine biota collected from Mākua Military Reservation (MMR), on the Waiʻanae Coast of Oʻahu, Hawaiʻi. This supplemental HHRA provides further characterization of the potential risks at MMR and is a follow-on assessment to a 2009 human health risk assessment conducted in relation to the Marine Resources Study (USARHAW and 25th ID (L), 2009).

This HHRA analyzes biota samples collected in accordance with the sampling and analysis plan (SAP) (Army, 2013). The SAP documented the purpose, scope of work, strategy, and methodology used to sample and analyze octopus (heʻe), sea cucumber (loli), and edible seaweed (limu kohu) per the June 20, 2012 ruling in Mālama Mākua vs. Robert Gates, Secretary of Defense and John McHugh, Secretary of the United States Department of the Army (U.S. District Court, 2012). This ruling stated that the defendants shall complete one or more studies of limu kohu and other marine resources (e.g., octopus and sea cucumber) near Mākua Beach, in accordance with the terms and conditions set forth in paragraphs 6, 7, and 10 of the 2007 Settlement Agreement (U.S. District Court, 2007). The residents of the Waiʻanae Coast rely on Mākua Beach for subsistence fishing (obtaining food as a means of maintaining life). The SAP was approved by applicable stakeholders and regulatory agencies prior to commencement of the field work.

Biota samples were collected from MMR and two (2) background locations, which were assumed unimpacted by MMR. One background location was on the north shore of Oʻahu around the end of Kaʻena Point. The second background location was along the coast of Mokulēʻia Beach. These two locations were chosen as representative background locations because they are relatively close to Mākua Beach geographically and are in areas that have a greatly reduced potential for the presence of constituents commonly associated with military training. These areas have comparable ocean currents (although currents may vary in strength between the locations) and wave actions similar to those found at Mākua Beach. The background locations were selected in accordance with USEPA background site selection criteria (USEPA, 2002a). Samples of target species, Octopus, sea cucumber, and limu kohu were collected in the near-shore waters of Mākua and the two (2) near-shore background locations. Sampling was conducted in two (2) rounds to account for seasonal variability. The first round of sampling was conducted during the dry season (Round 1, September and October 2013). The second round of sampling was conducted during the wet season (Round 2, January through March 2014).

The selection of analytes included in the current investigation was based on the HHRA conducted during the 2009 Marine Resource Study and the 2007 settlement agreement (i.e., the 'Foran List'). The full list of analytes is provided in the main body of the report. A summary of the analytical groups tested includes: organochlorine pesticides, purgeable organics (gasoline), volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), dioxins/furans (17 congeners of concern), explosives (nitroaromatics/nitramines), and metals. Specific to this assessment was an evaluation of both inorganic and organic forms of arsenic.

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Risk estimates were calculated for current and future seafood consumers who reside near and consume seafood collected from the study area. Seafood consumers are classified into two categories: "average" consumers and "high-end" consumers. Fishermen are considered "high-end" consumers, while the remaining local population is classified as "average" consumers. Seafood consumption rates used in the risk assessment were adopted from a seafood consumption survey conducted for the 2009 Ordnance Reef (HI-06) study area in 2010 (USACE, 2014).

The current and future seafood consumers evaluated in this assessment were conservatively assumed to obtain and consume 100% of their seafood from the Mākua study area. This assumption is extremely health protective. Many of the participants surveyed in 2010 stated that seafood was generally acquired from markets and nonlocal sources. Based on informal surveys with fishermen in the area and direct observation of fishermen conducting the sampling for this study, marine seafood resources at Mākua Beach could not support the ingestion rate used in the HHRA. Risks and hazards for the "high end" seafood consumer should be considered conservative and not indicative of risks and hazards for the general population. To provide a range of risk estimates, an "average" seafood consumer was also evaluated.

Risk Assessment Results

The first step of the risk assessment process was to compare MMR chemical concentrations and concentrations from the background locations. The background locations were used to determine naturally occurring concentrations of inorganic contaminants (i.e., metals) or contaminants assumed present due to bioaccumulation from other anthropogenic sources (i.e., organic compounds from other anthropogenic sources that bioaccumulate in the biota). The 95% upper tolerance limits (UTLs) for the background dataset was determined to be the site-specific background threshold value (BTV). The 95% UTLs were calculated using United States Environmental Protection Agency's (USEPA's) Statistical Software ProUCL Version 5.0 (USEPA, 2013a). ProUCL 5.0 computes UTLs which adjust for data skewness. ProUCL 5.0 computes upper limits using estimates based on normal, lognormal, gamma or nonparametric distributions. The BTV selected was based on the ProUCL recommended distribution.

Chemical concentrations in biota at MMR were also compared to conservative screening criteria. Screening criteria were calculated based on methods derived by the USEPA Fish Advisories using site-specific consumption rates for "high-end" fish consumption in the Human Health Risk Assessment for the 2009 Ordnance Reef (HI-06) study area in 2010 (USACE, 2014). The use of "high-end" fish consumption rates was determined to be conservative for screening consumption of the media of concern (octopus, sea cucumber, and limu kohu).

Calculation of background concentrations and screening was conducted for sampling during the dry season and wet season, individually. Any contaminant with detected concentrations (maximum detected value) greater than both the conservative screening criteria and calculated BTV in either Round 1 or Round 2 were carried forward for quantitative analysis.

Arsenic was speciated into organic and inorganic fractions. In octopus and limu kohu, concentrations of total and inorganic arsenic were not elevated in relation to the two background locations and therefore not carried forward into the baseline HHRA. In sea cucumber, inorganic

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arsenic was found at concentrations exceeding that of the background locations. Inorganic arsenic in sea cucumber was carried forward for quantitative analysis.

Potential Excess Lifetime Cancer Risks (PELCR) were calculated and compared to the USEPA regulatory risk range of 1E-06 to 1E-04. Estimated non-carcinogenic hazards are presented as total site Hazard Indices (HIs) that sum the Hazard Quotients (HQs) of each environmental contaminant of potential concern at MMR and via each specific medium. A total Hazard Index (HI) of 1 was considered the regulatory level of concern. The risk and hazard summary is provided in Tables ES-1 and ES-2.

The results of the HHRA for MMR indicate that for the "average" consumer, carcinogenic risks are within the regulatory risk range and non-carcinogenic hazards are less than the regulatory level of concern. The "average" consumer was assumed to ingest reasonable quantities of human food items (i.e., invertebrates and seaweed) generally consumed by a typical resident of the area. Fish and shellfish consumption was evaluated in the 2009 Marine Resources Study (USARHAW and 25th ID (L), 2009).Site-specific risk and hazard estimates for the current and future "average" consumer are presented in Table ES-1 below. Total cumulative carcinogenic risk estimated due to consumption of biota from MMR was 1E-05, which exceeds the point of departure value of 1E-06, but is within the regulatory risk range of 1E-05 to 1E-06. The cumulative non-carcinogenic hazard index was 0.5, which does not exceed the regulatory level of concern.

Site-specific carcinogenic risk estimates for the current and future "high-end" seafood consumers were within the regulatory risk range. Total cumulative carcinogenic risk estimated due to "high-end" consumption of biota from MMR was 8E-05, which exceeds the point of departure value of 1E-06, but is within the regulatory risk range of 1E-05 to 1E-06. The cumulative non-carcinogenic hazard index was 3, which exceeded the regulatory level of concern.

The individual biota types sampled in this assessment were also evaluated individually. There were no unacceptable levels of risk calculated for consumption of octopus, for either the "average" or "high-end" seafood consumers. There were also no unacceptable levels of risk calculated for consumption of sea cucumber, for either the "average" or "high-end" seafood consumers. Carcinogenic risk due to the consumption of limu kohu for both the current and future "average" or "high-end" seafood consumers exceeded the point of departure regulatory level of concern of 1E-06. The carcinogenic risk due to the consumption of limu kohu was within the regulatory risk range of 1E-04 to 1E-06. The primary risk driver in this assessment was organochlorine pesticides in limu kohu samples (heptachlor and heptachlor epoxide) collected during the dry season (Round 1 of sampling). Heptachlor and heptachlor epoxide were not detected in the background locations during Round 1 sampling. Heptachlor and heptachlor epoxide in limu kohu collected in Round 1 accounted for approximately 95% of the carcinogenic risk calculated. Heptachlor and heptachlor epoxide also accounted for approximately 70% of the non-carcinogenic hazards.

Lead was carried forward as a chemical of concern in both octopus and limu kohu. This HHRA used USEPA's Integrated Exposure Uptake Biokinetic (IEUBK) Model for Lead in Children (USEPA, 2010a) to assess lead hazards in diet (USEPA, 2003 and 2009). The USEPA

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recommends the use of central tendency (CTE) values as inputs to the IEUBK Model. This assessment evaluated a CTE scenario using average lead in biota concentrations to represent an "average" seafood consumer, as well as a reasonable maximum exposure (RME) scenario using the 95% UCL of lead concentrations to represent the "high-end" seafood consumer. PbB levels were also calculated assuming exposure to standard background sources such as incidental ingestion of lead in soil, dust, and drinking water. The HHRA compared calculated blood-lead (PbB) concentrations to the State of Hawaii, Department of Health PbB concentration goal of 5 micrograms per deciliter (µg/dL). Under both the "average" (CTE) and "high-end" (RME) consumer scenarios, lead hazards to children did not exceed the regulatory level of concern of 5 µg/dL. The results of the lead assessment are presented in Table ES-3.

This supplemental HHRA evaluated risks and hazards under multiple health-protective current and future land use scenarios. Risks and hazards should be evaluated with consideration of realistic current and future land use scenarios, the conservativeness of the risk assessment assumptions and process, and the economic and cultural importance of MMR to the community to determine the necessary future response actions for MMR, if any. For example, very conservative seafood consumption rates and a fraction ingested from site of 100% were used for both seafood consumer scenarios. These assumptions apply to only a very limited segment of the local population. The risk estimates calculated in this assessment should therefore be considered conservative.

Pesticides driving the risk estimates in this assessment are not sourced from military munitions or range activities and are present due to other onshore anthropogenic sources and urban/agricultural runoff. If organochlorine pesticides were excluded from this assessment, estimated carcinogenic risk and noncarcinogenic hazards would be below all applicable regulatory levels of concern.

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TABLE ES-1
Summary of Risks and Hazards
Average Consumer

Season	Biota	Chemical	Carcinogenic Risk				Noncarcinogenic Hazard Index			
			Child	%	Adult	%	Child	%	Adult	%
Dry Season (Round 1)	Octopus	Lead	NA	NA	NA	NA	NA	NA	NA	NA
		Dioxins TEQ	1.2E-08	0.3%	2.4E-08	0.3%	NA	NA	NA	NA
		Octopus Total:	1.2E-08		2.4E-08		NA		NA	
	Sea Cucumber	Arsenic	3.3E-08	0.8%	6.6E-08	0.8%	0.0008	0.2%	0.0004	0.2%
		Chromium	NA	NA	NA	NA	NA	NA	NA	NA
		Sea Cucumber Total:	3.3E-08		6.6E-08		0.0008		0.0004	
	Limu	Cobalt	NA	NA	NA	NA	0.03	6.9%	0.02	6.9%
		Lead	NA	NA	NA	NA	NA	NA	NA	NA
		Thallium	NA	NA	NA	NA	0.08	15.9%	0.04	15.9%
		Heptachlor	2.2E-06	52.4%	4.5E-06	52.4%	0.01	2.4%	0.006	2.4%
		Heptachlor epoxide	1.7E-06	39.3%	3.4E-06	39.3%	0.2	34.8%	0.08	34.8%
		Dioxins TEQ	1.7E-07	3.9%	3.3E-07	3.9%	NA	NA	NA	NA
		Limu Total:	4.1E-06		8.2E-06		0.3		0.1	
Wet Season (Round 2)	Octopus	Lead	NA	NA	NA	NA	NA	NA	NA	NA
		Dioxins TEQ	5.0E-08	1.2%	1.0E-07	1.2%	NA	NA	NA	NA
		Octopus Total:	5.0E-08		1.0E-07		NA		NA	
	Sea Cucumber	Arsenic	6.5E-08	1.5%	1.3E-07	1.5%	0.002	0.4%	0.0009	0.4%
		Chromium	NA	NA	NA	NA	NA	NA	NA	NA
		Sea Cucumber Total:	6.5E-08		1.3E-07		0.002		0.0009	
	Limu	Cobalt	NA	NA	NA	NA	0.1	24.8%	0.1	24.8%
		Lead	NA	NA	NA	NA	NA	NA	NA	NA
		Thallium	NA	NA	NA	NA	0.07	14.6%	0.03	14.6%
		Heptachlor	NA	NA	NA	NA	NA	NA	NA	NA
		Heptachlor epoxide	NA	NA	NA	NA	NA	NA	NA	NA
		Dioxins TEQ	2.9E-08	0.7%	5.8E-08	0.7%	NA	NA	NA	NA
		Limu Total:	2.9E-08		5.8E-08		0.2		0.1	
TOTAL			**4E-06**		**9E-06**		**0.5**		**0.2**	
RESIDENTIAL TOTAL			**1E-05**				**0.5**			

Notes:
Residential Totals for carcinogenic risk are the summation of the child and adult receptors. Residential non-carcinogenic hazards are the maximum value between the child and adult receptors.
Arsenic risks and hazards are based on inorganic forms only and do not include organic arsenic metabolites
Chromium was assumed to be present in biological species in the nontoxic trivalent (Chromium III) state (DeCarlo 2004, 2005 and Frey 1994).
This assessment assumes that the chromium detected in site biota would not contribute to health risks.

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TABLE ES-2
Summary of Risks and Hazards
High-End Consumer

Round	Biota	Chemical	Carcinogenic Risk				Noncarcinogenic Hazard Index			
			Child	%	Adult	%	Child	%	Adult	%
Dry Season (Round 1)	Octopus	Lead	NA	NA	NA	NA	NA	NA	NA	NA
		Dioxins TEQ	2.8E-08	0.1%	5.2E-08	0.1%	NA	NA	NA	NA
		Octopus Total:	2.8E-08		5.2E-08		NA		NA	
	Sea Cucumber	Arsenic	9.3E-08	0.3%	1.7E-07	0.3%	0.002	0.1%	0.001	0.1%
		Chromium	NA	NA	NA	NA	NA	NA	NA	NA
		Sea Cucumber Total:	9.3E-08		1.7E-07		0.002		0.001	
	Limu	Cobalt	NA	NA	NA	NA	0.08	2.8%	0.04	2.8%
		Lead	NA	NA	NA	NA	NA	NA	NA	NA
		Thallium	NA	NA	NA	NA	0.2	6.2%	0.09	6.2%
		Heptachlor	6.7E-06	23.3%	1.2E-05	23.3%	0.03	1.2%	0.02	1.2%
		Heptachlor epoxide	2.1E-05	72.1%	3.9E-05	72.1%	2	67.9%	1.0	67.9%
		Dioxins TEQ	8.3E-07	2.9%	1.6E-06	2.9%	NA	NA	NA	NA
		Limu Total:	2.8E-05		5.3E-05		2		1	
Wet Season (Round 2)	Octopus	Lead	NA	NA	NA	NA	NA	NA	NA	NA
		Dioxins TEQ	1.1E-07	0.4%	2.1E-07	0.4%	NA	NA	NA	NA
		Octopus Total:	1.1E-07		2.1E-07		NA		NA	
	Sea Cucumber	Arsenic	2.0E-07	0.7%	3.8E-07	0.7%	0.005	0.2%	0.002	0.2%
		Chromium	NA	NA	NA	NA	NA	NA	NA	NA
		Sea Cucumber Total:	2.0E-07		3.8E-07		0.005		0.002	
	Limu	Cobalt	NA	NA	NA	NA	0.4	13.7%	0.2	13.7%
		Lead	NA	NA	NA	NA	NA	NA	NA	NA
		Thallium	NA	NA	NA	NA	0.2	8.0%	0.1	8.0%
		Heptachlor	NA	NA	NA	NA	NA	NA	NA	NA
		Heptachlor epoxide	NA	NA	NA	NA	NA	NA	NA	NA
		Dioxins TEQ	7.1E-08	0.2%	1.3E-07	0.2%	NA	NA	NA	NA
		Limu Total:	7.1E-08		1.3E-07		0.7		0.3	
TOTAL			**3E-05**		**5E-05**		**3**		**1**	
RESIDENTIAL TOTAL			**8E-05**				**3**			

Notes:
Residential Totals for carcinogenic risk are the summation of the child and adult receptors. Residential non-carcinogenic hazards are the maximum value between the child and adult receptors.
Arsenic risks and hazards are based on inorganic forms only and do not include organic arsenic metabolites
Chromium was assumed to be present in biological species in the nontoxic trivalent (Chromium III) state (DeCarlo 2004, 2005 and Frey 1994).
This assessment assumes that the chromium detected in site biota would not contribute to health risks.

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TABLE ES-3
Summary of Lead Hazards

Round	Media	Percent of Consumption	Receptor	Age Group	Average Blood Lead (µg/dL)	High-End Blood Lead (µg/dL)
Dry Season (Round 1)	Octopus (he'e)	60% of total meat consumption	Child Resident	0.5-1	1.3	1.6
				1-2	1.4	2.1
				2-3	1.4	2.2
	Seaweed (limu kohu)	23% of total vegetable consumption		3-4	1.4	2.1
				4-5	1.3	2
				5-6	1.2	2
				6-7	1.1	2
Wet Season (Round 2)	Octopus (he'e)	60% of total meat consumption	Child Resident	0.5-1	1.2	1.3
				1-2	1.4	1.6
				2-3	1.4	1.6
	Seaweed (limu kohu)	23% of total vegetable consumption		3-4	1.3	1.5
				4-5	1.2	1.4
				5-6	1.1	1.3
				6-7	1.1	1.3

Note:
Residential Child blood-lead concentrations were calculated via USEPA IEUBK (USEPA, 2010a). Maximum blood-lead concentrations calculated were for the 2-3 age group
Percent of consumption was based on Pacific-Asian diet as assumed in the HDOH Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater (HDOH, 2011)
Octopus consumption was assumed to be 100% of the "Fish and Products" of the total "Fish, Meat & Poultry" in the Pacific-Asian diet (consumption of Fish and Products/ total Fish, Meat and Poultry consumption).
Limu kohu consumption was assumed to be 100% of the "other vegetables" of the total "Vegetable" consumption in the Pacific-Asian diet (consumption of Other Vegetables/total Vegetable consumption).
EPC = Exposure Point Concentration
µg/dL = micrograms per deciliter

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List of Acronyms

ADD	Average Daily Dose
ATSDR	Agency for Toxic Substances and Disease Registry
BTV	background threshold value
CADD	Chronic Average Daily Dose
CALFEXs	Combined Arms Live-Fire Exercises
CDC	Center for Disease Control and Prevention
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPC	Chemical of Potential Concern
CSF	Cancer Slope Factor
CSM	Conceptual Site Model
DMMP	Dredged Material Management Program
DoD	Department of Defense
DoN	Department of the Navy
DQO	Data Quality Objective
EPC	Exposure Point Concentration
FDA	Food and Drug Administration
HDOH	Hawai‘i Department of Health
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
ID	Infantry Division
IEUBK	Integrated Exposure Uptake Biokinetic Model for Lead in Children
IRIS	Integrated Risk Information System
LADD	Lifetime Average Daily Dose
LOAEL	Lowest Observed Adverse Effect Level
mg/kg	milligrams per kilogram
MMR	Mākua Military Reservation
NOAEL	No Observed Adverse Effect Level
PbB	Blood lead
PELCR	Potential Excess Lifetime Cancer Risk
QAPP	Quality Assurance Project Plan

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QA/QC	Quality Assurance / Quality Control
RAF	Relative Absorption Factor
RAGS	Risk Assessment Guidance for Superfund
RDX	cyclotrimethylenetrinitramine
RfD	Reference Dose
RI	Remedial Investigation
RL	Reporting Limit
RME	Reasonable Maximum Exposure
RSL	Regional Screening Level
SAP	Sampling and Analysis Plan
SVOC	Semi-Volatile Organic Compounds
UCL	Upper Confidence Limit
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
UTLs	upper tolerance limit
VOC	volatile organic compound
µg/dL	micrograms per deciliter

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1. INTRODUCTION

This report presents a supplemental site-specific human health risk assessment (HHRA) for Mākua Military Reservation (MMR), which is off the Waiʻanae Coast of Oʻahu, Hawaiʻi. This supplemental HHRA provides further characterization of the potential risks at MMR due to seafood consumption and is a follow-on assessment to a 2009 human health risk assessment conducted in relation to the Marine Resources Study (USARHAW and 25th ID [L] 2009).

1.1 PROJECT DESCRIPTION

This supplemental HHRA seeks to estimate the probability of adverse health effects in humans who may be exposed to substances found in marine resources used as an important component of their diet. This supplemental HHRA provides further characterization of the potential risks at MMR and is a follow-on assessment to a HHRA conducted in 2009.

This assessment focuses on data gaps identified on review of the 2009 report and discussion with the regulatory agencies and the community. The 2009 investigation and its deficiencies are discussed in this HHRA in Section 2.1.1. In compliance with the Court's ruling, the risk assessment focused on the following data gaps:

1) Assessed risk due to consumption of marine seafood resources, including octopus (heʻe), sea cucumber (loli), and edible seaweed (limu kohu), obtained for consumption by Waiʻanae Coast residents from near Mākua Beach. The species targeted for human health evaluation represent marine resources which were not sampled in the original marine resources study and determined from public input to be significant to the local community.

2) Determined whether arsenic in octopus, sea cucumber, and limu kohu, was present in the organic and/or inorganic form. Organic arsenic is considered less toxic than inorganic arsenic, thus human health risk would be evaluated on the inorganic fraction.

3) Determined if seasonal variability in chemical concentration exists between the dry season (September and October 2013) and the wet season (January through March 2014).

4) Lastly, evaluated if risk at Mākua Beach exceeds that at a background location not expected to have been impacted by military activities. Samples of octopus, sea cucumber, and limu kohu were collected and analyzed from Kaʻena Point and Mokulēʻia, designated as the two background locations.

1.2 PROJECT OBJECTIVE

The objective of this study is to investigate whether constituents potentially associated with military training are present in samples of selected species of octopus, sea cucumber, and limu

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found near Mākua Beach and relied on for subsistence by area residents. Samples of limu kohu, octopus, and sea cucumber found near Mākua Beach were to be collected during the wet and dry seasons to determine if seasonable variability of chemical constituents exists. The objective of this HHRA is to determine whether contamination in biota collected from the Mākua Beach area poses a threat to human health. This study was also projected to determine the organic and inorganic fractions of arsenic present in limu kohu, octopus, and sea cucumber. The objective of this study was to satisfy the Court Order of 20 June 2012 (U.S. District Court, 2012).

1.3 DESCRIPTION OF MĀKUA MILITARY RESERVATION

MMR is approximately 38 miles northwest of Honolulu, on the leeward side of Oʻahu in the Mākua and Kahanahāiki valleys. MMR is bordered on the west by the Farrington Highway and extends inland to the ridge of the Waiʻanae Mountains. The nearest town is Mākaha, approximately three miles south.

The installation encompasses almost 4,190 acres with annual rainfall ranging approximately 50 inches toward the head of the valley to less than 15 inches at the mouth of the valley (Giambelluca, Nullet, and Schroeder 1986). The high precipitous valley walls surrounding the installation reach heights of 2,100 to 2,900 ft (USARHAW and 25th ID (L) 2009). The broad range in rainfall and topography results in a diversity of vegetation types within the valley (Army, 2013). Figure 1 displays the location of the study area.

1.4 HISTORY OF MĀKUA MILITARY RESERVATION

Use of Mākua Valley by U.S. armed forces dates back to the 1920s when three parcels on the upper Mākua Valley floor were purchased for howitzer emplacements. After the bombing of Pearl Harbor in 1941, the Army used its' authority under martial law to take over the entire Mākua-Ka'ena Point area for security and training. In 1942, the Army issued a real estate directive for 6,600 acres of land at Mākua that were already being used.

Private parcels within the property were obtained by condemnation, whereas territorial lands were conferred by the territorial governor's consent. In 1943, the territorial government granted a revocable permit for the military to use the area "to assist in the present war effort extending for the duration of the present war and six months thereafter." The site was used extensively for bombing and infantry training, but no records of munitions expended on Mākua were kept. Mākua has remained under Army control ever since. After Hawaiʻi was granted statehood in 1959, the federal government exercised its option to set aside the land for its continued use (Army, 2013).

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2. HUMAN HEALTH RISK ASSESSMENT (HHRA)

This section presents the HHRA for the MMR. The HHRA has been performed per standard principles and approaches identified in the following guidance documents:

- United States Environmental Protection Agency's (USEPA) Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories Office of Science and Technology Office of Water November (USEPA, 2000);
- USEPA's Risk Assessment Guidance for Superfund (RAGS): Human Health Evaluation Manual, Part A (USEPA, 1989) and other USEPA guidance documents (USEPA, 1991a, 1991b, 1992, 1994b, 1997, 2001, 2002, 2004, and 2011);
- Hawai'i Department of Health (HDOH), State of Hawai'i. Evaluation of Environmental Hazards as Sites with Contaminated Soil and Groundwater (HDOH, 2011);
- USEPA's Regional Screening Level (RSL) Tables. Revised May 2014 (USEPA, 2014a);
- Risk Assessment Handbook, Volume I: Human Health Evaluation" (USACE, 1999).

The HHRA follows USEPA's approach for assessing risks to human health. The approach integrates risk assessment information into the process of evaluating and remediating sites and provides a framework for assessing sites that may vary greatly in terms of complexity, physical and chemical characteristics, and in the risk that they may pose to human health and the environment. The first step in the risk assessment process is a risk-based screening that is used to identify whether a site warrants further evaluation. If maximum concentrations of site chemicals exceed Project Screening Values, then a baseline quantitative HHRA is conducted. The quantitative analysis of the HHRA involves a detailed evaluation of risks and hazards and may evaluate current baseline risks, as well as risks associated with future land use at a site. The purpose of a HHRA is to identify whether a site poses acceptable risk based on current or future land use and current (i.e., baseline) site conditions if no remediation or institutional controls are applied at the site (USEPA, 1989). HHRAs also provide a basis for determining levels of chemicals that can remain on site and still adequately protect public health.

Elements of the HHRA

The HHRA process is iterative because many of the steps depend on other steps which, in turn, depend on information that is generated as part of the site evaluation process. For example, when additional site sampling data are gathered, new environmental contaminants (chemicals) are often added to the risk assessment that will result in changes to the toxicity assessment. In other cases, site characterization activities may indicate that additional media are contaminated and will result in modifications to both the Conceptual Site Model (CSM) and the exposure assessment. The HHRA can be divided into five steps that are organized as follows:

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(1) Selection of Chemicals of Potential Concern (COPCs)
(2) Exposure Assessment
(3) Toxicity Assessment
(4) Risk Characterization
(5) Uncertainty Analysis

The Selection of COPCs step, sometimes known as the Hazard Identification step or Data Evaluation and Reduction step, is the process of identifying chemicals for evaluation in the HHRA. The Exposure Assessment step identifies the CSM for a site and includes an evaluation of all plausible exposure pathways. The Toxicity Assessment step identifies toxicity values and effects to evaluate carcinogenic risks and non-carcinogenic hazards. The Risk Characterization step integrates the information from previous steps to produce numerical estimates of carcinogenic risks and non-carcinogenic hazards. The final step, the Uncertainty Analysis, identifies key uncertainties and evaluates their potential impacts on the risks. Each of these steps is discussed in detail in the following sections.

2.1 SELECTION OF CHEMICALS OF POTENTIAL CONCERN

The purpose of the hazard identification (data evaluation and reduction) process is to ensure the data collected is appropriate for use in a HHRA and to identify COPCs. A list of COPCs is determined once the following are thoroughly evaluated:

(1) Relevant Datasets
(2) Data Quality
(3) Comparison of Concentrations at MMR to Background Concentration
(4) Risk Based Screening

Eliminating certain environmental contaminants (chemical) from further consideration, prior to calculation of the risk estimate, reduces the level of effort and focuses the HHRA on those contaminants that are associated with the site-specific release. The steps required in the data reduction process are further described below.

2.1.1 Relevant Datasets

The following sections outline the investigations conducted at MMR. Only analytical data collected following the approved sampling and analysis plan (Army, 2013) was considered representative of current site conditions and was included in this supplemental HHRA.

2.1.1.1 Previous Investigations

On October 4, 2001, Mālama Mākua and the Department of Defense (DoD) entered into a Settlement Agreement and Stipulated Order (referred to herein as the Settlement Agreement [U.S. District Court, 2001]). The 25th Infantry Division (ID) agreed to complete an Environmental Impact Statement (EIS) regarding the proposal to resume live-fire training at MMR. Under the terms of the Settlement Agreement, the Army could conduct a limited number of Combined Arms Live-Fire Exercises (CALFEXs) for up to three years (through October

2004). In October 2004, the Army started preparing the EIS required under the Settlement Agreement and has since only conducted limited, nonlive-fire training at MMR. On January 8, 2007, Mālama Mākua and the DoD entered into a partial Settlement Agreement (referred to herein as the 2007 Settlement Agreement (U.S. District Court 2007)), in which the 25th ID agreed to undertake a marine resources study to determine if the marine resources near MMR were impacted by military training.

The Army conducted a marine resources study to determine whether marine resources (i.e., fish, shellfish and other invertebrates, and limu) near Mākua Beach and in Mākua muliwai (temporary brackish water pond) had constituents (e.g., explosives and some metals) primarily associated with training activities at MMR. In addition to evaluating chemicals associated with military training, the study also included the analysis of a wide variety of constituents, including explosives, dioxins/furans, metals, organochlorine pesticides, volatile organic compounds (VOCs), and semivolatile organic compounds (SVOCs). The study evaluated whether the proposed training activities at MMR pose a human health risk to area residents from the consumption of marine resources for subsistence. The results of the marine resources study were published by the Army as the "Marine Resources Study, Field Sampling Results and Risk Assessment, Mākua Military Reservation, Oʻahu, Hawaiʻi" (USARHAW and 25th ID (L) 2009). The 2009 Marine Resources Study identified a number of constituents in fish, shellfish and other invertebrates, and limu that were detected during analysis and are also known to be associated with the type of military training being proposed at MMR. These constituents were RDX (cyclotrimethylenetrinitramine), perchlorate, arsenic, chromium, cobalt, nitroglycerin, and manganese. The 2009 Marine Resources Study concluded that although these and other constituents may have been associated with military training at MMR; all except RDX were linked to geologic (e.g., volcanic rock) and anthropogenic (human) sources (e.g., fireworks, rodenticides, medication, and gasoline).

A comparison of the site data with the available background data showed little if any difference between constituents found in the Mākua area and the background locations. It was concluded that substances identified for analysis by the Settlement Agreement are not unique to military training and are found at both Mākua and background locations; therefore, it was submitted that proposed military activities were anticipated to have little influence on contaminant levels within marine resources in the Mākua nearshore or muliwai areas. The 2009 Marine Resources Report concluded that the target species of fish, shellfish and other invertebrates, and limu investigated were representative of other marine resources within the Mākua area. It was suggested that other marine resources occupying similar trophic levels and ecological niches would contain similar constituents and concentrations as those detected in the species investigated.

Based on the general similarity of carcinogenic and noncarcinogenic health risks between the Mākua area and the background locations, it was concluded that the Army's past activities at MMR were not independently responsible for any human health risks from the constituents detected in marine resources. Considering the concentrations of constituents found in the Mākua area, the numerous possible sources of these constituents, the mobility of these constituents and the fact that they can originate from multiple sources, the report concluded that it was unlikely that future military activities at MMR alone would cause unacceptable risk to human health. As

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this HHRA was intended to evaluate data gaps identified in the 2009 assessment, this data was not included for evaluation.

Court order regarding remedies for defendants' settlement violations

The June 20, 2012, ruling stated that the Defendants (the U.S. Army) shall: (1) Complete one or more studies of limu kohu and other marine resources (e.g., octopus and sea cucumber) near Mākua Beach on the Waiʻanae coast where residents rely on these resources for subsistence, (2) Specify whether arsenic in the limu kohu or other marine resources is organic or inorganic, and (3) Determine background contamination by testing limu kohu and other marine resources (US District Court 2012). These marine resources will be sampled in the nearshore waters of the Pacific Ocean just west of the MMR (Figures 1). They represent an additional effort to sample other marine resources over and above those that were sampled in the 2009 Marine Resources Study and were determined via public input to be significant to the local community. These other additional marine resources will also be sampled from nearby background locations on Oʻahu that are not expected to have been impacted by activities at MMR.

2.1.1.2 Supplemental Marine Resources Study (2013-2014)

The current Supplemental Marine Resources Study was designed to address the objectives presented in the June 20, 2012 court order. The Supplemental Marine Resources Study collected samples from two seasons, wet and dry season (September and October 2013 and January through March 2014). Samples were collected from two seasons in an effort to distinguish potential seasonal differences in environmental contaminant concentrations in sampled media due to factors such as the higher wave action, which may occur during winter months, and higher rainfall which may carry additional land-based environmental contaminants to the assessed area. All data collected in the Supplemental Marine Resources Study was considered for inclusion in the quantitative risk assessment. The data collected included biota samples that were collected from two (2) independent marine areas.

- Mākua Beach Study Area; and
- Background locations assumed unimpacted by MMR (e.g., Kaʻena Point and Mokulēʻia Beach)

The study areas were chosen to allow areas having potential non-munitions anthropogenic sources of contamination (e.g., Kaʻena Point and Mokulēʻia Beach) to be differentiated from areas with contamination attributable to training activities at Mākua.

Environmental Constituents Evaluated in the Supplemental Marine Resources Study

The selection of analytes included in the current investigation was based on the 2009 Marine Resources Study and the 2007 settlement agreement (i.e., the 'Foran List'). A summary of the analytical groups tested includes: organochlorine pesticides, purgeable organics (gasoline), VOCs, SVOCs, dioxins/furans (17 congeners of concern), explosives (nitroaromatics/nitramines), and metals. Specific to this assessment was an evaluation of both inorganic and organic forms of arsenic. The munitions constituents (MC) selected for evaluation

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in the HHRA are provided in Table 1. Several of these constituents have been show to not significantly bioaccumlate in biota (USEPA, 2014b), however were included in this HHRA. Analytical Results are presented in Appendix A.

Biota Media Evaluated in the Supplemental Marine Resources Study

Samples of biota from the assessment area targeted human food items that the community identified as resources for subsistence. A list of species of interest was created based on surveys and discussions with local residents from the Waiʻanae coast, regional commercial fishermen, local recreational fishermen, area divers, and spear fishermen. The species of interest included edible seaweed (limu kohu), octopus (heʻe), and sea cucumber (loli). All biological resources were sampled from nearshore shallow waters. The sampling goal was to collect eight samples of each of the target species (limu kohu, octopus, and sea cucumber) from the nearshore waters of Mākua and at the two background locations (Kaʻena Point and Mokulēʻia Beach) during both the dry season and wet season, resulting in a total of 144 tissue samples. Location of the samples collected in the Supplemental Marine Resources Study are presented in Figures 2 through Figure 7.

Per the 2007 settlement agreement, samples were analyzed for an agreed upon suite of constituents (Table 1). The comprehensive analytical program required collection of approximately 200 grams or 7 ounces (wet weight) for each sample. Single specimens of octopus were used for analysis. For limu kohu and sea cucumber, compositing of the consumable portions of same species from the same sampling area was done to create a sample of sufficient mass for the chemical analyses. Details of the biota samples collected in the Supplemental Marine Resources Study and the details of the analysis of environmental contaminants for each biota are presented in the main body of the Supplemental Marine Resources Study.

2.1.2 Evaluation of Data Quality

The analytical data for a site are evaluated prior to risk evaluation, to ensure that the data are of suitable quality to support risk assessment and subsequent risk management decisions. Data Quality Objectives (DQOs) detailed in the site-specific Sampling and Analysis Plan ensure that the information needed to perform a credible risk evaluation is collected. The remainder of this section details the approaches and methods used to ensure the adequacy of the data.

Data used in this HHRA was collected during the 2013 field investigation. Data from 2009 Marine Resources Report was determined not useful for this supplemental HHRA. Data from the 2009 Marine Resources Report was not included in this supplemental HHRA as it analyzed several biota species not included in this investigation. The HHRA conducted in 2009 was determined to have been performed in an acceptable manner; therefore, the data collected from the 2009 HHRA was not reassessed in this supplemental HHRA. It was determined that only data from the 2013 and 2014 sampling events would be applicable for comparison to background samples collected during the same timeframe.

The data collected during the 2013 and 2014 sampling events were considered representative of current site conditions. In total, 144 biota samples were collected and analyzed during the

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Supplemental Marine Resources Study. The below describes both the approach for documenting field activities and the data validation procedures used throughout the Supplemental Marine Resources Study.

Documentation and Records

Field personnel assigned all sample specimens a sampling media identification number, using a multi-digit alphanumeric code on a label or tag affixed to the container or to the individual specimens. This code was assigned to each sample as a unique identification number to track target species samples collected during the study. The sample label was printed on waterproof paper and included,

- job and site identifier
- date and time of collection
- sample identification number (including sampling location and target species identification information).

Samples were shipped frozen with synthetic ice. Samples were shipped by overnight express in a sealed cooler and under chain-of-custody (COC) to the analytical laboratories. Sample identification documents included field notebooks, sample labels, custody seals, and COC records.

Data Validation

All contract laboratories reviewed data for accuracy, consistency, and QA/QC nonconformances and submitted appropriate documentation in project deliverables supporting these verification activities. The laboratories identified any outliers or errors before reporting data for third party data validation. The third party data validation was performed to verify and ascertain the reliability of the analytical data for use in the risk assessment calculations. The third party validator was a separate contractor from the laboratory or the field sampling contractor to provide an independent review of the data.

The laboratory recorded general QC documentation, such as instrument calibration, routine monitoring of analytical performance, and calibration verification are maintained. Project-specific information from the QA/QC checks such as laboratory blanks (reagent, rinsate, and method), spikes (matrix spike [MS], matrix spike duplicate, analysis MS, and surrogate spike), calibration check samples (zero check, span check, and mid-range check), replicates, splits, and so on are included in lab QA/QC reports to facilitate data quality analysis. The analytical data was provided in USEPA Level III reports with laboratory QC data. Definitive level data reports include sample identification information, analytical results, and a summary of the QC data. The QC data includes calibrations and verifications of precision, accuracy, and representativeness where appropriate; hard copies of all supporting information, including copies of instrument printouts, and all log pages pertaining to the work

The third party data validation contractor prepared Data Usability Summary reports that assess the “usability” of the data. Data validation procedures were conducted in accordance with the requirements of:

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- *Intergovernmental Data Quality Task Force, Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP), USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, USEPA, June 2008, and USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review, (USEPA, 2010b).*

Data deliverables included validated data and validation reports. These data validation procedures assign qualifiers to the data that give the end users a qualitative measure of data usability. In general, data were assigned qualifiers by the laboratory and data validation procedures which are footnoted on the tables and provided in more detail in the laboratory and validation reports.

Analytical Detection Limits

It is important that the analytical methods selected for a site are sensitive enough to support the needs of the risk assessment (i.e., the detection limits for COPCs should be less than the screening levels to which they are being compared). The value of the HHRA is diminished if the detection limits are greater than applicable screening levels or if a non-detected value results in an unacceptable risk in a HHRA. To provide some information regarding the adequacy of the project reporting limits, Project Screening Values were calculated according to methods described in USEPA's Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories (USEPA, 2000). Note that screening values were calculated based on a generic fish consumption rate of 17.5 g/day. This value is less than the site-specific consumption rates for octopus, sea cucumber, and limu kohu consumption evaluated in this assessment. The laboratory method reporting limits selected for analysis were compared to the calculated screening values to ensure that the laboratory methods selected were sensitive enough to support the HHRA. A few select analytes had elevated detection limits exceeding the calculated screening criteria. Further discussion of the analytical detection limits is presented in the Uncertainty Assessment in Section 2.5.

2.1.3 Compare Site Concentrations to Background

The purpose of comparing site concentrations to background concentrations is to focus the risk assessment on chemicals that are related to site activities and to eliminate potential contaminants that are present at background concentrations. A comparison to background concentrations may identify chemicals that are in the environment specifically due to releases from the site, eliminate naturally occurring and anthropogenic chemicals from consideration, and ensure documentation of potential risks that have been eliminated during the background evaluation process.

Samples were collected from Kaʻena Point and Mokulēʻia Beach because these areas are assumed unimpacted by military activities at MMR for the purposes of establishing chemicals present due to natural background or bioaccumulation from anthropogenic sources. These two (2) locations were chosen as representative background locations because they are relatively close to Mākua Beach geographically and are in areas that have a greatly reduced potential for the presence of constituents commonly associated with military training. These areas have comparable ocean currents (although currents may vary in strength between the locations) and

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wave actions similar to those found at Mākua Beach. The background locations were selected in accordance with USEPA background site selection criteria (USEPA, 2002a). The USEPA defines a background sourced as "A background reference area, or control site, is the area where background samples will be collected for comparison with the samples collected on the site. A background reference area should have the same physical, chemical, geological, and biological characteristics as the site being investigated, but has not been affected by activities on the site" (USEPA, 1989). USEPA (1989) further states that "the locations of the background samples must be areas that could not have received contamination from the site, but that do have the same basic characteristics as the medium of concern at the site." USEPA (2002a) states that "The ideal background reference area would have the same distribution of concentrations of the chemicals of concern as those which would be expected on the site if the site had never been impacted. In most situations, this ideal reference area does not exist. If necessary, more than one reference area may be selected if the site exhibits a range of physical, chemical, geological, or biological variability. Background reference areas are normally selected from off-site areas, but are not limited to natural areas undisturbed by human activities."

For this assessment, biota from the background locations were assumed to have contaminant concentrations that would be equivalent to natural background or bioaccumulation from anthropogenic sources. The data collected from the two (2) background locations was combined into a background dataset to calculate background concentration. Anthropogenic background concentrations were calculated in accordance with the following guidance:

- "Use of Statistics for Determining Soil/Groundwater Cleanup Levels under the Risk Reduction Rules" (USEPA, 1998a)
- Memorandum Regarding "Role of Background in the CERCLA Cleanup Program, OSWER 9285.6-07P" (USEPA, 2002b)
- USEPA Region 10 Superfund Regional, Sediment Evaluation Team, Dredged Material Management Program (DMMP) Dioxin Workgroup. "Statistical Experts' Workshop, Workshop Report" (USEPA, 2008)

The 95% upper tolerance limits (UTLs) for the background dataset was determined to be the site-specific background threshold value (BTV). The 95% UTLs for all metals were calculated using USEPA's Statistical Software ProUCL Version 5.0 (USEPA, 2013a). ProUCL 5.0 computes UTLs which adjust for data skewness. ProUCL 5.0 computes upper limits using estimates based on normal, lognormal, gamma or nonparametric distributions. The BTV selected was based on the ProUCL recommended distribution. When data appeared to follow more than one distribution, the BTV based on an assumed normal distribution was selected. The BTVs were calculated separately for each round of sampling (September and October 2013 and January through March 2014). The background values calculated in this assessment are presented in Tables 2, 3, and Appendix B.

The background values calculated (i.e., BTVs) were included as a screening value in the risk-based screening as described in Section 2.1.5. Chemicals present in biota at MMR which

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exceeded both the calculated background value and risk-based screening levels were carried forward for quantitative analysis in the HHRA.

2.1.4 Risk-Based Screening

Generally, a risk-based screening assessment is performed to focus the assessment on chemicals that may be present at concentrations posing a threat to human health. The screening assessment is conducted by comparing maximum site contaminant concentrations to the conservative screening values (Project Screening Values). For biota samples, multiple screening criteria were considered including the Food and Drug Administration (FDA) Seafood Action Levels (FDA, 2011) and USEPA Fish Advisories (USEPA, 2000).

FDA's jurisdiction in setting screening criteria or action levels is limited to contaminants in food shipped and marketed in interstate commerce. Thus, the methodology the FDA used in establishing screening criteria or action levels is to determine the health risks of environmental contaminants in fish and shellfish that are bought and sold in interstate commerce rather than in locally harvested fish and shellfish (Bolger et al., 1990). FDA screening criteria are indicators of the levels of environmental contamination (chemical residue) in fish and shellfish that should not be exceeded. These criteria are intended for the general population who consume fish and shellfish typically purchased in supermarkets or fish markets that sell products harvested from a wide geographic area, including imported fish and shellfish products. The underlying assumptions the FDA used in its methodology were never intended to be protective of recreational, tribal, ethnic, or subsistence fishers. These groups typically consume larger quantities of fish than the general population and often harvest the fish and shellfish they consume from the same local water bodies repeatedly over many years. If these water bodies contain fish and shellfish with elevated tissue levels of environmental contaminants (chemical residues), these individuals potentially could have increased health risks associated with the consumption of fish and shellfish.

As this assessment is focused on MMR and consumers in this assessment are assumed to harvest fish and seafood specifically from this area, it was determined that the FDA action levels are inappropriate for use in this assessment for the reason indicated. Additionally, the FDA screening criteria do not define action levels for many of the chemicals (i.e., explosive or energetic residue) included in this HHRA.

The USEPA Fish Advisories Screening Values for each environmental contaminant (chemical residues) are defined as the concentration of an environmental contaminant in fish tissue that is of a potential public health concern. These are used as a threshold value against which tissue residue levels of the contaminant in fish and shellfish can be compared. The screening value is calculated based on both the non-carcinogenic and carcinogenic effects of the environmental (chemical) contaminant (USEPA, 2000). USEPA recommends the use of conservative calculated values derived from the non-carcinogenic rather than the carcinogenic effects because it is more protective of the consumer population. For recreational fishermen, the USEPA-recommended values typically range from 2 to 120 times lower than their corresponding FDA action or tolerance level. This difference is even more striking for subsistence fishermen for whom the screening values are 20 to 977 times lower than the FDA values. USEPA and FDA have agreed

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that the use of FDA action levels for the purposes of making local advisory determinations is inappropriate. In letters to all states, guidance documents, and annual conferences, the USEPA and FDA have discouraged the use of FDA action levels in favor of USEPA's risk-based approach to derive local fish consumption advisories. This HHRA, therefore, generally follows the USEPA approach to address potential human health risk concerns.

While this assessment generally follows the USEPA approach, the USEPA default ingestion rate was not used because it does not account for the elevated consumption habits of the local community. Project Screening Values were calculated using as ingestion rate modified to represent a "high-end" fish consumer. The value was specifically adopted from the 2009 Ordnance Reef (HI-06) Human Health Risk Assessment (160.57 grams per day; USACE, 2014). The use of "high-end" fish consumption rates was determined to be conservative for screening consumption of the media of concern (octopus, sea cucumber, and seaweed). The risk-based screening criteria calculated for comparison to maximum detected site concentrations are presented in Table 4. Also included in the risk-based screening were the background concentrations calculated from biota samples that were collected from Kaʻena Point and Mokulēʻia Beach, the background locations that were assumed unimpacted by military activities at MMR. Background concentrations were calculated for each round of sampling (September and October 2013 and January-March 2014) individually. Background concentrations were compared to their corresponding dataset from samples collected at MMR during the same season. Chemicals present in biota at MMR that exceeded both the calculated background value and risk-based screening levels were carried forward for quantitative analysis in the HHRA. Chemicals exceeding the background value and risk-based screening level in either round of sampling were carried forward for analysis in both rounds of sampling. The results of the risk-based screening are presented in Tables 5 and 6. The following chemicals were carried forward for quantitative analysis in the HHRA:

- Octopus (heʻe): Dioxins (17 congeners), Lead
- Sea Cucumber (loli): Inorganic Arsenic, Chromium
- Seaweed (limu kohu): Heptachlor, Heptachlor Epoxide, Dioxins (17 congeners), Cobalt, Lead, Thallium.

2.2 EXPOSURE ASSESSMENT

The purpose of the exposure assessment is to quantify human exposure to COPCs for complete exposure pathways. The results of the exposure assessment are combined with the toxicity assessment to characterize potential risks. In this HHRA, past, current and future uses of MMR were evaluated to determine potential relevant exposure scenarios. While these exposure scenarios represent hypothetical people and activities, they reflect the physical description of MMR and the surrounding residential, industrial, and commercial areas. The exposure assessment is divided into the following five subsections:

(1) Development of the CSM,

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(2) Methods Used to Estimate Exposure Point Concentrations (EPCs),

(3) Exposure Factors and Algorithms,

(4) Absorption Factors and Permeability Constants, and

(5) Method Used to Estimate Average Daily Dose.

2.2.1 Development of the Conceptual Site Model (CSM)

A key step in the risk assessment process is the development of a CSM that identifies the likely contaminant source areas, exposure pathways, and potential receptors. For any contaminant to pose a risk to human health, a complete exposure pathway must exist between the source and receptor. If a complete exposure pathway does not exist, a receptor has an acceptable (i.e., low) risk because it will not be directly exposed to the contaminant. The primary purpose of the CSM is to identify the potential pathways for exposure to contaminants which may be present at MMR due to military activities. The CSM defines the source area, presents potential routes of transport and fate, identifies media and routes of exposure, and the endpoint receptors. The CSM is a dynamic model that is used to include or exclude sources of chemical constituents, receptors, or exposure pathways based on site history and current information. The CSM used in this HHRA followed the CSM from the HHRA performed in the 2009 marine resources study. The identified potential exposure routes for this assessment are ingestion of contaminated media (biota). The human health CSM for MMR is summarized in Figure 8. The following subsections details the sources and mechanisms of chemical release, potential receptors and exposure pathways relevant to MMR.

2.2.1.1 Sources and Release Mechanisms

Sources and release mechanisms are essential elements to a complete exposure pathway. Sources are the origin of a contaminants or a medium contaminated as a result of a past release that can be a contaminant source for other media. Release mechanisms are the event or processes which causes the contaminants to be released or accumulate in the environment.

Source

The primary source of contaminants at MMR is historic military use. The site was used extensively for bombing and infantry training in the 1940s, but no records of munitions expended on Mākua were kept. In 2001, Mālama Mākua and the DoD entered into a Settlement Agreement and Stipulated Order to resume live-fire training at MMR. Under the terms of the Settlement Agreement, the Army could conduct a limited number of Combined Arms Live-Fire Exercises (CALFEXs) for up to three years (through October 2004). Additional munitions constituents may be present due to live-fire training activities at MMR.

Primary Release Mechanism

The primary release mechanisms for chemicals to the environment are releases from the military munitions and other military training activities at MMR. Munitions present at MMR could result

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in releases that occur over time due to corrosion and failure of the integrity of the munitions casings, and direct contact with the munitions. Releases and corrosion could introduce munitions constituents and other chemicals of concern to soil, water runoff, surface water and marine sediments.

Secondary Release Mechanisms

Secondary release mechanisms include the accumulation of chemicals into various media. Secondary release mechanisms also include uptake of the constituents by biota, accumulation of chemicals in sediment, and dissolution into the water column.

2.2.1.2 Potential Human Receptors

The site-specific receptors evaluated in the HHRA include current and future seafood consumers (residents, recreational and subsistence fishermen) in the area. To be health protective and provide a range of risk estimates for the current and future seafood consumers, both "high-end" seafood consumer and "average" seafood consumer scenarios were evaluated.

Potential Pathways and Exposure Routes

The following sections provide discussion of site media that receptors may contact, as well as the potential pathways and routes for exposure.

***2.2.1.3* Ingestion of Contaminated Biota**

Human exposure to the COPCs by ingestion could occur if contaminated invertebrates (octopus and sea cucumber) or seaweed (limu kohu), are consumed by human receptors. This pathway is considered complete because of the frequent use of the area by recreational and commercial fishermen. Chemicals evaluated in this assessment have the potential to be present in the human food chain at several trophic levels, including limu kohu, octopus, and sea cucumber. For ingestion pathways through the food chain, bioaccumulation of chemicals by lower trophic level species followed by ingestion of those animals by upper trophic level species could possibly result in the biomagnification of chemicals of concern.

Based on the 2012 Court Order and discussions with members of the Wai‘anae community, several human food-item biota that are regularly harvested and consumed by people in the community were identified. The subject biota are presented below and were the focus of the HHRA.

Biota Considered for Exposure

Common Name	Biota Type
Octopus	Invertebrate
Sea Cucumber	Invertebrate
Limu Kohu	Seaweed

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Fish and shellfish were not targeted for sampling in the supplemental marine resources study because fish and shellfish from the nearshore Mākua area were analyzed and evaluated in the 2009 Marine Resources Study. As such, fish and shellfish were not further evaluated in this supplemental HHRA.

2.2.1.4 Constraints and Boundaries of the CSM

The CSM for the HHRA is limited by the constraints and boundaries provided below:

- Lateral boundaries for the investigation area are illustrated in Figure 1. MMR is bordered on the west by the Farrington Highway and extends inland to the ridge of the Waiʻanae Mountains.

- Human receptors evaluated include current and future seafood consumers who may consume biota from the area. Media collected and evaluated in this assessment included biota (octopus, sea cucumber, and limu kohu).

- The environmental contaminant boundaries for this assessment included: organochlorine pesticides, purgeable organics (gasoline), volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), dioxins/furans (17 congeners of concern), explosives (nitroaromatics/nitramines), and metals.

- The temporal boundary of the HHRA was limited to data collected in the Supplemental Marine Resources Study conducted in 2013-2014. All attempts were made to collect data that could be considered "representative" of site conditions throughout the year.

2.2.2 Derivation of EPCs

EPCs for chemicals detected above background and risk-based screening criteria in media at MMR were estimated using all relevant analytical data collected from the 2013-2014 Supplemental Marine Resources Study described previously in Section 2.1.1.2. The data evaluated in the HHRA for biota is provided in Appendix A and summarized in Tables 5 and 6. The methodology and issues associated with developing representative EPCs are presented below.

2.2.2.1 Incorporation of Non-Detected Data into the Calculation of EPCs

Most chemicals at a site are not detected in every sample, thus detection (or reporting) limits that account for sample characteristics, sample preparation, and analytical adjustments are usually reported. Detection limits are the most relevant quantitation limits for evaluating nondetected chemicals. From a risk assessment perspective, detection limits provide valuable information that should be incorporated into the evaluation. A chemical that was not detected at a concentration exceeding its detection limit in a sample could actually be present in the sample at a concentration that is less than the detection limit. Incorporating nondetected results into the HHRA requires the use of professional judgment and site-specific information. The guiding principle when evaluating nondetected data is that the EPCs should be representative of site

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conditions. This HHRA assessment uses USEPA's ProUCL Version 5.0 software (USEPA, 2013a) to calculate 95% UCLs. ProUCL estimates nondetected sample concentrations based on the distribution of the data set and detection limits. ProUCL uses the Kaplan-Meier Method, which is assumed to yield a statistically precise and accurate estimate of nondetect sample concentrations. Appendix C provides the calculations of the 95% UCLs from ProUCL.

EPCs for Reasonable Maximum Exposure and Central Tendency Exposure

USEPA recommends that both reasonable maximum exposure (RME) (i.e., a high-end descriptor of risk) and central tendency exposure (CTE) (i.e., average or median descriptor of risk) scenarios should be included in the HHRA (USEPA, 1995). Evaluating RME and CTE scenarios provides risk managers with a range of risks, which is useful in the decision-making process. Tables 7 and 8 presents the EPCs calculated for the RME and CTE scenarios for each round of sampling respectively.

USEPA recommends that the RME be based on a plausible upper-bound estimate of exposure rather than the worst-case exposure scenario. For the RME scenario, the EPC should be based on the 95% UCL on the arithmetic mean (USEPA, 2002c). EPCs for the RME scenario were the 95% UCL of discrete samples calculated using USEPA's ProUCL software. For the datasets with insufficient data to calculate a statistically reliable 95% UCL, the maximum detected value was used. The RME EPC was used to estimate risk to the current and future "high-end" seafood consumer as a plausible upper-bound estimate of risk.

In general, CTE estimates are created by replacing the exposure factors and, in some cases, the EPCs, used in the RME scenario, with average or median values. The CTE estimate should be either the arithmetic mean exposure (average estimate) or the median exposure (median estimate) (USEPA, 1995). For the CTE scenario, the EPC may be based on the average, logarithmic average, median concentration, or the 95% UCL. For this assessment, EPCs for the CTE scenario were the arithmetic average of samples collected using the full detection limit for nondetect samples. The CTE EPC was used to estimate risk to the current and future "average" seafood consumer as a reasonable average exposure scenario.

2.2.2.2 Arsenic Speciation

Arsenic was speciated into organic and inorganic fractions. In octopus and limu kohu, concentrations of total and inorganic arsenic were not elevated in relation to the two background locations and therefore not carried forward into the baseline HHRA. In sea cucumber, inorganic arsenic was found at concentrations exceeding that of the background locations. Inorganic arsenic in sea cucumber was carried forward for quantitative analysis.

2.2.2.3 Chromium Evaluation

Studies indicate that chromium present in biological species generally exists in the nontoxic trivalent (Chromium III) state (DeCarlo 2004, 2005 and Frey 1994). Chromium III is considered a micronutrient and generally regarded as nontoxic due to poor absorption. This assessment therefore assumes that the chromium detected in site biota is in the trivalent state and would not

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contribute to health risks. As such, it was determined that chromium could be eliminated from further consideration in the risk assessment process.

2.2.3 Exposure Factors and Algorithms

The USEPA has identified standard default exposure factors that are appropriate to use when evaluating exposures at sites (USEPA, 1991c). Table 9 summarizes the algorithms and exposure parameters used in this assessment for seafood ingestion. Individual exposure parameters are discussed in the following sections.

2.2.3.1 Absorption Factors

To estimate the potential risk to human health posed by the presence of contaminants in seafood species at MMR, it is first necessary to estimate the potential exposure dose of each COPC. The potential exposure dose is similar to the administered dose or applied dose in a laboratory experiment. The animal-derived cancer slope factors (CSFs) and reference doses (RfDs) used in quantitative risk assessments are based on applied doses in most cases. However, the efficiency of COPC absorption via a particular route and from a particular matrix at MMR may differ from the absorption efficiency for the exposure route and matrix used in the experimental study that serves as the basis for the CSF or RfD. In this assessment, oral absorption from the site-specific exposure was assumed to be the same as absorption in the laboratory study. The oral RAFs were therefore assigned a value of 1 and the potential exposure dose via the oral route was not modified.

2.2.3.2 Seafood Consumption Rates

To determine a representative estimate of seafood consumption, this assessment based seafood consumption rates on a study performed on consumption of seafood consumption on the Wai‘anae coastline. In 2010, a seafood consumption survey was conducted of the local population living near a discarded military munitions site, Ordnance Reef (HI-06). Through discussion with the regulatory community and members of the Wai‘anae community, it was determined that exposure parameters obtained via survey of the population specific to Ordnance Reef (HI-06) would be more accurate than if obtained from other studies performed for different purposes, or for different populations. The objectives of the survey were to determine the average amount of seafood consumed in the local community and general fishing habits of the community and specific use of Ordnance Reef (HI-06) for recreational fishing. Surveys were conducted at a neighborhood board meeting, at a local supermarket with residents of the community, and with residents of the community who reside on the beach whose consumption habits and traditions may differ from those of other community members.

The seafood consumption survey conducted for Ordnance Reef (HI-06) was also intentionally performed to be health protective and may not realistically represent the proportion of individuals in the population that are “high end” consumers. Interviews for the Ordnance Reef (HI-06) survey were in large part directed by local fishermen and included other fishermen. As such, these individuals made up a large proportion of people partaking in the survey. Risks and

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hazards for the "high end" consumer should be considered conservative and not representative of risks and hazards for the general population.

Seafood Consumption Results

Table 10 and the table below present the results of the 2009 Ordnance Reef (HI-06) study's 2010 seafood consumption survey (USACE, 2014).

			Fish	Octopus	Crab	Limu
Seafood Consumption (g/day):	**"Average" Consumer Arithmetic Average**	Adult	84.00	23.00	12.32	11.29
		Child	35.64	9.76	5.23	4.79
	"High-End" Consumer 95% UCL	Adult	160.57	43.96	23.56	21.59
		Child	73.43	20.10	10.77	9.87

For this risk assessment, the octopus and limu kohu ingestion rates from the 2009 Ordnance Reef (HI-06) study were used unchanged to estimate octopus and limu kohu consumption rates in the MMR site area. As sea cumber ingestion was not evaluated by the survey, this risk assessment conservatively assumed sea cucumber ingestion was equivalent to the crab ingestion rate from the 2009 Ordnance Reef (HI-06) study's 2010 seafood consumption survey. This was a conservative assumption as crab ingestion would likely exceed consumption of sea cucumber.

2.2.3.3 Fraction Ingested from MMR

The current and future seafood consumers evaluated in this assessment were evaluated and conservatively assumed to obtain and consume 100% of their seafood from the MMR study area. In reality, it is highly unlikely that the MMR study area could support the ingestion rate used in the HHRA. Mākua Beach is a limited area with shoreline extending approximately 4,000 meters. The area of concern extended to a maximum depth of no more than 125 feet. The amount of seafood biota in the Mākua area cannot support this assumption.

2.2.3.4 Body Weight

Body weights were derived from Human Health Evaluation Manual: Supplemental Guidance: Standard Default Exposure Factors (USEPA, 1991a) by averaging the male and female data for mean body weight. These values are also used in USEPA's RSL table (USEPA, 2014a). The RME and CTE adult body weight used in this risk assessment was 70 kg. The RME and CTE child body weight used in the risk assessment was 15 kg.

2.2.3.5 Lifetime

For carcinogenic risk assessment, the lifetime average daily dose must be calculated. USEPA currently recommends a lifetime of 70 years (USEPA, 2014a) and this value is used in this risk assessment

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2.2.3.6 Exposure Duration

Exposure durations were taken from Human Health Evaluation Manual: Supplemental Guidance: Standard Default Exposure Factors (USEPA, 1991) and Exposure Factors Handbook (USEPA, 2011b). For current and future seafood consumers, a standard 30-year exposure duration tenure is assumed (USEPA, 2014a), with 6 years as a child and 24 years as an adult.

2.2.3.7 Exposure Frequency

Exposure frequency for the current and future seafood consumers (child and adult) was a total of 350 days/year. This total exposure frequency used each of the EPCs, for the wet and dry seasons respectively, for 175 days/year summed together to reach the total of 350 days/year.

2.2.4 Method to Estimate Average Daily Dose

Conservative exposure assumptions were used to construct the exposure scenarios evaluated in the HHRA. Most individuals will not be subject to all of the conditions that comprise the scenarios evaluated in this assessment. Individuals who do not meet all conditions of the scenarios evaluated have lower potential exposures and therefore, lower potential risks associated with those exposures.

The Chronic Average Daily Dose (CADD) is an estimate of a receptor's potential daily intake from exposure to contaminants with potential non-carcinogenic effects. Note that Average Daily Dose (ADD) is a term used in risk assessment and does not represent a true average because the assumptions used to derive it do not represent “averages”. According to USEPA (1989), the exposure dose should be calculated by averaging over the period of time for which the receptor is assumed to be exposed. The CADD for each contaminants via each route of exposure is compared to the RfD for that contaminants to estimate the potential hazard index due to exposure to that constituent via that route of exposure. Hazard indices are discussed in Section 2.4.3.

For constituents with potential carcinogenic effects, the Lifetime Average Daily Dose (LADD) is an estimate of potential daily intake over the course of a lifetime. Per USEPA (1989), the LADD is calculated by averaging the assumed exposure over the receptor's entire lifetime (assumed to be 70 years). The LADD for each constituent via each route of exposure is combined with the CSF for that constituent to estimate the Potential Excess Lifetime Cancer Risk (PELCR) due to exposure to that constituent via that route of exposure. PELCRs are discussed in Section 2.4.2.

The equation for estimating a receptor's potential average daily dose (both lifetime and chronic) and the exposure parameters used are presented in Table 9 and discussed in the following paragraphs.

2.3 TOXICITY ASSESSMENT

The toxicity assessment identifies toxicity values and effects to evaluate cancer risks and noncancer hazards. USEPA states that the purpose of the toxicity assessment is to “weigh available evidence regarding the potential for particular contaminants to cause adverse effects in

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exposed individuals and to provide, where possible, an estimate of the relationship between the extent of exposure to a contaminant and the increased likelihood and/or severity of adverse effects" (USEPA, 1989). In essence, the toxicity assessment can also be described as a dose-response assessment. A dose-response assessment is used to identify the types of adverse health effects a COPC may potentially cause, as well as the relationship between the amount of COPCs to which receptors may be exposed (i.e., dose) and the likelihood of an adverse health effect (i.e., response). USEPA characterizes adverse health effects as either cancer or noncancer and defines dose-response relationships for oral and inhalation routes of exposure. Dermal exposure toxicity criteria are estimated based on oral criteria. The results of the toxicity assessment, when combined with the results of the exposure assessment, provide an estimate of potential risk. For this assessment, only oral toxicity values are presented. Dermal and inhalation routes were considered insignificant.

This section provides dose-response information for COPCs evaluated in the HHRA. Table 11 provides the dose-response information used in this risk assessment. Dose-response information used in this risk assessment was obtained from the following sources:

- USEPA's IRIS (USEPA, 2014c);
- USEPA's Regional Screening Level (RSL) Tables. Revised May 2014 (USEPA, 2014a)

Section 2.3.3 summarizes the toxicity assessment for lead.

2.3.1 Carcinogenic Toxicity Values

USEPA describes the mechanism for carcinogenesis as a "non-threshold" process, meaning any level of exposure to such a contaminant is assumed to pose a probability of generating cancer. Risk at low exposure levels cannot be measured directly either by animal experiments or by epidemiological studies; therefore, a number of mathematical models and procedures have been developed for use in extrapolating risks from high to low doses. Different extrapolation models or procedures, while they may reasonably fit the observed data, may lead to large differences in the projected risk at low doses. It is assumed by the USEPA in developing CSFs that the risk of cancer is linearly related to dose. This means that relatively high doses, which are often used in animal studies, can be extrapolated downward to extremely small doses, with some incremental risk of cancer always possible. This assumes that even a small number of molecules (possibly a single molecule) of a carcinogen may cause changes in a single cell that could result in the cell dividing in an uncontrolled manner, eventually leading to cancer.

A CSF is a numerical estimate of the potency of a contaminant, which, when multiplied by the LADD, gives the probability of an individual developing cancer over a lifetime. CSFs are usually derived by the USEPA by means of a linear, multistage model and reflect the upper-bound limit of cancer potency of any contaminant. As a result, the calculated carcinogenic risk is likely to represent a plausible upper limit to the risk. The actual risk is unknown but is likely lower than the predicted risk, and may be as low as zero (USEPA, 1989).

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The USEPA uses a weight-of-evidence approach to classify the likelihood that a contaminant is a carcinogen. This qualitative information is important to consider when using the CSFs to estimate potential risk. Each contaminant (chemical) is assigned a weight-of-evidence for carcinogenicity (USEPA, 1986, 2005). Table 11 provides the CSF for contaminants evaluated in the HHRA.

2.3.2 Non-Carcinogenic Toxicity Values

An RfD is defined as "an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious [e.g., organ damage, biochemical alterations, birth defects] effects during a lifetime" (USEPA, 2011c). RfDs have been developed by the USEPA for chronic (long-term exposures), and developmental exposures (e.g., birth defects).

Non-carcinogenic contaminants are thought to exhibit threshold characteristics. That is, exposures less than a specific threshold dose will not result in adverse health effects, whereas exposures exceeding the threshold dose may produce adverse health effects. The assumption of a threshold for toxicity is based on the concept that the body has certain protective mechanisms that must be overcome before adverse effects manifest. For example, there could be a large number of cells performing the same or similar function whose population must be significantly depleted before a toxic effect is observed.

The threshold concept is important in the regulatory context. The threshold hypothesis holds that a range of exposures from zero to some finite value can be tolerated by an individual with essentially no chance of expression of the toxic effect. It is often prudent to focus on the most sensitive members of the population. Regulatory efforts are generally made to keep intakes below the population threshold, which is defined as the lowest of the thresholds of the individuals within a population (USEPA, 2011).

In general, an RfD is derived from a no observed adverse effect level (NOAEL) or a lowest observed adverse effect level (LOAEL) obtained from animal studies, or occasionally from human studies, by the application of standard order-of-magnitude uncertainty factors. In certain cases, an additional modifying factor is employed to account for professional assessment of scientific uncertainties in the available data (USEPA, 1989).

A NOAEL is an experimentally determined dose at which there was no statistically or biologically significant indication of the toxic effect of concern. The study chosen to establish the NOAEL is based on the criterion that the measured endpoint represents the most sensitive target organ or tissue (i.e., critical organ) for that contaminant. In an experiment with several NOAELs, generally the lowest one is chosen as the critical NOAEL. Because many contaminants can produce toxic effects on several organ systems, with each toxic effect possibly having a separate threshold dose, the distinction of the critical toxic effect provides added confidence that the NOAEL is protective of human health. The USEPA's IRIS profiles identify the target organ or critical effect that was identified in the study(ies) used to derive the RfD or RfC. Once the critical NOAEL is identified, the next step is to derive the RfD by dividing the NOAEL by safety factors as follows:

$$\text{RfD}_{\text{(average daily human dose)}} = \frac{NOAEL_{\text{Experimental Dose}}}{\textit{Uncertainty Factors x Modifying Factor}}$$

Generally, each uncertainty factor represents a specific area of uncertainty inherent in the available data and accounts for uncertainties, such as:

- Differences in responsiveness between humans and animals in prolonged exposure studies (factor of 10);
- Variation in susceptibility among individuals in the human population (factor of 10); and
- Incomplete databases (factor of 3-10) (USEPA, 2011c).

In addition to the safety factors, a modifying factor is applied in some instances. Modifying factors range from 1 to 10 and are included to reflect a qualitative professional assessment of additional uncertainties in the critical study and in the entire database for the chemical not explicitly addressed by the uncertainty factors. The default value for the modifying factor is one (USEPA, 2011c). Table 11 provides the RfDs used in this assessment.

2.3.3 Toxicity Assessment for Lead

The traditional risk assessment approach for evaluating effects from exposure to chemicals involves a comparison of chemical intakes to a RfD or a CSF. This approach is inappropriate for lead because USEPA has not identified a no-observable-adverse-effects level for lead. Similarly, USEPA has not established a CSF for lead to evaluate cancer risks. Blood-lead (PbB) concentrations are accepted as the preferred measure of cumulative lead exposures. The Centers for Disease Control and Prevention (CDC) has stated that children with PbB concentrations greater than 10 micrograms per deciliter (µg/dL) may have adverse health impacts (CDC, 2005). USEPA recommends that exposure to lead should not result in a PbB concentration greater than 10 µg/dL for more than 5 percent of the population (USEPA, 1994a, 1994b, and 1998b). In other words, a typical child (or group of similarly exposed children) would have less than a 5 percent chance of exceeding the PbB concentration of 10 µg/dL based on exposure to lead in soil. Results of recent studies indicated adverse health effects to children at PbB concentrations lower than 10 µg/dL. USEPA is now targeting reductions in the number of children with PbB concentrations of 5 µg/dL or higher (USEPA, 2013b). HDOH has followed suit and also recommends an action level for direct exposure to lead in residential soil of 200 milligrams per kilogram (mg/kg) to reflect the more stringent PbB concentration of 5 µg/dL (HDOH, 2011). This HHRA compares calculated PbB concentrations to the more stringent PbB concentration goal of 5 µg/dL.

This HHRA used USEPA's Integrated Exposure Uptake Biokinetic (IEUBK) Model for Lead in Children (USEPA, 2010a) to assess residential lead hazards from lead in diet (USEPA, 2003 and 2009). Blood lead levels for adult exposures to lead in site biota were not calculated because an

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appropriate and relevant model could not be identified. Current USEPA adult lead models are specifically used for exposures to soil or dust. The USEPA recommends the use of CTE values as inputs to the IEUBK Model. This assessment evaluated a CTE scenario using average lead in biota concentrations to represent the "average" seafood consumer scenario, as well as an RME scenario using the 95% UCL of lead concentrations to represent the "high-end" seafood consumer scenario. This assessment conservatively uses default model parameters for a residential scenario with the following notations: (a) This assessment uses the 95% UCL soil background lead concentration for Wai'anae volcanic soils of 19 µg/g (USNAVY, 2006) as the default soil concentration, (b) percentage of fish (octopus) and vegetables (limu kohu) consumed were based on a Pacific-Asian diet as assumed in the Hawaii Department of Health Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater (HDOH, 2011), and (c) lead concentrations in seafood were derived site-specific seafood concentrations.

2.4 RISK CHARACTERIZATION

Risk characterization integrates the results of the data evaluation and reduction, exposure assessment, and toxicity assessment into quantitative expressions of risk. The key components of the risk characterization process include the following:

- Quantify risks from individual contaminants;
- Quantify risks from multiple contaminants;
- Combine risks across exposure pathways; and

Risk characterization was conducted following similar methods to the 2009 Marine Resource Study HHRA. Risk characterization is the starting point for risk management considerations and the foundation for regulatory decision making, but it is only one of the important components in such decisions.

2.4.1 Regulatory Risk Levels of Concern and Carcinogenic and Non-carcinogenic Risks

For carcinogenic risk, the USEPA's approach "emphasizes the use of one chance in one million (i.e., 1E-06) as the point of departure while allowing site or remedy-specific factors, including potential future uses, to enter into the evaluation of what is appropriate at a given site." As risks increase above one chance in one million, they become less desirable, and the risk to individuals generally should not exceed one in ten thousand (i.e., 1E-04) (USEPA, 1991a). The USEPA uses a Hazard Index (HI) [i.e., the cumulative non-carcinogenic hazards for all contaminants (chemicals)] of 1 or greater, or an HI for a target organ/critical effect of 1 or greater, as a level of concern for evaluating non-carcinogenic HIs. This HHRA discusses site risks and exit criteria in the context of the recommended USEPA regulatory levels of concern.

2.4.2 Quantifying Carcinogenic Risks

The risk of cancer from contaminant exposure is described in terms of the probability that an exposed individual will develop cancer during a person's lifetime from that exposure. The risk

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estimate is calculated by multiplying the daily intake of a particular contaminant over a lifetime by the SF.

When the carcinogenic risk is less than one in 100 (i.e., 1×10^{-2}), the following equation is used (USEPA, 1989):

$$RISK = LADD \times SF$$

When the carcinogenic risk is greater than one in 100 (i.e., 1×10^{-2}), the following exponential equation should be used (USEPA, 1989):

$$RISK = 1 - exp\ (-LADD \times CSF)$$

where,

Parameter	Definition
RISK	Lifetime probability of developing cancer due to exposure to a chemical [contaminant] in the environment
LADD	Lifetime average daily dose of a chemical [contaminant] (mg/kg-day)
CSF	Carcinogenic slope factor for a chemical [contaminant] $(mg/kg\text{-}day)^{-1}$
exp	The exponential

All carcinogenic risks for contaminants for each scenario and receptor are then summed to yield the total carcinogenic risk. A one in one million carcinogenic risk (i.e., 1×10^{-6}) means that, in a population of 1,000,000 people exposed under an identical exposure scenario (i.e., had exactly the same daily intake of a carcinogen over the same time period), there could be one additional case of cancer in the population above the normal background rate.

2.4.3 Evaluating Non-carcinognic Health Effects

Adverse non-carcinogenic health effects from exposure to a COPC are quantitatively expressed as a Hazard Quotient (HQ). The HQ is the ratio of a human's estimated intake of a particular chemical [contaminant] to the RfD.

$$HQ = ADD / RfD$$

where,

Parameter	Definition
HQ	Hazard quotient – The ratio of the estimated dose of a chemical [contaminant] to the RfD
ADD	Average daily dose of a chemical [contaminant] (mg/kg-day)
RfD	Reference dose for a chemical [contaminant] (mg/kg-day)

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The RfD is the threshold intake level for a particular contaminant below which it is unlikely that even sensitive subpopulations would experience adverse health effects. Usually, only chronic HQs are evaluated, as the subchronic effects within a given exposure scenario are typically less than or equal to the chronic effects for the same scenario. For non-carcinogenic health effects, HQs are added across contaminants when they target the same organ, or produce the same critical effect to calculate a segregated HI. Segregation of HIs requires the identification of the adverse effects of each contaminant. Major effect categories include:

- Neurotoxicity;
- Developmental toxicity;
- Reproductive toxicity;
- Immunotoxicity; and
- Adverse effects by target organ (i.e., hepatic, renal, respiratory, cardiovascular, gastrointestinal, hematological, musculoskeletal, dermal, and ocular effects).

If the total segregated HI is less than 1, it indicates that adverse non-carcinogenic health effects are extremely unlikely. If the total segregated HI is greater than 1, it indicates that adverse health effects are possible. Often times all HQs are added together to determine the total HI. If the total HI is greater than 1, then the HQs should be segregated by target organ or critical effect and then compared to the target risk goal.

2.4.4 HHRA Risk Summary –Potential Carcinogenic Risk and Non-Carcinogenic Hazard Characterization

This section provides the results of the HHRA. The goal of the risk summary is to present the following information:

- Magnitude of the carcinogenic risks and non-carcinogenic HIs relative to the regulatory levels of concern (e.g., the carcinogenic risk range of 1E-4 to 1E-6 and a non-carcinogenic HI of 1) for each receptor.

- COPCs, exposure pathways, and media responsible for the majority of the risks

- Non-carcinogenic HIs by endpoint or critical effect if the total HI is greater than 1

Sections 2.4.4.1 and Section 2.4.4.2 discusses the cumulative PELCRs and HIs for the HHRA in terms of receptors and biota species, respectively. Tables 12 through 15 provide a summary of risks for MMR. The risk characterization spreadsheets that present the PELCRs and HIs are provided in Appendix D.

2.4.4.1 Risk Assessment Results by Receptor

Carcinogenic risks and non-carcinogenic hazard results for the risk characterization are presented below and in Tables 12 through 15.

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Current and Future "High-End" Seafood Consumers

Carcinogenic risks for the adult and child "high-end" seafood consumers were 5E-05 and 3E-05, respectively. Cumulative carcinogenic risk was 8E-05 for the "high-end" seafood consumers (child and adult combined). "High-end" seafood consumers cumulative carcinogenic risks exceeded the USEPA and HDOH point of departure risk level of 1E-06 but were within the regulatory risk range of 1E-04 to 1E-06. Cumulative non-carcinogenic HIs for the adult and child "high-end" seafood consumers were 1 and 3, respectively. The non-carcinogenic HI for the current and future "high-end" seafood consumers were above the USEPA regulatory level of concern of 1.

Current and Future "Average" Seafood Consumers

Carcinogenic risks for the adult and child "average" seafood consumers were 9E-06 and 4E-06, respectively. Cumulative carcinogenic risk was 1E-05 for the "average" seafood consumers (child and adult combined). "Average" seafood consumers cumulative risks exceeded the USEPA and HDOH point of departure risk level of 1E-06 but were within the regulatory risk range of 1E-04 to 1E-06. Cumulative non-carcinogenic HIs for the adult and child "average" seafood consumers were 0.2 and 0.5, respectively. The non-carcinogenic HI for the current and future "average" seafood consumers were below the USEPA regulatory level of concern of 1.

2.4.4.2 Risk Assessment Results by Biota Type

Carcinogenic risks and non-carcinogenic hazard results for the risk characterization based on specific biota collected in this assessment are presented below and in Tables 12 through 15.

Octopus (he'e)

Carcinogenic risks for the adult and child "high-end" seafood consumers assumed to ingest octopus during Round 1 (September 2013) from the MMR study area was 5E-08 and 3E-08, respectively. Carcinogenic risks for the adult and child "high-end" seafood consumers assumed to ingest octopus during Round 2 (January through March 2014) from the MMR study area was 2E-07 and 1E-07, respectively. Total carcinogenic risk was 4E-07 for octopus ingestion for a combined (adult and child) "high-end" seafood consumer during both seasons combined.

Carcinogenic risks for the adult and child "average" seafood consumers assumed to ingest octopus during Round 1 (September and October 2013) from the MMR study area was 2E-08 and 1E-08, respectively. Carcinogenic risks for the adult and child "average" seafood consumers assumed to ingest octopus during Round 2 (January through March 2014) from the MMR study area was 1E-07 and 5E-08, respectively. Total carcinogenic risk was 2E-07 for octopus ingestion for a combined (adult and child) "average" seafood consumer during both seasons combined.

Chemicals evaluated in octopus were determined to not have any non-carcinogenic effects and therefore non-carcinogenic HIs for adult and child seafood consumers assumed to ingest octopus were not evaluated. Carcinogenic risk from the ingestion of octopus did not exceed the point of departure regulatory level of concern of 1E-06 under both the "high-end" and "average" seafood consumer scenarios.

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Sea Cucumber (loli)

Carcinogenic risks for the adult and child "high-end" seafood consumers assumed to ingest sea cucumber during Round 1 (September and October 2013) from the MMR study area was 2E-07 and 9E-08, respectively. Carcinogenic risks for the adult and child "high-end" seafood consumers assumed to ingest sea cucumber during Round 2 (January through March 2014) from the MMR study area was 4E-07 and 2E-07, respectively. Total carcinogenic risk was 9E-07 for sea cucumber ingestion for a combined (adult and child) "high-end" seafood consumer during both seasons combined. Non-carcinogenic HIs for the adult and child "high-end" seafood consumers assumed to ingest sea cucumber during Round 1 from the MMR study area were 0.001 and 0.002, respectively. Non-carcinogenic HIs for the adult and child "high-end" seafood consumers assumed to ingest sea cucumber during Round 2 from the MMR study area were 0.002 and 0.005, respectively. The total non-carcinogenic hazards for sea cucumber ingestion for adult and high-end" seafood consumers during both seasons were 0.004 and 0.008 respectively.

Carcinogenic risks for the adult and child "average" seafood consumers assumed to ingest sea cucumber during Round 1 (September and October 2013) from the MMR study area was 7E-08 and 3E-08, respectively. Carcinogenic risks for the adult and child "average" seafood consumers assumed to ingest sea cucumber during Round 2 (January through March 2014) from the MMR study area was 1E-07 and 7E-08, respectively. Total carcinogenic risk was 3E-07 for sea cucumber ingestion for a combined (adult and child) "average" seafood consumer during both seasons combined. Non-carcinogenic HIs for the adult and child "average" seafood consumers assumed to ingest sea cucumber during Round 1 from the MMR study area were 0.0004 and 0.0008, respectively. Non-carcinogenic HIs for the adult and child "average" seafood consumers assumed to ingest sea cucumber during Round 2 from the MMR study area were 0.0009 and 0.002, respectively. The total non-carcinogenic hazard for sea cucumber ingestion for adult and child "average" seafood consumers during both seasons was 0.001 and 0.003 respectively.

The carcinogenic risk and non-carcinogenic hazards from the ingestion of sea cucumber did not exceed any regulatory level of concern under both the "high-end" and "average" seafood consumer scenarios.

Seaweed (Limu Kohu)

Carcinogenic risks for the adult and child "high-end" seafood consumers assumed to ingest limu kohu during Round 1 (September and October 2013) from the MMR study area was 5E-05 and 3E-05, respectively. Carcinogenic risks for the adult and child "high-end" seafood consumers assumed to ingest limu kohu during Round 2 (January through March 2014) from the MMR study area was 1E-07 and 7E-08, respectively. Total carcinogenic risk was 8E-05 for limu kohu ingestion for a combined (adult and child) "high-end" seafood consumer during both seasons combined. Non-carcinogenic HIs for the adult and child "high-end" seafood consumers assumed to ingest limu kohu during Round 1 from the MMR study area were 1 and 2, respectively. Non-carcinogenic HIs for the adult and child "high-end" seafood consumers assumed to ingest limu kohu during Round 2 from the MMR study area were 0.3 and 0.7, respectively. The total non-carcinogenic hazard for limu kohu ingestion for adult and child "high-end" seafood consumers during both seasons was 1 and 3, respectively.

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Carcinogenic risks for the adult and child "average" seafood consumers assumed to ingest limu kohu during Round 1 (September and October 2013) from the MMR study area was 8E-06 and 4E-06, respectively. Carcinogenic risks for the adult and child "average" seafood consumers assumed to ingest limu kohu during Round 2 (January through March 2014) from the MMR study area was 6E-08 and 3E-08, respectively. Total carcinogenic risk was 1E-05 for limu kohu ingestion for a combined (adult and child) "average" seafood consumers during both seasons combined. Non-carcinogenic HIs for the adult and child "average" seafood consumers assumed to ingest limu kohu during Round 1 from the MMR study area were 0.1 and 0.3, respectively. Non-carcinogenic HIs for the adult and child "average" seafood consumers assumed to ingest limu kohu during Round 2 from the MMR study area were 0.1 and 0.2, respectively. The total non-carcinogenic hazard for limu kohu ingestion for adult and child "average" seafood consumers during both seasons was 0.2 and 0.5 respectively.

The carcinogenic risk from the ingestion of limu kohu exceeded the point of departure regulatory level of concern of 1E-06, but was within the regulatory risk range of 1E-04 to 1E-06, during Round 1 for both the "high-end" and "average" seafood consumers. The non-carcinogenic hazards from the ingestion of limu kohu exceeded the regulatory level of concern of 1 during Round 1 for the "high-end" seafood consumers. The Round 1 "average" seafood consumer scenario for limu kohu consumption did not exceed the non-carcinogenic regulatory level of concern. During Round 2, the carcinogenic risk and non-carcinogenic hazards from the ingestion of limu kohu did not exceed any regulatory level of concern under both the "high-end" and "average" seafood consumer scenarios.

2.4.4.3 Lead Risk

Blood lead (PbB) levels for were calculated for the residential child receptors under both "high-end" and "average" seafood consumer scenarios. Blood lead (PbB) levels for were calculated for the child receptors with the assumption of lead concentrations of concern in both octopus and limu kohu seafood items. PbB levels were also calculated assuming exposure to standard background sources such as incidental ingestion of lead in soil, dust, and drinking water. Results of the lead risk assessment can be found on Tables 16 and 17. The IEUBK lead model outputs are provided in Appendix E.

"High-End" Seafood Consumer

PbB estimates for the child "high-end" seafood consumers during Round 1 sampling (September and October 2013), ranged from 1.6 µg/dL for a 0.5-1 year old child to 2.3 µg/dL for the 2-3 year old child. PbB estimates for the child "high-end" seafood consumers during Round 2 sampling (January through March 2014) ranged from 1.3 µg/dL for 0.5-1, 5-6, and 6-7 year old children to 1.6 µg/dL for 1-2 and 2-3 year old children. Lead risks to "high-end" seafood consumer children were below the current regulatory level of concern of 5 µg/dL.

"Average" Seafood Consumer

PbB estimates for the child "average" seafood consumers during Round 1 sampling (September and October 2013), ranged from 1.1 µg/dL for a 6-7 year old child to 1.4 µg/dL for 1-2, 2-3, and

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3-4 year old children. PbB estimates for the child "average" seafood consumers during Round 2 sampling (January through March 2014) ranged from 1.1 µg/dL for 5-6 and 6-7 year old children to 1.4 µg/dL for 1-2 and 2-3 year old children. Lead risks to "average" seafood consumer children were below the current regulatory level of concern of 5 µg/dL.

2.4.4.4 COPC Risk Contributors

Risk contributions from individual contaminants are presented in Appendix D, Risk Characterization. The primary risk driver in this assessment was organochlorine pesticides in limu kohu samples (heptachlor and heptachlor epoxide) collected during Round 1 of sampling. Heptachlor and heptachlor epoxide were not detected in the background locations during Round 1 sampling. Heptachlor and heptachlor epoxide were also not detected during Round 2 of sampling. Heptachlor and heptachlor epoxide in limu kohu collected in Round 1 accounted for approximately 95% of the carcinogenic risk calculated. Heptachlor and heptachlor epoxide also accounted for approximately 70% of the non-carcinogenic hazards. Pesticides are not sourced from military munitions or range activities and are likely present due to onshore anthropogenic sources and urban/agricultural runoff. In common practice, the Department of Defense did not use organochlorine pesticides on the ranges. If organochlorine pesticides were excluded from this assessment, estimated carcinogenic risk and noncarcinogenic hazards would be below all applicable regulatory levels of concern.

2.5 UNCERTAINTY ANALYSIS

The purpose of the uncertainty analysis is to present an evaluation of the uncertainties that enter the risk assessment at each step of the process to allow regulators, stakeholders, and risk managers to put the risks in proper context. The risks presented in HHRAs are conditional estimates, based on a number of assumptions about exposure and toxicity given a particular land use scenario. Uncertainties are introduced to a risk assessment because a range of values could be used for each assumption, but only a few actually are. Consistent with USEPA policy, more conservative (i.e., upper bound) values are generally chosen for each parameter, while other values (i.e., values closer to the central tendency) may be more representative of site-specific conditions (USEPA, 1989). Choosing upper bound values for each parameter typically results in overly conservative risks that do not reflect site-specific conditions. Uncertainties are used to "bracket" the range of risks that could result from choosing alternate values for the parameters used in calculating risks. USEPA Guidance for Risk Characterization states that, "Particularly critical to full characterization of risk is a frank and open discussion of the uncertainty in the overall assessment and in each of its components" (USEPA, 1995). There are several key reasons why uncertainty is discussed in the HHRA:

- Risk characterization involves the integration of a variety of different types of information. It is important to communicate the uncertainties associated with the different types of information in order to provide a context for evaluating the overall results;

- For a risk manager or stakeholder to evaluate a HHRA, the magnitude of the uncertainties in the evaluation must be understood; and

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- Discussions of the uncertainties in a HHRA will help risk managers evaluate the need for collecting additional information (USEPA, 1995).

The assumptions that introduce the greatest amount of uncertainty in this risk assessment are discussed in this section. Uncertainty is typically discussed in general terms, because, for most assumptions, there is usually not enough information to assign a numerical value that can be factored into the calculation of risk.

2.5.1 Hazard Identification/Data Reduction

The following site-specific uncertainties have been identified in the hazard identification/data reduction step of this supplemental HHRA:

- During the hazard identification step, contaminants are selected for inclusion in the quantitative risk assessment. The selection of analytes included in the current investigation was based on the 2009 Marine Resources Study and the 2007 settlement agreement (i.e., the 'Foran List'). The assessment included analytes which could be directly attributable to military munitions and training activities (explosives, select metals), as well as other potential anthropogenic constituents (pesticides, VOCs, SVOCs). The inclusion of all potential constituents and quantitative analysis of non-munitions related constituents increases the conservatism of the risk assessment. As described in Section 2.4.4.4, the primary risk driver in this assessment was organochlorine pesticides in limu kohu samples (heptachlor and heptachlor epoxide) collected during Round 1 of sampling. Heptachlor and heptachlor epoxide were not detected in the background locations however pesticides are not sourced from military munitions or range activities and are present due to onshore anthropogenic sources and urban/agricultural runoff. Dioxins may be from open burning (e.g., disposal of munitions and propellant and explosives) on MMR. Pesticides could have been used around buildings or as part of the general site maintenance.
- Ideally, the HHRA should use data that is representative of biota items caught and consumed by the community. While all attempts were made to catch specific size and age biota, the biota items caught and ultimately evaluated in the HHRA may not be directly applicable to what is generally caught and consumed by community residents. Toxicokinetic differences may exist between different age and size of biota resulting in differential bioaccumulation of contaminants. While uncertainty of the data collected exists, it was what was available during two distinct fishing seasons and what would generally represent what is caught by the local population. Little uncertainty is assumed due to the sampling program.
- With the exception of seaweed in the project area, octopus and sea cucumber tissue concentrations are assumed to come solely from exposure to project area sediment and surface water, which overestimates risks from site media since the receptors can forage in other areas.
- It is important that the analytical methods selected for a site are sensitive enough to support the needs of the risk assessment (i.e., the detection limits for COPCs should be

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less than the screening levels to which they are being compared). The value of the HHRA is diminished if the detection limits are greater than applicable screening levels or if a non-detected value results in an unacceptable risk in a HHRA. To provide some information regarding the adequacy of the project reporting limits, screening values were calculated according to methods described in USEPA's Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories (USEPA, 2000) for comparison to the analytical reporting limits. Uncertainty is introduced by this step because the criteria used to compare analytical reporting limits were calculated using a generic fish consumption rate of 17.5 g/day which is lower than the site-specific consumption rates for octopus and other biota species evaluated in this assessment. Reporting limits for aldrin and pentachlorophenol exceeded the calculated screening value in all sampled biota species. Aldrin and pentachlorophenol were not detected in a single sample collected from the study area or from the background reference area in either season. It is unlikely that aldrin or pentachlorophenol are present at concentrations which would pose a threat to human health. Reporting limits for methyl mercury and 2,4-dinitrotoluene exceeded the calculated screening value in sea cucumber and limu kohu. Methyl mercury was not detected in any sea cucumber sample and was detected in limu kohu samples at concentrations below calculated background concentrations. A few select dioxin congeners were determined to have an elevated reporting limit, however where dioxins were determined to be of concern, all dioxin congeners were carried forward into the quantitative risk analysis.

- Biota concentrations were screened against calculated background concentrations and risk-based screening levels. Use of the calculated screening values could decrease the conservativeness of the HHRA as they were used to exclude contaminants from quantitative assessment. To temper this uncertainty, screening values were calculated using rates for fish consumption, which are greater than any site-specific consumption rate for biota included in this assessment.

2.5.2 Exposure Assessment

The following site-specific uncertainties have been identified in the exposure assessment of this supplemental HHRA:

- During the exposure assessment, average daily doses of COPCs to which receptors are potentially exposed are estimated. The estimation of dose involves a host of assumptions including, but not limited to assumptions about the amount of recreational fishing that occurs in the area, accessibility of the fishing resource, how often seafood is consumed and the types of seafood consumed. Many of these assumptions are defined in this risk assessment. In general, the potential ingestion rates, exposure frequencies and durations and other exposure assumptions used in the risk assessment were conservative and health protective and were developed in coordination with the local community through a site-specific seafood consumption survey. The survey conducted focused on the population most likely impacted by the presence chemical constituent in the Wai‘anae community. Participants included, community leaders, shoppers at the local market, recreational fishermen who frequent the study area and those living a lifestyle which may be more

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inclined to live off natural resources. The consumption rates used in this assessment which were derived from the survey were very health protective in nature. The survey conducted which was utilized in this HHRA significantly increases the overall health protectiveness of the risk estimate as it is conservative in nature, developed in collaboration with the community and site-specific.

- Significant uncertainty in the exposure assessment was introduced by assuming that all seafood consumed was caught from Mākua Beach. The 2010 seafood consumption survey referenced unofficial inquiries with the public indicate that this assumption is far from realistic. The majority of participants unofficially indicated that most seafood consumed was acquired from the market. The assumption that 100% of the seafood is sourced from the study area significantly increases the health protectiveness of the HHRA and almost certainly overestimates actual exposures. In reality, it is highly unlikely that populations of seafood biota at Mākua Beach could support the ingestion rate used for the in the HHRA. The area is limited in areal extent and the amount of seafood biota in the area would not support fishermen acquiring 100% of their seafood from the study area. Risks and hazards for both the "high-end" and "average" seafood consumers should be considered conservative and not indicative of risks and hazards for the general population.
- Sea cucumber was not assessed in the 2009 Ordnance Reef seafood consumption survey. As a result no applicable sea cucumber ingestion rate could be identified. This HHRA assumed sea cucumber ingestion was equivalent to crab ingestion from the 2009 Ordnance Reef seafood consumption survey (USACE, 2014). This assumption certainly overestimates sea cucumber ingestion. It was not clear if the local community actively consumes sea cucumber. Sea cucumber ingestion may apply to only a limited amount of residents in the area.
- Chromium detected in biota at the site was assumed to occur in the trivalent state. While no scientific studies are available that detail the bioaccumulation of chromium in fish and other marine species, it is widely accepted that chromium in marine species exists in the trivalent state. If chromium is present in the hexavalent state, human health risks may be greater.

2.5.3 Toxicity Assessment

The following site-specific uncertainties have been identified in the toxicity assessment of this supplemental HHRA:

- Dose-response values are usually based on limited toxicological data. For this reason, a margin of safety is built into estimates of both carcinogenic and non-carcinogenic hazards, and actual risks are lower than those estimated. The two major areas of uncertainty introduced in the dose-response assessment are: (a) animal to human extrapolation; and (b) high to low-dose extrapolation. These are discussed below.
- Human dose-response values are often extrapolated, or estimated, using the results of animal studies. Extrapolation from animals to humans introduces a great deal of uncertainty in the risk assessment because in most instances, it is not known how

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differently a human may react to the constituent compared to the animal species used to test the constituent. The procedures used to extrapolate from animals to humans involve conservative assumptions and incorporate several uncertainty factors that overestimate the adverse effects associated with a specific dose. As a result, overestimation of the potential for adverse effects to humans is more likely than underestimation.

- Predicting potential health effects from the exposure to media within a study site requires the use of models to extrapolate the observed health effects from the high doses used in laboratory studies to the anticipated human health effects from low doses experienced in the environment. The models contain conservative assumptions to account for the large degree of uncertainty associated with this extrapolation (especially for potential carcinogens) and therefore, tend to be more likely to overestimate than underestimate the risks.

2.5.4 Risk Characterization

The following site-specific uncertainties have been identified in the risk characterization of this supplemental HHRA:

- Significant conservativeness was integrated into the risk characterization because it assessed risk from all contaminants included in the analytical program including pesticides and dioxins which in general are not associated with military training. The risk of adverse human health effects depends on estimated levels of exposure and on dose-response relationships. Once exposure to and risk and hazard from each of the selected contaminant evaluated in this assessment is calculated, the total risk posed by exposure to study area-related COPCs is determined by combining the health risk contributed by each of the contaminants evaluated. Where these contaminants do not interact, do not affect the same target organ, or do not have the same mechanism of action, summing the risks for multiple contaminants results in an overestimate of risk posed by COPCs at the site. However, in order not to understate the risk, it was initially assumed that the effects of the different chemicals evaluated in this assessment may be added together.
- Non-carcinogenic hazards exceeded the regulatory level of concern of 1 for the "high-end" seafood consumer scenario. As such, segregating the calculated HI into individual target endpoints was considered. However, where non-carcinogenic hazards exceeded 1 (due to limu consumption in Round 1), they were driven by a single contaminant (heptachlor epoxide in limu), the individual hazards for specific target endpoints would still be over the regulatory limit. Dividing the hazards by target endpoints would not diminish the hazards applicable to a specific endpoint to levels below the regulatory level of concern. HI's were not segregated in this HHRA.

2.6 CONCLUSIONS

This supplemental HHRA has evaluated risks and hazards under multiple health-protective current and future land use scenarios. This supplemental HHRA provides further characterization of the potential risks at MMR due to seafood consumption and is a follow-on assessment to a 2009 human health risk assessment conducted in relation to the Marine Resources Study (USARHAW and 25th ID [L] 2009). This assessment focuses on data gaps identified on review

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of the 2009 report and discussion with the regulatory agencies and the community. The results of the 2009 assessment were taken into account when designing the SAP for the 2013-2014 Marine Resource Study. The results of this supplemental HHRA for MMR indicate that carcinogenic risks within the regulatory risk range (1E-04 to 1E-06) and non-carcinogenic hazards are acceptable (less than 1) if consumption of the common seafood items (i.e. octopus, sea cucumber, seaweed) is limited to reasonable quantities such as those generally consumed by "average" seafood consumers. Carcinogenic risk was 1E-05 to the current and future "average" seafood consumers, and non-carcinogenic hazards for the "average" seafood consumers were 0.5.

Site-specific carcinogenic risk characterization estimates for the "high-end" seafood consumers were within the regulatory risk range, non-carcinogenic hazards for the "high-end" seafood consumers exceed the regulatory level of concern. The "high-end" seafood consumer scenario was assessed to be protective of subsistence consumers who would rely on the study area as a daily source of food.

MMR and any associated risks and hazards should be evaluated with consideration of realistic current and future land use scenarios. Extremely conservative assumptions were used in the risk assessment. For example, very conservative seafood consumption rates and a fraction ingested from site of 100% were used for both the "high-end" and "average" seafood consumption scenarios. These assumptions reasonably apply to only a very limited segment of the local population. The risk estimates calculated in this assessment should therefore be considered conservative.

The primary risk driver in this assessment was organochlorine in limu kohu samples (heptachlor and heptachlor epoxide). Pesticides are not sourced from military munitions or from range activities and are present due to other onshore anthropogenic sources and urban/agricultural runoff. If organochlorine pesticides were excluded from this assessment, estimated carcinogenic risk and noncarcinogenic hazards would be below all applicable regulatory levels of concern.

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Figures

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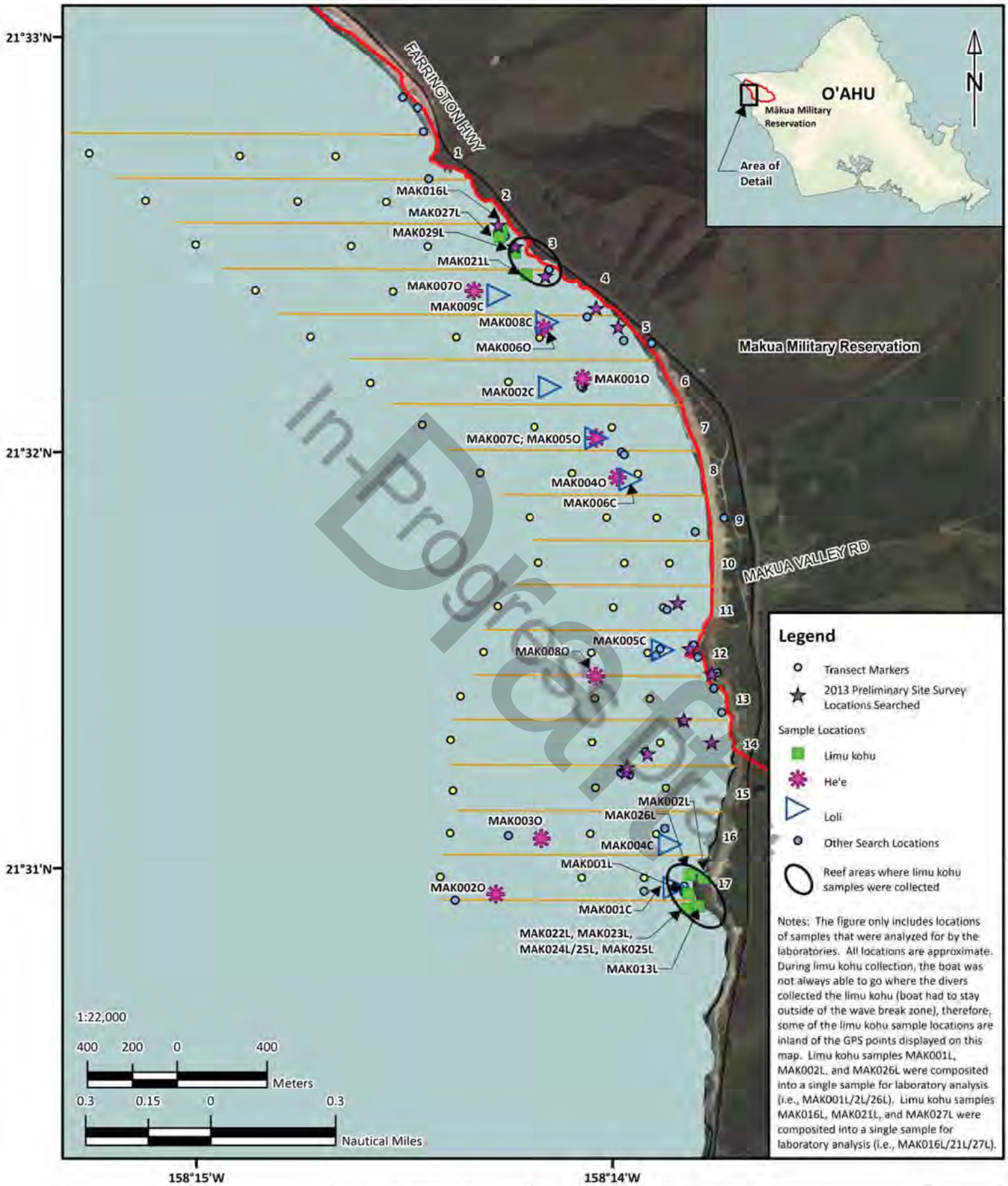
MAKUA MARINE RESOURCES SUPPLEMENTAL STUDY

SITE LOCATION MAP
MAKUA BEACH, O‘AHU, HAWAI‘I

FIGURE
1



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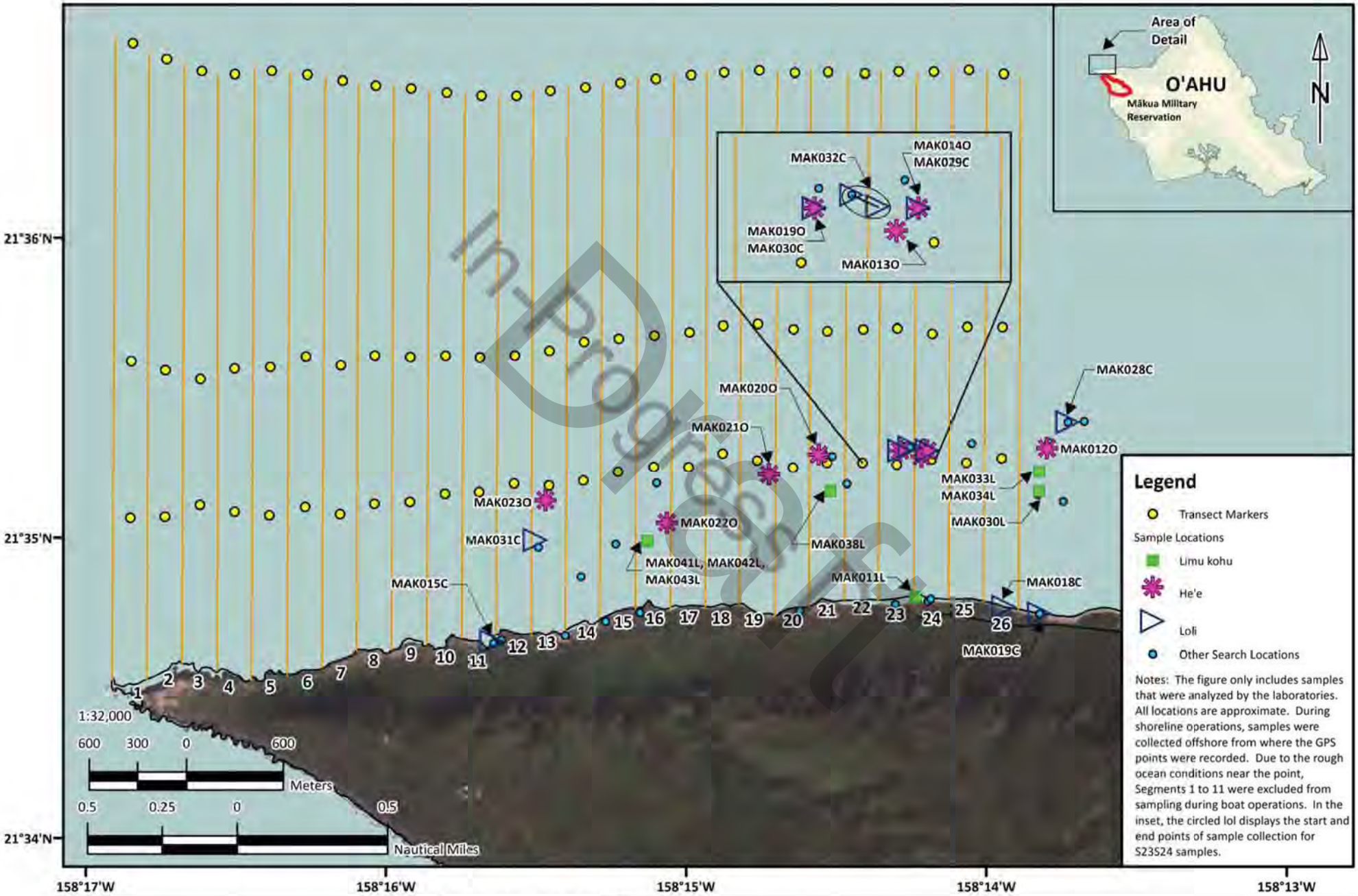
	PROJECT NO.: GSIPA 1032-001	MĀKUA MARINE RESOURCES SUPPLEMENTAL STUDY	FIGURE 2
	DATE: MAY 21, 2014		
	DRAWN BY: SK/CB	2013 SAMPLE LOCATIONS	
	REVIEWED BY: VD	MĀKUA BEACH, O'AHU, HAWAI'I	

In Progress Draft

	PROJECT NO.: GSIPA 1032-001	MĀKUA MARINE RESOURCES SUPPLEMENTAL STUDY	FIGURE 3
	DATE: MAY 21, 2014		
	DRAWN BY: CB/SK	2013 SAMPLE LOCATIONS MOKULĒ'IA, O'AHU, HAWAI'I	
	REVIEWED BY: VD		



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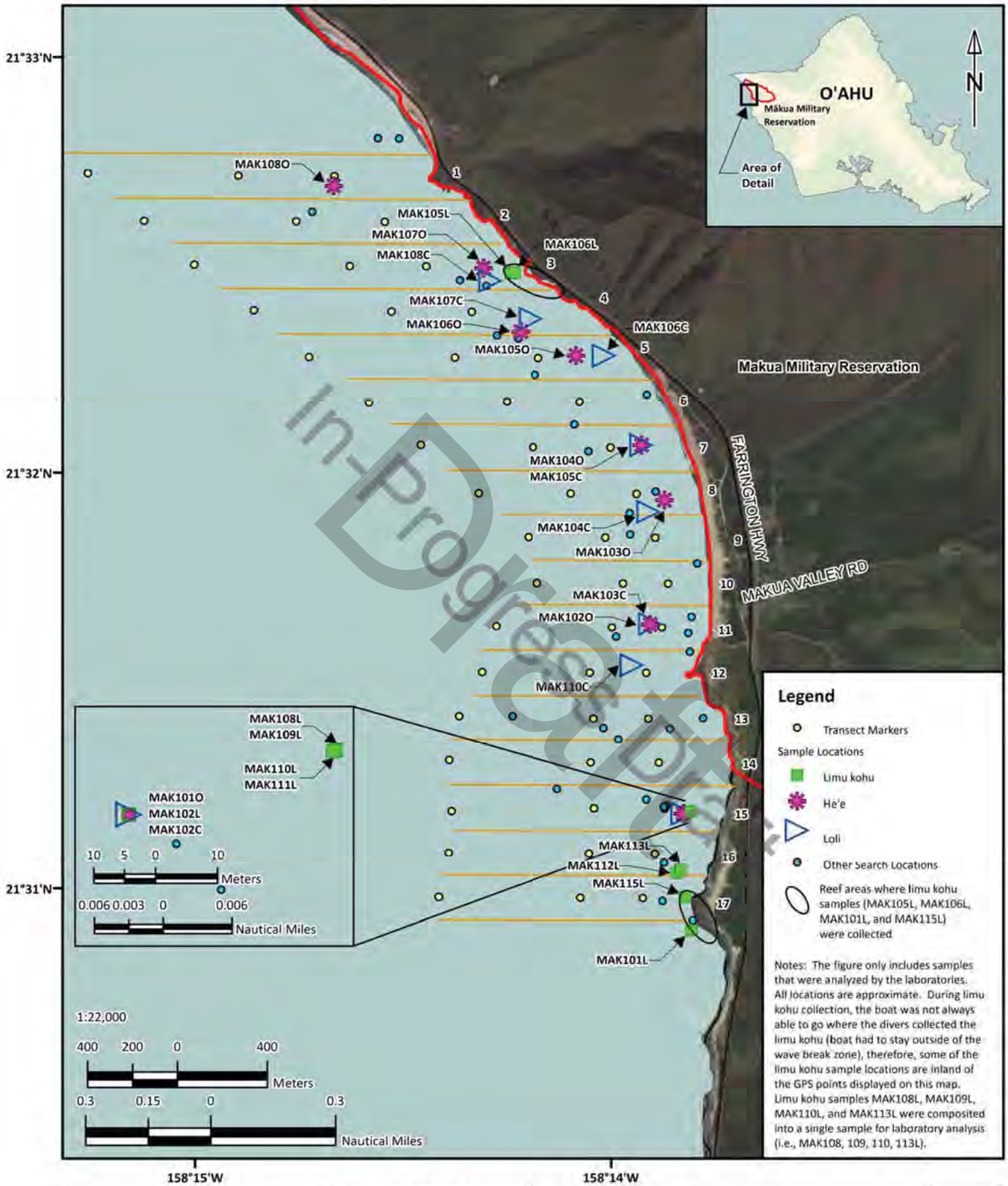
	PROJECT NO.: GSIPA 1032-001	MĀKUA MARINE RESOURCES SUPPLEMENTAL STUDY	FIGURE 4
	DATE: MAY 21, 2014		
	DRAWN BY: SK/CB	2013 SAMPLE LOCATIONS	
	REVIEWED BY: VD	KA'ENA POINT, O'AHU, HAWAI'I	



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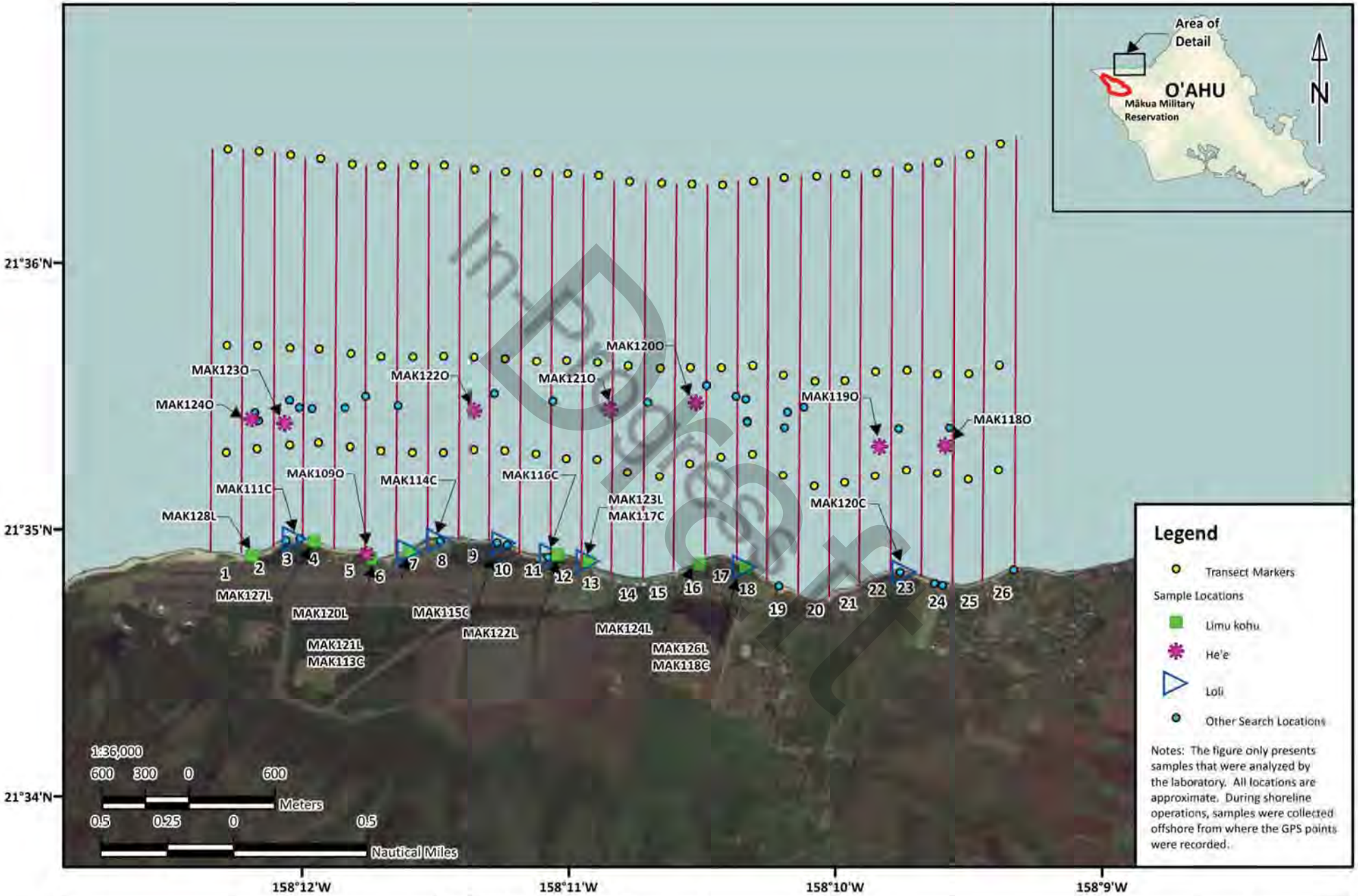
GSI PACIFIC	PROJECT NO.: GSIPA 1502-002 DATE: MAY 21, 2014 DRAWN BY: SK REVIEWED BY: VD	MĀKUA MARINE RESOURCES SUPPLEMENTAL STUDY **2014 SAMPLE LOCATIONS** **MĀKUA BEACH, O'AHU, HAWAI'I**	FIGURE 5



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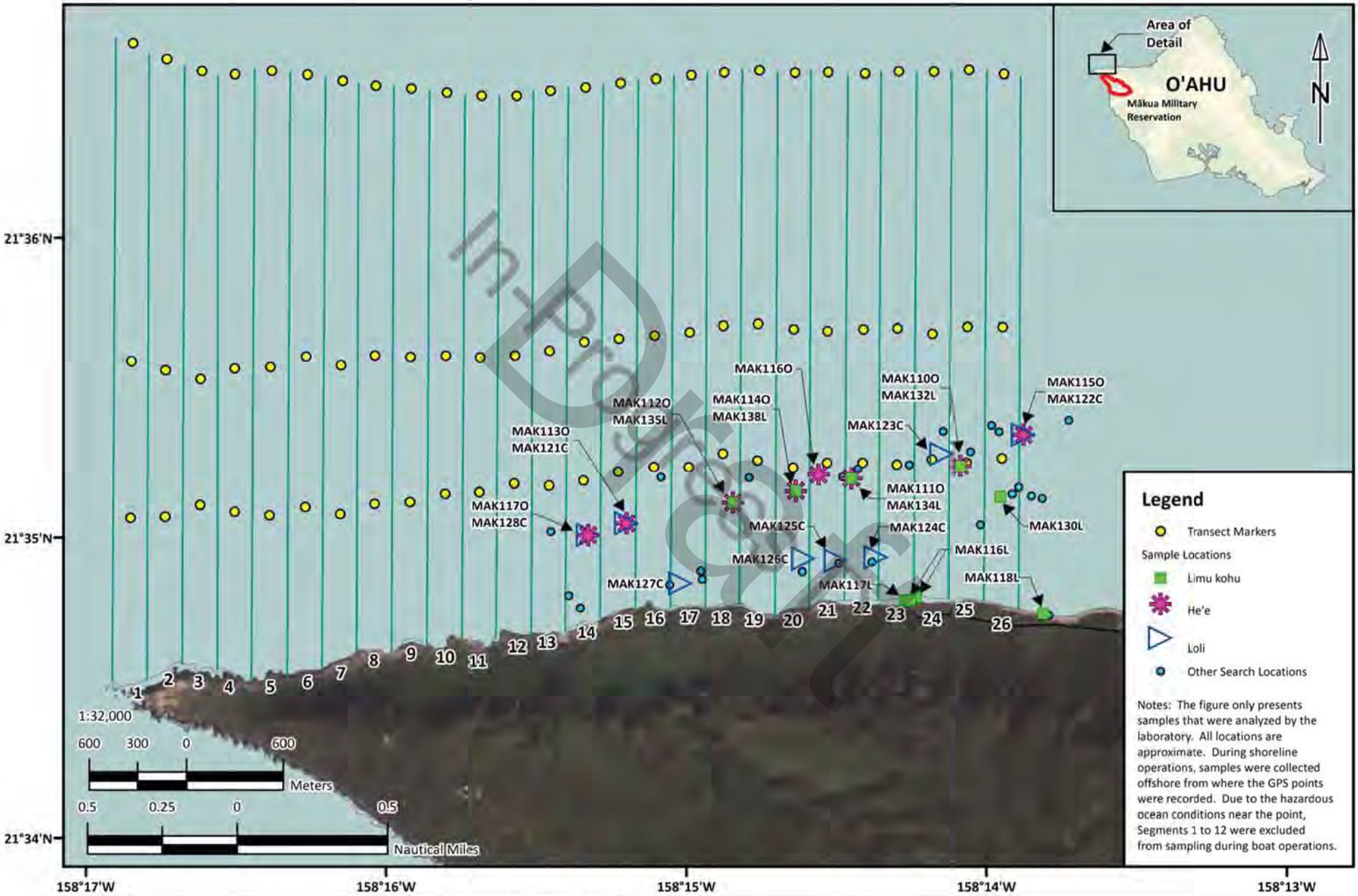
	PROJECT NO.: GSIPA 1052-002	MĀKUA MARINE RESOURCES SUPPLEMENTAL STUDY	FIGURE 6
	DATE: MAY 12, 2014		
	DRAWN BY: SK	2014 SAMPLE LOCATIONS	
	REVIEWED BY: VD	MOKULĒ'IA, O'AHU, HAWAI'I	



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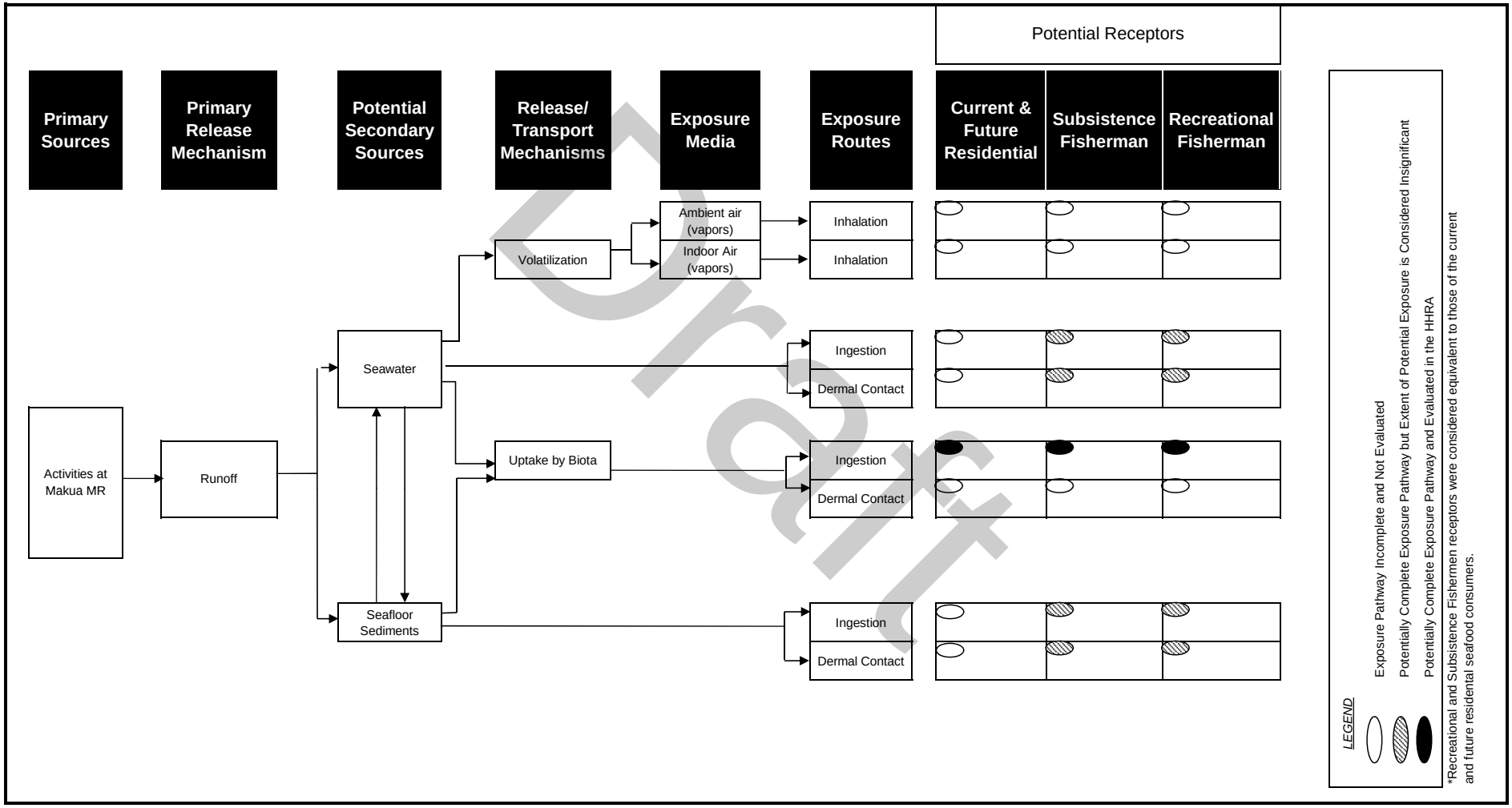
	PROJECT NO.: GSIPA 1052-002	MĀKUA MARINE RESOURCES SUPPLEMENTAL STUDY	FIGURE 7
	DATE: MAY 12, 2014		
	DRAWN BY: SK	2014 SAMPLE LOCATIONS KA'ENA POINT, O'AHU, HAWAI'I	
	REVIEWED BY: VD		

Figure 8
Human Health Risk Assessment
Conceptual Site Model
Mākua Military Reservation, Oahu, Hawai'i



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Tables

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TABLE 1
SAMPLE CONSTITUENTS
MAKUA MILITARY RESERVATION

Analyte	Analyte
Dioxins/Furans (17 congeners of concern)	**SVOCs (Semi Volatile Organic Compounds)**
HpCDD	Pyrene
HpCDF	Phthalate Esters
HxCDF	Bis(2-ethylhexyl) phthalate
OCDD	Di-n-butyl phthalate
OCDF	Diethyl phthalate
TCDD	Pentachlorophenol
Metals	**Explosives (Nitroaromatics/Nitramines)**
Aluminum	2,4-DNT
Antimony	RDX (Cyclonite)
Arsenic	Nitroglycerine
Barium	Other Energetic Compound
Beryllium	Perchlorate
Gasoline (Purgeable Organics)	**Organochlorine Pesticides**
Ethylbenzene	4,4'-DDT
m-Xylene	Aldrin
p-Xylene	alpha BHC
o-Xylene	beta BHC
Toluene	delta BHC
Stryrene	gamma BHC (lindane)
1,2,4-Trimethylbenzene	Heptachlor
	Heptachlor epoxide

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TABLE 2
SELECTION OF BACKGROUND CONCENTRATIONS
MAKUA MILITARY RESERVATION
ROUND 1

Exposure Point	Biota Type	Chemical	Frequency of Detection	(%)	Appoximate Distribution	Units	Background Threshold Values 95% UTL with 95% Coverage			
							Assuming Normal Distribution	Assuming Gamma Distribution	Assuming Lognormal Distribution	Nonparametric Upper Limits
North Shore Oahu (Mokulē'ia and Ka'ena Point)	Octopus (He'e)	**Pesticides**								
		Aldrin	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Alpha-BHC	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Beta-BHC	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Delta-BHC	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Gamma-BHC (Lindane)	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Heptachlor	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Heptachlor Epoxide	0 / 16	0.0%	--	µg/kg	--	--	--	--
		p,p'-DDT	0 / 16	0.0%	--	µg/kg	--	--	--	--
		VOCs								
		1,2,4-Trimethylbenzene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Ethyl Benzene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		M,P-XYLENES	0 / 16	0.0%	--	µg/kg	--	--	--	--
		o-Xylene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Styrene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Toluene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		SVOCs								
		bis(2-Ethylhexyl) phthalate	2 / 16	12.5%	Not Enough Data to Perform GOF Test	µg/kg	**564.9**	640	1442	1000
		Diethyl phthalate	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Dimethyl phthalate	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Di-n-butyl phthalate	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Di-n-octyl phthalate	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Pyrene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Pentachlorophenol	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Dioxins								
		2,3,7,8-TCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total TCDF	12 / 16	75.0%	Data do not follow a Discernible Distribution (0.05)	ng/kg	0.163	0.178	0.218	**0.18**
		2,3,7,8-TCDD	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total TCDD	11 / 16	68.8%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.664**	1.057	1.669	0.59
		1,2,3,7,8-PECDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		2,3,4,7,8-PeCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total PeCDF	1 / 16	6.3%	--	ng/kg	--	--	--	--
		1,2,3,7,8-PeCDD	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total PeCDD	1 / 16	6.3%	--	ng/kg	--	--	--	--
		1,2,3,4,7,8-HxCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		1,2,3,6,7,8-HxCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		2,3,4,6,7,8-HxCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		1,2,3,7,8,9-HxCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total HxCDF	4 / 16	25.0%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.111**	0.125	0.11	0.14
		1,2,3,4,7,8-HxCDD	1 / 16	6.3%	--	ng/kg	--	--	--	--
		1,2,3,6,7,8-HxCDD	0 / 16	0.0%	--	ng/kg	--	--	--	--
		1,2,3,7,8,9-HxCDD	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total HxCDD	8 / 16	50.0%	Detected Data appear Approximate Lognormal at 5% Significance Level	ng/kg	0.232	0.264	**0.298**	0.27
		1,2,3,4,6,7,8-HpCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		1,2,3,4,7,8,9-HpCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total HpCDF	12 / 16	75.0%	Detected data follow Appr. Gamma Distribution at 5% Significance Level	ng/kg	0.288	**0.304**	0.338	0.37
		1,2,3,4,6,7,8-HpCDD	1 / 16	6.3%	--	ng/kg	--	--	--	--
		Total HpCDD	15 / 16	93.8%	Detected data follow Appr. Gamma Distribution at 5% Significance Level	ng/kg	0.951	**1.102**	1.398	1.2
		OCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		OCDD	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Explosives								
		Perchlorate	0 / 16	0.0%	--	µg/Kg	--	--	--	--
		2,4-Dinitrotoluene2	0 / 16	0.0%	--	µg/Kg	--	--	--	--
		2,4-Dinitrotoluene3	0 / 16	0.0%	--	µg/Kg	--	--	--	--
		2,4-Dinitrotoluene4	0 / 16	0.0%	--	µg/Kg	--	--	--	--
		Hexahydro-trinitro-triazine (RDX)	0 / 16	0.0%	--	µg/Kg	--	--	--	--
		Nitroglycerine	0 / 16	0.0%	--	µg/Kg	--	--	--	--
		Metals								
		Inorganic Arsenic	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Arsenic(III)	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Arsenic(V)	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Dimethyl Arsenic	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**0.0342**	0.04	0.0466	0.031
		Monomethyl Arsenic	1 / 16	6.3%	--	mg/kg	--	--	--	--
		Aluminum	15 / 16	93.8%	Detected Data appear Lognormal at 5% Significance Level	mg/kg	3.105	3.099	**3.686**	4.27
		Antimony	1 / 16	6.3%	--	mg/kg	--	--	--	--
		Arsenic	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**44.06**	46.69	48.02	40.3
		Barium	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Beryllium	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Cadmium	5 / 16	31.3%	Detected Data appear Approximate Normal at 5% Significance Level	mg/kg	**0.0369**	0.0326	0.0313	0.05
		Chromium	2 / 16	12.5%	Data do not follow a Discernible Distribution (0.05)	mg/kg	0.295	0.262	0.288	**0.388**
		Cobalt	0 / 16	0.0%	--	mg/kg	--	--	--	--

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TABLE 2
SELECTION OF BACKGROUND CONCENTRATIONS
MAKUA MILITARY RESERVATION
ROUND 1

Exposure Point	Biota Type	Chemical	Frequency of Detection	(%)	Appoximate Distribution	Units	Background Threshold Values 95% UTL with 95% Coverage			
							Assuming Normal Distribution	Assuming Gamma Distribution	Assuming Lognormal Distribution	Nonparametric Upper Limits
North Shore Oahu	Octopus (He'e)	Copper	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**12.67**	14.03	14.89	12.2
		Iron	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Lead	16 / 16	100.0%	Data appear Approximate Lognormal at 5% Significance Level	mg/kg	0.144	0.113	**0.26**	0.16
		Manganese	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**0.348**	0.359	0.365	0.339
		Mercury	16 / 16	100.0%	Data appear Normal at 5% Significance Level	ng/g	**17.36**	15.81	19.88	16.4
		Methyl Mercury	16 / 16	100.0%	Data appear Normal at 5% Significance Level	ng/g	**15.31**	17.3	18.64	15.3
		Selenium	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**0.381**	0.405	0.417	0.353
		Silver	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Thallium	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Vanadium	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Zinc	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**17.16**	17.44	17.55	16.1
	Sea Cucumber (Loli)	**Pesticides**								
		Aldrin	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Alpha-BHC	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Beta-BHC	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Delta-BHC	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Gamma-BHC (Lindane)	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Heptachlor	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Heptachlor Epoxide	0 / 16	0.0%	--	µg/kg	--	--	--	--
		p,p'-DDT	0 / 16	0.0%	--	µg/kg	--	--	--	--
		VOCs								
		1,2,4-Trimethylbenzene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Ethyl Benzene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		M,P-XYLENES	0 / 16	0.0%	--	µg/kg	--	--	--	--
		o-Xylene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Styrene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Toluene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		SVOCs								
		bis(2-Ethylhexyl) phthalate	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Diethyl phthalate	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Dimethyl phthalate	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Di-n-butyl phthalate	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Di-n-octyl phthalate	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Pyrene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Pentachlorophenol	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Dioxins								
		2,3,7,8-TCDF	11 / 16	68.8%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.122**	0.127	0.13	0.19
		Total TCDF	10 / 16	62.5%	Detected Data appear Approximate Normal at 5% Significance Level	ng/kg	**0.336**	0.4	0.466	0.33
		2,3,7,8-TCDD	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total TCDD	14 / 16	87.5%	Detected Data appear Normal at 5% Significance Level	ng/kg	**1.858**	2.818	4.042	1.4
		1,2,3,7,8-PECDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		2,3,4,7,8-PeCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total PeCDF	2 / 16	12.5%	Not Enough Data to Perform GOF Test	ng/kg	**0.169**	0.145	0.131	0.23
		1,2,3,7,8-PeCDD	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total PeCDD	10 / 16	62.5%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.186**	0.229	0.265	0.19
		1,2,3,4,7,8-HxCDF	1 / 16	6.3%	--	ng/kg	--	--	--	--
		1,2,3,6,7,8-HxCDF	1 / 16	6.3%	--	ng/kg	--	--	--	--
		2,3,4,6,7,8-HxCDF	3 / 16	18.8%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.0661**	0.0646	0.0641	0.14
		1,2,3,7,8,9-HxCDF	1 / 16	6.3%	--	ng/kg	--	--	--	--
		Total HxCDF	4 / 16	25.0%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.1**	0.101	0.102	0.16
		1,2,3,4,7,8-HxCDD	1 / 16	6.3%	--	ng/kg	--	--	--	--
		1,2,3,6,7,8-HxCDD	1 / 16	6.3%	--	ng/kg	--	--	--	--
		1,2,3,7,8,9-HxCDD	2 / 16	12.5%	Not Enough Data to Perform GOF Test	ng/kg	**0.093**	0.0941	0.096	0.26
		Total HxCDD	5 / 16	31.3%	Detected Data appear Approximate Normal at 5% Significance Level	ng/kg	**0.418**	0.438	0.493	0.55
		1,2,3,4,6,7,8-HpCDF	6 / 16	37.5%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.0745**	0.0797	0.0826	0.18
		1,2,3,4,7,8,9-HpCDF	1 / 16	6.3%	--	ng/kg	--	--	--	--
		Total HpCDF	5 / 16	31.3%	Detected data follow Appr. Gamma Distribution at 5% Significance Level	ng/kg	0.166	**0.154**	0.152	0.22
		1,2,3,4,6,7,8-HpCDD	11 / 16	68.8%	Detected data follow Appr. Gamma Distribution at 5% Significance Level	ng/kg	0.822	**0.885**	0.959	0.89
		Total HpCDD	11 / 16	68.8%	Detected Data appear Lognormal at 5% Significance Level	ng/kg	1.538	1.905	**2.759**	1.7
		OCDF	6 / 16	37.5%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.327**	0.338	0.347	0.53
		OCDD	12 / 16	75.0%	Detected Data appear Approximate Lognormal at 5% Significance Level	ng/kg	3.56	4.066	**4.613**	3.5
		Explosives								
		Perchlorate	1 / 16	6.3%	--	µg/Kg	--	--	--	--
		2,4-Dinitrotoluene2	0 / 16	0.0%	--	µg/Kg	--	--	--	--
		2,4-Dinitrotoluene3	0 / 16	0.0%	--	µg/Kg	--	--	--	--
		2,4-Dinitrotoluene4	0 / 16	0.0%	--	µg/Kg	--	--	--	--
		Hexahydro-trinitro-triazine (RDX)	0 / 16	0.0%	--	µg/Kg	--	--	--	--
		Nitroglycerine	0 / 16	0.0%	--	µg/Kg	--	--	--	--
		Metals								
		Inorganic Arsenic	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**0.0282**	0.0326	0.0354	0.024
		Arsenic(III)	8 / 16	50.0%	Detected Data appear Normal at 5% Significance Level	mg/kg	**0.0211**	0.0265	0.0308	0.019

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SELECTION OF BACKGROUND CONCENTRATIONS
MAKUA MILITARY RESERVATION
ROUND 1

Exposure Point	Biota Type	Chemical	Frequency of Detection	(%)	Appoximate Distribution	Units	Background Threshold Values 95% UTL with 95% Coverage			
							Assuming Normal Distribution	Assuming Gamma Distribution	Assuming Lognormal Distribution	Nonparametric Upper Limits
North Shore Oahu	Sea Cucumber (Loli)	Arsenic(V)	12 / 16	75.0%	Detected Data appear Normal at 5% Significance Level	mg/kg	**0.0157**	0.0191	0.0214	0.013
		Dimethyl Arsenic	9 / 16	56.3%	Detected Data appear Approximate Normal at 5% Significance Level	mg/kg	**0.0139**	0.0148	0.0155	0.016
		Monomethyl Arsenic	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Aluminum	16 / 16	100.0%	Detected data appear Gamma Distributed at 5% Significance Level	mg/kg	3.143	**4.256**	5.588	2.84
		Antimony	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Arsenic	16 / 16	100.0%	Data do not follow a Discernible Distribution (0.05)	mg/kg	23.2	45.66	109.8	**18.5**
		Barium	10 / 16	62.5%	Detected Data appear Normal at 5% Significance Level	mg/kg	**0.0924**	0.106	0.114	0.08
		Beryllium	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Cadmium	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Chromium	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Cobalt	1 / 16	6.3%	--	mg/kg	--	--	--	--
		Copper	16 / 16	100.0%	Data do not follow a Discernible Distribution (0.05)	mg/kg	38.74	42.03	65.78	**52.7**
		Iron	5 / 16	31.3%	Detected Data appear Approximate Normal at 5% Significance Level	mg/kg	**11.35**	11.61	12.53	14.7
		Lead	16 / 16	100.0%	Data appear Lognormal at 5% Significance Level	mg/kg	1.569	1.74	**2.961**	2.14
		Manganese	16 / 16	100.0%	Detected data appear Gamma Distributed at 5% Significance Level	mg/kg	0.672	**0.834**	0.998	0.68
		Mercury	16 / 16	100.0%	Data appear Approximate Lognormal at 5% Significance Level	ng/g	3.558	5.8	**9.28**	2.88
		Methyl Mercury	1 / 16	6.3%	--	ng/g	--	--	--	--
		Selenium	16 / 16	100.0%	Data do not follow a Discernible Distribution (0.05)	mg/kg	3.123	4.831	6.957	**2.37**
		Silver	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Thallium	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Vanadium	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**0.073**	0.0814	0.0874	0.075
		Zinc	11 / 16	68.8%	Detected Data appear Lognormal at 5% Significance Level	mg/kg	20.22	21.02	**27.4**	27.8
	Seaweed (Limu)	**Pesticides**								
		Aldrin	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Alpha-BHC	4 / 16	25.0%	Detected Data appear Normal at 5% Significance Level	µg/kg	**19.39**	20.6	21.68	22.7
		Beta-BHC	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Delta-BHC	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Gamma-BHC (Lindane)	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Heptachlor	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Heptachlor Epoxide	0 / 16	0.0%	--	µg/kg	--	--	--	--
		p,p'-DDT	0 / 16	0.0%	--	µg/kg	--	--	--	--
		VOCs								
		1,2,4-Trimethylbenzene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Ethyl Benzene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		M,P-XYLENES	0 / 16	0.0%	--	µg/kg	--	--	--	--
		o-Xylene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Styrene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Toluene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		SVOCs								
		bis(2-Ethylhexyl) phthalate	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Diethyl phthalate	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Dimethyl phthalate	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Di-n-butyl phthalate	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Di-n-octyl phthalate	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Pyrene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Pentachlorophenol	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Dioxins								
		2,3,7,8-TCDF	7 / 16	43.8%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.144**	0.151	0.155	0.13
		Total TCDF	6 / 16	37.5%	Detected data follow Appr. Gamma Distribution at 5% Significance Level	ng/kg	0.989	**0.803**	0.761	1.4
		2,3,7,8-TCDD	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total TCDD	16 / 16	100.0%	Data appear Normal at 5% Significance Level	ng/kg	**1.008**	1.097	1.146	0.96
		1,2,3,7,8-PECDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		2,3,4,7,8-PeCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total PeCDF	3 / 16	18.8%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.27**	0.232	0.219	0.37
		1,2,3,7,8-PeCDD	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total PeCDD	11 / 16	68.8%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.236**	0.281	0.319	0.22
		1,2,3,4,7,8-HxCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		1,2,3,6,7,8-HxCDF	1 / 16	6.3%	--	ng/kg	--	--	--	--
		2,3,4,6,7,8-HxCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		1,2,3,7,8,9-HxCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total HxCDF	3 / 16	18.8%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.0614**	0.0629	0.0635	0.061
		1,2,3,4,7,8-HxCDD	0 / 16	0.0%	--	ng/kg	--	--	--	--
		1,2,3,6,7,8-HxCDD	1 / 16	6.3%	--	ng/kg	--	--	--	--
		1,2,3,7,8,9-HxCDD	3 / 16	18.8%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.681**	0.723	0.77	0.79
		Total HxCDD	4 / 16	25.0%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.227**	0.24	0.247	0.21
		1,2,3,4,6,7,8-HpCDF	16 / 16	100.0%	Data appear Approximate Normal at 5% Significance Level	ng/kg	**0.147**	0.157	0.162	0.13
		1,2,3,4,7,8,9-HpCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total HpCDF	13 / 16	81.3%	Detected Data appear Lognormal at 5% Significance Level	ng/kg	0.268	0.322	**0.371**	0.24
		1,2,3,4,6,7,8-HpCDD	0 / 16	0.0%	--	ng/kg				
		Total HpCDD	15 / 16	93.8%	Detected Data appear Approximate Normal at 5% Significance Level	ng/kg	**0.759**	1.004	1.307	0.73
		OCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--

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TABLE 2
SELECTION OF BACKGROUND CONCENTRATIONS
MAKUA MILITARY RESERVATION
ROUND 1

Exposure Point	Biota Type	Chemical	Frequency of Detection	(%)	Appoximate Distribution	Units	Background Threshold Values 95% UTL with 95% Coverage			
							Assuming Normal Distribution	Assuming Gamma Distribution	Assuming Lognormal Distribution	Nonparametric Upper Limits
North Shore Oahu	Seaweed (Limu)	OCDD	1 / 16	6.3%	--	ng/kg	--	--	--	--
		Explosives								
		Perchlorate	12 / 16	75.0%	Detected Data appear Lognormal at 5% Significance Level	µg/Kg	3.259	3.749	**4.381**	3.9
		2,4-Dinitrotoluene2	0 / 16	0.0%	--	µg/Kg	--	--	--	--
		2,4-Dinitrotoluene3	0 / 16	0.0%	--	µg/Kg	--	--	--	--
		2,4-Dinitrotoluene4	0 / 16	0.0%	--	µg/Kg	--	--	--	--
		Hexahydro-trinitro-triazine (RDX)	0 / 16	0.0%	--	µg/Kg	--	--	--	--
		Nitroglycerine	0 / 16	0.0%	--	µg/Kg	--	--	--	--
		Metals								
		Inorganic Arsenic	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**2.02**	2.336	2.537	1.66
		Arsenic(III)	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**1.678**	1.924	2.083	1.45
		Arsenic(V)	13 / 16	81.3%	Detected data follow Appr. Gamma Distribution at 5% Significance Level	mg/kg	0.436	**0.472**	0.515	0.535
		Dimethyl Arsenic	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**0.373**	0.428	0.463	0.3
		Monomethyl Arsenic	1 / 16	6.3%	--	mg/kg	--	--	--	--
		Aluminum	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**642.3**	912.7	1316	630
		Antimony	10 / 16	62.5%	Data do not follow a Discernible Distribution (0.05)	mg/kg	0.027	0.0283	0.0486	**0.03**
		Arsenic	16 / 16	100.0%	Data appear Approximate Normal at 5% Significance Level	mg/kg	**3.692**	3.802	3.856	3.76
		Barium	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**3.088**	3.753	4.344	3.11
		Beryllium	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Cadmium	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**0.107**	0.123	0.132	0.09
		Chromium	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**4.158**	6.164	9.623	4.19
		Cobalt	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**0.374**	0.462	0.542	0.35
		Copper	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**0.966**	1.044	1.086	0.87
		Iron	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**1043**	1593	2463	932
		Lead	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**0.915**	1.032	1.101	0.81
		Manganese	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**17.83**	23.34	29.52	17.8
		Mercury	16 / 16	100.0%	Data appear Normal at 5% Significance Level	ng/g	**3.832**	4.298	4.595	3.33
		Methyl Mercury	0 / 16	0.0%	--	ng/g	--	--	--	--
		Selenium	7 / 16	43.8%	Data do not follow a Discernible Distribution (0.05)	mg/kg	0.0856	0.0858	0.0984	**0.093**
		Silver	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Thallium	14 / 16	87.5%	Detected Data appear Normal at 5% Significance Level	mg/kg	**0.00994**	0.0108	0.0113	0.009
		Vanadium	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**5.188**	5.928	6.467	5.02
		Zinc	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**2.834**	2.966	3.032	2.65

Notes:

Background concentrations calaculated for non-metals contaminants assumed due to bio accumulation of widespread organic contaminants, calculated based on biota samples collected in unimpacted areas on north shore O'ahu. Samples included in the background calculation include those collected from Mokulē'ia and Ka'ena Point.

Datasets with less than 4 detected values is not enough to compute meaningful or reliable statistics and estimates.

GOF = goodness of fit

mg/kg = milligrams per kilogram

Background Threshold Values (BTV) calculated by ProUCL version 5.0 (EPA, 2013)

ProUCL BTV based on recommended distribution is presented in **bold and shaded**

When data appeared to follow more than one distribution, the BTV based on an assumed normal distribution was selected.

N/A or "--" = not available/not applicable

UTL = Upper Tolerance Limit

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TABLE 3
SELECTION OF BACKGROUND CONCENTRATIONS
MAKUA MILITARY RESERVATION
ROUND 2

Exposure Point	Biota Type	Chemical	Frequency of Detection	(%)	Appoximate Distribution	Units	Background Threshold Values 95% UTL with 95% Coverage			
							Assuming Normal Distribution	Assuming Gamma Distribution	Assuming Lognormal Distribution	Nonparametric Upper Limits
North Shore Oahu (Mokulē'ia and Ka'ena Point)	Octopus (He'e)	**Pesticides**								
		Alpha-BHC	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Gamma-BHC (Lindane)	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Delta-BHC	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Heptachlor	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Aldrin	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Heptachlor Epoxide	0 / 16	0.0%	--	µg/kg	--	--	--	--
		p,p'-DDT	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Beta-BHC	0 / 16	0.0%	--	µg/kg	--	--	--	--
		VOCs								
		Toluene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Ethyl Benzene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		M,P-Xylenes	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Styrene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		o-Xylene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		1,2,4-Trimethylbenzene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		SVOCs								
		Dimethylphthalate	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Diethylphthalate	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Di-n-butylphthalate	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Pyrene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		bis(2-Ethylhexyl)phthalate	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Di-n-octylphthalate	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Pentachlorophenol	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Dioxins								
		2,3,7,8-TCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total TCDF	7 / 16	43.8%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.182**	0.192	0.198	0.19
		2,3,7,8-TCDD	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total TCDD	8 / 16	50.0%	Detected Data appear Approximate Normal at 5% Significance Level	ng/kg	**0.432**	0.525	0.615	0.48
		1,2,3,7,8-PeCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		2,3,4,7,8-PeCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total PeCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		1,2,3,7,8-PeCDD	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total PeCDD	0 / 16	0.0%	--	ng/kg	--	--	--	--
		1,2,3,4,7,8-HxCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		1,2,3,6,7,8-HxCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		2,3,4,6,7,8-HxCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		1,2,3,7,8,9-HxCDF	3 / 16	18.8%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.153**	0.16	0.164	0.16
		Total HxCDF	1 / 16	6.3%	--	ng/kg	--	--	--	--
		1,2,3,4,7,8-HxCDD	0 / 16	0.0%	--	ng/kg	--	--	--	--
		1,2,3,6,7,8-HxCDD	2 / 16	12.5%	Not Enough Data to Perform GOF Test	ng/kg	**0.12**	0.118	0.108	0.18
		1,2,3,7,8,9-HxCDD	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total HxCDD	0 / 16	0.0%	--	ng/kg	--	--	--	--
		1,2,3,4,6,7,8-HpCDF	3 / 16	18.8%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.122**	0.129	0.133	0.13
		1,2,3,4,7,8,9-HpCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total HpCDF	1 / 16	6.3%	--	ng/kg	--	--	--	--
		1,2,3,4,6,7,8-HpCDD	6 / 16	37.5%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.205**	0.23	0.248	0.21
		Total HpCDD	6 / 16	37.5%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.189**	0.204	0.212	0.17
		OCDF	1 / 16	6.3%	--	ng/kg	--	--	--	--
		OCDD	5 / 16	31.3%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.714**	0.718	0.723	0.82
		Explosives								
		Perchlorate	1 / 16	6.3%	--	µg/Kg	--	--	--	--
		2,4-Dinitrotoluene3	0 / 16	0.0%	--	µg/Kg	--	--	--	--
		2,4-Dinitrotoluene5	0 / 16	0.0%	--	µg/Kg	--	--	--	--
		Hexahydro-trinitro-triazine (RDX)	0 / 16	0.0%	--	µg/Kg	--	--	--	--
		Nitroglycerine	0 / 16	0.0%	--	µg/Kg	--	--	--	--
		Metals								
		Inorganic Arsenic	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Arsenic(III)	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Arsenic(V)	1 / 16	6.3%	--	mg/kg	--	--	--	--
		Dimethyl Arsenic	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**0.0234**	0.0274	0.0301	0.019
		Monomethyl Arsenic	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Aluminum	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Antimony	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Arsenic	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**47.36**	48.86	49.54	46.2
		Barium	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Beryllium	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Cadmium	15 / 16	93.8%	Detected Data appear Approximate Normal at 5% Significance Level	mg/kg	**0.0586**	0.0666	0.0761	0.07
		Chromium	7 / 16	43.8%	Detected Data appear Normal at 5% Significance Level	mg/kg	**0.228**	0.257	0.292	0.249
		Cobalt	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Copper	16 / 16	100.0%	Data do not follow a Discernible Distribution (0.05)	mg/kg	30.68	28.13	27.61	**40**

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TABLE 3
SELECTION OF BACKGROUND CONCENTRATIONS
MAKUA MILITARY RESERVATION
ROUND 2

Exposure Point	Biota Type	Chemical	Frequency of Detection	(%)	Appoximate Distribution	Units	Background Threshold Values 95% UTL with 95% Coverage			
							Assuming Normal Distribution	Assuming Gamma Distribution	Assuming Lognormal Distribution	Nonparametric Upper Limits
North Shore Oahu	Octopus (He'e)	Iron	16 / 16	100.0%	Data do not follow a Discernible Distribution (0.05)	mg/kg	154.3	95.81	75.27	**221**
		Lead	9 / 16	56.3%	Detected data follow Appr. Gamma Distribution at 5% Significance Level	mg/kg	0.593	**0.81**	1.939	0.778
		Manganese	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**0.415**	0.431	0.439	0.389
		Mercury	16 / 16	100.0%	Data appear Normal at 5% Significance Level	ng/g	**18.95**	19.96	20.48	18.6
		Methyl Mercury	16 / 16	100.0%	Data appear Normal at 5% Significance Level	ng/g	**14.83**	15.87	16.39	12.6
		Selenium	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Silver	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Thallium	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Vanadium	2 / 16	12.5%	Not Enough Data to Perform GOF Test	mg/kg	**0.0187**	0.0185	0.0264	0.021
		Zinc	16 / 16	100.0%	Data do not follow a Discernible Distribution (0.05)	mg/kg	26.09	25.72	25.62	**30**
	Sea Cucumber (Loli)	**Pesticides**								
		Alpha-BHC	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Gamma-BHC (Lindane)	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Delta-BHC	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Heptachlor	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Aldrin	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Heptachlor Epoxide	0 / 16	0.0%	--	µg/kg	--	--	--	--
		p,p'-DDT	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Beta-BHC	0 / 16	0.0%	--	µg/kg	--	--	--	--
		VOCs								
		Toluene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Ethyl Benzene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		M,P-Xylenes	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Styrene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		o-Xylene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		1,2,4-Trimethylbenzene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		SVOCs								
		Dimethylphthalate	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Diethylphthalate	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Di-n-butylphthalate	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Pyrene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		bis(2-Ethylhexyl)phthalate	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Di-n-octylphthalate	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Pentachlorophenol	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Dioxins								
		2,3,7,8-TCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total TCDF	14 / 16	87.5%	Detected data follow Appr. Gamma Distribution at 5% Significance Level	ng/kg	0.868	**1.304**	1.873	0.69
		2,3,7,8-TCDD	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total TCDD	8 / 16	50.0%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.211**	0.289	0.364	0.19
		1,2,3,7,8-PeCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		2,3,4,7,8-PeCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total PeCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		1,2,3,7,8-PeCDD	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total PeCDD	0 / 16	0.0%	--	ng/kg	--	--	--	--
		1,2,3,4,7,8-HxCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		1,2,3,6,7,8-HxCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		2,3,4,6,7,8-HxCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		1,2,3,7,8,9-HxCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total HxCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		1,2,3,4,7,8-HxCDD	2 / 16	12.5%	Not Enough Data to Perform GOF Test	ng/kg	**0.0654**	0.0678	0.0604	0.087
		1,2,3,6,7,8-HxCDD	5 / 16	31.3%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.12**	0.144	0.163	0.1
		1,2,3,7,8,9-HxCDD	4 / 16	25.0%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.0911**	0.106	0.115	0.088
		Total HxCDD	7 / 16	43.8%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.244**	0.252	0.264	0.3
		1,2,3,4,6,7,8-HpCDF	6 / 16	37.5%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.0725**	0.0745	0.0755	0.075
		1,2,3,4,7,8,9-HpCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total HpCDF	3 / 16	18.8%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.0706**	0.0709	0.0711	0.075
		1,2,3,4,6,7,8-HpCDD	2 / 16	12.5%	Not Enough Data to Perform GOF Test	ng/kg	**0.685**	0.659	0.706	0.75
		Total HpCDD	8 / 16	50.0%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.794**	1.126	1.625	0.84
		OCDF	3 / 16	18.8%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.136**	0.146	0.151	0.24
		OCDD	5 / 16	31.3%	Detected Data appear Normal at 5% Significance Level	ng/kg	**2.757**	3.992	5.453	2.3
		Explosives								
		Perchlorate	6 / 16	37.5%	Detected Data appear Approximate Normal at 5% Significance Level	µg/Kg	**0.74**	0.735	0.734	0.79
		2,4-Dinitrotoluene3	0 / 16	0.0%	--	µg/Kg	--	--	--	--
		2,4-Dinitrotoluene5	0 / 16	0.0%	--	µg/Kg	--	--	--	--
		Hexahydro-trinitro-triazine (RDX)	0 / 16	0.0%	--	µg/Kg	--	--	--	--
		Nitroglycerine	0 / 16	0.0%	--	µg/Kg	--	--	--	--
		Metals								
		Inorganic Arsenic	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**0.0928**	0.132	0.18	0.072
		Arsenic(III)	15 / 16	93.8%	Detected Data appear Lognormal at 5% Significance Level	mg/kg	0.0216	0.0245	**0.0266**	0.021
		Arsenic(V)	16 / 16	100.0%	Data appear Approximate Normal at 5% Significance Level	mg/kg	**0.0733**	0.105	0.14	0.057
		Dimethyl Arsenic	3 / 16	18.8%	Detected Data appear Approximate Normal at 5% Significance Level	mg/kg	**0.00603**	0.00606	0.00607	0.006

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TABLE 3
SELECTION OF BACKGROUND CONCENTRATIONS
MAKUA MILITARY RESERVATION
ROUND 2

Exposure Point	Biota Type	Chemical	Frequency of Detection	(%)	Appoximate Distribution	Units	Background Threshold Values 95% UTL with 95% Coverage			
							Assuming Normal Distribution	Assuming Gamma Distribution	Assuming Lognormal Distribution	Nonparametric Upper Limits
North Shore Oahu	Sea Cucumber (Loli)	Monomethyl Arsenic	1 / 16	6.3%	--	mg/kg	--	--	--	--
		Aluminum	14 / 16	87.5%	Detected Data appear Normal at 5% Significance Level	mg/kg	**23.09**	41.7	102.5	24.3
		Antimony	1 / 16	6.3%	--	mg/kg	--	--	--	--
		Arsenic	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**1.552**	1.8	1.969	1.38
		Barium	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**0.324**	0.419	0.504	0.28
		Beryllium	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Cadmium	1 / 16	6.3%	--	mg/kg	--	--	--	--
		Chromium	16 / 16	100.0%	Detected data appear Gamma Distributed at 5% Significance Level	mg/kg	0.614	**0.757**	0.929	0.596
		Cobalt	13 / 16	81.3%	Detected Data appear Normal at 5% Significance Level	mg/kg	**0.0805**	0.101	0.116	0.068
		Copper	16 / 16	100.0%	Data do not follow a Discernible Distribution (0.05)	mg/kg	27.13	15.79	10.6	**38.9**
		Iron	16 / 16	100.0%	Detected data appear Gamma Distributed at 5% Significance Level	mg/kg	63.49	**84.35**	108.8	62.8
		Lead	13 / 16	81.3%	Detected data follow Appr. Gamma Distribution at 5% Significance Level	mg/kg	1.545	**1.309**	2.058	2.25
		Manganese	16 / 16	100.0%	Data appear Approximate Normal at 5% Significance Level	mg/kg	**2.005**	2.504	3.207	2.37
		Mercury	8 / 16	50.0%	Data do not follow a Discernible Distribution (0.05)	ng/g	2.264	2.25	2.688	**3.12**
		Methyl Mercury	0 / 16	0.0%	--	ng/g	--	--	--	--
		Selenium	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**0.73**	0.777	0.796	0.68
		Silver	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Thallium	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Vanadium	16 / 16	100.0%	Data appear Approximate Normal at 5% Significance Level	mg/kg	**0.2**	0.242	0.277	0.19
		Zinc	13 / 16	81.3%	Data do not follow a Discernible Distribution (0.05)	mg/kg	14.94	11.03	13.11	**21.6**
	Seaweed (Limu)	**Pesticides**								
		Alpha-BHC	2 / 16	12.5%	Not Enough Data to Perform GOF Test	µg/kg	**33.09**	30.56	52.03	42.2
		Gamma-BHC (Lindane)	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Delta-BHC	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Heptachlor	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Aldrin	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Heptachlor Epoxide	0 / 16	0.0%	--	µg/kg	--	--	--	--
		p,p'-DDT	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Beta-BHC	0 / 16	0.0%	--	µg/kg	--	--	--	--
		VOCs								
		Toluene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Ethyl Benzene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		M,P-Xylenes	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Styrene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		o-Xylene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		1,2,4-Trimethylbenzene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		SVOCs								
		Dimethylphthalate	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Diethylphthalate	1 / 16	6.3%	--	µg/kg	--	--	--	--
		Di-n-butylphthalate	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Pyrene	0 / 16	0.0%	--	µg/kg	--	--	--	--
		bis(2-Ethylhexyl)phthalate	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Di-n-octylphthalate	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Pentachlorophenol	0 / 16	0.0%	--	µg/kg	--	--	--	--
		Dioxins								
		2,3,7,8-TCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total TCDF	8 / 16	50.0%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.484**	0.721	1.033	0.45
		2,3,7,8-TCDD	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total TCDD	10 / 16	62.5%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.249**	0.381	0.536	0.21
		1,2,3,7,8-PeCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		2,3,4,7,8-PeCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total PeCDF	2 / 16	12.5%	Not Enough Data to Perform GOF Test	ng/kg	**0.147**	0.108	0.0921	0.21
		1,2,3,7,8-PeCDD	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total PeCDD	0 / 16	0.0%	--	ng/kg	--	--	--	--
		1,2,3,4,7,8-HxCDF	1 / 16	6.3%	--	ng/kg	--	--	--	--
		1,2,3,6,7,8-HxCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		2,3,4,6,7,8-HxCDF	1 / 16	6.3%	--	ng/kg	--	--	--	--
		1,2,3,7,8,9-HxCDF	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total HxCDF	3 / 16	18.8%	Detected Data appear Approximate Normal at 5% Significance Level	ng/kg	**0.122**	0.143	0.161	0.11
		1,2,3,4,7,8-HxCDD	0 / 16	0.0%	--	ng/kg	--	--	--	--
		1,2,3,6,7,8-HxCDD	2 / 16	12.5%	Not Enough Data to Perform GOF Test	ng/kg	**0.0261**	0.0264	0.0226	0.17
		1,2,3,7,8,9-HxCDD	0 / 16	0.0%	--	ng/kg	--	--	--	--
		Total HxCDD	2 / 16	12.5%	Not Enough Data to Perform GOF Test	ng/kg	**0.141**	0.109	0.0865	0.2
		1,2,3,4,6,7,8-HpCDF	9 / 16	56.3%	Detected data appear Gamma Distributed at 5% Significance Level	ng/kg	0.182	**0.219**	0.259	0.19
		1,2,3,4,7,8,9-HpCDF	1 / 16	6.3%	--	ng/kg	--	--	--	--
		Total HpCDF	6 / 16	37.5%	Detected Data appear Approximate Normal at 5% Significance Level	ng/kg	**0.354**	0.419	0.584	0.46
		1,2,3,4,6,7,8-HpCDD	3 / 16	18.8%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.49**	0.554	0.521	0.63
		Total HpCDD	13 / 16	81.3%	Detected data appear Gamma Distributed at 5% Significance Level	ng/kg	1.317	**1.88**	2.849	1.2
		OCDF	3 / 16	18.8%	Detected Data appear Normal at 5% Significance Level	ng/kg	**0.513**	0.542	0.567	0.54
		OCDD	5 / 16	31.3%	Detected Data appear Normal at 5% Significance Level	ng/kg	**8.043**	10.64	14.06	6.9

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TABLE 3
SELECTION OF BACKGROUND CONCENTRATIONS
MAKUA MILITARY RESERVATION
ROUND 2

Exposure Point	Biota Type	Chemical	Frequency of Detection	(%)	Appoximate Distribution	Units	Background Threshold Values 95% UTL with 95% Coverage			
							Assuming Normal Distribution	Assuming Gamma Distribution	Assuming Lognormal Distribution	Nonparametric Upper Limits
North Shore Oahu	Seaweed (Limu)	**Explosives**								
		Perchlorate	12 / 16	75.0%	Detected Data appear Lognormal at 5% Significance Level	µg/Kg	10.25	11.99	**16.11**	12
		2,4-Dinitrotoluene3	0 / 16	0.0%	--	µg/Kg	--	--	--	--
		2,4-Dinitrotoluene5	0 / 16	0.0%	--	µg/Kg	--	--	--	--
		Hexahydro-trinitro-triazine (RDX)	0 / 16	0.0%	--	µg/Kg	--	--	--	--
		Nitroglycerine	0 / 16	0.0%	--	µg/Kg	--	--	--	--
		Metals								
		Inorganic Arsenic	16 / 16	100.0%	Data appear Lognormal at 5% Significance Level	mg/kg	1.605	1.919	**2.204**	1.42
		Arsenic(III)	16 / 16	100.0%	Data appear Lognormal at 5% Significance Level	mg/kg	1.394	1.649	**1.878**	1.39
		Arsenic(V)	9 / 16	56.3%	Detected Data appear Approximate Lognormal at 5% Significance Level	mg/kg	0.282	0.289	**0.303**	0.332
		Dimethyl Arsenic	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**0.311**	0.342	0.359	0.27
		Monomethyl Arsenic	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Aluminum	16 / 16	100.0%	Data appear Lognormal at 5% Significance Level	mg/kg	725.5	885.9	**1186**	838
		Antimony	13 / 16	81.3%	Detected Data appear Approximate Normal at 5% Significance Level	mg/kg	**0.0275**	0.0306	0.0327	0.028
		Arsenic	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**3.121**	3.301	3.4	3.12
		Barium	16 / 16	100.0%	Data appear Lognormal at 5% Significance Level	mg/kg	29.45	34.31	**48.96**	34.9
		Beryllium	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Cadmium	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**0.0623**	0.0718	0.0779	0.053
		Chromium	16 / 16	100.0%	Detected data appear Gamma Distributed at 5% Significance Level	mg/kg	3.275	**4.352**	6.479	3.65
		Cobalt	16 / 16	100.0%	Detected data appear Gamma Distributed at 5% Significance Level	mg/kg	0.451	**0.521**	0.613	0.523
		Copper	16 / 16	100.0%	Data appear Lognormal at 5% Significance Level	mg/kg	1.16	1.227	**1.268**	1.17
		Iron	16 / 16	100.0%	Data appear Approximate Normal at 5% Significance Level	mg/kg	**1046**	1514	2394	1140
		Lead	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**0.709**	0.855	0.981	0.7
		Manganese	16 / 16	100.0%	Data appear Lognormal at 5% Significance Level	mg/kg	21.65	23.16	**27.18**	27.4
		Mercury	16 / 16	100.0%	Detected Data appear Normal at 5% Significance Level	ng/g	**4.617**	4.943	5.118	4.38
		Methyl Mercury	0 / 16	0.0%	--	ng/g	--	--	--	--
		Selenium	8 / 16	50.0%	Detected Data appear Normal at 5% Significance Level	mg/kg	**0.148**	0.17	0.183	0.12
		Silver	0 / 16	0.0%	--	mg/kg	--	--	--	--
		Thallium	16 / 16	100.0%	Data appear Normal at 5% Significance Level	mg/kg	**0.00797**	0.00862	0.009	0.008
		Vanadium	16 / 16	100.0%	Detected data appear Gamma Distributed at 5% Significance Level	mg/kg	6.979	**7.53**	8.248	8.41
		Zinc	15 / 16	93.8%	Detected Data appear Normal at 5% Significance Level	mg/kg	**3.131**	3.767	4.255	2.81

Notes:

Background concentrations calaculated for non-metals contaminants assumed due to bio accumulation of widespread organic contaminants, calculated based on biota samples collected in unimpacted areas on north shore O'ahu. Samples included in the background calculation include those collected from Mokulē'ia and Ka'ena Point.

Datasets with less than 4 detected values is not enough to compute meaningful or reliable statistics and estimates.

GOF = goodness of fit

mg/kg = milligrams per kilogram

Background Threshold Values (BTV) calculated by ProUCL version 5.0 (EPA, 2013)

ProUCL BTV based on recommended distribution is presented in **bold and shaded**

When data appeared to follow more than one distribution, the BTV based on an assumed normal distribution was selected.

N/A or "--" = not available/not applicable

UTL = Upper Tolerance Limit

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TABLE 4
CALCULATION OF SCREENING VALUES

EPA Fish Advisories (USEPA 2000)

Noncarcinogens

SVn = (RfD * BW)/CR

where:

SVn	= Screening value for a noncarcinogen (mg/kg; ppm)	
RfD	= Oral reference dose (mg/kg - d)	see table below
BW	= Mean body weight of the general population or subpopulation of concern (kg). BW=70kg for all adults (EPA,	70
CR	= Site-specific daily consumption rate of fish based on 2012 Ordnance Reef consumption survey (grams/day). CR=160.57 g/d for high-end adult residential receptors.	0.16057

Carcinogens

SVc = [(MRL/CSF)*BW]/CR

where:

SVc	= Screening value for a carcinogen (mg/kg; ppm)	
MRL	= Maximum acceptable risk level (dimensionless) From EPA Office of Water	1.00E-05
CSF	= Oral cancer slope factor (mg/kg-d)	see table below
BW	= Mean body weight of the general population or subpopulation of concern (kg). BW=70kg for all adults (EPA, 1999)	70
CR	= Site-specific daily consumption rate of fish based on 2012 Ordnance Reef consumption survey (grams/day). CR=160.57 g/d for high-end adult residential receptors.	0.16057

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TABLE 4
CALCULATION OF SCREENING VALUES

Analyte	RfD From EPA IRIS (mg/kg-d)	RfD From EPA RSL's (mg/kg-d)	FINAL RfD (mg/kg-d)	CSF From EPA IRIS (mg/kg-d)	CSF From EPA RSLs (mg/kg-d)	FINAL CSF (mg/kg-d)	Fish Advisories SVn (mg/kg)	Fish Advisories SVc (mg/kg)	Final SV from Fish Advisories (mg/kg)
Dioxins/Furans									
HpCDD	not defined	not defined	not defined	not defined	1.30E+03	1.30E+03	not defined	3.35E-06	3.35E-06
HpCDF	not defined	not defined	not defined	not defined	1.30E+03	1.30E+03	not defined	3.35E-06	3.35E-06
HxCDD	not defined	not defined	not defined	not defined	1.30E+04	1.30E+04	not defined	3.35E-07	3.35E-07
HxCDF	not defined	not defined	not defined	not defined	1.30E+04	1.30E+04	not defined	3.35E-07	3.35E-07
PeCDD	not defined	not defined	not defined	not defined	1.30E+05	1.30E+05	not defined	3.35E-08	3.35E-08
PeCDF	not defined	not defined	not defined	not defined	3.90E+04	3.90E+04	not defined	1.12E-07	1.12E-07
OCDD	not defined	not defined	not defined	not defined	3.90E+01	3.90E+01	not defined	1.12E-04	1.12E-04
OCDF	not defined	not defined	not defined	not defined	3.90E+01	3.90E+01	not defined	1.12E-04	1.12E-04
TCDF	not defined	not defined	not defined	not defined	1.30E+04	1.30E+04	not defined	3.35E-07	3.35E-07
TCDD	7.00E-10	7.00E-10	7.00E-10	not defined	1.30E+05	1.30E+05	3.05E-07	3.35E-08	3.35E-08
Gasoline (Purgeable Organics)									
Ethylbenzene	1.00E-01	1.00E-01	1.00E-01	not defined	1.10E-02	1.10E-02	4.36E+01	3.96E-01	3.96E-01
m-Xylene	2.00E-01	2.00E-01	2.00E-01	not defined	not defined	not defined	8.72E+01	not defined	8.72E+01
p-Xylene	2.00E-01	2.00E-01	2.00E-01	not defined	not defined	not defined	8.72E+01	not defined	8.72E+01
o-Xylene	2.00E-01	2.00E-01	2.00E-01	not defined	not defined	not defined	8.72E+01	not defined	8.72E+01
Toluene	8.00E-02	8.00E-02	8.00E-02	not defined	not defined	not defined	3.49E+01	not defined	3.49E+01
Stryrene	2.00E-01	2.00E-01	2.00E-01	not defined	not defined	not defined	8.72E+01	not defined	8.72E+01
1,2,4-Trimethylbenzene	not defined	not defined	not defined	not defined	not defined	not defined	not defined	not defined	not defined
Metals									
Aluminium	not defined	1.00E+00	1.00E+00	not defined	not defined	not defined	4.36E+02	not defined	4.36E+02
Antimony	4.00E-04	4.00E-04	4.00E-04	not defined	not defined	not defined	1.74E-01	not defined	1.74E-01
Inorganic Arsenic	3.00E-04	3.00E-04	3.00E-04	1.50E+00	1.50E+00	1.50E+00	1.31E-01	2.91E-03	2.91E-03
Barium	2.00E-01	2.00E-01	2.00E-01	not defined	not defined	not defined	8.72E+01	not defined	8.72E+01
Beryllium	2.00E-03	2.00E-03	2.00E-03	not defined	not defined	not defined	8.72E-01	not defined	8.72E-01
Cadmium	1.00E-03	1.00E-03	1.00E-03	not defined	not defined	not defined	4.36E-01	not defined	4.36E-01
Chromium (VI)	3.00E-03	3.00E-03	3.00E-03	not defined	5.00E-01	5.00E-01	1.31E+00	8.72E-03	8.72E-03
Cobalt	not defined	3.00E-04	3.00E-04	not defined	not defined	not defined	1.31E-01	not defined	1.31E-01
Copper	not defined	4.00E-02	4.00E-02	not defined	not defined	not defined	1.74E+01	not defined	1.74E+01
Iron	not defined	7.00E-01	7.00E-01	not defined	not defined	not defined	3.05E+02	not defined	3.05E+02
Lead	not defined	not defined	not defined	not defined	not defined	not defined	not defined	not defined	not defined
Manganese	1.40E-01	1.40E-01	1.40E-01	not defined	not defined	not defined	6.10E+01	not defined	6.10E+01
Mercury	3.00E-04	3.00E-04	3.00E-04	not defined	not defined	not defined	1.31E-01	not defined	1.31E-01
Methyl Mercury	not defined	1.00E-04	1.00E-04	not defined	not defined	not defined	4.36E-02	not defined	4.36E-02
Selenium	5.00E-03	5.00E-03	5.00E-03	not defined	not defined	not defined	2.18E+00	not defined	2.18E+00
Silver	5.00E-03	5.00E-03	5.00E-03	not defined	not defined	not defined	2.18E+00	not defined	2.18E+00
Thallium	not defined	1.00E-05	1.00E-05	not defined	not defined	not defined	4.36E-03	not defined	4.36E-03
Vanadium	not defined	5.00E-03	5.00E-03	not defined	not defined	not defined	2.18E+00	not defined	2.18E+00
Zinc	3.00E-01	3.00E-01	3.00E-01	not defined	not defined	not defined	1.31E+02	not defined	1.31E+02
Explosives (Nitroaromatics/Nitramines)									
2,4 - Dinitrotoluene	2.00E-03	2.00E-03	2.00E-03	not defined	3.10E-01	3.10E-01	8.72E-01	1.41E-02	1.41E-02
RDX	3.00E-03	3.00E-03	3.00E-03	1.10E-01	1.10E-01	1.10E-01	1.31E+00	3.96E-02	3.96E-02
Nitroglycerin	not defined	1.00E-04	1.00E-04	not defined	1.70E-02	1.70E-02	4.36E-02	2.56E-01	4.36E-02
Perchlorate	7.00E-04	7.00E-04	7.00E-04	not defined	not defined	not defined	3.05E-01	not defined	3.05E-01
Organochlorine Pesticides									
4,4'-DDT	5.00E-04	5.00E-04	5.00E-04	3.40E-01	3.40E-01	3.40E-01	2.18E-01	1.28E-02	1.28E-02
Aldrin	3.00E-05	3.00E-05	3.00E-05	1.70E+01	1.70E+01	1.70E+01	1.31E-02	2.56E-04	2.56E-04
alpha BHC	not defined	8.00E-03	8.00E-03	6.30E+00	6.30E+00	6.30E+00	3.49E+00	6.92E-04	6.92E-04
beta BHC	not defined	not defined	not defined	1.80E+00	1.80E+00	1.80E+00	not defined	2.42E-03	2.42E-03
delta BHC	not defined	not defined	not defined	not defined	not defined	not defined	not defined	not defined	not defined
gamma BHC (Lindane)	3.00E-04	3.00E-04	3.00E-04	not defined	1.10E+00	1.10E+00	1.31E-01	3.96E-03	3.96E-03
Heptachlor	5.00E-04	5.00E-04	5.00E-04	4.50E+00	4.50E+00	4.50E+00	2.18E-01	9.69E-04	9.69E-04
Heptachlor epoxide	1.30E-05	1.30E-05	1.30E-05	9.10E+00	9.10E+00	9.10E+00	5.67E-03	4.79E-04	4.79E-04

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TABLE 4
CALCULATION OF SCREENING VALUES

VOCs/SVOCs									
Pyrene	3.00E-02	3.00E-02	3.00E-02	not defined	not defined	not defined	1.31E+01	not defined	1.31E+01
Pentachlorophenol	5.00E-03	5.00E-03	5.00E-03	4.00E-01	4.00E-01	4.00E-01	2.18E+00	1.09E-02	1.09E-02
Phthalate Esters:									
Bis(2-ethylhexyl) phthalate	2.00E-02	2.00E-02	2.00E-02	1.40E-02	1.40E-02	1.40E-02	8.72E+00	3.11E-01	3.11E-01
Di-n-butyl phthalate	1.00E-01	1.00E-01	1.00E-01	not defined	not defined	not defined	4.36E+01	not defined	4.36E+01
Diethyl phthalate	8.00E-01	8.00E-01	8.00E-01	not defined	not defined	not defined	3.49E+02	not defined	3.49E+02
Dimethyl phthalate	not defined	not defined	not defined	not defined	not defined	not defined	not defined	not defined	not defined
Di-n-octyl phthalate	not defined	1.00E-02	1.00E-02	not defined	not defined	not defined	4.36E+00	not defined	4.36E+00
Metal Speciation									
Inorganic Arsenic	3.00E-04	3.00E-04	3.00E-04	1.50E+00	1.50E+00	1.50E+00	1.31E-01	2.91E-03	2.91E-03

Notes:
Screening Values were calculated based on the 2009 Ordnance Reef Remedial Investigation, which performed a limited seafood consumption survey in 2010. Consumption rate was based on the "high-end" seafood consumers of fish (USACE, 2014). Fish consumption rates were determined to be adequately conservative for screening biota types including octopus, sea cucumber and seaweed studied from Mauka
Final RfD values are the lower value between the EPA IRIS and EPA RSL values. Final CSF values are the higher value between the EPA IRIS and EPA RSL values
Screening Values calculated by methods described in US EPA Fish Advisories (USEPA, 2000) using default parameters and the lower RfD and higher CSF from EPA IRIS or EPA RSLs
Final Screening Value (SV) is the lowest of the carcinogenic and noncarcinogenic SV
No Screening Value could be determined for Trimethylbenzene, 1,2,4- as only the inhalation pathway is considered (only an RfC has been defined)
CSFs for the dioxin congeners are calculated from the toxicity of 2,3,7,8-TCDD based on World Health Organization toxic equivalency factors (WHO, 2005)
Exact congener of PeCDF was not defined, therefore this assessment used a TEF of 0.3 for 2,3,4,7,8-PeCDF
IRIS - EPA Integrated Risk Information System
NSL - No Screening Level available to compare to Proposed RL
RL - Reporting Limit
RSL - EPA Region Screening Level Tables (EPA, 2014)

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TABLE 5

OCCURRENCE, RISK-BASED SCREENING AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MAKUA MILITARY RESERVATION

ROUND 1

Exposure Point	Biota	Chemical	Maximum Concentration Detected (Qualifier)	Units	Sample of Max Detect	Detection Frequency	(%)	Maximum Detection Limit	Concentration Used for Screening (Maximum Detected) (Qualifier)	Project Screening Levels	Background Conc.	Screening Toxicity Value	Screening Level Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Makua Military Reservation	Octopus	**Pesticides**													
		Aldrin	-	µg/kg	-	0 / 8	0.0%	4	-	2.56E-01	--	2.56E-01	SV	N	ND
		Alpha-BHC	-	µg/kg	-	0 / 8	0.0%	4	-	6.92E-01	--	6.92E-01	SV	N	ND
		Beta-BHC	-	µg/kg	-	0 / 8	0.0%	4	-	2.42E+00	--	2.42E+00	SV	N	ND
		Delta-BHC	-	µg/kg	-	0 / 8	0.0%	4	-	not defined	--	not defined	SV	N	ND
		Gamma-BHC (Lindane)	-	µg/kg	-	0 / 8	0.0%	4	-	3.96E+00	--	3.96E+00	SV	N	ND
		Heptachlor	-	µg/kg	-	0 / 8	0.0%	4	-	9.69E-01	--	9.69E-01	SV	N	ND
		Heptachlor Epoxide	-	µg/kg	-	0 / 8	0.0%	4	-	4.79E-01	--	4.79E-01	SV	N	ND
		p,p'-DDT	-	µg/kg	-	0 / 8	0.0%	4	-	1.28E+01	--	1.28E+01	SV	N	ND
		VOCs													
		1,2,4-Trimethylbenzene	-	µg/kg	-	0 / 8	0.0%	2.5	-	not defined	--	not defined	SV	N	ND
		Ethyl Benzene	-	µg/kg	-	0 / 8	0.0%	2.5	-	3.96E+02	--	3.96E+02	SV	N	ND
		M,P-XYLENES	-	µg/kg	-	0 / 8	0.0%	5	-	8.72E+04	--	8.72E+04	SV	N	ND
		o-Xylene	-	µg/kg	-	0 / 8	0.0%	2.5	-	8.72E+04	--	8.72E+04	SV	N	ND
		Styrene	-	µg/kg	-	0 / 8	0.0%	2.5	-	8.72E+04	--	8.72E+04	SV	N	ND
		Toluene	-	µg/kg	-	0 / 8	0.0%	2.5	-	3.49E+04	--	3.49E+04	SV	N	ND
		SVOCs													
		bis(2-Ethylhexyl) phthalate	-	µg/kg	-	0 / 8	0.0%	200	-	3.11E+02	564.9	5.65E+02	BG	N	ND
		Diethyl phthalate	-	µg/kg	-	0 / 8	0.0%	200	-	3.49E+05	--	3.49E+05	SV	N	ND
		Dimethyl phthalate	-	µg/kg	-	0 / 8	0.0%	200	-	not defined	--	not defined	SV	N	ND
		Di-n-butyl phthalate	-	µg/kg	-	0 / 8	0.0%	200	-	4.36E+04	--	4.36E+04	SV	N	ND
		Di-n-octyl phthalate	-	µg/kg	-	0 / 8	0.0%	200	-	4.36E+03	--	4.36E+03	SV	N	ND
		Pyrene	-	µg/kg	-	0 / 8	0.0%	200	-	1.31E+04	--	1.31E+04	SV	N	ND
		Pentachlorophenol	-	µg/kg	-	0 / 8	0.0%	300	-	1.09E+01	--	1.09E+01	SV	N	ND
		Dioxins													
		2,3,7,8-TCDF	-	ng/kg	-	0 / 8	0.0%	0.084	-	3.35E-01	--	3.35E-01	SV	N	ND
		Total TCDF	0.17 J	ng/kg	MAK005O	4 / 8	50.0%	0.084	0.17	3.35E-01	0.18	3.35E-01	SV	N	BSV
		2,3,7,8-TCDD	-	ng/kg	-	0 / 8	0.0%	0.11	-	3.35E-02	--	3.35E-02	SV	N	ND
		Total TCDD	0.58	ng/kg	MAK001O	6 / 8	75.0%	0.11	0.58	3.35E-02	0.664	6.64E-01	BG	N	BSV
		1,2,3,7,8-PECDF	-	ng/kg	-	0 / 8	0.0%	0.12	-	1.12E-01	--	1.12E-01	SV	N	ND
		2,3,4,7,8-PeCDF	-	ng/kg	-	0 / 8	0.0%	0.096	-	1.12E-01	--	1.12E-01	SV	N	ND
		Total PeCDF	-	ng/kg	-	0 / 8	0.0%	0.11	-	1.12E-01	--	1.12E-01	SV	N	ND
		1,2,3,7,8-PeCDD	-	ng/kg	-	0 / 8	0.0%	0.25	-	3.35E-02	--	3.35E-02	SV	N	ND
		Total PeCDD	1.4	ng/kg	MAK004O	1 / 8	12.5%	1.4	1.4	3.35E-02	--	3.35E-02	SV	**Y**	ASV
		1,2,3,4,7,8-HxCDF	-	ng/kg	-	0 / 8	0.0%	0.14	-	3.35E-01	--	3.35E-01	SV	N	ND
		1,2,3,6,7,8-HxCDF	-	ng/kg	-	0 / 8	0.0%	0.13	-	3.35E-01	--	3.35E-01	SV	N	ND
		2,3,4,6,7,8-HxCDF	-	ng/kg	-	0 / 8	0.0%	0.12	-	3.35E-01	--	3.35E-01	SV	N	ND
		1,2,3,7,8,9-HxCDF	-	ng/kg	-	0 / 8	0.0%	0.18	-	3.35E-01	--	3.35E-01	SV	N	ND
		Total HxCDF	-	ng/kg	-	0 / 8	0.0%	0.14	-	3.35E-01	0.111	3.35E-01	SV	N	ND
		1,2,3,4,7,8-HxCDD	-	ng/kg	-	0 / 8	0.0%	0.17	-	3.35E-01	--	3.35E-01	SV	N	ND
		1,2,3,6,7,8-HxCDD	-	ng/kg	-	0 / 8	0.0%	0.21	-	3.35E-01	--	3.35E-01	SV	N	ND

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TABLE 5

OCCURRENCE, RISK-BASED SCREENING AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MAKUA MILITARY RESERVATION

ROUND 1

Exposure Point	Biota	Chemical	Maximum Concentration Detected (Qualifier)	Units	Sample of Max Detect	Detection Frequency	(%)	Maximum Detection Limit	Concentration Used for Screening (Maximum Detected) (Qualifier)	Project Screening Levels	Background Conc.	Screening Toxicity Value	Screening Level Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Makua Military Reservation	Octopus	1,2,3,7,8,9-HxCDD	-	ng/kg	-	0 / 8	0.0%	0.19	-	3.35E-01	--	3.35E-01	SV	N	ND
		Total HxCDD	0.14	ng/kg	MAK002O	1 / 8	12.5%	0.18	0.14	3.35E-01	0.298	3.35E-01	SV	N	BSV
		1,2,3,4,6,7,8-HpCDF	0.068	ng/kg	MAK001O	1 / 8	12.5%	0.11	0.068	3.35E+00	--	3.35E+00	SV	N	BSV
		1,2,3,4,7,8,9-HpCDF	-	ng/kg	-	0 / 8	0.0%	0.16	-	3.35E+00	--	3.35E+00	SV	N	ND
		Total HpCDF	0.22	ng/kg	MAK001O	3 / 8	37.5%	0.13	0.22	3.35E+00	0.304	3.35E+00	SV	N	BSV
		1,2,3,4,6,7,8-HpCDD	0.37	ng/kg	MAK001O	7 / 8	87.5%	0.13	0.37	3.35E+00	--	3.35E+00	SV	N	BSV
		Total HpCDD	0.71	ng/kg	MAK001O	6 / 8	75.0%	0.18	0.71	3.35E+00	1.102	3.35E+00	SV	N	BSV
		OCDF	-	ng/kg	-	0 / 8	0.0%	0.97	-	1.12E+02	--	1.12E+02	SV	N	ND
		OCDD	-	ng/kg	-	0 / 8	0.0%	1.7	-	1.12E+02	--	1.12E+02	SV	N	ND
		Explosives													
		Perchlorate	0.62 J J	µg/Kg	MAK007O	1 / 8	12.5%	0.3	0.62	3.05E+02	--	3.05E+02	SV	N	BSV
		2,4-Dinitrotoluene2	-	µg/Kg	-	0 / 8	0.0%	100	-	1.41E+01	--	1.41E+01	SV	N	ND
		2,4-Dinitrotoluene3	-	µg/Kg	-	0 / 8	0.0%	-	-	1.41E+01	--	1.41E+01	SV	N	ND
		2,4-Dinitrotoluene4	-	µg/Kg	-	0 / 8	0.0%	-	-	1.41E+01	--	1.41E+01	SV	N	ND
		Hexahydro-trinitro-triazine (RDX)	-	µg/Kg	-	0 / 8	0.0%	200	-	3.96E+01	--	3.96E+01	SV	N	ND
		Nitroglycerine	-	µg/Kg	-	0 / 8	0.0%	300	-	4.36E+01	--	4.36E+01	SV	N	ND
		Metals													
		Inorganic Arsenic	-	mg/kg	-	0 / 8	0.0%	0.004	-	2.91E-03	--	2.91E-03	SV	N	ND
		Aluminum	0.58 B J	mg/kg	MAK008O	4 / 8	50.0%	0.14	0.58	4.36E+02	3.686	4.36E+02	SV	N	BSV
		Antimony	0.012 B J	mg/kg	MAK007O	1 / 8	12.5%	0.007	0.012	1.74E-01	--	1.74E-01	SV	N	BSV
		Arsenic	37.8	mg/kg	MAK006O	8 / 8	100.0%	-	37.8	2.91E-03	44.06	4.41E+01	BG	N	BSV
		Barium	-	mg/kg	-	0 / 8	0.0%	0.03	-	8.72E+01	--	8.72E+01	SV	N	ND
		Beryllium	-	mg/kg	-	0 / 8	0.0%	0.03	-	8.72E-01	--	8.72E-01	SV	N	ND
		Cadmium	0.008 B J	mg/kg	MAK006O	1 / 8	12.5%	0.007	0.008	4.36E-01	0.0369	4.36E-01	SV	N	BSV
		Chromium	0.298	mg/kg	MAK001O	1 / 8	12.5%	0.018	0.298	8.72E-03	0.388	3.88E-01	BG	N	BSV
		Cobalt	-	mg/kg	-	0 / 8	0.0%	0.02	-	1.31E-01	--	1.31E-01	SV	N	ND
		Copper	14.5	mg/kg	MAK003O	8 / 8	100.0%	-	14.5	1.74E+01	12.67	1.74E+01	SV	N	BSV
		Iron	-	mg/kg	-	0 / 8	0.0%	0.081	-	3.05E+02	--	3.05E+02	SV	N	ND
		Lead	0.36	mg/kg	MAK003O	8 / 8	100.0%	-	0.36	not defined	0.26	2.60E-01	BG	**Y**	ASV
		Manganese	0.289	mg/kg	MAK007O	8 / 8	100.0%	-	0.289	6.10E+01	0.348	6.10E+01	SV	N	BSV
		Mercury	17.4	ng/g	MAK006O	8 / 8	100.0%	-	17.4	1.31E+02	17.36	1.31E+02	SV	N	BSV
		Methyl Mercury	11.4	ng/g	MAK006O	8 / 8	100.0%	-	11.4	4.36E+01	15.31	4.36E+01	SV	N	BSV
		Selenium	0.294	mg/kg	MAK007O	8 / 8	100.0%	-	0.294	2.18E+00	0.381	2.18E+00	SV	N	BSV
		Silver	-	mg/kg	-	0 / 8	0.0%	0.02	-	2.18E+00	--	2.18E+00	SV	N	ND
		Thallium	-	mg/kg	-	0 / 8	0.0%	0.002	-	4.36E-03	--	4.36E-03	SV	N	ND
		Vanadium	-	mg/kg	-	0 / 8	0.0%	0.014	-	2.18E+00	--	2.18E+00	SV	N	ND
		Zinc	14.1	mg/kg	MAK003O	8 / 8	100.0%	-	14.1	1.31E+02	17.16	1.31E+02	SV	N	BSV

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TABLE 5
OCCURRENCE, RISK-BASED SCREENING AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
MAKUA MILITARY RESERVATION
ROUND 1

Exposure Point	Biota	Chemical	Maximum Concentration Detected (Qualifier)	Units	Sample of Max Detect	Detection Frequency	(%)	Maximum Detection Limit	Concentration Used for Screening (Maximum Detected) (Qualifier)	Project Screening Levels	Background Conc.	Screening Toxicity Value	Screening Level Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Makua Military Reservation	Cucumber	**Pesticides**													
		Aldrin	-	µg/kg	-	0 / 8	0.0%	4	-	2.56E-01	--	2.56E-01	SV	N	ND
		Alpha-BHC	-	µg/kg	-	0 / 8	0.0%	4	-	6.92E-01	--	6.92E-01	SV	N	ND
		Beta-BHC	-	µg/kg	-	0 / 8	0.0%	4	-	2.42E+00	--	2.42E+00	SV	N	ND
		Delta-BHC	-	µg/kg	-	0 / 8	0.0%	4	-	not defined	--	not defined	SV	N	ND
		Gamma-BHC (Lindane)	-	µg/kg	-	0 / 8	0.0%	4	-	3.96E+00	--	3.96E+00	SV	N	ND
		Heptachlor	-	µg/kg	-	0 / 8	0.0%	4	-	9.69E-01	--	9.69E-01	SV	N	ND
		Heptachlor Epoxide	-	µg/kg	-	0 / 8	0.0%	4	-	4.79E-01	--	4.79E-01	SV	N	ND
		p,p'-DDT	-	µg/kg	-	0 / 8	0.0%	4	-	1.28E+01	--	1.28E+01	SV	N	ND
		VOCs													
		1,2,4-Trimethylbenzene	-	µg/kg	-	0 / 8	0.0%	2.5	-	not defined	--	not defined	SV	N	ND
		Ethyl Benzene	-	µg/kg	-	0 / 8	0.0%	2.5	-	3.96E+02	--	3.96E+02	SV	N	ND
		M,P-XYLENES	-	µg/kg	-	0 / 8	0.0%	5	-	8.72E+04	--	8.72E+04	SV	N	ND
		o-Xylene	-	µg/kg	-	0 / 8	0.0%	2.5	-	8.72E+04	--	8.72E+04	SV	N	ND
		Styrene	-	µg/kg	-	0 / 8	0.0%	2.5	-	8.72E+04	--	8.72E+04	SV	N	ND
		Toluene	-	µg/kg	-	0 / 8	0.0%	2.5	-	3.49E+04	--	3.49E+04	SV	N	ND
		SVOCs													
		bis(2-Ethylhexyl) phthalate	-	µg/kg	-	0 / 8	0.0%	200	-	3.11E+02	--	3.11E+02	SV	N	ND
		Diethyl phthalate	-	µg/kg	-	0 / 8	0.0%	200	-	3.49E+05	--	3.49E+05	SV	N	ND
		Dimethyl phthalate	-	µg/kg	-	0 / 8	0.0%	200	-	not defined	--	not defined	SV	N	ND
		Di-n-butyl phthalate	-	µg/kg	-	0 / 8	0.0%	200	-	4.36E+04	--	4.36E+04	SV	N	ND
		Di-n-octyl phthalate	-	µg/kg	-	0 / 8	0.0%	200	-	4.36E+03	--	4.36E+03	SV	N	ND
		Pyrene	-	µg/kg	-	0 / 8	0.0%	200	-	1.31E+04	--	1.31E+04	SV	N	ND
		Pentachlorophenol	-	µg/kg	-	0 / 8	0.0%	300	-	1.09E+01	--	1.09E+01	SV	N	ND
		Dioxins													
		2,3,7,8-TCDF	-	ng/kg	-	0 / 8	0.0%	0.099	-	3.35E-01	0.122	3.35E-01	SV	N	ND
		Total TCDF	0.1 J	ng/kg	MAK009C	1 / 8	12.5%	0.099	0.1	3.35E-01	0.336	3.36E-01	BG	N	BSV
		2,3,7,8-TCDD	-	ng/kg	-	0 / 8	0.0%	0.19	-	3.35E-02	--	3.35E-02	SV	N	ND
		Total TCDD	0.91	ng/kg	MAK001C	6 / 8	75.0%	0.19	0.91	3.35E-02	1.858	1.86E+00	BG	N	BSV
		1,2,3,7,8-PECDF	-	ng/kg	-	0 / 8	0.0%	0.14	-	1.12E-01	--	1.12E-01	SV	N	ND
		2,3,4,7,8-PeCDF	-	ng/kg	-	0 / 8	0.0%	0.082	-	1.12E-01	--	1.12E-01	SV	N	ND
		Total PeCDF	-	ng/kg	-	0 / 8	0.0%	0.11	-	1.12E-01	0.169	1.69E-01	BG	N	ND
		1,2,3,7,8-PeCDD	-	ng/kg	-	0 / 8	0.0%	0.2	-	3.35E-02	--	3.35E-02	SV	N	ND
		Total PeCDD	0.12	ng/kg	MAK006C	1 / 8	12.5%	0.2	0.12	3.35E-02	0.186	1.86E-01	BG	N	BSV
		1,2,3,4,7,8-HxCDF	-	ng/kg	-	0 / 8	0.0%	0.12	-	3.35E-01	--	3.35E-01	SV	N	ND
		1,2,3,6,7,8-HxCDF	-	ng/kg	-	0 / 8	0.0%	0.11	-	3.35E-01	--	3.35E-01	SV	N	ND
		2,3,4,6,7,8-HxCDF	-	ng/kg	-	0 / 8	0.0%	0.099	-	3.35E-01	0.0661	3.35E-01	SV	N	ND
		1,2,3,7,8,9-HxCDF	-	ng/kg	-	0 / 8	0.0%	0.16	-	3.35E-01	--	3.35E-01	SV	N	ND
		Total HxCDF	-	ng/kg	-	0 / 8	0.0%	0.12	-	3.35E-01	0.1	3.35E-01	SV	N	ND
		1,2,3,4,7,8-HxCDD	-	ng/kg	-	0 / 8	0.0%	0.23	-	3.35E-01	--	3.35E-01	SV	N	ND
		1,2,3,6,7,8-HxCDD	-	ng/kg	-	0 / 8	0.0%	0.32	-	3.35E-01	--	3.35E-01	SV	N	ND

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TABLE 5

OCCURRENCE, RISK-BASED SCREENING AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MAKUA MILITARY RESERVATION

ROUND 1

Exposure Point	Biota	Chemical	Maximum Concentration Detected (Qualifier)	Units	Sample of Max Detect	Detection Frequency	(%)	Maximum Detection Limit	Concentration Used for Screening (Maximum Detected) (Qualifier)	Project Screening Levels	Background Conc.	Screening Toxicity Value	Screening Level Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Makua Military Reservation	Cucumber	1,2,3,7,8,9-HxCDD	-	ng/kg	-	0 / 8	0.0%	0.27	-	3.35E-01	0.093	3.35E-01	SV	N	ND
		Total HxCDD	0.21	ng/kg	MAK006C	1 / 8	12.5%	0.27	0.21	3.35E-01	0.418	4.18E-01	BG	N	BSV
		1,2,3,4,6,7,8-HpCDF	-	ng/kg	-	0 / 8	0.0%	0.15	-	3.35E+00	0.0745	3.35E+00	SV	N	ND
		1,2,3,4,7,8,9-HpCDF	-	ng/kg	-	0 / 8	0.0%	0.18	-	3.35E+00	--	3.35E+00	SV	N	ND
		Total HpCDF	0.18	ng/kg	MAK001C	4 / 8	50.0%	0.16	0.18	3.35E+00	0.154	3.35E+00	SV	N	BSV
		1,2,3,4,6,7,8-HpCDD	0.46 JZ	ng/kg	MAK001C	6 / 8	75.0%	0.41	0.46	3.35E+00	0.885	3.35E+00	SV	N	BSV
		Total HpCDD	0.67	ng/kg	MAK001C	8 / 8	100.0%	-	0.67	3.35E+00	2.759	3.35E+00	SV	N	BSV
		OCDF	-	ng/kg	-	0 / 8	0.0%	0.33	-	1.12E+02	0.327	1.12E+02	SV	N	ND
		OCDD	-	ng/kg	-	0 / 8	0.0%	0.65	-	1.12E+02	4.613	1.12E+02	SV	N	ND
		Explosives													
		Perchlorate	-	µg/Kg	-	0 / 8	0.0%	0.3	-	3.05E+02	--	3.05E+02	SV	N	ND
		2,4-Dinitrotoluene2	-	µg/Kg	-	0 / 8	0.0%	100	-	1.41E+01	--	1.41E+01	SV	N	ND
		2,4-Dinitrotoluene3	-	µg/Kg	-	0 / 8	0.0%	-	-	1.41E+01	--	1.41E+01	SV	N	ND
		2,4-Dinitrotoluene4	-	µg/Kg	-	0 / 8	0.0%	-	-	1.41E+01	--	1.41E+01	SV	N	ND
		Hexahydro-trinitro-triazine (RDX)	-	µg/Kg	-	0 / 8	0.0%	200	-	3.96E+01	--	3.96E+01	SV	N	ND
		Nitroglycerine	-	µg/Kg	-	0 / 8	0.0%	300	-	4.36E+01	--	4.36E+01	SV	N	ND
		Metals													
		Inorganic Arsenic	0.034	mg/kg	MAK009C	8 / 8	100.0%	-	0.034	2.91E-03	0.0282	2.82E-02	BG	**Y**	ASV
		Aluminum	9.46	mg/kg	MAK006C	8 / 8	100.0%	-	9.46	4.36E+02	4.256	4.36E+02	SV	N	BSV
		Antimony	0.011 B J	mg/kg	MAK009C	1 / 8	12.5%	0.007	0.011	1.74E-01	--	1.74E-01	SV	N	BSV
		Arsenic	0.719	mg/kg	MAK004C	8 / 8	100.0%	-	0.719	2.91E-03	18.5	1.85E+01	BG	N	BSV
		Barium	0.06 B J	mg/kg	MAK001C	5 / 8	62.5%	0.03	0.06	8.72E+01	0.0924	8.72E+01	SV	N	BSV
		Beryllium	-	mg/kg	-	0 / 8	0.0%	0.03	-	8.72E-01	--	8.72E-01	SV	N	ND
		Cadmium	-	mg/kg	-	0 / 8	0.0%	0.007	-	4.36E-01	--	4.36E-01	SV	N	ND
		Chromium	0.261	mg/kg	MAK001C	1 / 8	12.5%	0.018	0.261	8.72E-03	--	8.72E-03	SV	**Y**	ASV
		Cobalt	0.026 B J	mg/kg	MAK006C	1 / 8	12.5%	0.02	0.026	1.31E-01	--	1.31E-01	SV	N	BSV
		Copper	10.3	mg/kg	MAK007C	8 / 8	100.0%	-	10.3	1.74E+01	52.7	5.27E+01	BG	N	BSV
		Iron	19.8	mg/kg	MAK006C	5 / 8	62.5%	0.75	19.8	3.05E+02	11.35	3.05E+02	SV	N	BSV
		Lead	0.45	mg/kg	MAK007C	8 / 8	100.0%	-	0.45	not defined	2.961	2.96E+00	BG	N	BSV
		Manganese	0.39	mg/kg	MAK006C	4 / 8	50.0%	0.012	0.39	6.10E+01	0.834	6.10E+01	SV	N	BSV
		Mercury	0.39 J2	ng/g	MAK007C	8 / 8	100.0%	-	0.39	1.31E+02	9.28	1.31E+02	SV	N	BSV
		Methyl Mercury	-	ng/g	-	0 / 8	0.0%	0.99	-	4.36E+01	--	4.36E+01	SV	N	ND
		Selenium	0.331	mg/kg	MAK004C	8 / 8	100.0%	-	0.331	2.18E+00	2.37	2.37E+00	BG	N	BSV
		Silver	-	mg/kg	-	0 / 8	0.0%	0.02	-	2.18E+00	--	2.18E+00	SV	N	ND
		Thallium	-	mg/kg	-	0 / 8	0.0%	0.002	-	4.36E-03	--	4.36E-03	SV	N	ND
		Vanadium	0.077 B J	mg/kg	MAK006C	8 / 8	100.0%	-	0.077	2.18E+00	0.073	2.18E+00	SV	N	BSV
		Zinc	5.63	mg/kg	MAK007C	2 / 8	25.0%	0.2	5.63	1.31E+02	27.4	1.31E+02	SV	N	BSV

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TABLE 5

OCCURRENCE, RISK-BASED SCREENING AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MAKUA MILITARY RESERVATION

ROUND 1

Exposure Point	Biota	Chemical	Maximum Concentration Detected (Qualifier)	Units	Sample of Max Detect	Detection Frequency	(%)	Maximum Detection Limit	Concentration Used for Screening (Maximum Detected) (Qualifier)	Project Screening Levels	Background Conc.	Screening Toxicity Value	Screening Level Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Makua Military Reservation	Seaweed (Limu)	**Pesticides**													
		Aldrin	-	µg/kg	-	0 / 8	0.0%	4	-	2.56E-01	--	2.56E-01	SV	N	ND
		Alpha-BHC	14	µg/kg	MAK023L	6 / 8	75.0%	4	14	6.92E-01	19.39	1.94E+01	BG	N	BSV
		Beta-BHC	-	µg/kg	-	0 / 8	0.0%	4	-	2.42E+00	--	2.42E+00	SV	N	ND
		Delta-BHC	-	µg/kg	-	0 / 8	0.0%	4	-	not defined	--	not defined	SV	N	ND
		Gamma-BHC (Lindane)	-	µg/kg	-	0 / 8	0.0%	4	-	3.96E+00	--	3.96E+00	SV	N	ND
		Heptachlor	67	µg/kg	MAK024L/25L	6 / 8	75.0%	4	67	9.69E-01	--	9.69E-01	SV	**Y**	ASV
		Heptachlor Epoxide	83.9	µg/kg	MAK016L/21L/27L	1 / 8	12.5%	4	83.9	4.79E-01	--	4.79E-01	SV	**Y**	ASV
		p,p'-DDT	-	µg/kg	-	0 / 8	0.0%	4	-	1.28E+01	--	1.28E+01	SV	N	ND
		VOCs													
		1,2,4-Trimethylbenzene	-	µg/kg	-	0 / 8	0.0%	5	-	not defined	--	not defined	SV	N	ND
		Ethyl Benzene	-	µg/kg	-	0 / 8	0.0%	5	-	3.96E+02	--	3.96E+02	SV	N	ND
		M,P-XYLENES	-	µg/kg	-	0 / 8	0.0%	10	-	8.72E+04	--	8.72E+04	SV	N	ND
		o-Xylene	-	µg/kg	-	0 / 8	0.0%	5	-	8.72E+04	--	8.72E+04	SV	N	ND
		Styrene	-	µg/kg	-	0 / 8	0.0%	5	-	8.72E+04	--	8.72E+04	SV	N	ND
		Toluene	-	µg/kg	-	0 / 8	0.0%	5	-	3.49E+04	--	3.49E+04	SV	N	ND
		SVOCs													
		bis(2-Ethylhexyl) phthalate	-	µg/kg	-	0 / 8	0.0%	200	-	3.11E+02	--	3.11E+02	SV	N	ND
		Diethyl phthalate	-	µg/kg	-	0 / 8	0.0%	200	-	3.49E+05	--	3.49E+05	SV	N	ND
		Dimethyl phthalate	-	µg/kg	-	0 / 8	0.0%	200	-	not defined	--	not defined	SV	N	ND
		Di-n-butyl phthalate	-	µg/kg	-	0 / 8	0.0%	200	-	4.36E+04	--	4.36E+04	SV	N	ND
		Di-n-octyl phthalate	-	µg/kg	-	0 / 8	0.0%	200	-	4.36E+03	--	4.36E+03	SV	N	ND
		Pyrene	-	µg/kg	-	0 / 8	0.0%	200	-	1.31E+04	--	1.31E+04	SV	N	ND
		Pentachlorophenol	-	µg/kg	-	0 / 8	0.0%	300	-	1.09E+01	--	1.09E+01	SV	N	ND
		Dioxins													
		2,3,7,8-TCDF	0.12 JZ	ng/kg	MAK029L	4 / 8	50.0%	0.15	0.12	3.35E-01	0.144	3.35E-01	SV	N	BSV
		Total TCDF	0.5	ng/kg	MAK016L/21L/27L	5 / 8	62.5%	0.15	0.5	3.35E-01	0.803	8.03E-01	BG	N	BSV
		2,3,7,8-TCDD	-	ng/kg	-	0 / 8	0.0%	0.12	-	3.35E-02	--	3.35E-02	SV	N	ND
		Total TCDD	1	ng/kg	MAK016L/21L/27L	7 / 8	87.5%	0.12	1	3.35E-02	1.008	1.01E+00	BG	N	BSV
		1,2,3,7,8-PECDF	-	ng/kg	-	0 / 8	0.0%	0.072	-	1.12E-01	--	1.12E-01	SV	N	ND
		2,3,4,7,8-PeCDF	-	ng/kg	-	0 / 8	0.0%	0.074	-	1.12E-01	--	1.12E-01	SV	N	ND
		Total PeCDF	-	ng/kg	-	0 / 8	0.0%	0.073	-	1.12E-01	0.27	2.70E-01	BG	N	ND
		1,2,3,7,8-PeCDD	0.046	ng/kg	MAK001L/2L/26L	1 / 8	12.5%	0.054	0.046	3.35E-02	--	3.35E-02	SV	**Y**	ASV
		Total PeCDD	0.22	ng/kg	MAK016L/21L/27L	4 / 8	50.0%	0.054	0.22	3.35E-02	0.236	2.36E-01	BG	N	BSV
		1,2,3,4,7,8-HxCDF	-	ng/kg	-	0 / 8	0.0%	0.064	-	3.35E-01	--	3.35E-01	SV	N	ND
		1,2,3,6,7,8-HxCDF	0.057	ng/kg	MAK001L/2L/26L	2 / 8	25.0%	0.057	0.057	3.35E-01	--	3.35E-01	SV	N	BSV
		2,3,4,6,7,8-HxCDF	-	ng/kg	-	0 / 8	0.0%	0.054	-	3.35E-01	--	3.35E-01	SV	N	ND
		1,2,3,7,8,9-HxCDF	-	ng/kg	-	0 / 8	0.0%	0.076	-	3.35E-01	--	3.35E-01	SV	N	ND
		Total HxCDF	0.39	ng/kg	MAK024L/25L	4 / 8	50.0%	0.063	0.39	3.35E-01	0.0614	3.35E-01	SV	**Y**	ASV
		1,2,3,4,7,8-HxCDD	-	ng/kg	-	0 / 8	0.0%	0.2	-	3.35E-01	--	3.35E-01	SV	N	ND
		1,2,3,6,7,8-HxCDD	-	ng/kg	-	0 / 8	0.0%	0.16	-	3.35E-01	--	3.35E-01	SV	N	ND

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TABLE 5

OCCURRENCE, RISK-BASED SCREENING AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MAKUA MILITARY RESERVATION

ROUND 1

Exposure Point	Biota	Chemical	Maximum Concentration Detected (Qualifier)	Units	Sample of Max Detect	Detection Frequency	(%)	Maximum Detection Limit	Concentration Used for Screening (Maximum Detected) (Qualifier)	Project Screening Levels	Background Conc.	Screening Toxicity Value	Screening Level Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Makua Military Reservation	Seaweed (Limu)	1,2,3,7,8,9-HxCDD	1.1 JZ	ng/kg	MAK016L/21L/27L	2 / 8	25.0%	0.15	1.1	3.35E-01	0.681	6.81E-01	BG	**Y**	ASV
		Total HxCDD	0.25 J	ng/kg	MAK024L/25L	1 / 8	12.5%	0.17	0.25	3.35E-01	0.227	3.35E-01	SV	N	BSV
		1,2,3,4,6,7,8-HpCDF	0.75	ng/kg	MAK024L/25L	7 / 8	87.5%	0.064	0.75	3.35E+00	0.147	3.35E+00	SV	N	BSV
		1,2,3,4,7,8,9-HpCDF	0.057	ng/kg	MAK029L	1 / 8	12.5%	0.072	0.057	3.35E+00	--	3.35E+00	SV	N	BSV
		Total HpCDF	4.5	ng/kg	MAK024L/25L	6 / 8	75.0%	0.068	4.5	3.35E+00	0.371	3.35E+00	SV	**Y**	ASV
		1,2,3,4,6,7,8-HpCDD	3.6	ng/kg	MAK024L/25L	1 / 8	12.5%	0.079	3.6	3.35E+00		3.35E+00	SV	**Y**	ASV
		Total HpCDD	9.4	ng/kg	MAK024L/25L	7 / 8	87.5%	0.079	9.4	3.35E+00	0.759	3.35E+00	SV	**Y**	ASV
		OCDF	10	ng/kg	MAK024L/25L	1 / 8	12.5%	0.13	10	1.12E+02	--	1.12E+02	SV	N	BSV
		OCDD	60	ng/kg	MAK024L/25L	1 / 8	12.5%	0.2	60	1.12E+02	--	1.12E+02	SV	N	BSV
		Explosives													
		Perchlorate	-	µg/Kg	-	0 / 8	0.0%	0.3	-	3.05E+02	4.381	3.05E+02	SV	N	ND
		2,4-Dinitrotoluene2	-	µg/Kg	-	0 / 8	0.0%	-	-	1.41E+01	--	1.41E+01	SV	N	ND
		2,4-Dinitrotoluene3	-	µg/Kg	-	0 / 8	0.0%	200	-	1.41E+01	--	1.41E+01	SV	N	ND
		2,4-Dinitrotoluene4	-	µg/Kg	-	0 / 8	0.0%	10	-	1.41E+01	--	1.41E+01	SV	N	ND
		Hexahydro-trinitro-triazine (RDX)	-	µg/Kg	-	0 / 8	0.0%	200	-	3.96E+01	--	3.96E+01	SV	N	ND
		Nitroglycerine	-	µg/Kg	-	0 / 8	0.0%	300	-	4.36E+01	--	4.36E+01	SV	N	ND
		Metals													
		Inorganic Arsenic	0.605	mg/kg	MAK016L/21L/27L	8 / 8	100.0%	-	0.605	2.91E-03	2.02	2.02E+00	BG	N	BSV
		Aluminum	87.6	mg/kg	MAK024L/25L	8 / 8	100.0%	-	87.6	4.36E+02	642.3	6.42E+02	BG	N	BSV
		Antimony	0.01 B J	mg/kg	MAK023L	2 / 8	25.0%	0.007	0.01	1.74E-01	0.03	1.74E-01	SV	N	BSV
		Arsenic	2.37	mg/kg	MAK013L	8 / 8	100.0%	-	2.37	2.91E-03	3.692	3.69E+00	BG	N	BSV
		Barium	4.49	mg/kg	MAK025L	8 / 8	100.0%	-	4.49	8.72E+01	3.088	8.72E+01	SV	N	BSV
		Beryllium	-	mg/kg	-	0 / 8	0.0%	0.03	-	8.72E-01	--	8.72E-01	SV	N	ND
		Cadmium	0.13	mg/kg	MAK013L	8 / 8	100.0%	-	0.13	4.36E-01	0.107	4.36E-01	SV	N	BSV
		Chromium	0.528	mg/kg	MAK024L/25L	8 / 8	100.0%	-	0.528	8.72E-03	4.158	4.16E+00	BG	N	BSV
		Cobalt	0.1 B J	mg/kg	MAK016L/21L/27L	8 / 8	100.0%	-	0.1	1.31E-01	0.374	3.74E-01	BG	N	BSV
		Copper	0.51	mg/kg	MAK024L/25L	8 / 8	100.0%	-	0.51	1.74E+01	0.966	1.74E+01	SV	N	BSV
		Iron	137	mg/kg	MAK024L/25L	8 / 8	100.0%	-	137	3.05E+02	1043	1.04E+03	BG	N	BSV

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TABLE 5

OCCURRENCE, RISK-BASED SCREENING AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MAKUA MILITARY RESERVATION

ROUND 1

Exposure Point	Biota	Chemical	Maximum Concentration Detected (Qualifier)	Units	Sample of Max Detect	Detection Frequency	(%)	Maximum Detection Limit	Concentration Used for Screening (Maximum Detected) (Qualifier)	Project Screening Levels	Background Conc.	Screening Toxicity Value	Screening Level Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Makua Military Reservation	Seaweed (Limu)	Lead	0.63	mg/kg	MAK024L/25L	8 / 8	100.0%	-	0.63	not defined	0.915	9.15E-01	BG	N	BSV
		Manganese	3.07	mg/kg	MAK024L/25L	8 / 8	100.0%	-	3.07	6.10E+01	17.83	6.10E+01	SV	N	BSV
		Mercury	2.27	ng/g	MAK001L/2L/26L	8 / 8	100.0%	-	2.27	1.31E+02	3.832	1.31E+02	SV	N	BSV
		Methyl Mercury	1.01 B J	ng/g	MAK001L/2L/26L	2 / 8	25.0%	0.99	1.01	4.36E+01	--	4.36E+01	SV	N	BSV
		Selenium	-	mg/kg	-	0 / 8	0.0%	0.061	-	2.18E+00	0.093	2.18E+00	SV	N	ND
		Silver	-	mg/kg	-	0 / 8	0.0%	0.02	-	2.18E+00	--	2.18E+00	SV	N	ND
		Thallium	0.007 B J	mg/kg	MAK001L/2L/26L	8 / 8	100.0%	-	0.007	4.36E-03	0.00994	9.94E-03	BG	N	BSV
		Vanadium	2.55	mg/kg	MAK025L	8 / 8	100.0%	-	2.55	2.18E+00	5.188	5.19E+00	BG	N	BSV
		Zinc	3.48	mg/kg	MAK001L/2L/26L	8 / 8	100.0%	-	3.48	1.31E+02	2.834	1.31E+02	SV	N	BSV

Notes:

Project Screening Levels were calculated based on methods derived by the USEPA Fish Advisories using site-specific consumption rates for "high-end" fish consumption in a 2009 Ordnance Reef Human Health Risk Assessment (USACE, 2014)

The Screening Toxicity Value is the calculated Project Screeninging Level unless lower than background. If a background concentration could be calculated and this value exceeded the Project Screening Level, the background was used as the screening value.

"-" and NA = not available or not applicable

ASV = above screening value

B - Less than 10x higher than method blank level.

USEPA = United States Environmental Protection Agency

Z - Indicates an EMPC result. The result is qualified in the Pace Analytical laboratory report as a "J" with either an "I" (interference present) or "P" (PCDE interference) qualifier.

µg/kg = micrograms per kilogram

BG = background assumed due to bio accumulation of widespread organic contaminants, calculated based on biota samples collected in unimpacted areas on north shore O'ahu

BSV = below screening value

COPC = Chemical of Potential Concern

J = estimated value

mg/kg= milligrams per kilogram

ng/g = nanograms per gram

SV = Project Screening Value

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TABLE 6
OCCURRENCE, RISK-BASED SCREENING AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
MAKUA MILITARY RESERVATION
ROUND 2

Exposure Point	Biota	Chemical	Maximum Concentration Detected (Qualifier)	Units	Sample of Max Detect	Detection Frequency		Maximum Detection Limit	Concentration Used for Screening (Maximum Detected) (Qualifier)	USEPA Fish Advisories Screening Level	Background Conc.	Screening Toxicity Value	Screening Level Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
							(%)								
Makua Military Reservation	Octopus (He'e)	**Pesticides**													
		Alpha-BHC	-	µg/kg	-	0 / 8	0.00%	4.03	-	6.92E-01	--	6.92E-01	SV	N	ND
		Gamma-BHC (Lindane)	-	µg/kg	-	0 / 8	0.00%	4.03	-	3.96E+00	--	3.96E+00	SV	N	ND
		Delta-BHC	-	µg/kg	-	0 / 8	0.00%	4.03	-	not defined	--	not defined	SV	N	ND
		Heptachlor	-	µg/kg	-	0 / 8	0.00%	4.03	-	9.69E-01	--	9.69E-01	SV	N	ND
		Aldrin	-	µg/kg	-	0 / 8	0.00%	4.03	-	2.56E-01	--	2.56E-01	SV	N	ND
		Heptachlor Epoxide	-	µg/kg	-	0 / 8	0.00%	4.03	-	4.79E-01	--	4.79E-01	SV	N	ND
		p,p'-DDT	-	µg/kg	-	0 / 8	0.00%	4.03	-	1.28E+01	--	1.28E+01	SV	N	ND
		Beta-BHC	-	µg/kg	-	0 / 8	0.00%	4.03	-	2.42E+00	--	2.42E+00	SV	N	ND
		VOCs													
		Toluene	-	µg/kg	-	0 / 8	0.00%	2.5	-	3.49E+04	--	3.49E+04	SV	N	ND
		Ethyl Benzene	-	µg/kg	-	0 / 8	0.00%	2.5	-	3.96E+02	--	3.96E+02	SV	N	ND
		M,P-Xylenes	-	µg/kg	-	0 / 8	0.00%	5	-	8.72E+04	--	8.72E+04	SV	N	ND
		Styrene	-	µg/kg	-	0 / 8	0.00%	2.5	-	8.72E+04	--	8.72E+04	SV	N	ND
		o-Xylene	-	µg/kg	-	0 / 8	0.00%	2.5	-	8.72E+04	--	8.72E+04	SV	N	ND
		1,2,4-Trimethylbenzene	-	µg/kg	-	0 / 8	0.00%	2.5	-	not defined	--	not defined	SV	N	ND
		SVOCs													
		Dimethylphthalate	-	µg/kg	-	0 / 8	0.00%	200	-	not defined	--	not defined	SV	N	ND
		Diethylphthalate	-	µg/kg	-	0 / 8	0.00%	200	-	3.49E+05	--	3.49E+05	SV	N	ND
		Di-n-butylphthalate	-	µg/kg	-	0 / 8	0.00%	200	-	4.36E+04	--	4.36E+04	SV	N	ND
		Pyrene	-	µg/kg	-	0 / 8	0.00%	200	-	1.31E+04	--	1.31E+04	SV	N	ND
		bis(2-Ethylhexyl)phthalate	-	µg/kg	-	0 / 8	0.00%	200	-	3.11E+02	--	3.11E+02	SV	N	ND
		Di-n-octylphthalate	-	µg/kg	-	0 / 8	0.00%	200	-	4.36E+03	--	4.36E+03	SV	N	ND
		Pentachlorophenol	-	µg/kg	-	0 / 8	0.00%	300	-	1.09E+01	--	1.09E+01	SV	N	ND
		Dioxins													
		2,3,7,8-TCDF	0.075	ng/kg	MAK105O	6 / 8	75.00%	0.051	0.075	3.35E-01	--	3.35E-01	SV	N	BSV
		Total TCDF	0.15	ng/kg	MAK104O	8 / 8	100.00%	-	0.15	3.35E-01	0.182	3.35E-01	SV	N	BSV
		2,3,7,8-TCDD	-	ng/kg	-	0 / 8	0.00%	0.049	-	3.35E-02	--	3.35E-02	SV	N	ND
		Total TCDD	0.092	ng/kg	MAK102O	1 / 8	12.50%	0.049	0.092	3.35E-02	0.432	4.32E-01	BG	N	BSV
		1,2,3,7,8-PeCDF	-	ng/kg	-	0 / 8	0.00%	0.062	-	1.12E-01	--	1.12E-01	SV	N	ND
		2,3,4,7,8-PeCDF	-	ng/kg	-	0 / 8	0.00%	0.049	-	1.12E-01	--	1.12E-01	SV	N	ND
		Total PeCDF	-	ng/kg	-	0 / 8	0.00%	0.056	-	1.12E-01	--	1.12E-01	SV	N	ND
		1,2,3,7,8-PeCDD	-	ng/kg	-	0 / 8	0.00%	0.049	-	3.35E-02	--	3.35E-02	SV	N	ND
		Total PeCDD	-	ng/kg	-	0 / 8	0.00%	0.049	-	3.35E-02	--	3.35E-02	SV	N	ND
		1,2,3,4,7,8-HxCDF	0.034 JZ	ng/kg	MAK101O	1 / 8	12.50%	0.053	0.034	3.35E-01	--	3.35E-01	SV	N	BSV
		1,2,3,6,7,8-HxCDF	-	ng/kg	-	0 / 8	0.00%	0.042	-	3.35E-01	--	3.35E-01	SV	N	ND
		2,3,4,6,7,8-HxCDF	-	ng/kg	-	0 / 8	0.00%	0.039	-	3.35E-01	--	3.35E-01	SV	N	ND
		1,2,3,7,8,9-HxCDF	-	ng/kg	-	0 / 8	0.00%	0.06	-	3.35E-01	0.153	3.35E-01	SV	N	ND
		Total HxCDF	0.037	ng/kg	MAK101O	1 / 8	12.50%	0.049	0.037	3.35E-01	--	3.35E-01	SV	N	BSV
		1,2,3,4,7,8-HxCDD	-	ng/kg	-	0 / 8	0.00%	0.049	-	3.35E-01	--	3.35E-01	SV	N	ND
		1,2,3,6,7,8-HxCDD	0.047	ng/kg	MAK101O	1 / 8	12.50%	0.052	0.047	3.35E-01	0.12	3.35E-01	SV	N	BSV

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TABLE 6

OCCURRENCE, RISK-BASED SCREENING AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MAKUA MILITARY RESERVATION

ROUND 2

Exposure Point	Biota	Chemical	Maximum Concentration Detected (Qualifier)	Units	Sample of Max Detect	Detection Frequency	(%)	Maximum Detection Limit	Concentration Used for Screening (Maximum Detected) (Qualifier)	USEPA Fish Advisories Screening Level	Background Conc.	Screening Toxicity Value	Screening Level Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Makua Military Reservation	Octopus (He'e)	1,2,3,7,8,9-HxCDD	-	ng/kg	-	0 / 8	0.00%	0.047	-	3.35E-01	--	3.35E-01	SV	N	ND
		Total HxCDD	0.047	ng/kg	MAK101O	1 / 8	12.50%	0.049	0.047	3.35E-01	--	3.35E-01	SV	N	BSV
		1,2,3,4,6,7,8-HpCDF	-	ng/kg	-	0 / 8	0.00%	0.036	-	3.35E+00	0.122	3.35E+00	SV	N	ND
		1,2,3,4,7,8,9-HpCDF	-	ng/kg	-	0 / 8	0.00%	0.053	-	3.35E+00	--	3.35E+00	SV	N	ND
		Total HpCDF	0.1 J	ng/kg	MAK101O	1 / 8	12.50%	0.045	0.1	3.35E+00	--	3.35E+00	SV	N	BSV
		1,2,3,4,6,7,8-HpCDD	-	ng/kg	-	0 / 8	0.00%	0.13	-	3.35E+00	0.205	3.35E+00	SV	N	ND
		Total HpCDD	0.21	ng/kg	MAK101O	7 / 8	87.50%	0.07	0.21	3.35E+00	0.189	3.35E+00	SV	N	BSV
		OCDF	-	ng/kg	-	0 / 8	0.00%	0.17	-	1.12E+02	--	1.12E+02	SV	N	ND
		OCDD	-	ng/kg	-	0 / 8	0.00%	0.27	-	1.12E+02	0.714	1.12E+02	SV	N	ND
		Explosives													
		Perchlorate	-	µg/Kg	-	0 / 8	0.00%	0.3	-	3.05E+02	--	3.05E+02	SV	N	ND
		2,4-Dinitrotoluene3	-	µg/Kg	-	0 / 8	0.00%	100	-	1.41E+01	--	1.41E+01	SV	N	ND
		2,4-Dinitrotoluene5	-	µg/Kg	-	0 / 8	0.00%	-	-	1.41E+01	--	1.41E+01	SV	N	ND
		Hexahydro-trinitro-triazine (RDX)	-	µg/Kg	-	0 / 8	0.00%	200	-	3.96E+01	--	3.96E+01	SV	N	ND
		Nitroglycerine	-	µg/Kg	-	0 / 8	0.00%	300	-	4.36E+01	--	4.36E+01	SV	N	ND
		Metals													
		Inorganic Arsenic	-	mg/kg	-	0 / 8	0.00%	0.004	-	2.91E-03	--	2.91E-03	SV	N	ND
		Aluminum	0.87	mg/kg	MAK103O	6 / 8	75.00%	0.14	0.87	4.36E+02	--	4.36E+02	SV	N	BSV
		Antimony	-	mg/kg	-	0 / 8	0.00%	0.007	-	1.74E-01	--	1.74E-01	SV	N	ND
		Arsenic	32.3 J J	mg/kg	MAK103O	8 / 8	100.00%	-	32.3	2.91E-03	47.36	4.74E+01	BG	N	BSV
		Barium	-	mg/kg	-	0 / 8	0.00%	0.03	-	8.72E+01	--	8.72E+01	SV	N	ND
		Beryllium	-	mg/kg	-	0 / 8	0.00%	0.03	-	8.72E-01	--	8.72E-01	SV	N	ND
		Cadmium	0.01 B J	mg/kg	MAK107O	4 / 8	50.00%	0.007	0.01	4.36E-01	0.0586	4.36E-01	SV	N	BSV
		Chromium	0.027 B J	mg/kg	MAK107O	3 / 8	37.50%	0.018	0.027	8.72E-03	0.228	2.28E-01	BG	N	BSV
		Cobalt	-	mg/kg	-	0 / 8	0.00%	0.02	-	1.31E-01	--	1.31E-01	SV	N	ND
		Copper	7.8	mg/kg	MAK104O	8 / 8	100.00%	-	7.8	1.74E+01	40	4.00E+01	BG	N	BSV
		Iron	2.78	mg/kg	MAK105O	8 / 8	100.00%	-	2.78	3.05E+02	221	3.05E+02	SV	N	BSV
		Lead	0.05	mg/kg	MAK104O	8 / 8	100.00%	-	0.05	not defined	0.81	8.10E-01	BG	N	BSV
		Manganese	0.42	mg/kg	MAK104O	8 / 8	100.00%	-	0.42	6.10E+01	0.415	6.10E+01	SV	N	BSV
		Mercury	18.7	ng/g	MAK106O	8 / 8	100.00%	-	18.7	1.31E+02	18.95	1.31E+02	SV	N	BSV
		Methyl Mercury	15.9	ng/g	MAK106O	8 / 8	100.00%	-	15.9	4.36E+01	14.83	4.36E+01	SV	N	BSV
		Selenium	0.318	mg/kg	MAK105O	8 / 8	100.00%	-	0.318	2.18E+00	--	2.18E+00	SV	N	BSV
		Silver	-	mg/kg	-	0 / 8	0.00%	0.02	-	2.18E+00	--	2.18E+00	SV	N	ND
		Thallium	-	mg/kg	-	0 / 8	0.00%	0.002	-	4.36E-03	--	4.36E-03	SV	N	ND
		Vanadium	-	mg/kg	-	0 / 8	0.00%	0.014	-	2.18E+00	0.0187	2.18E+00	SV	N	ND
		Zinc	16.2	mg/kg	MAK101O	8 / 8	100.00%	-	16.2	1.31E+02	30	1.31E+02	SV	N	BSV
	Sea Cucumber (Loli)	**Pesticides**													
		Alpha-BHC	-	µg/kg	-	0 / 8	0.00%	4	-	6.92E-01	--	6.92E-01	SV	N	ND
		Gamma-BHC (Lindane)	-	µg/kg	-	0 / 8	0.00%	4	-	3.96E+00	--	3.96E+00	SV	N	ND
		Delta-BHC	-	µg/kg	-	0 / 8	0.00%	4	-	not defined	--	not defined	SV	N	ND
		Heptachlor	-	µg/kg	-	0 / 8	0.00%	4	-	9.69E-01	--	9.69E-01	SV	N	ND

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TABLE 6

OCCURRENCE, RISK-BASED SCREENING AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MAKUA MILITARY RESERVATION

ROUND 2

Exposure Point	Biota	Chemical	Maximum Concentration Detected (Qualifier)	Units	Sample of Max Detect	Detection Frequency	(%)	Maximum Detection Limit	Concentration Used for Screening (Maximum Detected) (Qualifier)	USEPA Fish Advisories Screening Level	Background Conc.	Screening Toxicity Value	Screening Level Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Makua Military Reservation	Sea Cucumber (Loli)	Aldrin	-	µg/kg	-	0 / 8	0.00%	4	-	2.56E-01	--	2.56E-01	SV	N	ND
		Heptachlor Epoxide	-	µg/kg	-	0 / 8	0.00%	4	-	4.79E-01	--	4.79E-01	SV	N	ND
		p,p'-DDT	-	µg/kg	-	0 / 8	0.00%	4	-	1.28E+01	--	1.28E+01	SV	N	ND
		Beta-BHC	-	µg/kg	-	0 / 8	0.00%	4	-	2.42E+00	--	2.42E+00	SV	N	ND
		VOCs													
		Toluene	-	µg/kg	-	0 / 8	0.00%	2.5	-	3.49E+04	--	3.49E+04	SV	N	ND
		Ethyl Benzene	-	µg/kg	-	0 / 8	0.00%	2.5	-	3.96E+02	--	3.96E+02	SV	N	ND
		M,P-Xylenes	-	µg/kg	-	0 / 8	0.00%	5	-	8.72E+04	--	8.72E+04	SV	N	ND
		Styrene	-	µg/kg	-	0 / 8	0.00%	2.5	-	8.72E+04	--	8.72E+04	SV	N	ND
		o-Xylene	-	µg/kg	-	0 / 8	0.00%	2.5	-	8.72E+04	--	8.72E+04	SV	N	ND
		1,2,4-Trimethylbenzene	-	µg/kg	-	0 / 8	0.00%	2.5	-	not defined	--	not defined	SV	N	ND
		SVOCs													
		Dimethylphthalate	-	µg/kg	-	0 / 8	0.00%	200	-	not defined	--	not defined	SV	N	ND
		Diethylphthalate	-	µg/kg	-	0 / 8	0.00%	200	-	3.49E+05	--	3.49E+05	SV	N	ND
		Di-n-butylphthalate	-	µg/kg	-	0 / 8	0.00%	200	-	4.36E+04	--	4.36E+04	SV	N	ND
		Pyrene	-	µg/kg	-	0 / 8	0.00%	200	-	1.31E+04	--	1.31E+04	SV	N	ND
		bis(2-Ethylhexyl)phthalate	-	µg/kg	-	0 / 8	0.00%	200	-	3.11E+02	--	3.11E+02	SV	N	ND
		Di-n-octylphthalate	-	µg/kg	-	0 / 8	0.00%	200	-	4.36E+03	--	4.36E+03	SV	N	ND
		Pentachlorophenol	-	µg/kg	-	0 / 8	0.00%	300	-	1.09E+01	--	1.09E+01	SV	N	ND
		Dioxins													
		2,3,7,8-TCDF	-	ng/kg	-	0 / 8	0.00%	0.053	-	3.35E-01	--	3.35E-01	SV	N	ND
		Total TCDF	0.14 J	ng/kg	MAK103C	6 / 8	75.00%	0.053	0.14	3.35E-01	1.304	1.30E+00	BG	N	BSV
		2,3,7,8-TCDD	-	ng/kg	-	0 / 8	0.00%	0.06	-	3.35E-02	--	3.35E-02	SV	N	ND
		Total TCDD	-	ng/kg	-	0 / 8	0.00%	0.06	-	3.35E-02	0.211	2.11E-01	BG	N	ND
		1,2,3,7,8-PeCDF	-	ng/kg	-	0 / 8	0.00%	0.051	-	1.12E-01	--	1.12E-01	SV	N	ND
		2,3,4,7,8-PeCDF	0.038	ng/kg	MAK108C	2 / 8	25.00%	0.04	0.038	1.12E-01	--	1.12E-01	SV	N	BSV
		Total PeCDF	0.038	ng/kg	MAK108C	1 / 8	12.50%	0.046	0.038	1.12E-01	--	1.12E-01	SV	N	BSV
		1,2,3,7,8-PeCDD	-	ng/kg	-	0 / 8	0.00%	0.043	-	3.35E-02	--	3.35E-02	SV	N	ND
		Total PeCDD	-	ng/kg	-	0 / 8	0.00%	0.043	-	3.35E-02	--	3.35E-02	SV	N	ND
		1,2,3,4,7,8-HxCDF	0.049	ng/kg	MAK108C	2 / 8	25.00%	0.034	0.049	3.35E-01	--	3.35E-01	SV	N	BSV
		1,2,3,6,7,8-HxCDF	-	ng/kg	-	0 / 8	0.00%	0.028	-	3.35E-01	--	3.35E-01	SV	N	ND
		2,3,4,6,7,8-HxCDF	0.061	ng/kg	MAK108C	2 / 8	25.00%	0.033	0.061	3.35E-01	--	3.35E-01	SV	N	BSV
		1,2,3,7,8,9-HxCDF	0.038 JZ	ng/kg	MAK103C	1 / 8	12.50%	0.048	0.038	3.35E-01	--	3.35E-01	SV	N	BSV
		Total HxCDF	0.11	ng/kg	MAK108C	1 / 8	12.50%	0.036	0.11	3.35E-01	--	3.35E-01	SV	N	BSV
		1,2,3,4,7,8-HxCDD	0.037	ng/kg	MAK108C	1 / 8	12.50%	0.047	0.037	3.35E-01	0.0654	3.35E-01	SV	N	BSV
		1,2,3,6,7,8-HxCDD	-	ng/kg	-	0 / 8	0.00%	0.057	-	3.35E-01	0.12	3.35E-01	SV	N	ND
		1,2,3,7,8,9-HxCDD	0.033	ng/kg	MAK108C	1 / 8	12.50%	0.048	0.033	3.35E-01	0.0911	3.35E-01	SV	N	BSV
		Total HxCDD	0.037	ng/kg	MAK108C	1 / 8	12.50%	0.05	0.037	3.35E-01	0.244	3.35E-01	SV	N	BSV
		1,2,3,4,6,7,8-HpCDF	0.065 JZ	ng/kg	MAK110C	4 / 8	50.00%	0.032	0.065	3.35E+00	0.0725	3.35E+00	SV	N	BSV
		1,2,3,4,7,8,9-HpCDF	-	ng/kg	-	0 / 8	0.00%	0.048	-	3.35E+00	--	3.35E+00	SV	N	ND
		Total HpCDF	0.056	ng/kg	MAK106C	1 / 8	12.50%	0.038	0.056	3.35E+00	0.0706	3.35E+00	SV	N	BSV

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TABLE 6

OCCURRENCE, RISK-BASED SCREENING AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MAKUA MILITARY RESERVATION

ROUND 2

Exposure Point	Biota	Chemical	Maximum Concentration Detected (Qualifier)	Units	Sample of Max Detect	Detection Frequency		Maximum Detection Limit	Concentration Used for Screening (Maximum Detected) (Qualifier)	USEPA Fish Advisories Screening Level	Background Conc.	Screening Toxicity Value	Screening Level Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
							(%)								
Makua Military Reservation	Sea Cucumber (Loli)	1,2,3,4,6,7,8-HpCDD	0.15	ng/kg	MAK110C	8 / 8	100.00%	-	0.15	3.35E+00	0.685	3.35E+00	SV	N	BSV
		Total HpCDD	0.15	ng/kg	MAK110C	7 / 8	87.50%	0.073	0.15	3.35E+00	0.794	3.35E+00	SV	N	BSV
		OCDF	0.24	ng/kg	MAK108C	2 / 8	25.00%	0.094	0.24	1.12E+02	0.136	1.12E+02	SV	N	BSV
		OCDD	0.73	ng/kg	MAK110C	3 / 8	37.50%	0.21	0.73	1.12E+02	2.757	1.12E+02	SV	N	BSV
		Explosives													
		Perchlorate	-	µg/Kg	-	0 / 8	0.00%	0.3	-	3.05E+02	0.74	3.05E+02	SV	N	ND
		2,4-Dinitrotoluene3	-	µg/Kg	-	0 / 8	0.00%	100	-	1.41E+01	--	1.41E+01	SV	N	ND
		2,4-Dinitrotoluene5	-	µg/Kg	-	0 / 8	0.00%	-	-	1.41E+01	--	1.41E+01	SV	N	ND
		Hexahydro-trinitro-triazine (RDX)	-	µg/Kg	-	0 / 8	0.00%	200	-	3.96E+01	--	3.96E+01	SV	N	ND
		Nitroglycerine	-	µg/Kg	-	0 / 8	0.00%	300	-	4.36E+01	--	4.36E+01	SV	N	ND
		Metals													
		Inorganic Arsenic	0.071 J	mg/kg	MAK106C	8 / 8	100.00%	-	0.071	2.91E-03	0.0928	9.28E-02	BG	N	BSV
		Aluminum	15.4	mg/kg	MAK106C	8 / 8	100.00%	-	15.4	4.36E+02	23.09	4.36E+02	SV	N	BSV
		Antimony	-	mg/kg	-	0 / 8	0.00%	0.007	-	1.74E-01	--	1.74E-01	SV	N	ND
		Arsenic	0.75 J J	mg/kg	MAK106C	8 / 8	100.00%	-	0.75	2.91E-03	1.552	1.55E+00	BG	N	BSV
		Barium	0.11 B J	mg/kg	MAK107C	8 / 8	100.00%	-	0.11	8.72E+01	0.324	8.72E+01	SV	N	BSV
		Beryllium	-	mg/kg	-	0 / 8	0.00%	0.03	-	8.72E-01	--	8.72E-01	SV	N	ND
		Cadmium	-	mg/kg	-	0 / 8	0.00%	0.007	-	4.36E-01	--	4.36E-01	SV	N	ND
		Chromium	0.326	mg/kg	MAK107C	8 / 8	100.00%	-	0.326	8.72E-03	0.757	7.57E-01	BG	N	BSV
		Cobalt	0.04 B J	mg/kg	MAK106C	5 / 8	62.50%	0.02	0.04	1.31E-01	0.0805	1.31E-01	SV	N	BSV
		Copper	8.81	mg/kg	MAK107C	8 / 8	100.00%	-	8.81	1.74E+01	38.9	3.89E+01	BG	N	BSV
		Iron	29.1	mg/kg	MAK106C	8 / 8	100.00%	-	29.1	3.05E+02	84.35	3.05E+02	SV	N	BSV
		Lead	0.27	mg/kg	MAK107C	8 / 8	100.00%	-	0.27	not defined	1.309	1.31E+00	BG	N	BSV
		Manganese	0.71	mg/kg	MAK106C	8 / 8	100.00%	-	0.71	6.10E+01	2.005	6.10E+01	SV	N	BSV
		Mercury	0.43	ng/g	MAK104C	8 / 8	100.00%	-	0.43	1.31E+02	3.12	1.31E+02	SV	N	BSV
		Methyl Mercury	-	ng/g	-	0 / 8	0.00%	1.1	-	4.36E+01	--	4.36E+01	SV	N	ND
		Selenium	0.574	mg/kg	MAK106C	8 / 8	100.00%	-	0.574	2.18E+00	0.73	2.18E+00	SV	N	BSV
		Silver	-	mg/kg	-	0 / 8	0.00%	0.02	-	2.18E+00	--	2.18E+00	SV	N	ND
		Thallium	-	mg/kg	-	0 / 8	0.00%	0.002	-	4.36E-03	--	4.36E-03	SV	N	ND
		Vanadium	0.101 B J	mg/kg	MAK103C	8 / 8	100.00%	-	0.101	2.18E+00	0.2	2.18E+00	SV	N	BSV
		Zinc	20.3	mg/kg	MAK107C	1 / 8	12.50%	0.2	20.3	1.31E+02	21.6	1.31E+02	SV	N	BSV
	Seaweed (Limu)	**Pesticides**													
		Alpha-BHC	-	µg/kg	-	0 / 8	0.00%	4.01	-	6.92E-01	33.09	3.31E+01	BG	N	ND
		Gamma-BHC (Lindane)	-	µg/kg	-	0 / 8	0.00%	4.01	-	3.96E+00	--	3.96E+00	SV	N	ND
		Delta-BHC	-	µg/kg	-	0 / 8	0.00%	4.01	-	not defined	--	not defined	SV	N	ND
		Heptachlor	-	µg/kg	-	0 / 8	0.00%	4.01	-	9.69E-01	--	9.69E-01	SV	N	ND
		Aldrin	-	µg/kg	-	0 / 8	0.00%	4.01	-	2.56E-01	--	2.56E-01	SV	N	ND
		Heptachlor Epoxide	-	µg/kg	-	0 / 8	0.00%	4.01	-	4.79E-01	--	4.79E-01	SV	N	ND
		p,p'-DDT	-	µg/kg	-	0 / 8	0.00%	4.01	-	1.28E+01	--	1.28E+01	SV	N	ND
		Beta-BHC	-	µg/kg	-	0 / 8	0.00%	4.01	-	2.42E+00	--	2.42E+00	SV	N	ND
		VOCs													

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TABLE 6

OCCURRENCE, RISK-BASED SCREENING AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MAKUA MILITARY RESERVATION

ROUND 2

Exposure Point	Biota	Chemical	Maximum Concentration Detected (Qualifier)	Units	Sample of Max Detect	Detection Frequency	(%)	Maximum Detection Limit	Concentration Used for Screening (Maximum Detected) (Qualifier)	USEPA Fish Advisories Screening Level	Background Conc.	Screening Toxicity Value	Screening Level Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
Makua Military Reservation	Seaweed (Limu)	Toluene	-	µg/kg	-	0 / 8	0.00%	5	-	3.49E+04	--	3.49E+04	SV	N	ND
		Ethyl Benzene	-	µg/kg	-	0 / 8	0.00%	5	-	3.96E+02	--	3.96E+02	SV	N	ND
		M,P-Xylenes	-	µg/kg	-	0 / 8	0.00%	10	-	8.72E+04	--	8.72E+04	SV	N	ND
		Styrene	-	µg/kg	-	0 / 8	0.00%	5	-	8.72E+04	--	8.72E+04	SV	N	ND
		o-Xylene	-	µg/kg	-	0 / 8	0.00%	5	-	8.72E+04	--	8.72E+04	SV	N	ND
		1,2,4-Trimethylbenzene	-	µg/kg	-	0 / 8	0.00%	5	-	not defined	--	not defined	SV	N	ND
		SVOCs													
		Dimethylphthalate	-	µg/kg	-	0 / 8	0.00%	200	-	not defined	--	not defined	SV	N	ND
		Diethylphthalate	-	µg/kg	-	0 / 8	0.00%	200	-	3.49E+05	--	3.49E+05	SV	N	ND
		Di-n-butylphthalate	-	µg/kg	-	0 / 8	0.00%	200	-	4.36E+04	--	4.36E+04	SV	N	ND
		Pyrene	-	µg/kg	-	0 / 8	0.00%	200	-	1.31E+04	--	1.31E+04	SV	N	ND
		bis(2-Ethylhexyl)phthalate	-	µg/kg	-	0 / 8	0.00%	200	-	3.11E+02	--	3.11E+02	SV	N	ND
		Di-n-octylphthalate	-	µg/kg	-	0 / 8	0.00%	200	-	4.36E+03	--	4.36E+03	SV	N	ND
		Pentachlorophenol	-	µg/kg	-	0 / 8	0.00%	300	-	1.09E+01	--	1.09E+01	SV	N	ND
		Dioxins													
		2,3,7,8-TCDF	-	ng/kg	-	0 / 8	0.00%	0.14	-	3.35E-01	--	3.35E-01	SV	N	ND
		Total TCDF	0.38	ng/kg	MAK101L	1 / 8	12.50%	0.14	0.38	3.35E-01	0.484	4.84E-01	BG	N	BSV
		2,3,7,8-TCDD	-	ng/kg	-	0 / 8	0.00%	0.082	-	3.35E-02	--	3.35E-02	SV	N	ND
		Total TCDD	-	ng/kg	-	0 / 8	0.00%	0.082	-	3.35E-02	0.249	2.49E-01	BG	N	ND
		1,2,3,7,8-PeCDF	-	ng/kg	-	0 / 8	0.00%	0.069	-	1.12E-01	--	1.12E-01	SV	N	ND
		2,3,4,7,8-PeCDF	-	ng/kg	-	0 / 8	0.00%	0.056	-	1.12E-01	--	1.12E-01	SV	N	ND
		Total PeCDF	0.16	ng/kg	MAK115L	3 / 8	37.50%	0.059	0.16	1.12E-01	0.147	1.47E-01	BG	**Y**	ASV
		1,2,3,7,8-PeCDD	-	ng/kg	-	0 / 8	0.00%	0.053	-	3.35E-02	--	3.35E-02	SV	N	ND
		Total PeCDD	-	ng/kg	-	0 / 8	0.00%	0.053	-	3.35E-02	--	3.35E-02	SV	N	ND
		1,2,3,4,7,8-HxCDF	0.023 JZ	ng/kg	MAK101L	1 / 8	12.50%	0.044	0.023	3.35E-01	--	3.35E-01	SV	N	BSV
		1,2,3,6,7,8-HxCDF	0.029	ng/kg	MAK105L	2 / 8	25.00%	0.043	0.029	3.35E-01	--	3.35E-01	SV	N	BSV
		2,3,4,6,7,8-HxCDF	0.019	ng/kg	MAK101L	1 / 8	12.50%	0.035	0.019	3.35E-01	--	3.35E-01	SV	N	BSV
		1,2,3,7,8,9-HxCDF	0.024	ng/kg	MAK101L	1 / 8	12.50%	0.046	0.024	3.35E-01	--	3.35E-01	SV	N	BSV
		Total HxCDF	0.029	ng/kg	MAK105L	3 / 8	37.50%	0.04	0.029	3.35E-01	0.122	3.35E-01	SV	N	BSV
		1,2,3,4,7,8-HxCDD	0.09 JZ	ng/kg	MAK101L	2 / 8	25.00%	0.079	0.09	3.35E-01	--	3.35E-01	SV	N	BSV
		1,2,3,6,7,8-HxCDD	-	ng/kg	-	0 / 8	0.00%	0.083	-	3.35E-01	0.0261	3.35E-01	SV	N	ND
		1,2,3,7,8,9-HxCDD	-	ng/kg	-	0 / 8	0.00%	0.07	-	3.35E-01	--	3.35E-01	SV	N	ND
		Total HxCDD	-	ng/kg	-	0 / 8	0.00%	0.078	-	3.35E-01	0.141	3.35E-01	SV	N	ND
		1,2,3,4,6,7,8-HpCDF	0.064 JZ	ng/kg	MAK111L	6 / 8	75.00%	0.053	0.064	3.35E+00	0.219	3.35E+00	SV	N	BSV
		1,2,3,4,7,8,9-HpCDF	-	ng/kg	-	0 / 8	0.00%	0.063	-	3.35E+00	--	3.35E+00	SV	N	ND
		Total HpCDF	0.056	ng/kg	MAK102L	2 / 8	25.00%	0.058	0.056	3.35E+00	0.354	3.35E+00	SV	N	BSV
		1,2,3,4,6,7,8-HpCDD	0.1 JZ	ng/kg	MAK102L	6 / 8	75.00%	0.075	0.1	3.35E+00	0.49	3.35E+00	SV	N	BSV
		Total HpCDD	0.15	ng/kg	MAK111L	6 / 8	75.00%	0.075	0.15	3.35E+00	1.88	3.35E+00	SV	N	BSV
		OCDF	0.12 JZ	ng/kg	MAK101L	1 / 8	12.50%	0.16	0.12	1.12E+02	0.513	1.12E+02	SV	N	BSV
		OCDD	0.8	ng/kg	MAK102L	3 / 8	37.50%	0.23	0.8	1.12E+02	8.043	1.12E+02	SV	N	BSV

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TABLE 6

OCCURRENCE, RISK-BASED SCREENING AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MAKUA MILITARY RESERVATION

ROUND 2

Exposure Point	Biota	Chemical	Maximum Concentration Detected (Qualifier)	Units	Sample of Max Detect	Detection Frequency		Maximum Detection Limit	Concentration Used for Screening (Maximum Detected) (Qualifier)	USEPA Fish Advisories Screening Level	Background Conc.	Screening Toxicity Value	Screening Level Source	COPC Flag (Y/N)	Rationale for Selection or Deletion
							(%)								
Makua Military Reservation	Seaweed (Limu)	**Explosives**													
		Perchlorate	-	µg/Kg	-	0 / 8	0.00%	0.3	-	3.05E+02	16.11	3.05E+02	SV	N	ND
		2,4-Dinitrotoluene3	-	µg/Kg	-	0 / 8	0.00%	-	-	1.41E+01	--	1.41E+01	SV	N	ND
		2,4-Dinitrotoluene5	-	µg/Kg	-	0 / 8	0.00%	20	-	1.41E+01	--	1.41E+01	SV	N	ND
		Hexahydro-trinitro-triazine (RDX)	-	µg/Kg	-	0 / 8	0.00%	200	-	3.96E+01	--	3.96E+01	SV	N	ND
		Nitroglycerine	-	µg/Kg	-	0 / 8	0.00%	300	-	4.36E+01	--	4.36E+01	SV	N	ND
		Metals													
		Inorganic Arsenic	1.43	mg/kg	MAK111L	8 / 8	100.00%	-	1.43	2.91E-03	2.204	2.20E+00	BG	N	BSV
		Aluminum	438 J	mg/kg	MAK112L	8 / 8	100.00%	-	438	4.36E+02	1186	1.19E+03	BG	N	BSV
		Antimony	0.02 B	mg/kg	MAK108,109,110,113L	7 / 8	87.50%	0.007	0.02	1.74E-01	0.0275	1.74E-01	SV	N	BSV
		Arsenic	2.52 J J	mg/kg	MAK112L	8 / 8	100.00%	-	2.52	2.91E-03	3.121	3.12E+00	BG	N	BSV
		Barium	1.66	mg/kg	MAK101L	7 / 8	87.50%	0.03	1.66	8.72E+01	48.96	8.72E+01	SV	N	BSV
		Beryllium	-	mg/kg	-	0 / 8	0.00%	0.03	-	8.72E-01	--	8.72E-01	SV	N	ND
		Cadmium	0.03	mg/kg	MAK101L	7 / 8	87.50%	0.007	0.03	4.36E-01	0.0623	4.36E-01	SV	N	BSV
		Chromium	3.06	mg/kg	MAK112L	8 / 8	100.00%	-	3.06	8.72E-03	4.352	4.35E+00	BG	N	BSV
		Cobalt	0.59	mg/kg	MAK102L	7 / 8	87.50%	0.02	0.59	1.31E-01	0.521	5.21E-01	BG	**Y**	ASV
		Copper	1.18	mg/kg	MAK108,109,110,113L	7 / 8	87.50%	0.03	1.18	1.74E+01	1.268	1.74E+01	SV	N	BSV
		Iron	957 J	mg/kg	MAK112L	8 / 8	100.00%	-	957	3.05E+02	1046	1.05E+03	BG	N	BSV
		Lead	1.58	mg/kg	MAK108,109,110,113L	8 / 8	100.00%	-	1.58	not defined	0.709	7.09E-01	BG	**Y**	ASV
		Manganese	12.5 J	mg/kg	MAK102L	7 / 8	87.50%	0.01	12.5	6.10E+01	27.18	6.10E+01	SV	N	BSV
		Mercury	3.67	ng/g	MAK102L	8 / 8	100.00%	-	3.67	1.31E+02	4.617	1.31E+02	SV	N	BSV
		Methyl Mercury	-	ng/g	-	0 / 8	0.00%	1.11	-	4.36E+01	--	4.36E+01	SV	N	ND
		Selenium	0.063 B J	mg/kg	MAK112L	1 / 8	12.50%	0.061	0.063	2.18E+00	0.148	2.18E+00	SV	N	BSV
		Silver	-	mg/kg	-	0 / 8	0.00%	0.02	-	2.18E+00	--	2.18E+00	SV	N	ND
		Thallium	0.008 B	mg/kg	MAK108,109,110,113L	7 / 8	87.50%	0.002	0.008	4.36E-03	0.00797	7.97E-03	BG	**Y**	ASV
		Vanadium	3.86	mg/kg	MAK102L	8 / 8	100.00%	-	3.86	2.18E+00	7.53	7.53E+00	BG	N	BSV
		Zinc	3.17	mg/kg	MAK108,109,110,113L	5 / 8	62.50%	0.2	3.17	1.31E+02	3.131	1.31E+02	SV	N	BSV

Notes:

Project Screening Levels were calculated based on methods derived by the USEPA Fish Advisories using site-specific consumption rates for "high-end" fish consumption in a 2009 Ordnance Reef Human Health Risk Assessment (USACE, 2014)

The Screening Toxicity Value is the calculated Project Screeninging Level unless lower than background. If a background concentration could be calculated and this value exceeded the Project Screening Level, the background was used as the screening value.

"-" and NA = not available or not applicable

ASV = above screening value

B - Less than 10x higher than method blank level.

BG = background assumed due to bio accumulation of widespread organic contaminants, calculated based on biota samples collected in unimpacted areas on north shore O'ahu

BSV = below screening value

SV = Project Screening Value

COPC = Chemical of Potential Concern

USEPA = United States Environmental Protection Agency

J = estimated value

Z - Indicates an EMPC result. The result is qualified in the Pace Analytical laboratory report as a "J" with either an "I" (interference present) or "P" (PCDE interference) qualifier.

mg/kg= milligrams per kilogram

µg/kg = micrograms per kilogram

ng/g = nanograms per gram

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TABLE 7
EXPOSURE POINT CONCENTRATIONS
MAKUA MILITARY RESERVATION
ROUND 1

Exposure Point	Biota	Chemical	Maximum Concentration Detected (Qualifier)	95% UCL	Distribution	Arithmetic Mean	Reasonable Maximum Exposures (RME) Exposure Point Concentration			Central Tendancy Exposures (CTE) Exposure Point Concentration		
							Value	Units	Statistic	Value	Units	Statistic
Makua Military Reservation	Octopus	**Dioxins**										
		2,3,7,8-TCDF	-	-	-	-	-	-	-	-	-	-
		2,3,7,8-TCDD	-	-	-	-	-	-	-	-	-	-
		1,2,3,7,8-PeCDF	-	-	-	-	-	-	-	-	-	-
		2,3,4,7,8-PeCDF	-	-	-	-	-	-	-	-	-	-
		1,2,3,7,8-PeCDD	-	-	-	-	-	-	-	-	-	-
		1,2,3,4,7,8-HxCDF	-	-	-	-	-	-	-	-	-	-
		1,2,3,6,7,8-HxCDF	-	-	-	-	-	-	-	-	-	-
		2,3,4,6,7,8-HxCDF	-	-	-	-	-	-	-	-	-	-
		1,2,3,7,8,9-HxCDF	-	-	-	-	-	-	-	-	-	-
		1,2,3,4,7,8-HxCDD	-	-	-	-	-	-	-	-	-	-
		1,2,3,6,7,8-HxCDD	-	-	-	-	-	-	-	-	-	-
		1,2,3,7,8,9-HxCDD	-	-	-	-	-	-	-	-	-	-
		1,2,3,4,6,7,8-HpCDF	0.068	-	-	0.126	0.068	ng/kg	Max	0.068	ng/kg	Max
		1,2,3,4,7,8,9-HpCDF	-	-	-	-	-	-	-	-	-	-
		1,2,3,4,6,7,8-HpCDD	0.37	0.319	Normal	0.268	0.319	ng/kg	95% UCL	0.268	ng/kg	Mean
		OCDF	-	-	-	-	-	-	-	-	-	-
		OCDD	-	-	-	-	-	-	-	-	-	-
		Metals										
		Lead	0.36	0.251	NonPara	0.06	0.251	mg/kg	95% UCL	0.06	mg/kg	Mean
	Sea Cucumber (Loli)	**Metals**										
		Inorganic Arsenic	0.034	0.021	Normal	0.015	0.021	mg/kg	95% UCL	0.015	mg/kg	Mean
		Chromium	0.261	-	-	0.102	0.261	mg/kg	95% UCL	0.102	mg/kg	Mean
	Seaweed (Limu)	**Pesticides**										
		Heptachlor	67	54.77	Normal	37.7	54.77	µg/kg	95% UCL	37.675	µg/kg	Mean
		Heptachlor Epoxide	83.9	-	-	14.0	83.9	µg/kg	Max	13.988	µg/kg	Mean
		Dioxins										
		2,3,7,8-TCDF	0.12 JZ	0.107	Normal	0.109	0.107	ng/kg	95% UCL	0.107	ng/kg	95% UCL
		2,3,7,8-TCDD	-	-	-	-	-	-	-		-	-
		1,2,3,7,8-PeCDF	-	-	-	-	-	-	-		-	-
		2,3,4,7,8-PeCDF	-	-	-	-	-	-	-		-	-
		1,2,3,7,8-PeCDD	0.046	-	-	0.045	0.046	ng/kg	Max	0.045	ng/kg	Mean
		1,2,3,4,7,8-HxCDF	-	-	-	-	-	-	-	-	-	-
		1,2,3,6,7,8-HxCDF	0.057	-	-	0.043	0.057	ng/kg	Max	0.043	ng/kg	Mean
		2,3,4,6,7,8-HxCDF	-	-	-	-	-	-	-	-	-	-
		1,2,3,7,8,9-HxCDF	-	-	-	-	-	-	-	-	-	-
		1,2,3,4,7,8-HxCDD	-	-	-	-	-	-	-	-	-	-
		1,2,3,6,7,8-HxCDD	-	-	-	-	-	-	-	-	-	-
		1,2,3,7,8,9-HxCDD	1.1 JZ	-	-	0.268	1.1	ng/kg	Max	0.268	ng/kg	Mean
		1,2,3,4,6,7,8-HpCDF	0.75	0.529	NonPara	0.152	0.529	ng/kg	95% UCL	0.152	ng/kg	Mean
		1,2,3,4,7,8,9-HpCDF	0.057	-	-	0.058	0.057	ng/kg	Max	0.057	ng/kg	Max
		1,2,3,4,6,7,8-HpCDD	3.6	-	-	0.540	3.6	ng/kg	Max	0.540	ng/kg	Mean
		OCDF	10	-	-	1.386	10	ng/kg	Max	1.386	ng/kg	Mean
		OCDD	60	-	-	7.978	60	ng/kg	Max	7.978	ng/kg	Mean
		Metals										
		Cobalt	0.1 B J	0.0797	Normal	0.064	0.0797	mg/kg	95% UCL	0.064	mg/kg	Mean
		Lead	0.63	0.47	Normal	0.361	0.47	mg/kg	95% UCL	0.361	mg/kg	Mean
		Thallium	0.007 B J	0.00585	Normal	0.0049	0.00585	mg/kg	95% UCL	0.0049	mg/kg	Mean

Notes:

EPCs carried forward for further evaluation in the baseline human health risk assessment included all chemical that exceeded calculated screening values or background concentrations from either Round 1 sampling or Round 2 sampling events.

Dioxins were carried forward in both Octopus and Seaweed samples. If a single dioxin congener was determined to be of concern, baseline risk was calculated for all dectected dioxin congeners.

Small datasets with less than 3 detections, are not enough to compute meaningful or reliable statistics and estimates, no 95% UCL is presented.

Arithmetic means were conservatively calculated assuming nondetects were present at their full detection limit. Arithmetic mean was not calculated for those dioxin congeners which were not detected.

" - " = Not Applicable/Not Detected

B - Less than 10x higher than method blank level.

J = estimated value

mg/kg= milligrams per kilogram

ng/g = nanograms per gram

NonPara = Non-Parametric Distribution, 95% UCL based on the 95% Chebyshev(Mean, Sd) UCL

Normal = Distribution is approximately normal at 5% significance level. 95% UCL based on the 95% Student's-t UCL

Z - Indicates an EMPC result. The result is qualified in the Pace Analytical laboratory report as a "J" with either an "I" (interference present) or "P" (PCDE interference) qualifier.

µg/kg = micrograms per kilogram

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TABLE 8
EXPOSURE POINT CONCENTRATIONS
MAKUA MILITARY RESERVATION
ROUND 2

Biota	Chemical	Units	Maximum Concentration Detected (Qualifier)	95% UCL	Distribution	Arithmetic Mean	Reasonable Maximum Exposures (RME) Exposure Point Concentration			Central Tendancy Exposures (CTE) Exposure Point Concentration		
							Value	Units	Statistic	Value	Units	Statistic
Octopus	**Dioxins**											
(He'e)	2,3,7,8-TCDF	ng/kg	0.075	0.0734	Normal	0.064	0.073	ng/kg	95% UCL	0.064	ng/kg	Mean
	2,3,7,8-TCDD	ng/kg	-	-	-	-		-			-	
	1,2,3,7,8-PeCDF	ng/kg	-	-	-	-		-			-	
	2,3,4,7,8-PeCDF	ng/kg	-	-	-	-		-			-	
	1,2,3,7,8-PeCDD	ng/kg	-	-	-	-		-			-	
	1,2,3,4,7,8-HxCDF	ng/kg	0.034 JZ	-	-	0.040	0.034	ng/kg	Max	0.040	ng/kg	Mean
	1,2,3,6,7,8-HxCDF	ng/kg	-	-	-	-		-			-	
	2,3,4,6,7,8-HxCDF	ng/kg	-	-	-	-		-			-	
	1,2,3,7,8,9-HxCDF	ng/kg	-	-	-	-		-			-	
	1,2,3,4,7,8-HxCDD	ng/kg	-	-	-	-		-			-	
	1,2,3,6,7,8-HxCDD	ng/kg	0.047	-	-	0.041	0.047	ng/kg	Max	0.041	ng/kg	Mean
	1,2,3,7,8,9-HxCDD	ng/kg	-	-	-	-		-			-	
	1,2,3,4,6,7,8-HpCDF	ng/kg	-	-	-	-		-			-	
	1,2,3,4,7,8,9-HpCDF	ng/kg	-	-	-	-		-			-	
	1,2,3,4,6,7,8-HpCDD	ng/kg	-	-	-	-		-			-	
	OCDF	ng/kg	-	-	-	-		-			-	
	OCDD	ng/kg	-	-	-	-		-			-	
	Metals											
	Lead	mg/kg	0.05	0.0342	Normal	0.026	0.034	mg/kg	95% UCL	0.026	mg/kg	Mean
Sea	**Metals**											
Cucumber	Inorganic Arsenic	mg/kg	0.071 J	0.0456	Normal	0.03	0.046	mg/kg	95% UCL	0.030	mg/kg	Mean
(Loli)	Chromium	mg/kg	0.326	0.221	Normal	0.01	0.221	mg/kg	95% UCL	0.007	mg/kg	Mean
Seaweed	**Pesticides**											
(Limu)	Heptachlor	µg/kg	-	-	-	-	-	-	-	-	-	-
	Heptachlor Epoxide	µg/kg	-	-	-	-	-	-	-	-	-	-
	Dioxins											
	2,3,7,8-TCDF	ng/kg	-	-	-	-	-	-	-	-	-	-
	2,3,7,8-TCDD	ng/kg	-	-	-	-	-	-	-	-	-	-
	1,2,3,7,8-PeCDF	ng/kg	-	-	-	-	-	-	-	-	-	-
	2,3,4,7,8-PeCDF	ng/kg	-	-	-	-	-	-	-	-	-	-
	1,2,3,7,8-PeCDD	ng/kg	-	-	-	-	-	-	-	-	-	-
	1,2,3,4,7,8-HxCDF	ng/kg	0.023 JZ	-	-	0.031	0.023	ng/kg	Max	0.023	ng/kg	Max
	1,2,3,6,7,8-HxCDF	ng/kg	0.029	-	-	0.028	0.029	ng/kg	Max	0.028	ng/kg	Mean
	2,3,4,6,7,8-HxCDF	ng/kg	0.019	-	-	0.026	0.019	ng/kg	Max	0.019	ng/kg	Max
	1,2,3,7,8,9-HxCDF	ng/kg	0.024	-	-	0.032	0.024	ng/kg	Max	0.024	ng/kg	Max
	1,2,3,4,7,8-HxCDD	ng/kg	0.09 JZ	-	-	0.059	0.09	ng/kg	Max	0.059	ng/kg	Mean
	1,2,3,6,7,8-HxCDD	ng/kg	-	-	-	-	-	-	-	-	-	-
	1,2,3,7,8,9-HxCDD	ng/kg	-	-	-	-	-	-	-	-	-	-
	1,2,3,4,6,7,8-HpCDF	ng/kg	0.064 JZ	0.055	Normal	0.049	0.055	ng/kg	95% UCL	0.049	ng/kg	Mean
	1,2,3,4,7,8,9-HpCDF	ng/kg	-	-	-	-	-	-	-	-	-	-
	1,2,3,4,6,7,8-HpCDD	ng/kg	0.1 JZ	0.086	Normal	0.073	0.086	ng/kg	95% UCL	0.073	ng/kg	Mean
	OCDF	ng/kg	0.12 JZ	-	-	0.133	0.12	ng/kg	Max	0.12	ng/kg	Max
	OCDD	ng/kg	0.8	0.645	Normal	0.530	0.645	ng/kg	95% UCL	0.53	ng/kg	Mean
	Metals											
	Cobalt	mg/kg	0.59	0.392	Normal	0.23	0.392	mg/kg	95% UCL	0.23	mg/kg	Mean
	Lead	mg/kg	1.58	1.79	NonPara	0.76	1.58	mg/kg	Max	0.76	mg/kg	Mean
	Thallium	mg/kg	0.008 B	0.0076	NonPara	0.0045	0.0076	mg/kg	95% UCL	0.0045	mg/kg	Mean

Notes:

EPCs carried forward for further evaluation in the baseline human health risk assessment included all chemical that exceeded calculated screening values or background concentrations from either Round 1 sampling or Round 2 sampling events.

Dioxins were carried forward in both Octopus and Seaweed samples. If a single dioxin congener was determined to be of concern, baseline risk was calculated for all dectected dioxin congeners. Dioxin congeners evaluated included those with toxicity equivlency factors defined by WHO, 2005)

Arithmetic means were conservatively calculated assuming nondetects were present at their full detection limit. Arithmetic mean was not calculated for those dioxin congeners which were not d

" - " = Not Applicable/Not Detected

B - Less than 10x higher than method blank level.

J = estimated value

mg/kg= milligrams per kilogram

ng/g = nanograms per gram

NonPara = Non-Parametric Distribution, 95% UCL based on the 95% Chebyshev(Mean, Sd) UCL

Normal = Distribution is approximately normal at 5% significance level. 95% UCL based on the 95% Student's-t UCL

Z - Indicates an EMPC result. The result is qualified in the Pace Analytical laboratory report as a "J" with either an "I" (interference present) or "P" (PCDE interference) qualifier.

µg/kg = micrograms per kilogram

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TABLE 9
EXPOSURE PARAMETERS FOR EVALUATING BIOTA INGESTION

$$\text{Daily Intake } \left({}^{mg}/_{kg\text{-}day}\right) = \frac{C \times FC \times IR \times ED \times EF \times CF}{BW \times AT}$$

Exposure Parameter	Definition	Units	Residential (Average Consumer)		Residential (High End Consumer)	
			Child (0-6)[a]	Adult[a]	Child (0-6) [a]	Adult [a]
C	Chemical concentration in biota[b]	mg/kg	Chemical Specific[b]	Chemical Specific[b]	Chemical Specific[b]	Chemical Specific[b]
FC	Fraction from contaminated source	%	100	100	100	100
IR	Ingestion rate	mg/day	Site Specific [c]	Site Specific [c]	Site Specific [c]	Site Specific [c]
ED	Exposure duration	years	6	24	6	24
EF	Exposure frequency	days/year	350[d]	350[d]	350[d]	350[d]
CF	Conversion factor	kg/g	1 E-03	1 E-03	1 E-03	1 E-03
BW	Body weight	kg	15	70	15	70
AT_{nc}	Averaging time - noncarcinogenic	days	2,190	8,760	2,190	8,760
AT_{carc}	Averaging time - carcinogenic (lifetime)	days	25,550	25,550	25,550	25,550

[a] exposure parameters without footnotes are USEPA Standard Defaults (USEPA, 1991 c).

[b] concentrations were calculated (as described in Section 2.2.2 Derivation of EPCs)

[c] Ingestion Rate varies by type of biota. Ingestions rates were based on a Limited Seafood Consumption Survey conducted in 2012 (USACE, 2014) and calculated as descibed in Section 2.2.3.2 Seafood Consumption Rates. Average consumer used the arithmetic average of survey results. High End Consumer used the 95% UCL of survey results.

[d] Exposure Frequency was evaluated assuming 175 days/year from the dry season (Round 1, September-October 2013) and 175 days/year from the wet season (Round 2, January-March 2014)

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TABLE 10

2010 LIMITED SEAFOOD CONSUMPTION SURVEY RESULTS

	Meals per Month		Weight per Meal (oz)			Percent of Seafood			
	Response	Average	Response	Adult	Child	Fish	Octopus	Crab	Limu
William Aila	20	20	Men 10-12, Women 8, Child 4	9.5	4	35%	35%	20%	10%
Nanakuli Public Meeting									
Carl Jellings	6 to 8	7	Men 12, Women 8, Child <8	10	6	90%	3%	3%	3%
James Manakusa	2 to 3	2.5	Man 8 oz	8		95%	0%	0%	5%
Al Fremel	1	1	Man 4oz	4		100%	0%	0%	0%
Calvin Endo	8	8	Man 4oz	4		75%	5%	5%	15%
Tamura Market Survey									
Anonymous	20	20	4lb/family (avg 0.5 lb/person)	12	4	50%	50%	0%	0%
Joseph Manuel	30	30	2-3 lbs/family (avg 0.5 lbs/person)	12	4	85%	5%	5%	5%
Gene Kahai	4 to 5	4.5	0.5 lb to 1lb	12		100%	0%	0%	0%
Anonymous	30	30	0.5 lb to 1lb	8		35%	35%	20%	10%
Anonymous	10	10	0.5lb	8		90%	3%	3%	3%
Anonymous	6 to 7	6.5	1lb	16		100%	0%	0%	0%
Anonymous	2/week	8	0.5lb	8		90%	10%	0%	0%
Beach Dwellers									
Rebecca Delrosario	6	6	0.5lb	8		35%	35%	20%	10%
Diana Jarra	60	60	12oz	12		25%	25%	25%	25%
Lenda Gilman	4/week	16	2lb	32		50%	50%	0%	0%
Harmonika Lono "Ali"	Rarely	2	12oz	12		25%	25%	25%	25%
Rose L. Chung-Lono	3	3	4oz	4		25%	25%	25%	25%
Twinkle Borge	3/week	12	12oz to 1lb	14		25%	25%	25%	25%
Tony Paglindoal	1 or 2	1.5	8oz	8		90%	3%	3%	3%
ARITHMETIC AVERAGE		**13.05**		**10.61**	**4.50**	**64%**	**18%**	**9%**	**9%**
95% UCL		**20.17**		**13.12**	**6 ***				

Total Average Daily Consumption Rate (g/day):	Arithmetic Average	130.81	55.51
	95% UCL	250.08	114.36

*max value used due to inadequate unique results to calculate a UCL

Average Daily Consumption = Meals per Month / (30days/month) * Weight per Meal * (28.35 g/oz)

Some responders may represent multiple individuals

			Fish	Octopus	Crab	Limu
Seafood Consumption (g/day):	**Average Seafood Consumer (Arithmetic Average)**	Adult	84.00	23.00	12.32	11.29
		Child	35.64	9.76	5.23	4.79
	High End Seafood Consumer (95% UCL)	Adult	160.57	43.96	23.56	21.59
		Child	73.43	20.10	10.77	9.87

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TABLE 11
DOSE-RESPONSE VALUES
MAKUA MILITARY RESERVATION

Analyte	Reference Dose (RfD) (mg/kg-d)	Reference Dose (RfD) Source	Cancer Slope Factor (CSF) (mg/kg-d)	Cancer Slope Factor (CSF) Source
Dioxins/Furans				
HpCDD	not defined	-	1.30E+03	RSL
HpCDF	not defined	-	1.30E+03	RSL
HxCDD	not defined	-	1.30E+04	RSL
HxCDF	not defined	-	1.30E+04	RSL
PeCDD	not defined	-	1.30E+05	RSL
PeCDF	not defined	-	3.90E+04	RSL
OCDD	not defined	-	3.90E+01	RSL
OCDF	not defined	-	3.90E+01	RSL
TCDF	not defined	-	1.30E+04	RSL
TCDD	7.00E-10	IRIS	1.30E+05	RSL
Purgeable Organic				
Ethylbenzene	1.00E-01	IRIS	1.10E-02	RSL
m-Xylene	2.00E-01	IRIS	not defined	-
p-Xylene	2.00E-01	IRIS	not defined	-
o-Xylene	2.00E-01	IRIS	not defined	-
Toluene	8.00E-02	IRIS	not defined	-
Stryrene	2.00E-01	IRIS	not defined	-
1,2,4-Trimethylbenzene	not defined		not defined	-
Metals				
Aluminium	1.00E+00	RSL	not defined	-
Antimony	4.00E-04	IRIS	not defined	-
Inorganic Arsenic	3.00E-04	IRIS	1.50E+00	IRIS
Barium	2.00E-01	IRIS	not defined	-
Beryllium	2.00E-03	IRIS	not defined	-
Cadmium	1.00E-03	IRIS	not defined	-
Chromium (VI)	3.00E-03	IRIS	5.00E-01	RSL
Cobalt	3.00E-04	RSL	not defined	-
Copper	4.00E-02	RSL	not defined	-
Iron	7.00E-01	RSL	not defined	-
Lead	not defined	-	not defined	-
Manganese	1.40E-01	IRIS	not defined	-
Mercury	3.00E-04	IRIS	not defined	-
Methyl Mercury	1.00E-04	RSL	not defined	-
Selenium	5.00E-03	IRIS	not defined	-
Silver	5.00E-03	IRIS	not defined	-
Thallium	1.00E-05	RSL	not defined	-
Vanadium	5.00E-03	RSL	not defined	-
Zinc	3.00E-01	IRIS	not defined	-

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TABLE 11

DOSE-RESPONSE VALUES

MAKUA MILITARY RESERVATION

Analyte	Reference Dose (RfD) (mg/kg-d)	Reference Dose (RfD) Source	Cancer Slope Factor (CSF) (mg/kg-d)	Cancer Slope Factor (CSF) Source
Explosives				
2,4 - Dinitrotoluene	2.00E-03	IRIS	3.10E-01	RSL
RDX	3.00E-03	IRIS	1.10E-01	IRIS
Nitroglycerin	1.00E-04	RSL	1.70E-02	RSL
PETN	2.00E-03	RSL	4.00E-03	RSL
Perchlorate	7.00E-04	IRIS	not defined	-
Organochlorine Pesticides				
4,4'-DDT	5.00E-04	IRIS	3.40E-01	IRIS
Aldrin	3.00E-05	IRIS	1.70E+01	IRIS
alpha BHC	8.00E-03	RSL	6.30E+00	IRIS
beta BHC	not defined	-	1.80E+00	IRIS
delta BHC	not defined	-	not defined	-
gamma BHC (Lindane)	3.00E-04	IRIS	1.10E+00	
Heptachlor	5.00E-04	IRIS	4.50E+00	IRIS
Heptachlor epoxide	1.30E-05	IRIS	9.10E+00	IRIS
VOCs/SVOCs				
Pyrene	3.00E-02	IRIS	not defined	-
Phthalate Esters:				
Bis(2-ethylhexyl) phthalate	2.00E-02	IRIS	1.40E-02	IRIS
Di-n-butyl phthalate	1.00E-01	IRIS	not defined	-
Diethyl phthalate	8.00E-01	IRIS	not defined	-
Dimethyl phthalate	not defined	-	not defined	-
Di-n-octyl phthalate	1.00E-02	RSL	not defined	-
Metal Speciation				
Inorganic Arsenic	3.00E-04	IRIS	1.50E+00	IRIS

Notes:

RfD values are the lower value between the EPA IRIS and EPA RSL values. CSF values are the higher value between the EPA IRIS and EPA RSL values

CSFs for the dioxin congeners are calculated from the toxicity of 2,3,7,8-TCDD based on World Health Organization (WHO) toxic equivalency factors (TEFs) (WHO, 2005)

Exact congener of PeCDF was not defined, therefore this assessment used a TEF of 0.3 for 2,3,4,7,8-PeCDF

IRIS - EPA Integrated Risk Information System

RSL - EPA Region Screening Level Tables (EPA, 2014)

SVOC - semi-volatile organic compounds

VOC - volatile organic compounds

WHO 2005 TEF

chlorinated dibenzo-p-dioxins		chlorinated dibenzofurans	
2,3,7,8-TCDD	1	2,3,7,8-TCDF	0.1
1,2,3,7,8-PeCDD	1	1,2,3,7,8-PeCDF	0.03
1,2,3,4,7,8-HxCDD	0.1	2,3,4,7,8-PeCDF	0.3
1,2,3,6,7,8-HxCDD	0.1	1,2,3,4,7,8-HxCDF	0.1
1,2,3,7,8,9-HxCDD	0.1	1,2,3,6,7,8-HxCDF	0.1
1,2,3,4,6,7,8-HpCDD	0.01	1,2,3,7,8,9-HxCDF	0.1
OCDD	0.0003	2,3,4,6,7,8-HxCDF	0.1
		1,2,3,4,6,7,8-HpCDF	0.01
		1,2,3,4,7,8,9-HpCDF	0.01
		OCDF	0.0003

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TABLE 12
CUMULATIVE HUMAN HEALTH RISKS
HIGH-END CONSUMER
ROUND 1
MAKUA MILITARY RESERVATION

		Carcinogenic Risk				Hazard Index			
		Child	%	Adult	%	Child	%	Adult	%
Octopus	Lead	NA	NA	NA	NA	NA	NA	NA	NA
	Dioxins TEQ	2.8E-08	0.1%	5.2E-08	0.1%	NA	NA	NA	NA
Octopus Total:		**2.8E-08**		**5.2E-08**		**NA**		**NA**	
Sea Cucumber	Arsenic	9.3E-08	0.3%	1.7E-07	0.3%	0.002	0.1%	0.001	0.1%
	Chromium	NA	NA	NA	NA	NA	NA	NA	NA
Sea Cucumber Total:		**9.3E-08**		**1.7E-07**		**0.002**		**0.001**	
Limu	Cobalt	NA	NA	NA	NA	0.08	3.6%	0.04	3.6%
	Lead	NA	NA	NA	NA	NA	NA	NA	NA
	Thallium	NA	NA	NA	NA	0.2	7.9%	0.09	7.9%
	Heptachlor	6.7E-06	23.6%	1.2E-05	23.6%	0.03	1.5%	0.02	1.5%
	Heptachlor epoxide	2.1E-05	73.1%	3.9E-05	73.1%	2	87.0%	1	87.0%
	Dioxins TEQ	8.3E-07	2.9%	1.6E-06	2.9%	NA	NA	NA	NA
Limu Total:		**2.8E-05**		**5.3E-05**		**2**		**1**	

Total	**3.E-05**	**5.E-05**	**2**	**1**

Total Residential	**8.E-05**	**2**

Total Residential numbers are the combined Child and Adult Cancer risks, and the maximum non-carcinogenic hazards

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TABLE 13
CUMULATIVE HUMAN HEALTH RISKS
HIGH-END CONSUMER
ROUND 2
MAKUA MILITARY RESERVATION

		Carcinogenic Risk				Hazard Index			
		Child	%	Adult	%	Child	%	Adult	%
Octopus	Lead	NA	NA	NA	NA	NA	NA	NA	NA
	Dioxins TEQ	1.1E-07	28.8%	2.1E-07	28.8%	NA	NA	NA	NA
Octopus Total:		**1.1E-07**		**2.1E-07**		**NA**		**NA**	
Sea Cucumber	Arsenic	2.0E-07	52.7%	3.8E-07	52.7%	0.005	0.8%	0.002	0.8%
	Chromium	NA	NA	NA	NA	NA	NA	NA	NA
Sea Cucumber Total:		**2.0E-07**		**3.8E-07**		**0.005**		**0.002**	
Limu	Cobalt	NA	NA	NA	NA	0.4	62.7%	0.2	62.7%
	Lead	NA	NA	NA	NA	NA	NA	NA	NA
	Thallium	NA	NA	NA	NA	0.2	36.5%	0.1	36.5%
	Heptachlor	NA	NA	NA	NA	NA	NA	NA	NA
	Heptachlor epoxide	NA	NA	NA	NA	NA	NA	NA	NA
	Dioxins TEQ	7.1E-08	18.5%	1.3E-07	18.5%	NA	NA	NA	NA
Limu Total:		**7.1E-08**		**1.3E-07**		**0.7**		**0.3**	

Total	**4.E-07**	**7.E-07**	**0.7**	**0.3**

Total Residential	**1.E-06**	**0.7**

Total Residential numbers are the combined Child and Adult Cancer risks, and the maximum non-carcinogenic hazards

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TABLE 14
CUMULATIVE HUMAN HEALTH RISKS
AVERAGE CONSUMER
ROUND 1
MAKUA MILITARY RESERVATION

		Carcinogenic Risk				Hazard Index			
		Child	%	Adult	%	Child	%	Adult	%
Octopus	Lead	NA	NA	NA	NA	NA	NA	NA	NA
	Dioxins TEQ	1.17E-08	0.3%	2.36E-08	0.3%	NA	NA	NA	NA
Octopus Total:		**1.17E-08**		**2.36E-08**		**NA**		**NA**	
Sea Cucumber	Arsenic	3.25E-08	0.8%	6.57E-08	0.8%	0.001	0.3%	0.0004	0.3%
	Chromium	NA	NA	NA	NA	NA	NA	NA	NA
Sea Cucumber Total:		**3.25E-08**		**6.57E-08**		**0.0008**		**0.0004**	
Limu	Cobalt	NA	NA	NA	NA	0.03	11.5%	0.02	11.5%
	Lead	NA	NA	NA	NA	NA	NA	NA	NA
	Thallium	NA	NA	NA	NA	0.08	26.3%	0.04	26.3%
	Heptachlor	2.23E-06	54.2%	4.50E-06	54.2%	0.01	4.1%	0.006	4.1%
	Heptachlor epoxide	1.67E-06	40.7%	3.38E-06	40.7%	0.2	57.8%	0.08	57.8%
	Dioxins TEQ	1.66E-07	4.0%	3.35E-07	4.0%	NA	NA	NA	NA
Limu Total:		**4.06E-06**		**8.21E-06**		**0.3**		**0.1**	

Total	**4.E-06**	**8.E-06**	**0.3**	**0.1**

Total Residential	**1.E-05**	**0.3**

Total Residential numbers are the combined Child and Adult Cancer risks, and the maximum non-carcinogenic hazards

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TABLE 15
CUMULATIVE HUMAN HEALTH RISKS
AVERAGE CONSUMER
ROUND 2
MAKUA MILITARY RESERVATION

		Carcinogenic Risk				Hazard Index			
		Child	%	Adult	%	Child	%	Adult	%
Octopus	Lead	NA	NA	NA	NA	NA	NA	NA	NA
	Dioxins TEQ	5.0E-08	35.0%	1.0E-07	35.0%	NA	NA	NA	NA
Octopus Total:		**5.0E-08**		**1.0E-07**		**NA**		**NA**	
Sea Cucumber	Arsenic	6.5E-08	45.2%	1.3E-07	45.2%	0.002	0.9%	0.0009	0.9%
	Chromium	NA	NA	NA	NA	NA	NA	NA	NA
Sea Cucumber Total:		**6.5E-08**		**1.3E-07**		**0.002**		**0.0009**	
Limu	Cobalt	NA	NA	NA	NA	0.1	62.4%	0.06	62.4%
	Lead	NA	NA	NA	NA	NA	NA	NA	NA
	Thallium	NA	NA	NA	NA	0.07	36.7%	0.03	36.7%
	Heptachlor	NA	NA	NA	NA	NA	NA	NA	NA
	Heptachlor epoxide	NA	NA	NA	NA	NA	NA	NA	NA
	Dioxins TEQ	2.9E-08	19.8%	5.8E-08	19.8%	NA	NA	NA	NA
Limu Total:		**2.9E-08**		**5.8E-08**		**0.2**		**0.09**	

Total	**1.E-07**	**3.E-07**	**0.2**	**0.09**

Total Residential	**4.E-07**	**0.2**

Total Residential numbers are the combined Child and Adult Cancer risks, and the maximum non-carcinogenic hazards

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TABLE 16

INTEGRATED EXPOSURE UPTAKE BIOKINETIC (IEUBK) MODEL RESULTS

MAKUA MILITARY RESERVATION

HIGH END CONSUMER

Round	Media	EPC	Units	Percent of Consumption	Receptor	Age Group	IEUBK Outputs						
							Air (µg/day)	Diet (µg/day)	Alternate (µg/day)	Water (µg/day)	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)
Round 1	Octopus (he'e)	0.251	mg/kg	60% of total meat consumption	Child Subsistence Fishermen	0.5-1	0.021	1.948	0	0.387	0.527	2.883	1.6
						1-2	0.034	3.255	0	0.957	0.828	5.075	2.1
						2-3	0.062	4.036	0	0.996	0.828	5.922	2.2
	Seaweed (limu kohu)	0.47	mg/kg	23% of total vegetable consumption		3-4	0.067	4.214	0	1.02	0.833	6.133	2.1
						4-5	0.067	4.395	0	1.064	0.62	6.146	2
						5-6	0.093	4.718	0	1.125	0.559	6.495	2
						6-7	0.093	5.331	0	1.144	0.528	7.096	2
Round 2	Octopus (he'e)	0.034	mg/kg	60% of total meat consumption	Child Subsistence Fishermen	0.5-1	0.021	1.509	0	0.389	0.53	2.449	1.3
						1-2	0.034	1.963	0	0.968	0.837	3.803	1.6
						2-3	0.062	2.449	0	1.007	0.838	4.357	1.6
	Seaweed (limu kohu)	1.58	mg/kg	23% of total vegetable consumption		3-4	0.067	2.444	0	1.031	0.842	4.385	1.5
						4-5	0.067	2.441	0	1.075	0.627	4.21	1.4
						5-6	0.093	2.549	0	1.136	0.565	4.344	1.3
						6-7	0.093	2.747	0	1.157	0.534	4.532	1.3

Notes:

Residential Child blood-lead concentrations were calculated via EPA IEUBK (EPA, 2010). Maximum blood-lead concentrations calculated were for the 2-3 age group.

EPCs for the reasonable maximum exposure are based on the 95% UCL of lead concentration in the seafood biota.

Dietary intake in the IEUBK model was modified to include the consumption of site-specific biota concentrations in octopus and limu kohu. The consumption rate of the IEUBK model cannot be changed, and therefore is not site-specific. The default consumption rate of the IEUBK model was used in this assessment

Percent of consumption was based on Pacific-Asian diet as assumed in the HDOH Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater (HDOH, 2011)

Octopus consumption was assumed to be 100% of the "Fish and Products" consumption of the total "Fish, Meat & Poultry" consumption in the Pacific-Asian diet (consumption of Fish and Products/ total Fish, Meat and Poultry consumption). This value was used as the percentage of "fish from fishing" in the IEUBK Model.

Limu kohu consumption was assumed to be 100% of the "other vegetables" of the total "Vegetable" consumption in the Pacific-Asian diet (consumption of Other Vegetables/total Vegetable consumption). This value was used as the percentage of "home grown vegetables" in the IEUBK Model.

EPC = Exposure Point Concentration

g/d = grams per day

PbB = blood-lead

µg/day = micrograms per day

µg/dL = micrograms per deciliter

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TABLE 17

INTEGRATED EXPOSURE UPTAKE BIOKINETIC (IEUBK) MODEL RESULTS

MAKUA MILITARY RESERVATION

AVERAGE CONSUMER

Round	Media	EPC	Units	Percent of Consumption	Receptor	Age Group	IEUBK Outputs						
							Air (µg/day)	Diet (µg/day)	Alternate (µg/day)	Water (µg/day)	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)
Round 1	Octopus (he'e)	0.06	mg/kg	60% of total meat consumption	Child Recreational Fishermen	0.5-1	0.021	1.346	0	0.39	0.531	2.288	1.3
						1-2	0.034	1.602	0	0.971	0.84	3.447	1.4
						2-3	0.062	1.9	0	1.012	0.842	3.815	1.4
	Seaweed (limu kohu)	0.361	mg/kg	23% of total vegetable consumption		3-4	0.067	1.909	0	1.035	0.845	3.855	1.4
						4-5	0.067	1.919	0	1.078	0.628	3.693	1.3
						5-6	0.093	2.035	0	1.139	0.567	3.834	1.2
						6-7	0.093	2.25	0	1.16	0.535	4.038	1.1
Round 2	Octopus (he'e)	0.026	mg/kg	60% of total meat consumption	Child Recreational Fishermen	0.5-1	0.021	1.321	0	0.39	0.531	2.263	1.2
						1-2	0.034	1.504	0	0.972	0.841	3.351	1.4
						2-3	0.062	1.801	0	1.012	0.842	3.718	1.4
	Seaweed (limu kohu)	0.76	mg/kg	23% of total vegetable consumption		3-4	0.067	1.783	0	1.036	0.846	3.731	1.3
						4-5	0.067	1.766	0	1.079	0.629	3.541	1.2
						5-6	0.093	1.851	0	1.14	0.567	3.652	1.1
						6-7	0.093	2.007	0	1.161	0.536	3.797	1.1

Notes:

Residential Child blood-lead concentrations were calculated via EPA IEUBK (EPA, 2010). Maximum blood-lead concentrations calculated were for the 2-3 age group.

EPCs for the central tendency exposure are based on the arithmetic mean of lead concentration in the seafood biota.

Dietary intake in the IEUBK model was modified to include the consumption of site-specific biota concentrations in octopus and limu kohu. There is no consumption rate term in the IEUBK model, and therefore is not site-specific. The default consumption rate of the IEUBK model was used in this assessment

Percent of consumption was based on Pacific-Asian diet as assumed in the HDOH Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater (HDOH, 2011)

Octopus consumption was assumed to be 100% of the "Fish and Products" consumption of the total "Fish, Meat & Poultry" consumption in the Pacific-Asian diet (consumption of Fish and Products/ total Fish, Meat and Poultry consumption). This value was used as the percentage of "fish from fishing" in the IEUBK Model.

Limu kohu consumption was assumed to be 100% of the "other vegetables" of the total "Vegetable" consumption in the Pacific-Asian diet (consumption of Other Vegetables/total Vegetable consumption). This value was used as the percentage of "home grown vegetables" in the IEUBK Model.

EPC = Exposure Point Concentration

g/d = grams per day

PbB = blood-lead

µg/day = micrograms per day

µg/dL = micrograms per deciliter

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Appendix A
Analytical Data

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Mākua Military Reservation

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Round 1 – September to October 2013

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Organochlorine Pesticides

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Analyte		Aldrin					Alpha-BHC					Beta-BHC					Delta-BHC					Gamma-BHC (Lindane)					Heptachlor					Heptachlor Epoxide					p,p'-DDT				
CAS Number		309-00-2					319-84-6					319-85-7					319-86-8					58-89-9					76-44-8					1024-57-3					50-29-3				
Units		µg/kg					µg/kg					µg/kg					µg/kg					µg/kg					µg/kg					µg/kg					µg/kg				
Lab ID	Collection Date	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL
Mākua Beach																																									
***Octopus* (*He'e*)**																																									
MAK001O	9/9/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK002O	9/9/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK003O	9/9/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK004O	9/11/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK005O	9/11/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK006O	9/11/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK007O	9/11/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK008O	9/11/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
***Sea Cucumber* (*Loli*)**																																									
MAK001C	9/9/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK002C	9/9/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK004C	9/9/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK005C	9/9/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK006C	9/11/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK007C	9/11/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK008C	9/11/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK009C	9/11/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
Seaweed (*Limu*)																																									
MAK001L/2L/26L	9/9/2013; 9/10/2013; 9/27/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK013L	9/18/2013	4	U	U	4	4	13.2			4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	45.8			4	4	4	U	U	4	4	4	U	U	4	4
MAK016L/21L/27L	9/23/2013; 9/27/2013; 9/27/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	27.3			4	4	83.9			4	4	4	U	U	4	4
MAK022L	9/27/2013	4	U	U	4	4	9.05			4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	62.8			4	4	4	U	U	4	4	4	U	U	4	4
MAK023L	9/27/2013	4	U	U	4	4	14.0			4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	57.4			4	4	4	U	U	4	4	4	U	U	4	4
MAK024L/25L	9/27/2013; 9/27/2013	4	U	U	4	4	13.3			4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	67.0			4	4	4	U	U	4	4	4	U	U	4	4
MAK025L	9/27/2013	4	U	U	4	4	10.9			4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	33.1			4	4	4	U	U	4	4	4	U	U	4	4
MAK029L	10/11/2013	4	U	U	4	4	4.05			4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4

Octopus (He'e) Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
	number of detections	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	-	-	-	-	-	-	-	-
	Standard Deviation	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	Mean	*4.00*	*4.00*	*4.00*	*4.00*	*4.00*	*4.00*	*4.00*	*4.00*
	Sample of Max Detection	-	-	-	-	-	-	-	-
	Max Dectection Limit	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*

Sea Cucumber (Loli) Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
	number of detections	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	-	-	-	-	-	-	-	-
	Standard Deviation	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	Mean	*4.00*	*4.00*	*4.00*	*4.00*	*4.00*	*4.00*	*4.00*	*4.00*
	Sample of Max Detection	-	-	-	-	-	-	-	-
	Max Dectection Limit	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*

Seaweed (Limu)Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*8*	*2*	*8*	*8*	*8*	*2*	*7*	*8*
	number of detections	*0*	*6*	*0*	*0*	*0*	*6*	*1*	*0*
	Frequency of Detection	*0.0%*	*75.0%*	*0.0%*	*0.0%*	*0.0%*	*75.0%*	*12.5%*	*0.0%*
	Maximum Detected	-	*14*	-	-	-	*67*	*83.9*	-
	Standard Deviation	*0.00*	*4.46*	*0.00*	*0.00*	*0.00*	*24.91*	*28.25*	*0.00*
	Mean	*4.00*	*9.06*	*4.00*	*4.00*	*4.00*	*37.68*	*13.99*	*4.00*
	Sample of Max Detection	-	*MAK023L*	-	-	-	*MAK024L/25L*	*MAK016L/21L/27L*	-
	Max Dectection Limit	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*

Notes:

µg/kg - micrograms per kilogram

BHC - benzene hexachloride

CAS - Chemical Abstracts Service

DDT - dichloro-diphenyl-trichloroethane

ID - identification

MDL - method detection limit

RL - reporting limit

Laboratory Qualifier (LQ)

U - Indicates compound was analyzed for but not detected. The sample quantitation limit must be corrected for dilution and for percent moisture. These results are presented as "ND" in the ARDL laboratory reports but are reported as the RL value with a "U" qualifier in the Staged Electronic Data Deliverable and this table.

Validator Qualifier (VQ)

U - Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

UJ - Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

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Volatile Organic Compounds

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	Analyte	1,2,4-Trimethylbenzene					Ethyl Benzene					M,P-XYLENES					o-Xylene					Styrene					Toluene				
	CAS Number	95-63-6					100-41-4					108-38-3 & 106-42-3					95-47-6					100-42-5					108-88-3				
	Units	µg/kg					µg/kg					µg/kg					µg/kg					µg/kg					µg/kg				
Lab ID	Collection Date	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL
Mākua Beach																															
Octopus (He'e)																															
MAK001O	9/9/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25.0	U	U	25.0	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK002O	9/9/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25.0	U	U	25.0	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK003O	9/9/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25.0	U	U	25.0	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK004O	9/11/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25.0	U	U	25.0	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK005O	9/11/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25.0	U	U	25.0	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK006O	9/11/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25.0	U	U	25.0	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK007O	9/11/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25.0	U	U	25.0	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK008O	9/11/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25.0	U	U	25.0	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
Sea Cucumber (Loli)																															
MAK001C	9/9/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25.0	U	U	25.0	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK002C	9/9/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25.0	U	U	25.0	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK004C	9/9/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25.0	U	U	25.0	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK005C	9/9/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25.0	U	U	25.0	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK006C	9/11/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25.0	U	U	25.0	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK007C	9/11/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25.0	U	U	25.0	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK008C	9/11/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25.0	U	U	25.0	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK009C	9/11/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25.0	U	U	25.0	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
Seaweed (*Limu*)																															
MAK001L/2L/26L	9/9/2013; 9/10/2013; 9/27/2013	25	U	U	25	5.0	25	U	U	25	5.0	50	U	U	50	10.0	25	U	U	25	5.0	25	U	U	25	5.0	25	U	U	25.0	5.0
MAK013L	9/18/2013	25	U	U	25	5.0	25	U	U	25	5.0	50	U	U	50	10.0	25	U	U	25	5.0	25	U	U	25	5.0	25	U	U	25.0	5.0
MAK016L/21L/27L	9/23/2013; 9/27/2013; 9/27/2013	12.5	U	U	12.5	2.5	12.5	U	U	12.5	2.5	25	U	U	25	5.0	12.5	U	U	12.5	2.5	12.5	U	U	12.5	2.5	12.5	U	U	12.5	2.5
MAK022L	9/27/2013	25	U	U	25	5.0	25	U	U	25	5.0	50	U	U	50	10.0	25	U	U	25	5.0	25	U	U	25	5.0	25	U	U	25.0	5.0
MAK023L	9/27/2013	25	U	U	25	5.0	25	U	U	25	5.0	50	U	U	50	10.0	25	U	U	25	5.0	25	U	U	25	5.0	25	U	U	25.0	5.0
MAK024L/25L	9/27/2013; 9/27/2013	12.5	U	U	12.5	2.5	12.5	U	U	12.5	2.5	25	U	U	25	5.0	12.5	U	U	12.5	2.5	12.5	U	U	12.5	2.5	12.5	U	U	12.5	2.5
MAK025L	9/27/2013	12.5	U	U	12.5	2.5	12.5	U	U	12.5	2.5	25	U	U	25	5.0	12.5	U	U	12.5	2.5	12.5	U	U	12.5	2.5	12.5	U	U	12.5	2.5
MAK029L	10/11/2013	25	U	U	25	5.0	25	U	U	25	5.0	50	U	U	50	10.0	25	U	U	25	5.0	25	U	U	25	5.0	25	U	U	25.0	5.0

Octopus (He'e) Samples	*number of samples analyzed*					*8*					*8*					*8*					*8*					*8*					*8*
	number of non-detect					*8*					*8*					*8*					*8*					*8*					*8*
	number of detections					*0*					*0*					*0*					*0*					*0*					*0*
	Frequency of Detection					*0.0%*					*0.0%*					*0.0%*					*0.0%*					*0.0%*					*0.0%*
	Maximum Detected					*-*					*-*					*-*					*-*					*-*					*-*
	Standard Deviation					*0.00*					*0.00*					*0.00*					*0.00*					*0.00*					*0.00*
	Mean					*12.50*					*12.50*					*25.00*					*12.50*					*12.50*					*12.50*
	Sample of Max Detection					*-*					*-*					*-*					*-*					*-*					*-*
	Max Dectection Limit					*2.5*					*2.5*					*5*					*2.5*					*2.5*					*2.5*
Sea Cucumber (Loli) Samples	*number of samples analyzed*					*8*					*8*					*8*					*8*					*8*					*8*
	number of non-detect					*8*					*8*					*8*					*8*					*8*					*8*
	number of detections					*0*					*0*					*0*					*0*					*0*					*0*
	Frequency of Detection					*0.0%*					*0.0%*					*0.0%*					*0.0%*					*0.0%*					*0.0%*
	Maximum Detected					*-*					*-*					*-*					*-*					*-*					*-*
	Standard Deviation					*0.00*					*0.00*					*0.00*					*0.00*					*0.00*					*0.00*
	Mean					*12.50*					*12.50*					*25.00*					*12.50*					*12.50*					*12.50*
	Sample of Max Detection					*-*					*-*					*-*					*-*					*-*					*-*
	Max Dectection Limit					*2.5*					*2.5*					*5*					*2.5*					*2.5*					*2.5*
Seaweed (Limu)Samples	*number of samples analyzed*					*8*					*8*					*8*					*8*					*8*					*8*
	number of non-detect					*8*					*8*					*8*					*8*					*8*					*8*
	number of detections					*0*					*0*					*0*					*0*					*0*					*0*
	Frequency of Detection					*0.0%*					*0.0%*					*0.0%*					*0.0%*					*0.0%*					*0.0%*
	Maximum Detected					*-*					*-*					*-*					*-*					*-*					*-*
	Standard Deviation					*6.47*					*6.47*					*12.94*					*6.47*					*6.47*					*6.47*
	Mean					*20.31*					*20.31*					*40.63*					*20.31*					*20.31*					*20.31*
	Sample of Max Detection					*-*					*-*					*-*					*-*					*-*					*-*
	Max Dectection Limit					*5*					*5*					*10*					*5*					*5*					*5*

Notes:

µg/kg - micrograms per kilogram

CAS - Chemical Abstracts Service

ID - identification

MDL - method detection limit

RL - reporting limit

Laboratory Qualifier (LQ)

U - Indicates compound was analyzed for but not detected. The sample quantitation limit must be corrected for dilution and for percent moisture. These results are presented as "ND" in the ARDL laboratory reports but are reported as the RL value with a "U" qualifier in this table.

Validator Qualifier (VQ)

U - Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

UJ - Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

Draft

Semivolatile Organic Compounds

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	Analyte	Dimethylphthalate					Diethylphthalate					di-n-Butylphthalate					Pyrene					bis(2-Ethylhexyl)phthalate					di-n-Octylphthalate					Pentachlorophenol				
	CAS Number	*131-11-3*					*84-66-2*					*84-74-2*					*129-00-0*					*117-81-7*					*117-84-0*					*87-86-5*				
	Units	*µg/kg-wet*					*µg/kg-wet*					*µg/kg-wet*					*µg/kg-wet*					*µg/kg-wet*					*µg/kg-wet*					*µg/kg-wet*				
Lab ID	**Collection Date**	**Result[2]**	**LQ**	**VQ**	**RL**	**MDL**	**Result[2]**	**LQ**	**VQ**	**RL**	**MDL**	**Result[2]**	**LQ**	**VQ**	**RL**	**MDL**	**Result[2]**	**LQ**	**VQ**	**RL**	**MDL**	**Result[2]**	**LQ**	**VQ**	**RL**	**MDL**	**Result[2]**	**LQ**	**VQ**	**RL**	**MDL**	**Result[2]**	**LQ**	**VQ**	**RL**	**MDL**
Mākua																																				
Octopus (He'e)																																				
MAK001O	9/9/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	566	300
MAK002O	9/9/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	498	300
MAK003O	9/9/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	585	300
MAK004O	9/11/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		585	300
MAK005O	9/11/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		548	300
MAK006O	9/11/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		566	300
MAK007O	9/11/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		571	300
MAK008O	9/11/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		571	300
Sea Cucumber (Loli)																																				
MAK001C	9/9/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	580	300
MAK002C	9/9/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	588	300
MAK004C	9/9/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	571	300
MAK005C	9/9/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	548	300
MAK006C	9/11/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		541	300
MAK007C	9/11/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		603	300
MAK008C	9/11/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		548	300
MAK009C	9/11/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		571	300
Seaweed (Limu kohu)																																				
MAK001L/2L/26L	9/9/2013; 9/10/2013; 9/27/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	597	300
MAK013L	9/18/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		556	300
MAK016L/21L/27L	9/23/2013; 9/27/2013; 9/27/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	580	300
MAK022L	9/27/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		597	300
MAK023L	9/27/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		569	300
MAK024L/25L	9/27/2013; 9/27/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		585	300
MAK025L	9/27/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		300	300
MAK029L	10/11/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		566	300

Octopus (He'e) Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*8*	*8*	*8*	*8*	*8*	*8*	*8*
	number of detections	*0*	*0*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	-	-	-	-	-	-	-
	Standard Deviation	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	Mean	*1000.00*	*1000.00*	*1000.00*	*1000.00*	*1000.00*	*1000.00*	*561.25*
	Sample of Max Detection	-	-	-	-	-	-	-
	Max Dectection Limit	*200*	*200*	*200*	*200*	*200*	*200*	*300*

Sea Cucumber (Loli) Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*8*	*8*	*8*	*8*	*8*	*8*	*8*
	number of detections	*0*	*0*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	-	-	-	-	-	-	-
	Standard Deviation	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	Mean	*1000.00*	*1000.00*	*1000.00*	*1000.00*	*1000.00*	*1000.00*	*568.75*
	Sample of Max Detection	-	-	-	-	-	-	-
	Max Dectection Limit	*200*	*200*	*200*	*200*	*200*	*200*	*300*

Seaweed (Limu)Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*8*	*8*	*8*	*8*	*8*	*8*	*8*
	number of detections	*0*	*0*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	-	-	-	-	-	-	-
	Standard Deviation	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	Mean	*1000.00*	*1000.00*	*1000.00*	*1000.00*	*1000.00*	*1000.00*	*543.75*
	Sample of Max Detection	-	-	-	-	-	-	-
	Max Dectection Limit	*200*	*200*	*200*	*200*	*200*	*200*	*300*

Notes:

[1] Final screening values from fish advisories as listed in Table 9 of the *Final Supplemental Marine Resources Study Sampling and Analysis Plan* (August 2013).

[2] Results presented as "ND" in the the Applied Research Development Laboratory, Inc. (ARDL) and U.S. Army Engineer Research and Development Center-Environmental Chemistry Branch (ERDC-ECB) laboratory reports are presented in the Staged Electronic Data Deliverable files (ARDL) and Electronic Data Deliverable file (ERDC-ECB) with a "U" qualifier and are thus presented in this table with the LQ.

µg/kg-wet - micrograms per kilogram-wet weight
CAS - Chemical Abstracts Service
EPA - U.S. Environmental Protection Agency
ID - identification

ND - not detected
MDL - method detection limit
RL - reporting limit
U.S. - United States

Laboratory qualifier (LQ) - ARDL
J - Indicates an estimated value. This flag is used when estimating a concentration of a compound that meets identification criteria but the result is less than the quantitation or RL but greater than the MDL.
U - Indicates compound was analyzed for but not detected. The sample quantitation limit must be corrected for dilution and for percent moisture.

LQ - ERDC-ECB
U - Not detected at or above the RL.

Validator qualifier (VQ)
J - Indicates an estimated value.
UJ - Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

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Dioxins/Furans

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Analyte		2,3,7,8-TCDF				Total TCDF				2,3,7,8-TCDD				Total TCDD				1,2,3,7,8-PECDF				2,3,4,7,8-PeCDF				Total PeCDF				1,2,3,7,8-PeCDD				Total PeCDD				1,2,3,4,7,8-HxCDF				1,2,3,6,7,8-HxCDF				2,3,4,6,7,8-HxCDF			
CAS Number		51207-31-9				30402-14-3				01746-01-6				41903-57-5				57117-41-6				57117-31-4				30402-15-4				40321-76-4				36088-22-9				70648-26-9				57117-44-9				60851-34-5			
Units		ng/kg				ng/kg				ng/kg				ng/kg				ng/kg				ng/kg				ng/kg				ng/kg				ng/kg				ng/kg				ng/kg				ng/kg			
Lab ID	Collection Date	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]
Mākua Beach																																																	
Octopus (He'e)																																																	
MAK001O	9/9/2013	0.073	BJZ	U	0.05	0.064		J	0.05	0.079	U	U	0.079	0.58			0.079	0.066	U	U	0.066	0.049	U	U	0.049	0.058	U	U	0.058	0.11	U	U	0.11	0.11	U	U	0.11	0.067	U	U	0.067	0.064	U	U	0.064	0.056	U	U	0.056
MAK002O	9/9/2013	0.071	U	U	0.071	0.071	U	U	0.071	0.097	U	U	0.097	0.5			0.097	0.097	U	U	0.097	0.087	U	U	0.087	0.092	U	U	0.092	0.15	U	U	0.15	0.15	U	U	0.15	0.11	U	U	0.11	0.13	U	U	0.13	0.11	U	U	0.11
MAK003O	9/9/2013	0.097		U	0.081	0.097		J	0.081	0.083	U	U	0.083	0.35			0.083	0.075	U	U	0.075	0.05	U	U	0.05	0.062	U	U	0.062	0.14	U	U	0.14	0.14	U	U	0.14	0.12	U	U	0.12	0.11	U	U	0.11	0.086	U	U	0.086
MAK004O	9/11/2013	0.079	U	U	0.079	0.079	U	U	0.079	0.095	U	U	0.095	0.49			0.095	0.12	U	U	0.12	0.096	U	U	0.096	0.11	U	U	0.11	0.25	U	U	0.25	**1.4**			1.4	0.14	U	U	0.14	0.11	U	U	0.11	0.12	U	U	0.12
MAK005O	9/11/2013	0.085		U	0.057	0.17		J	0.057	0.08	U	U	0.08	0.44			0.08	0.062	U	U	0.062	0.051	U	U	0.051	0.057	U	U	0.057	0.14	U	U	0.14	0.14	U	U	0.14	0.096	U	U	0.096	0.089	U	U	0.089	0.075	U	U	0.075
MAK006O	9/11/2013	0.078	U	U	0.078	0.078	U	U	0.078	0.11	U	U	0.11	0.42			0.11	0.067	U	U	0.067	0.041	U	U	0.041	0.054	U	U	0.054	0.15	U	U	0.15	0.15	U	U	0.15	0.08	U	U	0.08	0.08	U	U	0.08	0.082	U	U	0.082
MAK007O	9/11/2013	0.091		U	0.061	0.16		J	0.061	0.08	U	U	0.08	0.08	U	U	0.08	0.075	U	U	0.075	0.051	U	U	0.051	0.063	U	U	0.063	0.14	U	U	0.14	0.14	U	U	0.14	0.092	U	U	0.092	0.077	U	U	0.077	0.085	U	U	0.085
MAK008O	9/11/2013	0.084	U	U	0.084	0.084	U	U	0.084	0.1	U	U	0.1	0.1	U	U	0.1	0.097	U	U	0.097	0.064	U	U	0.064	0.08	U	U	0.08	0.13	U	U	0.13	0.13	U	U	0.13	0.14	U	U	0.14	0.12	U	U	0.12	0.12	U	U	0.12
Sea Cucumber (Loli)																																																	
MAK001C	9/9/2013	0.1	BJZ	U	0.099	0.099	U	U	0.099	0.19	U	U	0.19	0.91			0.19	0.14	U	U	0.14	0.082	U	U	0.082	0.11	U	U	0.11	0.2	U	U	0.2	0.2	U	U	0.2	0.12	U	U	0.12	0.11	U	U	0.11	0.099	U	U	0.099
MAK002C	9/9/2013	0.075	BJZ	U	0.063	0.063	U	U	0.063	0.084	U	U	0.084	0.084	U	U	0.084	0.072	U	U	0.072	0.052	U	U	0.052	0.062	U	U	0.062	0.064	U	U	0.064	0.064	U	U	0.064	0.047	U	U	0.047	0.049	U	U	0.049	0.049	U	U	0.049
MAK004C	9/9/2013	0.069	BJZ	U	0.057	0.057	U	U	0.057	0.095	U	U	0.095	0.36			0.095	0.063	U	U	0.063	0.04	U	U	0.04	0.051	U	U	0.051	0.067	U	U	0.067	0.067	U	U	0.067	0.041	U	U	0.041	0.036	U	U	0.036	0.038	U	U	0.038
MAK005C	9/9/2013	0.069	U	U	0.069	0.069	U	U	0.069	0.12	U	U	0.12	0.25			0.12	0.073	U	U	0.073	0.049	U	U	0.049	0.061	U	U	0.061	0.06	U	U	0.06	0.06	U	U	0.06	0.05	U	U	0.05	0.047	U	U	0.047	0.036	U	U	0.036
MAK006C	9/11/2013	0.079	BJZ	U	0.058	0.058	U	U	0.058	0.065	U	U	0.065	0.65			0.065	0.059	U	U	0.059	0.046	U	U	0.046	0.053	U	U	0.053	0.079	U	U	0.079	0.12			0.079	0.05	U	U	0.05	0.051	U	U	0.051	0.042	U	U	0.042
MAK007C	9/11/2013	0.081	U	U	0.081	0.081	U	U	0.081	0.1	U	U	0.1	0.88			0.1	0.064	U	U	0.064	0.045	U	U	0.045	0.054	U	U	0.054	0.078	U	U	0.078	0.078	U	U	0.078	0.053	U	U	0.053	0.044	U	U	0.044	0.048	U	U	0.048
MAK008C	9/11/2013	0.091	BJZ	U	0.068	0.068	U	U	0.068	0.1	U	U	0.1	0.53			0.1	0.064	U	U	0.064	0.04	U	U	0.04	0.052	U	U	0.052	0.075	U	U	0.075	0.075	U	U	0.075	0.054	U	U	0.054	0.052	U	U	0.052	0.05	U	U	0.05
MAK009C	9/11/2013	0.1		U	0.05	0.1		J	0.05	0.069	U	U	0.069	0.069	U	U	0.069	0.043	U	U	0.043	0.031	U	U	0.031	0.037	U	U	0.037	0.058	U	U	0.058	0.058	U	U	0.058	0.048	U	U	0.048	0.046	U	U	0.046	0.038	U	U	0.038
Seaweed (Limu)																																																	
MAK001L/2L/26L	9/9/2013; 9/10/2013; 9/27/2013	0.089			0.064	0.21			0.064	0.048	U	U	0.048	0.59			0.048	0.05	U	U	0.05	0.047	U	U	0.047	0.049	U	U	0.049	0.046			0.045	0.15			0.045	0.034		U	0.032	0.057			0.028	0.038	BJZ	U	0.031
MAK013L	9/18/2013	0.09			0.072	0.22			0.072	0.067	U	U	0.067	0.73			0.067	0.059	U	U	0.059	0.047	U	U	0.047	0.053	U	U	0.053	0.047	U	U	0.047	0.047	U	U	0.047	0.04	U	U	0.04	0.035	U	U	0.035	0.038	U	U	0.038
MAK016L/21L/27L	9/23/2013; 9/27/2013; 9/27/2013	0.13	U	U	0.13	0.5			0.13	0.12	U	U	0.12	1			0.12	0.072	U	U	0.072	0.074	U	U	0.074	0.073	U	U	0.073	0.053	U	U	0.053	0.22			0.053	0.037	U	U	0.037	0.042	U	U	0.042	0.049	U	U	0.049
MAK022L	9/27/2013	0.1			0.082	0.1			0.082	0.063	U	U	0.063	0.53			0.063	0.057	U	U	0.057	0.05	U	U	0.05	0.054	U	U	0.054	0.037	U	U	0.037	0.037	U	U	0.037	0.038	U	U	0.038	0.032	U	U	0.032	0.033	U	U	0.033
MAK023L	9/27/2013	0.15	U	U	0.15	0.15	U	U	0.15	0.088	U	U	0.088	0.4			0.088	0.062	U	U	0.062	0.045	U	U	0.045	0.054	U	U	0.054	0.041	U	U	0.041	0.041	U	U	0.041	0.041	U	U	0.041	0.039	U	U	0.039	0.04	U	U	0.04
MAK024L/25L	9/27/2013; 9/27/2013	0.086	U	U	0.086	0.086	U	U	0.086	0.064	U	U	0.064	0.064	U	U	0.064	0.046	U	U	0.046	0.046	U	U	0.046	0.046	U	U	0.046	0.045	U	U	0.045	0.061			0.045	0.064	U	U	0.064	0.057	U	U	0.057	0.054	U	U	0.054
MAK025L	9/27/2013	0.11	U	U	0.11	0.11	U	U	0.11	0.054	U	U	0.054	0.42			0.054	0.057	U	U	0.057	0.045	U	U	0.045	0.051	U	U	0.051	0.035	U	U	0.035	0.035	U	U	0.035	0.048	U	U	0.048	0.031	U	U	0.031	0.043		U	0.038
MAK029L	10/11/2013	0.12	JZ		0.081	0.17			0.081	0.076	U	U	0.076	0.61			0.076	0.051	U	U	0.051	0.058	U	U	0.058	0.055	U	U	0.055	0.054	U	U	0.054	0.08			0.054	0.036	JZ	U	0.032	0.05			0.025	0.035	BJZ	U	0.03

		2,3,7,8-TCDF	Total TCDF	2,3,7,8-TCDD	Total TCDD	1,2,3,7,8-PECDF	2,3,4,7,8-PeCDF	Total PeCDF	1,2,3,7,8-PeCDD	Total PeCDD	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	2,3,4,6,7,8-HxCDF
Octopus (He'e) Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*8*	*4*	*8*	*2*	*8*	*8*	*8*	*8*	*7*	*8*	*8*	*8*
	number of detections	*0*	*4*	*0*	*6*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*50.0%*	*0.0%*	*75.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*12.5%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	*-*	*J 0.17*	*-*	*0.58*	*-*	*-*	*-*	*-*	*1.40*	*-*	*-*	*-*
	Standard Deviation	*0.009*	*0.041*	*0.012*	*0.19*	*0.020*	*0.020*	*0.020*	*0.042*	*0.45*	*0.027*	*0.023*	*0.02*
	Mean	*0.082*	*0.10*	*0.091*	*0.37*	*0.082*	*0.061*	*0.072*	*0.15*	*0.30*	*0.11*	*0.10*	*0.09*
	Sample of Max Detection	*-*	*MAK005O*	*-*	*MAK001O*	*-*	*-*	*-*	*-*	*MAK004O*	*-*	*-*	*-*
	Max Dectection Limit	*0.084*	*0.084*	*0.11*	*0.11*	*0.12*	*0.096*	*0.11*	*0.25*	*1.4*	*0.14*	*0.13*	*0.12*
Sea Cucumber (Loli) Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*8*	*7*	*8*	*2*	*8*	*8*	*8*	*8*	*7*	*8*	*8*	*8*
	number of detections	*0*	*1*	*0*	*6*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*12.5%*	*0.0%*	*75.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*12.5%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	*-*	*J 0.10*	*-*	*0.91*	*-*	*-*	*-*	*-*	*0.12*	*-*	*-*	*-*
	Standard Deviation	*0.013*	*0.017*	*0.039*	*0.33*	*0.029*	*0.015*	*0.022*	*0.047*	*0.049*	*0.025*	*0.023*	*0.02*
	Mean	*0.08*	*0.074*	*0.10*	*0.47*	*0.072*	*0.048*	*0.060*	*0.085*	*0.09*	*0.058*	*0.054*	*0.05*
	Sample of Max Detection	*-*	*MAK009C*	*-*	*MAK001C*	*-*	*-*	*-*	*-*	*MAK006C*	*-*	*-*	*-*
	Max Dectection Limit	*0.099*	*0.099*	*0.19*	*0.19*	*0.14*	*0.082*	*0.11*	*0.2*	*0.2*	*0.12*	*0.11*	*0.099*
Seaweed (Limu)Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*4*	*3*	*8*	*1*	*8*	*8*	*8*	*7*	*4*	*8*	*6*	*8*
	number of detections	*4*	*5*	*0*	*7*	*0*	*0*	*0*	*1*	*4*	*0*	*2*	*0*
	Frequency of Detection	*50.0%*	*62.5%*	*0.0%*	*87.5%*	*0.0%*	*0.0%*	*0.0%*	*12.5%*	*50.0%*	*0.0%*	*25.0%*	*0.0%*
	Maximum Detected	*JZ 0.12*	*0.50*	*-*	*1.00*	*-*	*-*	*-*	*0.046*	*0.22*	*-*	*0.057*	*-*
	Standard Deviation	*0.023*	*0.13*	*0.023*	*0.27*	*0.008*	*0.010*	*0.008*	*0.007*	*0.067*	*0.010*	*0.011*	*0.01*
	Mean	*0.11*	*0.19*	*0.073*	*0.54*	*0.057*	*0.052*	*0.054*	*0.045*	*0.084*	*0.042*	*0.043*	*0.04*
	Sample of Max Detection	*MAK029L*	*MAK016L/21L/27L*	*-*	*MAK016L/21L/27L*	*-*	*-*	*-*	*MAK001L/2L/26L*	*MAK016L/21L/27L*	*-*	*MAK001L/2L/26L*	*-*
	Max Dectection Limit	*0.15*	*0.15*	*0.12*	*0.12*	*0.072*	*0.074*	*0.073*	*0.054*	*0.054*	*0.064*	*0.057*	*0.054*

Notes:

[2] Results presented as "ND" in the the Pace Analytical laboratory reports are presented in this table as the RL value with a "U" qualifie

[3] For Hi-Res analysis, if results are outside of an ion-ratio comparison, then they are reported as Estimated Maximum Possible Concentration (EMPC), which will carry a laboratory "J" qualifier. EMPC results are indicated in the Staged Electronic Data Deliverable (SEDD), and thus in this table, with a "Z" qualifier.
Pace Analytical laboratory reports, "J" qualifiers also define results that are greater than the sample specific estimated detection limit (EDL) but less than the laboratory contract required quantitation limit (CRQL). Per the analytical method, the limit of detection equals the estimated quantitation limit, therefore method detection limits and
CRQLs did not apply; therefore, detects less than the CRQL were not flagged "J" in the SEDDs and thus in this data table.

[4] The RL value presented in the laboratory report is equivalent to the dioxin analysis' sample specific EDI

CAS - Chemical Abstracts Service
ID - identification
ng/kg - nanograms per kilogram
ND - not detected
PCDE - polychlorinated diphenyl ethers
RL - reporting limit

Laboratory Qualifier (LQ)

[B] - Less than 10x higher than method blank level
[J] - Estimated value.
[U] - Analyte not detected
[Z] - Indicates an EMPC result. The result is qualified in the Pace Analytical laboratory report as a "J" with either an "I" (interference present) or "P" (PCDE interference) qualifier

Validator Qualifier (VQ)

[J] - Indicates an estimated value
[U] - Indicates the compound or analyte was analyzed for but not detected at or above the stated limi
[UJ] - Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

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Analyte		1,2,3,7,8,9-HxCDF				Total HxCDF				1,2,3,4,7,8-HxCDD				1,2,3,6,7,8-HxCDD				1,2,3,7,8,9-HxCDD				Total HxCDD				1,2,3,4,6,7,8-HpCDF				1,2,3,4,7,8,9-HpCDF				Total HpCDF				1,2,3,4,6,7,8-HpCDD				Total HpCDD			
CAS Number		72918-21-9				55684-94-1				39227-28-6				57653-85-7				19408-74-3				34465-46-8				67562-39-4				55673-89-7				38998-75-3				35822-46-9				37871-00-4			
Units		ng/kg				ng/kg				ng/kg				ng/kg				ng/kg				ng/kg				ng/kg				ng/kg				ng/kg				ng/kg				ng/kg			
Lab ID	Collection Date	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]
Mākua Beach																																													
Octopus (He'e)																																													
MAK001O	9/9/2013	0.093	U	U	0.093	0.07	U	U	0.07	0.093	U	U	0.093	0.11	U	U	0.11	0.11	U	U	0.11	0.1	U	U	0.1	0.068			0.065	0.12	U	U	0.12	0.22			0.093	0.37			0.11	0.71			0.11
MAK002O	9/9/2013	0.14	U	U	0.14	0.12	U	U	0.12	0.14	U	U	0.14	0.14	U	U	0.14	0.14	U	U	0.14	0.14			0.14	0.073	U	U	0.073	0.13	U	U	0.13	0.17			0.1	0.28			0.17	0.61			0.17
MAK003O	9/9/2013	0.16	U	U	0.16	0.12	U	U	0.12	0.14	U	U	0.14	0.16	U	U	0.16	0.15	U	U	0.15	0.15	U	U	0.15	0.085	U	U	0.085	0.11	U	U	0.11	0.098	U	U	0.098	0.26	JZ		0.15	0.15	U	U	0.15
MAK004O	9/11/2013	0.18	U	U	0.18	0.14	U	U	0.14	0.17	U	U	0.17	0.21	U	U	0.21	0.17	U	U	0.17	0.18	U	U	0.18	0.11	U	U	0.11	0.16	U	U	0.16	0.13	U	U	0.13	0.34	JZ		0.18	0.18	U	U	0.18
MAK005O	9/11/2013	0.12	U	U	0.12	0.095	U	U	0.095	0.14	U	U	0.14	0.14	U	U	0.14	0.11	U	U	0.11	0.13	U	U	0.13	0.075	U	U	0.075	0.13	U	U	0.13	0.12			0.1	0.3			0.11	0.3			0.11
MAK006O	9/11/2013	0.13	U	U	0.13	0.092	U	U	0.092	0.12	U	U	0.12	0.15	U	U	0.15	0.15	U	U	0.15	0.14	U	U	0.14	0.1	U	U	0.1	0.12	U	U	0.12	0.11	U	U	0.11	0.13	U	U	0.13	0.17			0.13
MAK007O	9/11/2013	0.094	U	U	0.094	0.087	U	U	0.087	0.13	U	U	0.13	0.099	U	U	0.099	0.11	U	U	0.11	0.11	U	U	0.11	0.06	U	U	0.06	0.08	U	U	0.08	0.07	U	U	0.07	0.26	JZ		0.11	0.31			0.11
MAK008O	9/11/2013	0.18	U	U	0.18	0.14	U	U	0.14	0.17	U	U	0.17	0.18	U	U	0.18	0.19	U	U	0.19	0.18	U	U	0.18	0.1	U	U	0.1	0.16	U	U	0.16	0.13	U	U	0.13	0.2	JZ		0.16	0.24			0.16
Sea Cucumber (Loli)																																													
MAK001C	9/9/2013	0.16	U	U	0.16	0.12	U	U	0.12	0.23	U	U	0.23	0.32	U	U	0.32	0.27	U	U	0.27	0.27	U	U	0.27	0.15	U	U	0.15	0.18	U	U	0.18	0.18			0.16	0.46	JZ		0.41	0.67			0.41
MAK002C	9/9/2013	0.065	U	U	0.065	0.052	U	U	0.052	0.14	U	U	0.14	0.16	U	U	0.16	0.15	U	U	0.15	0.15	U	U	0.15	0.066	U	U	0.066	0.097	U	U	0.097	0.11			0.082	0.1	U	U	0.1	0.24			0.1
MAK004C	9/9/2013	0.055	U	U	0.055	0.043	U	U	0.043	0.096	U	U	0.096	0.11	U	U	0.11	0.11	U	U	0.11	0.1	U	U	0.1	0.072	U	U	0.072	0.092	U	U	0.092	0.089			0.082	0.14			0.12	0.14			0.12
MAK005C	9/9/2013	0.057	U	U	0.057	0.047	U	U	0.047	0.079	U	U	0.079	0.1	U	U	0.1	0.096	U	U	0.096	0.091	U	U	0.091	0.11	U	U	0.11	0.13	U	U	0.13	0.12	U	U	0.12	0.1	U	U	0.1	0.2			0.1
MAK006C	9/11/2013	0.056	U	U	0.056	0.05	U	U	0.05	0.088	U	U	0.088	0.12	U	U	0.12	0.1	U	U	0.1	0.21			0.1	0.064	U	U	0.064	0.088	U	U	0.088	0.076	U	U	0.076	0.22			0.13	0.38			0.13
MAK007C	9/11/2013	0.064	U	U	0.064	0.052	U	U	0.052	0.086	U	U	0.086	0.09	U	U	0.09	0.1	U	U	0.1	0.093	U	U	0.093	0.069	U	U	0.069	0.086	U	U	0.086	0.078	U	U	0.078	0.16			0.12	0.35			0.12
MAK008C	9/11/2013	0.064	U	U	0.064	0.055	U	U	0.055	0.09	U	U	0.09	0.11	U	U	0.11	0.11	U	U	0.11	0.1	U	U	0.1	0.071	U	U	0.071	0.092	U	U	0.092	0.081	U	U	0.081	0.19			0.12	0.19			0.12
MAK009C	9/11/2013	0.063	U	U	0.063	0.049	U	U	0.049	0.082	U	U	0.082	0.085	U	U	0.085	0.095	U	U	0.095	0.087	U	U	0.087	0.058	U	U	0.058	0.09	U	U	0.09	0.088			0.074	0.14	JZ		0.099	0.18			0.099
Seaweed (Limu)																																													
MAK001L/2L/26L	9/9/2013; 9/10/2013; 9/27/2013	0.042	U	U	0.042	0.092		J	0.033	0.066	U	U	0.066	0.081	U	U	0.081	0.077	U	U	0.077	0.074	U	U	0.074	0.074	JZ		0.038	0.043	U	U	0.043	0.041	U	U	0.041	0.099	BJZ	U	0.031	0.14		J	0.031
MAK013L	9/18/2013	0.044	U	U	0.044	0.039	U	U	0.039	0.086	U	U	0.086	0.1	U	U	0.1	0.095	U	U	0.095	0.095	U	U	0.095	0.077	JZ		0.047	0.062	U	U	0.062	0.078			0.054	0.12		U	0.051	0.25		J	0.051
MAK016L/21L/27L	9/23/2013; 9/27/2013; 9/27/2013	0.055	U	U	0.055	0.046	U	U	0.046	0.11	U	U	0.11	0.081	U	U	0.081	1.1	JZ		0.076	0.09	U	U	0.09	0.087			0.049	0.055	U	U	0.055	0.15			0.052	0.09	BJZ	U	0.044	0.044	U	U	0.044
MAK022L	9/27/2013	0.038	U	U	0.038	0.035	U	U	0.035	0.065	U	U	0.065	0.076	U	U	0.076	0.071	JZ	U	0.07	0.07	U	U	0.07	0.06			0.033	0.043	U	U	0.043	0.06			0.038	0.092		U	0.034	0.17		J	0.034
MAK023L	9/27/2013	0.048	U	U	0.048	0.042	U	U	0.042	0.075	U	U	0.075	0.096	JZ	U	0.083	0.084	U	U	0.084	0.081	U	U	0.081	0.046	U	U	0.046	0.06	U	U	0.06	0.053	U	U	0.053	0.095		U	0.051	0.095		J	0.051
MAK024L/25L	9/27/2013; 9/27/2013	0.076	U	U	0.076	0.39			0.063	0.067	U	U	0.067	0.11		U	0.083	0.094	U	U	0.094	0.25		J	0.082	0.75			0.064	0.072	U	U	0.072	4.5			0.068	3.6			0.079	9.4			0.079
MAK025L	9/27/2013	0.046	U	U	0.046	0.043		J	0.041	0.11	U	U	0.11	0.099	U	U	0.099	0.11	U	U	0.11	0.1	U	U	0.1	0.061			0.054	0.069	U	U	0.069	0.14			0.062	0.086	BJZ	U	0.052	0.14		J	0.052
MAK029L	10/11/2013	0.045		U	0.041	0.095		J	0.032	0.2	U	U	0.2	0.16	U	U	0.16	0.51	JZ		0.15	0.17	U	U	0.17	0.064	JZ		0.041	0.057			0.045	0.057			0.043	0.14		U	0.049	0.14		J	0.049

Octopus (He'e) Samples	*number of samples analyzed*	8				8				8				8				8				8				8				8				8				8				8			
	number of non-detect	8				8				8				8				8				7				7				8				5				1				2			
	number of detections	0				0				0				0				0				1				1				0				3				7				6			
	Frequency of Detection	0.0%				0.0%				0.0%				0.0%				0.0%				12.5%				12.5%				0.0%				37.5%				87.5%				75.0%			
	Maximum Detected	-				-				-				-				-				0.14				0.07				-				0.22				0.37				0.71			
	Standard Deviation	0.035				0.026				0.025				0.036				0.030				0.029				0.018				0.026				0.05				0.08				0.21			
	Mean	0.14				0.11				0.14				0.15				0.14				0.14				0.084				0.13				0.13				0.27				0.33			
	Sample of Max Detection	-				-				-				-				-				MAK002O				MAK001O				-				MAK001O				MAK001O				MAK001O			
	Max Dectection Limit	0.18				0.14				0.17				0.21				0.19				0.18				0.11				0.16				0.13				0.13				0.18			
Sea Cucumber (Loli) Samples	*number of samples analyzed*	8				8				8				8				8				8				8				8				8				8				8			
	number of non-detect	8				8				8				8				8				7				8				8				4				2				0			
	number of detections	0				0				0				0				0				1				0				0				4				6				8			
	Frequency of Detection	0.0%				0.0%				0.0%				0.0%				0.0%				12.5%				0.0%				0.0%				50.0%				75.0%				100.0%			
	Maximum Detected	-				-				-				-				-				0.21				-				-				0.18				0.46		JZ		0.67			
	Standard Deviation	0.035				0.025				0.052				0.078				0.060				0.068				0.032				0.033				0.03				0.12				0.17			
	Mean	0.07				0.059				0.11				0.14				0.13				0.14				0.083				0.11				0.10				0.19				0.29			
	Sample of Max Detection	-				-				-				-				-				MAK006C				-				-				MAK001C				MAK001C				MAK001C			
	Max Dectection Limit	0.16				0.12				0.23				0.32				0.27				0.27				0.15				0.18				0.16				0.41				-			
Seaweed (Limu)Samples	*number of samples analyzed*	8				8				8				8				8				8				8				8				8				8				8			
	number of non-detect	8				4				8				8				6				7				1				7				2				7				1			
	number of detections	0				4				0				0				2				1				7				1				6				1				7			
	Frequency of Detection	0.0%				50.0%				0.0%				0.0%				25.0%				12.5%				87.5%				12.5%				75.0%				12.5%				87.5%			
	Maximum Detected	-				0.39				-				-				1.10		JZ		0.25		J		0.75				0.057				4.50				3.60				9.40			
	Standard Deviation	0.012				0.12				0.045				0.027				0.37				0.083				0.24				0.011				1.56				1.24				3.27			
	Mean	0.049				0.10				0.10				0.10				0.27				0.12				0.15				0.058				0.63				0.54				1.30			
	Sample of Max Detection	-				MAK024L/25L				-				-				MAK016L/21L/27L				MAK024L/25L				MAK024L/25L				MAK029L				MAK024L/25L				MAK024L/25L				MAK024L/25L			
	Max Dectection Limit	0.076				0.063				0.2				0.16				0.15				0.17				0.064				0.072				0.068				0.079				0.079			

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	Analyte	OCDF				OCDD			
	CAS Number	39001-02-0				03268-87-9			
	Units	ng/kg				ng/kg			
Lab ID	Collection Date	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]
Mākua Beach									
***Octopus* (*He'e*)**									
MAK001O	9/9/2013	0.35	U	U	0.35	1.8	BJZ	U	0.42
MAK002O	9/9/2013	0.71	U	U	0.71	2	BJZ	U	1
MAK003O	9/9/2013	0.64	U	U	0.64	2.1		U	1.2
MAK004O	9/11/2013	0.73	U	U	0.73	2	BJZ	U	1.2
MAK005O	9/11/2013	0.57	U	U	0.57	2.9		U	1
MAK006O	9/11/2013	0.64	U	U	0.64	1.8		U	0.96
MAK007O	9/11/2013	0.42	U	U	0.42	1.9	BJZ	U	0.66
MAK008O	9/11/2013	0.97	U	U	0.97	1.7	U	U	1.7
***Sea Cucumber* (*Loli*)**									
MAK001C	9/9/2013	0.52		UJ	0.33	3.7		U	0.65
MAK002C	9/9/2013	0.27	BJZ	U	0.2	1.1	BJZ	U	0.54
MAK004C	9/9/2013	0.2	U	U	0.2	1.3		U	0.57
MAK005C	9/9/2013	0.25		U	0.17	1.3		U	0.55
MAK006C	9/11/2013	0.23	BJZ	U	0.18	1.3	BJZ	U	0.47
MAK007C	9/11/2013	0.27		U	0.16	1.4		U	0.57
MAK008C	9/11/2013	0.18	U	U	0.18	0.87	BJZ	U	0.5
MAK009C	9/11/2013	0.18	BJZ	U	0.15	0.97		U	0.42
Seaweed (Limu)									
MAK001L/2L/26L	9/9/2013; 9/10/2013; 9/27/2013	0.24	JZ	U	0.088	0.59		U	0.11
MAK013L	9/18/2013	0.16	JZ	U	0.11	0.63		U	0.14
MAK016L/21L/27L	9/23/2013; 9/27/2013; 9/27/2013	0.12	JZ	U	0.11	0.47	BJZ	U	0.14
MAK022L	9/27/2013	0.15		U	0.064	0.54	BJZ	U	0.084
MAK023L	9/27/2013	0.12	U	U	0.12	0.45		U	0.18
MAK024L/25L	9/27/2013; 9/27/2013	10			0.13	60			0.19
MAK025L	9/27/2013	0.14	JZ	U	0.13	0.73		U	0.2
MAK029L	10/11/2013	0.16		U	0.087	0.41	BJZ	U	0.14

Octopus (He'e) Samples	*number of samples analyzed*	*8*	*8*
	number of non-detect	*8*	*8*
	number of detections	*0*	*0*
	Frequency of Detection	*0.0%*	*0.0%*
	Maximum Detected	-	-
	Standard Deviation	*0.19*	*0.38*
	Mean	*0.63*	*2.03*
	Sample of Max Detection	-	-
	Max Dectection Limit	*0.97*	*1.7*

Sea Cucumber (Loli) Samples	*number of samples analyzed*	*8*	*8*
	number of non-detect	*8*	*8*
	number of detections	*0*	*0*
	Frequency of Detection	*0.0%*	*0.0%*
	Maximum Detected	-	-
	Standard Deviation	*0.11*	*0.91*
	Mean	*0.26*	*1.49*
	Sample of Max Detection	-	-
	Max Dectection Limit	*0.33*	*0.65*

Seaweed (Limu)Samples	*number of samples analyzed*	*8*	*8*
	number of non-detect	*7*	*7*
	number of detections	*1*	*1*
	Frequency of Detection	*12.5%*	*12.5%*
	Maximum Detected	*10.00*	*60.00*
	Standard Deviation	*3.48*	*21.02*
	Mean	*1.39*	*7.98*
	Sample of Max Detection	*MAK024L/25L*	*MAK024L/25L*
	Max Dectection Limit	*0.13*	*0.2*

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Analyte		Perchlorate					2,4-Dinitrotoluene[2]					2,4-Dinitrotoluene[3]					2,4-Dinitrotoluene[4]					Hexahydro-trinitro-triazine (RDX)					Nitroglycerine				
CAS Number		14797-73-0					121-14-2					121-14-2					121-14-2					121-82-4					55-63-0				
Units		µg/Kg					µg/Kg					µg/Kg					µg/Kg					µg/Kg					µg/Kg				
Laboratory/Analytical Method		TestAmerica Sacramento/EPA 6850					ARDL/EPA 8330A					ARDL/EPA 8270C					ERDC/EPA 8330					ARDL/EPA 8330A					ARDL/EPA 8330A				
Lab ID	Collection Date	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result[5]	LQ	VQ	RL[5]	MDL[5]	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL
Mäkua Beach																															
Octopus (He'e)																															
MAK001O	9/9/2013	0.30	U	UJ	10	0.30	500	U	U	500	100	--			--	--	--			--	--	500	U	U	500	200	500	U	U	500	300
MAK002O	9/9/2013	0.30	U		10	0.30	500	U	U	500	100	--			--	--	--			--	--	500	U	U	500	200	500	U	U	500	300
MAK003O	9/9/2013	0.29	U	UJ	9.6	0.29	500	U	U	500	100	--			--	--	--			--	--	500	U	U	500	200	500	U	U	500	300
MAK004O	9/11/2013	0.29	U	UJ	9.7	0.29	500	U	U	500	100	--			--	--	--			--	--	500	U	U	500	200	500	U	U	500	300
MAK005O	9/11/2013	0.30	U	UJ	9.9	0.30	500	U	U	500	100	--			--	--	--			--	--	500	U	U	500	200	500	U	U	500	300
MAK006O	9/11/2013	0.28	U	UJ	9.5	0.28	500	U	U	500	100	--			--	--	--			--	--	500	U	U	500	200	500	U	U	500	300
MAK007O	9/11/2013	0.62	J	J	9.6	0.29	500	U	U	500	100	--			--	--	--			--	--	500	U	U	500	200	500	U	U	500	300
MAK008O	9/11/2013	0.30	U		10	0.30	500	U	U	500	100	--			--	--	--			--	--	500	U	U	500	200	500	U	U	500	300
Sea Cucumber (Loli)																															
MAK001C	9/9/2013	0.29	U		9.8	0.29	500	U	U	500	100	--			--	--	--			--	--	500	U	U	500	200	500	U	U	500	300
MAK002C	9/9/2013	0.29	U		9.7	0.29	500	U	U	500	100	--			--	--	--			--	--	500	U	U	500	200	500	U	U	500	300
MAK004C	9/9/2013	0.30	U		10	0.30	500	U	U	500	100	--			--	--	--			--	--	500	U	U	500	200	500	U	U	500	300
MAK005C	9/9/2013	0.30	U		10	0.30	500	U	U	500	100	--			--	--	--			--	--	500	U	U	500	200	500	U	U	500	300
MAK006C	9/11/2013	0.28	U		9.5	0.28	500	U	U	500	100	--			--	--	--			--	--	500	U	U	500	200	500	U	U	500	300
MAK007C	9/11/2013	0.30	U		9.9	0.30	500	U	U	500	100	--			--	--	--			--	--	500	U	U	500	200	500	U	U	500	300
MAK008C	9/11/2013	0.29	U		9.7	0.29	500	U	U	500	100	--			--	--	--			--	--	500	U	U	500	200	500	U	U	500	300
MAK009C	9/11/2013	0.30	U		9.9	0.30	500	U	U	500	100	--			--	--	--			--	--	500	U	U	500	200	500	U	U	500	300
Seaweed (Limu kohu)																															
MAK001L/2L/26L	9/9/2013; 9/10/2013; 9/27/2013	0.30	U	UJ	10	0.30	--			--	--	1000	U		1000	200	100	U		100	10	500	U	U	500	200	500	U	U	500	300
MAK013L	9/18/2013	0.29	U	UJ	9.6	0.29	--			--	--	1000	U		1000	200	100	U		100	10	500	U	U	500	200	500	U	U	500	300
MAK016L/21L/27L	9/23/2013; 9/27/2013; 9/27/2013	0.29	U	UJ	9.8	0.29	--			--	--	1000	U		1000	200	100	U		100	10	500	U	U	500	200	500	U	U	500	300
MAK022L	9/27/2013	0.30	U	UJ	10	0.30	--			--	--	1000	U		1000	200	100	U		100	10	500	U	U	500	200	500	U	U	500	300
MAK023L	9/27/2013	0.29	U	UJ	9.6	0.29	--			--	--	1000	U		1000	200	100	U		100	10	500	U	U	500	200	500	U	U	500	300
MAK024L/25L	9/27/2013	0.29	U	UJ	9.7	0.29	--			--	--	1000	U		1000	200	100	U		100	10	500	U	U	500	200	500	U	U	500	300
MAK025L	9/27/2013	0.30	U	UJ	9.9	0.30	--			--	--	1000	U		1000	200	100	U		100	10	500	U	U	500	200	500	U	U	500	300
MAK029L	10/11/2013	0.30	U	UJ	10	0.30	--			--	--	1000	U		1000	200	100	U		100	10	500	U	U	500	200	500	U	U	500	300

		Perchlorate	2,4-Dinitrotoluene[2]	2,4-Dinitrotoluene[3]	2,4-Dinitrotoluene[4]	Hexahydro-trinitro-triazine (RDX)	Nitroglycerine
Octopus (He'e) Samples	*number of samples analyzed*	*8*	*8*	*0*	*0*	*8*	*8*
	number of non-detect	*7*	*8*	*0*	*0*	*8*	*8*
	number of detections	*1*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*12.5%*	*0.0%*	*-*	*-*	*0.0%*	*0.0%*
	Maximum Detected	*J J 0.62*	*-*	*-*	*-*	*-*	*-*
	Standard Deviation	*0.12*	*0.00*	*-*	*-*	*0.00*	*0.00*
	Mean	*0.34*	*500.00*	*-*	*-*	*500.00*	*500.00*
	Sample of Max Detection	*MAK007O*	*-*	*-*	*-*	*-*	*-*
	Max Dectection Limit	*0.3*	*100*	*-*	*-*	*200*	*300*

		Perchlorate	2,4-Dinitrotoluene[2]	2,4-Dinitrotoluene[3]	2,4-Dinitrotoluene[4]	Hexahydro-trinitro-triazine (RDX)	Nitroglycerine
Sea Cucumber (Loli) Samples	*number of samples analyzed*	*8*	*8*	*0*	*0*	*8*	*8*
	number of non-detect	*8*	*8*	*0*	*0*	*8*	*8*
	number of detections	*0*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*0.0%*	*-*	*-*	*0.0%*	*0.0%*
	Maximum Detected	*-*	*-*	*-*	*-*	*-*	*-*
	Standard Deviation	*0.007*	*0.00*	*-*	*-*	*0.00*	*0.00*
	Mean	*0.29*	*500.00*	*-*	*-*	*500.00*	*500.00*
	Sample of Max Detection	*-*	*-*	*-*	*-*	*-*	*-*
	Max Dectection Limit	*0.3*	*100*	*-*	*-*	*200*	*300*

		Perchlorate	2,4-Dinitrotoluene[2]	2,4-Dinitrotoluene[3]	2,4-Dinitrotoluene[4]	Hexahydro-trinitro-triazine (RDX)	Nitroglycerine
Seaweed (Limu)Samples	*number of samples analyzed*	*8*	*0*	*8*	*8*	*8*	*8*
	number of non-detect	*8*	*0*	*8*	*8*	*8*	*8*
	number of detections	*0*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*-*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	*-*	*-*	*-*	*-*	*-*	*-*
	Standard Deviation	*0.005*	*-*	*0.00*	*0.00*	*0.00*	*0.00*
	Mean	*0.30*	*-*	*1000.00*	*100.00*	*500.00*	*500.00*
	Sample of Max Detection	*-*	*-*	*-*	*-*	*-*	*-*
	Max Dectection Limit	*0.3*	*-*	*200*	*10*	*200*	*300*

Notes:

[2] Applied Research Development Laboratory, Inc. (ARDL) encountered matrix interference problems in seaweed samples with the 8330A (HPLC) analysis of this analyte . Therefore the 8270C data for these samples were reprocessed to add a result for 2,4-dinitrotoluene.

[3] 2,4-dinitrotoluene results for seaweed from reprocessed 8270C data (conducted by ARDL).

[4] U.S. Army Engineer Research and Development Center (ERDC) analyzed the seaweed samples for 2,4-dinitrotoluene using EPA Method 8330.

[5] For consistency, the results, RL, and MDL were converted to µg/Kg. The RL was converted from 0.100 mg/Kg to 100 µg/Kg and the MDL was converted from 0.010 mg/kg to 10 µg/Kg.

CAS - Chemical Abstracts Service

ID - identification

-- - not analyzed

EPA - United States Environmental Protection Agency

µg/Kg - micrograms per kilogram

MDL - method detection limit

RL - reporting limit

Laboratory qualifier (LQ) - ARDL

[J] - Indicates an estimated value. This flag is used when estimating a concentration of a compound that meets identification criteria but the result is less than the quantitation or reporting limit but greater than the method detection limit.

[U] - Indicates compound was analyzed for but not detected. The sample quantitation limit must be corrected for dilutionand for percent moisture. These results are presented as "ND" in the ARDL laboratory reports but are reported as the RL value with a "U" qualifier in this table.

LQ - TestAmerica Sacramento

[J] - Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

[U] - Indicates the compound was not detected at the RL (or MDL is shown). The results are presented as "ND" in the TestAmerica laboratory reports but are reported as the MDL value with a "U" qualifier in the SEDD and thus this table.

LQ - ERDC

[U] - Indicates a compound was analyzed for but not detected at or above the RL. These results are presented as "ND" in the ERDC laboratory report but are reported as the RL value with a "U" qualifier in this table.

Validator qualifier (VQ)

[J] - Indicates an estimated value.

[U] - Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

[UJ] - Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

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Metals

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	Analyte	Inorganic Arsenic					Arsenic(III)					Arsenic(V)					Dimethyl Arsenic					Monomethyl Arsenic				
	CAS Number	7440-38-2 (Inorg)					22569-72-8					12523-21-6					75-60-5					7440-38-2 (MMA)				
	Units	mg/kg					mg/kg					mg/kg					mg/kg					mg/kg				
Lab ID	**Collection Date**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**
Mäkua Beach																										
Octopus (He'e)																										
MAK001O	9/9/2013	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.023			0.011	0.004	0.004	U		0.011	0.004
MAK002O	9/9/2013	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.016			0.011	0.004	0.004	U		0.011	0.004
MAK003O	9/9/2013	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.017			0.012	0.004	0.004	U		0.012	0.004
MAK004O	9/11/2013	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.014			0.011	0.004	0.004	U		0.011	0.004
MAK005O	9/11/2013	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.011	B		0.011	0.004	0.004	U		0.011	0.004
MAK006O	9/11/2013	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.013			0.012	0.004	0.004	U,N	UJ	0.012	0.004
MAK007O	9/11/2013	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.014			0.011	0.004	0.004	U		0.011	0.004
MAK008O	9/11/2013	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.023			0.011	0.004	0.004	U,N	UJ	0.011	0.004
Sea Cucumber (Loli)																										
MAK001C	9/9/2013	0.007	B	J	0.01	0.004	0.004	U		0.01	0.004	0.007	B	J	0.01	0.004	0.004	U		0.012	0.004	0.004	U		0.012	0.004
MAK002C	9/9/2013	0.012			0.01	0.004	0.004	U		0.01	0.004	0.012			0.01	0.004	0.004	U		0.011	0.004	0.004	U		0.011	0.004
MAK004C	9/9/2013	0.01			0.009	0.004	0.004	U		0.009	0.004	0.01			0.009	0.004	0.004	U		0.011	0.004	0.004	U		0.011	0.004
MAK005C	9/9/2013	0.009	B		0.009	0.004	0.004	U		0.009	0.004	0.009			0.009	0.004	0.004	U		0.011	0.004	0.004	U		0.011	0.004
MAK006C	9/11/2013	0.02			0.009	0.004	0.006	B	J	0.009	0.004	0.014			0.009	0.004	0.004	U		0.011	0.004	0.004	U		0.011	0.004
MAK007C	9/11/2013	0.017			0.01	0.004	0.004	U		0.01	0.004	0.017			0.01	0.004	0.008	B	J	0.012	0.004	0.004	U		0.012	0.004
MAK008C	9/11/2013	0.012			0.01	0.004	0.005	B	J	0.01	0.004	0.008	B	J	0.01	0.004	0.004	U		0.012	0.004	0.004	U		0.012	0.004
MAK009C	9/11/2013	0.034			0.009	0.004	0.01			0.009	0.004	0.024			0.009	0.004	0.005	B	J	0.011	0.004	0.004	U		0.011	0.004
Seaweed (Limu)																										
MAK001L/2L/26L	9/9/2013; 9/10/2013; 9/27/2013	0.198		J	0.039	0.016	0.152			0.039	0.016	0.046		J	0.039	0.016	0.352		J	0.024	0.008	0.004	U		0.012	0.004
MAK013L	9/18/2013	0.244			0.199	0.079	0.205			0.04	0.016	0.079	U		0.199	0.079	0.346		J	0.024	0.008	0.008	U		0.024	0.008
MAK016L/21L/27L	9/23/2013; 9/27/2013; 9/27/2013	0.605			0.197	0.079	0.479			0.039	0.016	0.126	B	J	0.197	0.079	0.213		J	0.024	0.008	0.008	U		0.024	0.008
MAK022L	9/27/2013	0.224			0.199	0.08	0.207			0.04	0.016	0.08	U		0.199	0.08	0.294		J	0.024	0.008	0.008	U		0.024	0.008
MAK023L	9/27/2013	0.183	B	J	0.198	0.079	0.169			0.04	0.016	0.079	U		0.198	0.079	0.334		J	0.024	0.008	0.008	U		0.024	0.008
MAK024L/25L	9/27/2013; 9/27/2013	0.19	B	J	0.198	0.079	0.166			0.04	0.016	0.079	U		0.198	0.079	0.292		J	0.024	0.008	0.008	U		0.024	0.008
MAK025L	9/27/2013	0.177			0.04	0.016	0.142			0.04	0.016	0.035	B	J	0.04	0.016	0.288		J	0.024	0.008	0.008	U		0.024	0.008
MAK029L	10/11/2013	0.602			0.198	0.079	0.511			0.198	0.079	0.092	B	J	0.198	0.079	0.209		J	0.024	0.008	0.008	U		0.024	0.008

Octopus (He'e) Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*8*	*8*	*8*	*0*	*8*
	number of detections	*0*	*0*	*0*	*8*	*0*
	Frequency of Detection	*0.0%*	*0.0%*	*0.0%*	*100.0%*	*0.0%*
	Maximum Detected	*-*	*-*	*-*	*0.023*	*-*
	Standard Deviation	*0.00*	*0.00*	*0.00*	*0.0045*	*0.00*
	Mean	*0.004*	*0.004*	*0.004*	*0.02*	*0.004*
	Sample of Max Detection	*-*	*-*	*-*	*MAK001O*	*-*
	Max Dectection Limit	*0.004*	*0.004*	*0.004*	*-*	*0.004*

Sea Cucumber (Loli) Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*0*	*5*	*0*	*6*	*8*
	number of detections	*8*	*3*	*8*	*2*	*0*
	Frequency of Detection	*100.0%*	*37.5%*	*100.0%*	*25.0%*	*0.0%*
	Maximum Detected	*0.034*	*0.01*	*0.024*	B J *0.008*	*-*
	Standard Deviation	*0.009*	*0.0021*	*0.006*	*0.0014*	*0.00*
	Mean	*0.015*	*0.005*	*0.013*	*0.0046*	*0.0040*
	Sample of Max Detection	*MAK009C*	*MAK009C*	*MAK009C*	*MAK007C*	*-*
	Max Dectection Limit	*-*	*0.004*	*-*	*0.004*	*0.004*

Seaweed (Limu)Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*0*	*0*	*4*	*0*	*8*
	number of detections	*8*	*8*	*4*	*8*	*0*
	Frequency of Detection	*100.0%*	*100.0%*	*50.0%*	*100.0%*	*0.0%*
	Maximum Detected	*0.605*	*0.511*	B J *0.126*	J *0.352*	*-*
	Standard Deviation	*0.19*	*0.15*	*0.028*	*0.055*	*0.00*
	Mean	*0.30*	*0.25*	*0.077*	*0.29*	*0.008*
	Sample of Max Detection	*MAK016L/21L/27L*	*MAK029L*	*MAK016L/21L/27L*	*MAK001L/2L/26L*	*-*
	Max Dectection Limit	*-*	*-*	*0.08*	*-*	*0.008*

Notes:

CAS - Chemical Abstracts Service

ID - identification

MDL - method detection limit

mg/kg - milligrams per kilogram

RL - reporting limit

Laboratory qualifier (LQ)

B - Detected by the instrument, the result is greater than the MDL but less than or equal to the RL. Result is reported and considered an estimate.

N - Spike recovery was not within acceptance criteria. Result is estimated.

U - Result is less than or equal to the MDL or client requested reporting limit (CRRL). Result is reported as the MDL or CRRL.

Validator qualifier (VQ)

J - Indicates an estimated value.

UJ - Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

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Analyte		Aluminum					Antimony					Arsenic					Barium					Beryllium					Cadmium					Chromium				
CAS Number		7429-90-5					7440-36-0					7440-38-2					7440-39-3					7440-41-7					7440-43-9					7440-47-3				
Units		mg/kg					mg/kg					mg/kg					mg/kg					mg/kg					mg/kg					mg/kg				
Lab ID	Collection Date	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL
Mākua Beach																																				
Octopus (He'e)																																				
MAK001O	9/9/2013	0.14	U		0.81	0.14	0.007	U		0.02	0.007	25.2			0.04	0.014	0.03	U		0.16	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007	**0.298**			0.121	0.018
MAK002O	9/9/2013	0.12	U		0.68	0.12	0.006	U		0.02	0.006	21.5			0.034	0.012	0.03	U		0.14	0.03	0.03	U		0.08	0.03	0.006	U		0.02	0.006	0.021	B	U	0.103	0.015
MAK003O	9/9/2013	0.18	B	J	0.71	0.12	0.006	U		0.02	0.006	23.7			0.036	0.012	0.03	U		0.14	0.03	0.03	U		0.08	0.03	0.006	U		0.02	0.006	0.077	B	U	0.107	0.016
MAK004O	9/11/2013	0.12	U		0.71	0.12	0.006	U		0.02	0.006	29.7			0.036	0.012	0.03	U		0.14	0.03	0.03	U		0.08	0.03	0.006	U		0.02	0.006	0.019	B	U	0.107	0.016
MAK005O	9/11/2013	0.29	B	J	0.79	0.14	0.007	U		0.02	0.007	27.5			0.04	0.014	0.03	U		0.16	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007	0.018	U		0.119	0.018
MAK006O	9/11/2013	0.13	U		0.73	0.13	0.006	U		0.02	0.006	37.8			0.037	0.013	0.03	U		0.15	0.03	0.03	U		0.08	0.03	0.008	B	J	0.02	0.006	0.057	B	U	0.11	0.017
MAK007O	9/11/2013	0.3	B	J	0.8	0.14	0.012	B	J	0.02	0.007	33.7			0.04	0.014	0.03	U		0.16	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007	0.018	U		0.12	0.018
MAK008O	9/11/2013	0.58	B	J	0.8	0.14	0.007	U		0.02	0.007	24.2			0.04	0.014	0.03	U		0.16	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007	0.02	B	U	0.12	0.018
Sea Cucumber (Loli)																																				
MAK001C	9/9/2013	0.75	B		0.75	0.13	0.007	U		0.02	0.007	0.497			0.037	0.013	0.06	B	J	0.15	0.03	0.03	U		0.08	0.03	0.007	U		0.02	0.007	0.261			0.112	0.017
MAK002C	9/9/2013	2.34			0.79	0.14	0.007	U		0.02	0.007	0.498			0.039	0.014	0.03	U		0.16	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007	0.073	B	U	0.118	0.018
MAK004C	9/9/2013	0.35	B	J	0.74	0.13	0.006	U		0.02	0.006	0.719			0.037	0.013	0.03	U		0.15	0.03	0.03	U		0.08	0.03	0.006	U		0.02	0.006	0.128		U	0.111	0.017
MAK005C	9/9/2013	0.64	B	J	0.78	0.14	0.007	U		0.02	0.007	0.294			0.039	0.014	0.03	U		0.16	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007	0.051	B	U	0.117	0.017
MAK006C	9/11/2013	9.46			0.8	0.14	0.007	U		0.02	0.007	0.441			0.04	0.014	0.06	B	J	0.16	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007	0.106	B	U	0.119	0.018
MAK007C	9/11/2013	2.32			0.71	0.12	0.006	U		0.02	0.006	0.446			0.036	0.012	0.04	B	J	0.14	0.03	0.03	U		0.08	0.03	0.006	U		0.02	0.006	0.088	B	U	0.107	0.016
MAK008C	9/11/2013	5.39			0.71	0.12	0.006	U		0.02	0.006	0.4			0.035	0.012	0.04	B	J	0.14	0.03	0.03	U		0.08	0.03	0.006	U		0.02	0.006	0.068	B	U	0.106	0.016
MAK009C	9/11/2013	0.82			0.75	0.13	0.01	B	J	0.02	0.007	0.536			0.038	0.013	0.06	B	J	0.15	0.03	0.03	U		0.08	0.03	0.007	U		0.02	0.007	0.042	B	U	0.113	0.017
Seaweed (Limu)																																				
MAK001L/2L/26L	9/9/2013; 9/10/2013; 9/27/2013	22.8			0.81	0.14	0.007	U		0.02	0.007	2.28			0.041	0.014	0.38			0.16	0.03	0.03	U		0.09	0.03	0.03			0.02	0.007	0.178			0.122	0.018
MAK013L	9/18/2013	34.9			0.74	0.13	0.006	U		0.02	0.006	2.37			0.037	0.013	0.45			0.15	0.03	0.03	U		0.08	0.03	0.13			0.02	0.006	0.23			0.111	0.017
MAK016L/21L/27L	9/23/2013; 9/27/2013; 9/27/2013	41.1			0.81	0.14	0.007	U		0.02	0.007	2.27			0.041	0.014	1.74			0.16	0.03	0.03	U		0.09	0.03	0.04			0.02	0.007	0.474			0.122	0.018
MAK022L	9/27/2013	54.1			0.77	0.13	0.007	U		0.02	0.007	1.89			0.038	0.013	0.67			0.15	0.03	0.03	U		0.09	0.03	0.05			0.02	0.007	0.349			0.115	0.017
MAK023L	9/27/2013	31.2			0.79	0.14	0.01	B	J	0.02	0.007	2.2			0.04	0.014	0.49			0.16	0.03	0.03	U		0.09	0.03	0.05			0.02	0.007	0.172			0.119	0.018
MAK024L/25L	9/27/2013; 9/27/2013	87.6			0.75	0.13	0.008	B	J	0.02	0.007	2.14			0.038	0.013	0.76			0.15	0.03	0.03	U		0.08	0.03	0.06			0.02	0.007	0.528			0.113	0.017
MAK025L	9/27/2013	44			0.78	0.14	0.007	U		0.02	0.007	1.97			0.039	0.014	4.49			0.16	0.03	0.03	U		0.09	0.03	0.05			0.02	0.007	0.26			0.117	0.017
MAK029L	10/11/2013	20.9		J	0.77	0.14	0.007	U		0.02	0.007	2.06			0.039	0.014	0.51			0.15	0.03	0.03	U		0.09	0.03	0.03			0.02	0.007	0.17			0.116	0.017

Octopus (He'e) Samples	*number of samples analyzed*					*8*					*8*					*8*					*8*					*8*					*8*				*8*
	number of non-detect					*4*					*7*					*0*					*8*					*8*					*7*				*7*
	number of detections					*4*					*1*					*8*					*0*					*0*					*1*				*1*
	Frequency of Detection					*50.0%*					*12.5%*					*100.0%*					*0.0%*					*0.0%*					*12.5%*				*12.5%*
	Maximum Detected		B	J		*0.58*		B	J		*0.012*					*37.8*					-					-		B	J		*0.008*				*0.298*
	Standard Deviation					*0.16*					*0.0020*					*5.54*					*0.00*					*0.0017*					*0.0007*				*0.10*
	Mean					*0.23*					*0.0071*					*27.91*					*0.030*					*0.029*					*0.007*				*0.066*
	Sample of Max Detection					*MAK008O*					*MAK007O*					*MAK006O*					-					-					*MAK006O*				*MAK001O*
	Max Dectection Limit					*0.14*					*0.007*					-					*0.03*					*0.03*					*0.007*				*0.018*

Sea Cucumber (Loli) Samples	*number of samples analyzed*					*8*					*8*					*8*					*8*					*8*					*8*				*8*
	number of non-detect					*0*					*7*					*0*					*3*					*8*					*8*				*7*
	number of detections					*8*					*1*					*8*					*5*					*0*					*0*				*1*
	Frequency of Detection					*100.0%*					*12.5%*					*100.0%*					*62.5%*					*0.0%*					*0.0%*				*12.5%*
	Maximum Detected					*9.46*		B	J		*0.011*					*0.719*		B	J		*0.06*					-					-				*0.261*
	Standard Deviation					*3.17*					*0.0016*					*0.12*					*0.014*					*0.0012*					*0.0005*				*0.070*
	Mean					*2.76*					*0.01*					*0.48*					*0.044*					*0.028*					*0.007*				*0.10*
	Sample of Max Detection					*MAK006C*					*MAK009C*					*MAK004C*					*MAK001C*					-					-				*MAK001C*
	Max Dectection Limit					-					*0.007*					-					*0.03*					*0.03*					*0.007*				*0.018*

Seaweed (Limu)Samples	*number of samples analyzed*					*8*					*8*					*8*					*8*					*8*					*8*				*8*
	number of non-detect					*0*					*6*					*0*					*0*					*8*					*0*				*0*
	number of detections					*8*					*2*					*8*					*8*					*0*					*8*				*8*
	Frequency of Detection					*100.0%*					*25.0%*					*100.0%*					*100.0%*					*0.0%*					*100.0%*				*100.0%*
	Maximum Detected					*87.6*		B	J		*0.01*					*2.37*					*4.49*					-					*0.13*				*0.528*
	Standard Deviation					*21.42*					*0.0012*					*0.16*					*1.40*					*0.00*					*0.032*				*0.14*
	Mean					*42.08*					*0.01*					*2.15*					*1.19*					*0.030*					*0.06*				*0.30*
	Sample of Max Detection					*MAK024L/25L*					*MAK023L*					*MAK013L*					*MAK025L*					-					*MAK013L*				*MAK024L/25L*
	Max Dectection Limit					-					*0.007*					-					-					*0.03*					-				-

Notes:

CAS - Chemical Abstracts Service
ID - identification
ng/g - nanograms per gram
MDL - method detection limit
mg/kg - milligrams per kilogram
RL - reporting limit

Laboratory qualifier (LQ)

B - Detected by the instrument, the result is greater than the MDL but less than or equal to the RL. Result is reported and considered an estimate.
J - Estimated value. A full explanation is presented in the laboratory report case narrative (BRL Report 1345019 or BRL Report 1343025).
M - Duplicate precision (relative percent difference) was not within acceptance criteria. Result is estimated.
N - Spike recovery was not within acceptance criteria. Result is estimated.
U - Result is less than or equal to the MDL or client requested reporting limit (CRRL). Result is reported as the MDL or CRRL.

Validator qualifier (VQ)

J - Indicates an estimated value.
U - Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
UJ - Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

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Analyte		Cobalt					Copper					Iron					Lead					Manganese					Mercury					Methyl Mercury				
CAS Number		7440-48-4					7440-50-8					7439-89-6					7439-92-1					7439-96-5					7439-97-6					22967-92-6				
Units		mg/kg					mg/kg					mg/kg					mg/kg					mg/kg					ng/g					ng/g				
Lab ID	**Collection Date**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**
Mākua Beach																																				
Octopus (He'e)																																				
MAK001O	9/9/2013	0.02		U	0.16	0.02	10.5			0.16	0.03	2.73		U	0.806	0.081	0.08			0.04	0.004	0.18			0.04	0.01	10.5			1.91	0.57	7.86			2.84	0.95
MAK002O	9/9/2013	0.02		U	0.14	0.02	4.11			0.14	0.03	0.761		U	0.685	0.068	0.004		B J	0.03	0.003	0.19			0.03	0.01	6.19			1.8	0.54	5.35			2.78	0.93
MAK003O	9/9/2013	0.02		U	0.14	0.02	14.5			0.14	0.03	1.73		U	0.714	0.071	0.36			0.04	0.004	0.27			0.04	0.01	6.34			1.96	0.59	5.59			2.61	0.87
MAK004O	9/11/2013	0.02		U	0.14	0.02	6.23			0.14	0.03	0.950		U	0.714	0.071	0.005		B J	0.04	0.004	0.23			0.04	0.01	10.3			1.79	0.54	7.17			2.75	0.92
MAK005O	9/11/2013	0.02		U	0.16	0.02	6.04			0.16	0.03	1.62		U	0.792	0.079	0.007		B J	0.04	0.004	0.24			0.04	0.01	10.4			1.74	0.52	9.52			2.82	0.94
MAK006O	9/11/2013	0.02		U	0.15	0.02	6.72		J	0.15	0.03	1.31		U	0.734	0.073	0.007		B J	0.04	0.004	0.24			0.04	0.01	17.4			1.95	0.58	11.4			3.88	1.29
MAK007O	9/11/2013	0.02		U	0.16	0.02	8.64		J	0.16	0.03	2.58		M,N UJ	0.802	0.08	0.007		B J	0.04	0.004	0.29			0.04	0.01	11.8			1.93	0.58	11.2			4.3	1.43
MAK008O	9/11/2013	0.02		U	0.16	0.02	5.38			0.16	0.03	2.31		U	0.803	0.08	0.01		B J	0.04	0.004	0.22			0.04	0.01	9.29			1.94	0.58	7.36			4.11	1.37
Sea Cucumber (Loli)																																				
MAK001C	9/9/2013	0.02		U	0.15	0.02	0.78			0.15	0.03	4.18			0.748	0.075	0.03		B J	0.04	0.004	0.24			0.04	0.01	0.18		J2 J	0.38	0.12	0.96		U	2.89	0.96
MAK002C	9/9/2013	0.02		U	0.16	0.02	0.43			0.16	0.03	4.73			0.787	0.079	0.03		B J	0.04	0.004	0.12		U	0.04	0.01	0.29		J2 J	0.37	0.11	0.93		U	2.78	0.93
MAK004C	9/9/2013	0.02		U	0.15	0.02	2.97			0.15	0.03	2.66		U	0.742	0.074	0.12			0.04	0.004	0.16		U	0.04	0.01	0.35			0.32	0.1	0.89		U	2.67	0.89
MAK005C	9/9/2013	0.02		U	0.16	0.02	0.31			0.16	0.03	1.3		U	0.777	0.078	0.02		B J	0.04	0.004	0.07		U	0.04	0.01	0.22		J2 J	0.39	0.12	0.97		U	2.92	0.97
MAK006C	9/11/2013	0.03		B J	0.16	0.02	0.38			0.16	0.03	19.8			0.795	0.08	0.02		B J	0.04	0.004	0.39			0.04	0.01	0.32		J2 J	0.38	0.11	0.91		U	2.73	0.91
MAK007C	9/11/2013	0.02		U	0.14	0.02	10.3			0.14	0.03	5.35			0.714	0.071	0.45			0.04	0.004	0.20			0.04	0.01	0.39		J2	0.39	0.12	0.91		U	2.72	0.91
MAK008C	9/11/2013	0.02		U	0.14	0.02	0.36			0.14	0.03	9.29			0.709	0.071	0.04		B	0.04	0.004	0.19			0.04	0.01	0.27		J2 J	0.39	0.12	0.99		U	2.98	0.99
MAK009C	9/11/2013	0.02		U	0.15	0.02	0.35			0.15	0.03	2.85		U	0.75	0.75	0.02		B J	0.04	0.004	0.13		U	0.04	0.01	0.25		J2 J	0.38	0.11	0.87		U	2.61	0.87
Seaweed (Limu)																																				
MAK001L/2L/26L	9/9/2013; 9/10/2013; 9/27/2013	0.04		B J	0.16	0.02	0.42			0.16	0.03	37			0.815	0.081	0.37			0.04	0.004	1.26			0.04	0.01	2.27			0.8	0.24	1.01		B J	2.94	0.98
MAK013L	9/18/2013	0.05		B J	0.15	0.02	0.47			0.15	0.03	58.4			0.739	0.074	0.29			0.04	0.004	1.69			0.04	0.01	2.14			0.8	0.24	0.98		U	2.93	0.98
MAK016L/21L/27L	9/23/2013; 9/27/2013; 9/27/2013	0.1		B J	0.16	0.02	0.5			0.16	0.03	121			0.811	0.081	0.4			0.04	0.004	2.97			0.04	0.01	1.71			0.8	0.24	0.99		U	2.98	0.99
MAK022L	9/27/2013	0.07		B J	0.15	0.02	0.47			0.15	0.03	84.4			0.766	0.077	0.51			0.04	0.004	2.63			0.04	0.01	2.01			0.79	0.24	0.93		U	2.78	0.93
MAK023L	9/27/2013	0.06		B J	0.16	0.02	0.44			0.16	0.03	51.9			0.792	0.079	0.19			0.04	0.004	1.65			0.04	0.01	2.02			0.76	0.23	0.89		U	2.68	0.89
MAK024L/25L	9/27/2013; 9/27/2013	0.09		B J	0.15	0.02	0.51			0.15	0.03	137			0.75	0.075	0.63			0.04	0.004	3.07			0.04	0.01	2.04			0.8	0.24	0.9		U	2.7	0.9
MAK025L	9/27/2013	0.07		B J	0.16	0.02	0.4			0.16	0.03	69.8			0.777	0.078	0.37			0.04	0.004	1.91			0.04	0.01	1.94			0.79	0.24	0.97		U,N	2.9	0.97
MAK029L	10/11/2013	0.03		B J	0.15	0.02	0.46			0.15	0.03	38.8		J	0.774	0.077	0.13			0.04	0.004	1.12		J	0.04	0.01	2.05			0.8	0.24	0.99		U	2.96	0.99

Octopus (He'e) Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*8*	*0*	*8*	*0*	*0*	*0*	*0*
	number of detections	*0*	*8*	*0*	*8*	*8*	*8*	*8*
	Frequency of Detection	*0.0%*	*100.0%*	*0.0%*	*100.0%*	*100.0%*	*100.0%*	*100.0%*
	Maximum Detected	*-*	*14.5*	*-*	*0.36*	*0.289*	*17.4*	*11.4*
	Standard Deviation	*0.0012*	*3.36*	*0.74*	*0.12*	*0.037*	*3.51*	*2.32*
	Mean	*0.02*	*7.77*	*1.75*	*0.060*	*0.23*	*10.28*	*8.18*
	Sample of Max Detection	*-*	*MAK003O*	*-*	*MAK003O*	*MAK007O*	*MAK006O*	*MAK006O*
	Max Dectection Limit	*0.02*	*-*	*0.081*	*-*	*-*	*-*	*-*

Sea Cucumber (Loli) Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*7*	*0*	*3*	*0*	*4*	*0*	*8*
	number of detections	*1*	*8*	*5*	*8*	*4*	*8*	*0*
	Frequency of Detection	*12.5%*	*100.0%*	*62.5%*	*100.0%*	*50.0%*	*100.0%*	*0.0%*
	Maximum Detected	*B J 0.026*	*10.3*	*19.8*	*0.45*	*0.39*	*J2 0.39*	*-*
	Standard Deviation	*0.0025*	*3.48*	*5.97*	*0.15*	*0.10*	*0.069*	*0.042*
	Mean	*0.020*	*1.99*	*6.27*	*0.09*	*0.19*	*0.28*	*0.93*
	Sample of Max Detection	*MAK006C*	*MAK007C*	*MAK006C*	*MAK007C*	*MAK006C*	*MAK007C*	*-*
	Max Dectection Limit	*0.02*	*-*	*0.75*	*-*	*0.012*	*-*	*0.99*

Seaweed (Limu)Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*0*	*0*	*0*	*0*	*0*	*0*	*6*
	number of detections	*8*	*8*	*8*	*8*	*8*	*8*	*2*
	Frequency of Detection	*100.0%*	*100.0%*	*100.0%*	*100.0%*	*100.0%*	*100.0%*	*25.0%*
	Maximum Detected	*B J 0.1*	*0.51*	*137*	*0.63*	*3.07*	*2.27*	*B J 1.01*
	Standard Deviation	*0.024*	*0.038*	*37.11*	*0.16*	*0.76*	*0.16*	*0.045*
	Mean	*0.064*	*0.46*	*74.79*	*0.36*	*2.04*	*2.02*	*0.96*
	Sample of Max Detection	*MAK016L/21L/27L*	*MAK024L/25L*	*MAK024L/25L*	*MAK024L/25L*	*MAK024L/25L*	*MAK001L/2L/26L*	*MAK001L/2L/26L*
	Max Dectection Limit	*-*	*-*	*-*	*-*	*-*	*-*	*0.99*

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Analyte		Selenium					Silver					Thallium					Vanadium					Zinc				
CAS Number		7782-49-2					7440-22-4					7440-28-0					7440-62-2					7440-66-6				
Units		mg/kg					mg/kg					mg/kg					mg/kg					mg/kg				
Lab ID	**Collection Date**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**
Mākua Beach																										
Octopus (He'e)																										
MAK001O	9/9/2013	0.283			0.151	0.06	0.02	U,J	UJ	0.10	0.02	0.002	U		0.008	0.002	0.014	U		0.121	0.014	13.2			1	0.2
MAK002O	9/9/2013	0.159			0.128	0.051	0.02	U,J	UJ	0.09	0.02	0.002	U		0.007	0.002	0.012	U		0.103	0.012	9.9			0.9	0.17
MAK003O	9/9/2013	0.241			0.134	0.054	0.02	U,J	UJ	0.09	0.02	0.002	U		0.007	0.002	0.012	U		0.107	0.012	14.1			0.9	0.18
MAK004O	9/11/2013	0.21			0.134	0.054	0.02	U,J	UJ	0.09	0.02	0.002	U		0.007	0.002	0.012	U		0.107	0.012	11.3			0.9	0.18
MAK005O	9/11/2013	0.243			0.149	0.059	0.02	U,J	UJ	0.10	0.02	0.002	U		0.008	0.002	0.014	U		0.119	0.014	12			1	0.2
MAK006O	9/11/2013	0.264			0.138	0.055	0.02	U,J	UJ	0.09	0.02	0.002	U		0.007	0.002	0.013	U		0.11	0.013	12.4			0.9	0.18
MAK007O	9/11/2013	0.294			0.15	0.06	0.02	U,J	UJ	0.10	0.02	0.002	U		0.008	0.002	0.014	U		0.12	0.014	12.2			1	0.2
MAK008O	9/11/2013	0.244			0.151	0.06	0.02	U,J	UJ	0.10	0.02	0.002	U		0.008	0.002	0.014	U		0.12	0.014	10.9			1	0.2
Sea Cucumber (Loli)																										
MAK001C	9/9/2013	0.266			0.14	0.056	0.02	U,J	UJ	0.09	0.02	0.002	U		0.007	0.002	0.036	B	J	0.112	0.013	0.92	B	U	0.9	0.19
MAK002C	9/9/2013	0.295			0.148	0.057	0.02	U,J	UJ	0.10	0.02	0.002	U		0.008	0.002	0.023	B	J	0.118	0.014	0.47	B	U	1	0.2
MAK004C	9/9/2013	0.331			0.139	0.056	0.02	U,J	UJ	0.09	0.02	0.002	U		0.007	0.002	0.028	B	J	0.111	0.013	1.43			0.9	0.19
MAK005C	9/9/2013	0.178			0.146	0.058	0.02	U,J	UJ	0.10	0.02	0.002	U		0.008	0.002	0.023	B	J	0.117	0.014	0.37	B	U	1	0.19
MAK006C	9/11/2013	0.318			0.149	0.06	0.02	U,J	UJ	0.10	0.02	0.002	U		0.008	0.002	0.077	B	J	0.119	0.014	0.58	B	U	1	0.2
MAK007C	9/11/2013	0.295			0.134	0.054	0.02	U,J	UJ	0.09	0.02	0.002	U		0.007	0.002	0.035	B	J	0.107	0.012	5.63			0.9	0.18
MAK008C	9/11/2013	0.267			0.133	0.053	0.02	U,J	UJ	0.09	0.02	0.002	U		0.007	0.002	0.035	B	J	0.106	0.012	0.59	B	U	0.9	0.18
MAK009C	9/11/2013	0.329			0.141	0.056	0.02	U,J	UJ	0.09	0.02	0.002	U		0.008	0.002	0.018	B	J	0.113	0.013	0.34	B	U	0.9	0.19
Seaweed (Limu)																										
MAK001L/2L/26L	9/9/2013; 9/10/2013; 9/27/2013	0.061	U		0.153	0.061	0.02	U,J	UJ	0.1	0.02	0.007	B	J	0.008	0.002	1.21			0.122	0.014	3.48			1	0.2
MAK013L	9/18/2013	0.055	U		0.139	0.055	0.02	U,J	UJ	0.09	0.02	0.007	B		0.007	0.002	1.29			0.111	0.013	2.23			0.9	0.18
MAK016L/21L/27L	9/23/2013; 9/27/2013; 9/27/2013	0.061	U		0.152	0.061	0.02	U,J	UJ	0.1	0.02	0.004	B	J	0.008	0.002	2.21			0.122	0.014	2.08			1	0.2
MAK022L	9/27/2013	0.057	U		0.144	0.057	0.02	U,J	UJ	0.1	0.02	0.004	B	J	0.008	0.002	2.41			0.115	0.013	2.01			1	0.19
MAK023L	9/27/2013	0.059	U		0.149	0.059	0.02	U,J	UJ	0.1	0.02	0.005	B	J	0.008	0.002	1.25			0.119	0.014	2.21			1	0.2
MAK024L/25L	9/27/2013; 9/27/2013	0.056	U		0.141	0.056	0.02	U,J	UJ	0.09	0.02	0.005	B	J	0.008	0.002	1.65			0.113	0.013	2.04			0.9	0.19
MAK025L	9/27/2013	0.058	U		0.146	0.058	0.02	U,J	UJ	0.1	0.02	0.003	B	J	0.008	0.002	2.55			0.117	0.014	1.84			1	0.19
MAK029L	10/11/2013	0.058	U		0.145	0.058	0.02	U,J	UJ	0.1	0.02	0.004	B	J	0.008	0.002	0.976			0.116	0.014	1.87			1	0.19

Octopus (He'e) Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*0*	*8*	*8*	*8*	*0*
	number of detections	*8*	*0*	*0*	*0*	*8*
	Frequency of Detection	*100.0%*	*0.0%*	*0.0%*	*0.0%*	*100.0%*
	Maximum Detected	*0.294*	*-*	*-*	*-*	*14.1*
	Standard Deviation	*0.043*	*0.0012*	*0.00*	*0.0010*	*1.32*
	Mean	*0.24*	*0.019*	*0.0020*	*0.01*	*12.00*
	Sample of Max Detection	*MAK007O*	*-*	*-*	*-*	*MAK003O*
	Max Dectection Limit	*-*	*0.02*	*0.002*	*0.014*	*-*

Sea Cucumber (Loli) Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*0*	*8*	*8*	*0*	*6*
	number of detections	*8*	*0*	*0*	*8*	*2*
	Frequency of Detection	*100.0%*	*0.0%*	*0.0%*	*100.0%*	*25.0%*
	Maximum Detected	*0.331*	*-*	*-*	B J *0.077*	*5.63*
	Standard Deviation	*0.050*	*0.0008*	*0.00*	*0.018*	*1.79*
	Mean	*0.28*	*0.019*	*0.0020*	*0.034*	*1.29*
	Sample of Max Detection	*MAK004C*	*-*	*-*	*MAK006C*	*MAK007C*
	Max Dectection Limit	*-*	*0.02*	*0.002*	*-*	*0.2*

Seaweed (Limu)Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*8*	*8*	*0*	*0*	*0*
	number of detections	*0*	*0*	*8*	*8*	*8*
	Frequency of Detection	*0.0%*	*0.0%*	*100.0%*	*100.0%*	*100.0%*
	Maximum Detected	*-*	*-*	B J *0.007*	*2.55*	*3.48*
	Standard Deviation	*0.0022*	*0.00*	*0.0015*	*0.61*	*0.53*
	Mean	*0.058*	*0.020*	*0.0049*	*1.69*	*2.22*
	Sample of Max Detection	*-*	*-*	*MAK001L/2L/26L*	*MAK025L*	*MAK001L/2L/26L*
	Max Dectection Limit	*0.061*	*0.02*	*-*	*-*	*-*

Draft

Round 2 – January to March 2014

Draft

Organochlorine Pesticides

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Analyte		Alpha-BHC					Gamma-BHC (Lindane)					Delta-BHC					Heptachlor					Aldrin					Heptachlor Epoxide					p,p'-DDT					Beta-BHC				
CAS Number		*319-84-6*					*58-89-9*					*319-86-8*					*76-44-8*					*309-00-2*					*1024-57-3*					*50-29-3*					*319-85-7*				
Units		*µg/kg*					*µg/kg*					*µg/kg*					*µg/kg*					*µg/kg*					*µg/kg*					*µg/kg*					*µg/kg*				
Lab ID	**Collection Date**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**
Mākua Beach																																									
Octopus (He'e)																																									
MAK101O	1/13/2014	4.02	U		4.02	4.02	4.02	U		4.02	4.02	4.02	U		4.02	4.02	4.02	U		4.02	4.02	**4.02**	U		0	4.02	4.02	4.02	U		4.02	4.02	4.02	U		4.02	4.02	4.02	U		4.02	4.02
MAK102O	1/13/2014	3.94	U		3.94	3.94	3.94	U		3.94	3.94	3.94	U		3.94	3.94	3.94	U		3.94	3.94	**3.94**	U		0	3.94	3.94	3.94	U		3.94	3.94	3.94	U		3.94	3.94	3.94	U		3.94	3.94
MAK103O	1/13/2014	3.97	U		3.97	3.97	3.97	U		3.97	3.97	3.97	U		3.97	3.97	3.97	U		3.97	3.97	**3.97**	U		0	3.97	3.97	3.97	U		3.97	3.97	3.97	U		3.97	3.97	3.97	U		3.97	3.97
MAK104O	1/13/2014	4	U		4	4	4	U		4	4	4	U		4	4	4	U		4	4	**4**	U		0	4	4	4	U		4	4	4	U		4	4	4	U		4	4
MAK105O	1/13/2014	3.96	U		3.96	3.96	3.96	U		3.96	3.96	3.96	U		3.96	3.96	3.96	U		3.96	3.96	**3.96**	U		0	3.96	3.96	3.96	U		3.96	3.96	3.96	U		3.96	3.96	3.96	U		3.96	3.96
MAK106O	1/13/2014	4.02	U		4.02	4.02	4.02	U		4.02	4.02	4.02	U		4.02	4.02	4.02	U		4.02	4.02	**4.02**	U		0	4.02	4.02	4.02	U		4.02	4.02	4.02	U		4.02	4.02	4.02	U		4.02	4.02
MAK107O	1/13/2014	4.03	U		4.03	4.03	4.03	U		4.03	4.03	4.03	U		4.03	4.03	4.03	U		4.03	4.03	**4.03**	U		0	4.03	4.03	4.03	U		4.03	4.03	4.03	U		4.03	4.03	4.03	U		4.03	4.03
MAK108O	1/13/2014	4.02	U		4.02	4.02	4.02	U		4.02	4.02	4.02	U		4.02	4.02	4.02	U		4.02	4.02	**4.02**	U		0	4.02	4.02	4.02	U		4.02	4.02	4.02	U		4.02	4.02	4.02	U		4.02	4.02
Sea Cucumber (Loli)																																									
MAK102C	1/13/2014	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	**3.98**	U		0	3.98	3.98	3.98	U		3.98	3.98	3.98	U	UJ	3.98	3.98	3.98	U		3.98	3.98
MAK103C	1/13/2014	3.99	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99	**3.99**	U		0	3.99	3.99	3.99	U		3.99	3.99	3.99	U	UJ	3.99	3.99	3.99	U		3.99	3.99
MAK104C	1/13/2014	3.94	U		3.94	3.94	3.94	U		3.94	3.94	3.94	U		3.94	3.94	3.94	U		3.94	3.94	**3.94**	U		0	3.94	3.94	3.94	U		3.94	3.94	3.94	U	UJ	3.94	3.94	3.94	U		3.94	3.94
MAK105C	1/13/2014	4	U		4	4	4	U		4	4	4	U		4	4	4	U		4	4	**4**	U		0	4	4	4	U		4	4	4	U	UJ	4	4	4	U		4	4
MAK106C	1/13/2014	3.99	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99	**3.99**	U		0	3.99	3.99	3.99	U		3.99	3.99	3.99	U	UJ	3.99	3.99	3.99	U		3.99	3.99
MAK107C	1/13/2014	4	U		4	4	4	U		4	4	4	U		4	4	4	U		4	4	**4**	U		0	4	4	4	U		4	4	4	U	UJ	4	4	4	U		4	4
MAK108C	1/13/2014	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	**3.98**	U		0	3.98	3.98	3.98	U		3.98	3.98	3.98	U	UJ	3.98	3.98	3.98	U		3.98	3.98
MAK110C	1/14/2014	3.99	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99	**3.99**	U		0	3.99	3.99	3.99	U		3.99	3.99	3.99	U	UJ	3.99	3.99	3.99	U		3.99	3.99
Seaweed (Limu kohu)																																									
MAK101L	1/13/2014	4	U		4	4	4	U	UJ	4	4	4	U	UJ	4	4	4	U		4	4	**4**	U	UJ	0	4	4	4	U		4	4	4	U	UJ	4	4	4	U		4	4
MAK102L	1/13/2014	3.97	U		3.97	3.97	3.97	U		3.97	3.97	3.97	U		3.97	3.97	3.97	U		3.97	3.97	**3.97**	U		0	3.97	3.97	3.97	U		3.97	3.97	3.97	U	UJ	3.97	3.97	3.97	U		3.97	3.97
MAK105L	1/13/2014	3.99	U	UJ	3.99	3.99	3.99	U	UJ	3.99	3.99	3.99	U	UJ	3.99	3.99	3.99	U	UJ	3.99	3.99	**3.99**	U	UJ	0	3.99	3.99	3.99	U	UJ	3.99	3.99	3.99	U	UJ	3.99	3.99	3.99	U	UJ	3.99	3.99
MAK106L	1/14/2014	4	U	UJ	4	4	4	U	UJ	4	4	4	U	UJ	4	4	4	U	UJ	4	4	**4**	U	UJ	0	4	4	4	U	UJ	4	4	4	U	UJ	4	4	4	U	UJ	4	4
MAK108,109,110,113L	1/14/2014	4.01	U	UJ	4.01	4.01	4.01	U	UJ	4.01	4.01	4.01	U	UJ	4.01	4.01	4.01	U	UJ	4.01	4.01	**4.01**	U	UJ	0	4.01	4.01	4.01	U	UJ	4.01	4.01	4.01	U	UJ	4.01	4.01	4.01	U	UJ	4.01	4.01
MAK111L	1/14/2014	4	U		4	4	4	U		4	4	4	U		4	4	4	U		4	4	**4**	U		0	4	4	4	U		4	4	4	U	UJ	4	4	4	U		4	4
MAK112L	1/14/2014	3.96	U		3.96	3.96	3.96	U		3.96	3.96	3.96	U		3.96	3.96	3.96	U		3.96	3.96	**3.96**	U		0	3.96	3.96	3.96	U		3.96	3.96	3.96	U	UJ	3.96	3.96	3.96	U		3.96	3.96
MAK115L	1/14/2014	3.99	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99	**3.99**	U		0	3.99	3.99	3.99	U		3.99	3.99	3.99	U	UJ	3.99	3.99	3.99	U		3.99	3.99

Octopus (He'e) Samples	*number of samples analyzed*					*8*					*8*					*8*					*8*					*8*					*8*					*8*					*8*
	number of non-detect					*8*					*8*					*8*					*8*					*8*					*8*					*8*					*8*
	number of detections					*0*					*0*					*0*					*0*					*0*					*0*					*0*					*0*
	Frequency of Detection					*0.0%*					*0.0%*					*0.0%*					*0.0%*					*0.0%*					*0.0%*					*0.0%*					*0.0%*
	Maximum Detected					-					-					-					-					-					-					-					-
	Standard Deviation					*0.034*					*0.034*					*0.034*					*0.034*					*0.034*					*0.034*					*0.034*					*0.034*
	Mean					*4.00*					*4.00*					*4.00*					*4.00*					*4.00*					*4.00*					*4.00*					*4.00*
	Sample of Max Detection					-					-					-					-					-					-					-					-
	Max Dectection Limit					*4.03*					*4.03*					*4.03*					*4.03*					*4.03*					*4.03*					*4.03*					*4.03*
Sea Cucumber (Loli) Samples	*number of samples analyzed*					*8*					*8*					*8*					*8*					*8*					*8*					*8*					*8*
	number of non-detect					*8*					*8*					*8*					*8*					*8*					*8*					*8*					*8*
	number of detections					*0*					*0*					*0*					*0*					*0*					*0*					*0*					*0*
	Frequency of Detection					*0.0%*					*0.0%*					*0.0%*					*0.0%*					*0.0%*					*0.0%*					*0.0%*					*0.0%*
	Maximum Detected					-					-					-					-					-					-					-					-
	Standard Deviation					*0.019*					*0.019*					*0.019*					*0.019*					*0.019*					*0.019*					*0.019*					*0.019*
	Mean					*3.98*					*3.98*					*3.98*					*3.98*					*3.98*					*3.98*					*3.98*					*3.98*
	Sample of Max Detection					-					-					-					-					-					-					-					-
	Max Dectection Limit					*4*					*4*					*4*					*4*					*4*					*4*					*4*					*4*
Seaweed (Limu)Samples	*number of samples analyzed*					*8*					*8*					*8*					*8*					*8*					*8*					*8*					*8*
	number of non-detect					*8*					*8*					*8*					*8*					*8*					*8*					*8*					*8*
	number of detections					*0*					*0*					*0*					*0*					*0*					*0*					*0*					*0*
	Frequency of Detection					*0.0%*					*0.0%*					*0.0%*					*0.0%*					*0.0%*					*0.0%*					*0.0%*					*0.0%*
	Maximum Detected					-					-					-					-					-					-					-					-
	Standard Deviation					*0.017*					*0.017*					*0.017*					*0.017*					*0.017*					*0.017*					*0.017*					*0.017*
	Mean					*3.99*					*3.99*					*3.99*					*3.99*					*3.99*					*3.99*					*3.99*					*3.99*
	Sample of Max Detection					-					-					-					-					-					-					-					-
	Max Dectection Limit					*4.01*					*4.01*					*4.01*					*4.01*					*4.01*					*4.01*					*4.01*					*4.01*

Notes:

[2] As noted in Table 9 of the *Final Supplemental Marine Resources Study Sampling and Analysis Plan* , the RLs for aldrin exceed the project screening value.

µg/kg - micrograms per kilogram
BHC - benzene hexachloride
CAS - Chemical Abstracts Service
DDT - dichloro-diphenyl-trichloroethane
ID - identification
ND - not detected
MDL - method detection limit
RL - reporting limit

Laboratory Qualifier (LQ)

[U] - Indicates compound was analyzed for but not detected. The sample quantitation limit must be corrected for dilution and for percent moisture. These results are presented as "ND" in the ARDL laboratory reports but are reported as the RL value with a "U" qualifier in the Staged Electronic Data Deliverable and this table.

Validator Qualifier (VQ)

[J] - Indicates an estimated value.
[R] - Quality control indicates the data is not usable.
[UJ] - Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

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Volatile Organic Compounds

Draft

Analyte		Toluene					Ethyl Benzene					M,P-Xylenes					Styrene					o-Xylene					1,2,4-Trimethylbenzene				
CAS Number		108-88-3					100-41-4					108-38-3					100-42-5					95-47-6					95-63-6				
Units		µg/kg					µg/kg					µg/kg					µg/kg					µg/kg					µg/kg				
Lab ID	Collection Date	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL
Mākua Beach																															
Octopus (He'e)																															
MAK101O	1/13/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U		12.5	2.5
MAK102O	1/13/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U		12.5	2.5
MAK103O	1/13/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U		12.5	2.5
MAK104O	1/13/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U		12.5	2.5
MAK105O	1/13/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U		12.5	2.5
MAK106O	1/13/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U		12.5	2.5
MAK107O	1/13/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U		12.5	2.5
MAK108O	1/13/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U		12.5	2.5
Sea Cucumber (Loli)																															
MAK102C	1/13/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U		12.5	2.5
MAK103C	1/13/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U		12.5	2.5
MAK104C	1/13/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U		12.5	2.5
MAK105C	1/13/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U		12.5	2.5
MAK106C	1/13/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U		12.5	2.5
MAK107C	1/13/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U		12.5	2.5
MAK108C	1/13/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U		12.5	2.5
MAK110C	1/14/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U		12.5	2.5
Seaweed (Limu kohu)																															
MAK101L	1/13/2014	25	U		25	5	25	U		25	5	50	U		50	10	25	U	UJ	25	5	25	U	UJ	25	5	25	U		25	5
MAK102L	1/13/2014	25	U		25	5	25	U		25	5	50	U		50	10	25	U		25	5	25	U		25	5	25	U		25	5
MAK105L	1/13/2014	25	U		25	5	25	U		25	5	50	U		50	10	25	U		25	5	25	U		25	5	25	U		25	5
MAK106L	1/14/2014	25	U		25	5	25	U		25	5	50	U		50	10	25	U		25	5	25	U		25	5	25	U		25	5
MAK108,109,110,113L	1/14/2014	25	U		25	5	25	U		25	5	50	U		50	10	25	U		25	5	25	U		25	5	25	U		25	5
MAK111L	1/14/2014	25	U		25	5	25	U		25	5	50	U		50	10	25	U		25	5	25	U		25	5	25	U		25	5
MAK112L	1/14/2014	25	U		25	5	25	U		25	5	50	U		50	10	25	U		25	5	25	U		25	5	25	U		25	5
MAK115L	1/14/2014	25	U		25	5	25	U		25	5	50	U		50	10	25	U		25	5	25	U		25	5	25	U		25	5

Octopus (He'e) Samples	*number of samples analyzed*					*8*					*8*					*8*					*8*					*8*					*8*
	number of non-detect					*8*					*8*					*8*					*8*					*8*					*8*
	number of detections					*0*					*0*					*0*					*0*					*0*					*0*
	Frequency of Detection					*0.0%*					*0.0%*					*0.0%*					*0.0%*					*0.0%*					*0.0%*
	Maximum Detected					*-*					*-*					*-*					*-*					*-*					*-*
	Standard Deviation					*0.00*					*0.00*					*0.00*					*0.00*					*0.00*					*0.00*
	Mean					*12.50*					*12.50*					*25.00*					*12.50*					*12.50*					*12.50*
	Sample of Max Detection					*-*					*-*					*-*					*-*					*-*					*-*
	Max Dectection Limit					*2.5*					*2.5*					*5*					*2.5*					*2.5*					*2.5*

Sea Cucumber (Loli) Samples	*number of samples analyzed*					*8*					*8*					*8*					*8*					*8*					*8*
	number of non-detect					*8*					*8*					*8*					*8*					*8*					*8*
	number of detections					*0*					*0*					*0*					*0*					*0*					*0*
	Frequency of Detection					*0.0%*					*0.0%*					*0.0%*					*0.0%*					*0.0%*					*0.0%*
	Maximum Detected					*-*					*-*					*-*					*-*					*-*					*-*
	Standard Deviation					*0.00*					*0.00*					*0.00*					*0.00*					*0.00*					*0.00*
	Mean					*12.50*					*12.50*					*25.00*					*12.50*					*12.50*					*12.50*
	Sample of Max Detection					*-*					*-*					*-*					*-*					*-*					*-*
	Max Dectection Limit					*2.5*					*2.5*					*5*					*2.5*					*2.5*					*2.5*

Seaweed (Limu)Samples	*number of samples analyzed*					*8*					*8*					*8*					*8*					*8*					*8*
	number of non-detect					*8*					*8*					*8*					*8*					*8*					*8*
	number of detections					*0*					*0*					*0*					*0*					*0*					*0*
	Frequency of Detection					*0.0%*					*0.0%*					*0.0%*					*0.0%*					*0.0%*					*0.0%*
	Maximum Detected					*-*					*-*					*-*					*-*					*-*					*-*
	Standard Deviation					*0.00*					*0.00*					*0.00*					*0.00*					*0.00*					*0.00*
	Mean					*25.00*					*25.00*					*50.00*					*25.00*					*25.00*					*25.00*
	Sample of Max Detection					*-*					*-*					*-*					*-*					*-*					*-*
	Max Dectection Limit					*5*					*5*					*10*					*5*					*5*					*5*

Notes:
µg/kg - micrograms per kilogram
CAS - Chemical Abstracts Service
ID - identification
ND - not detected
MDL - method detection limit
RL - reporting limit

Laboratory Qualifier (LQ)
U - Indicates compound was analyzed for but not detected. These results are presented as "ND" in the ARDL laboratory reports but are reported as the RL value with a "U" qualifier in this table.
Validator Qualifier (VQ)
UJ - Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated valu

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Semivolatile Organic Compounds

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Analyte		Dimethylphthalate					Diethylphthalate					di-n-Butylphthalate					Pyrene					bis(2-Ethylhexyl)phthalate					di-n-Octylphthalate					Pentachlorophenol				
CAS Number		131-11-3					84-66-2					84-74-2					129-00-0					117-81-7					117-84-0					87-86-5				
Units		µg/kg-wet					µg/kg-wet					µg/kg-wet					µg/kg-wet					µg/kg-wet					µg/kg-wet					µg/kg-wet				
Lab ID	Collection Date	Result[2]	LQ	VQ	RL	MDL	Result[2]	LQ	VQ	RL	MDL	Result[2]	LQ	VQ	RL	MDL	Result[2]	LQ	VQ	RL	MDL	Result[2]	LQ	VQ	RL	MDL	Result[2]	LQ	VQ	RL	MDL	Result[2]	LQ	VQ	RL	MDL
Mākua																																				
Octopus (He'e)																																				
MAK101O	1/13/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		561	300
MAK102O	1/13/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		548	300
MAK103O	1/13/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		548	300
MAK104O	1/13/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		571	300
MAK105O	1/13/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		591	300
MAK106O	1/13/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		548	300
MAK107O	1/13/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		585	300
MAK108O	1/13/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		574	300
Sea Cucumber (Loli)																																				
MAK102C	1/13/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		553	300
MAK103C	1/13/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		571	300
MAK104C	1/13/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	594	300
MAK105C	1/13/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		577	300
MAK106C	1/13/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	594	300
MAK107C	1/13/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		600	300
MAK108C	1/13/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	600	300
MAK110C	1/14/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		569	300
Seaweed (Limu kohu)																																				
MAK101L	1/13/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		569	300
MAK102L	1/13/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		566	300
MAK105L	1/13/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		580	300
MAK106L	1/14/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		543	300
MAK108,109,110,113	1/14/2014; 1/14/2014; 1/14/2014; 1/14/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		558	300
MAK111L	1/14/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		571	300
MAK112L	1/14/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	583	300
MAK115L	1/14/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		553	300

Octopus (He'e) Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*8*	*8*	*8*	*8*	*8*	*8*	*8*
	number of detections	*0*	*0*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	*-*	*-*	*-*	*-*	*-*	*-*	*-*
	Standard Deviation	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	Mean	*1000.00*	*1000.00*	*1000.00*	*1000.00*	*1000.00*	*1000.00*	*565.75*
	Sample of Max Detection	*-*	*-*	*-*	*-*	*-*	*-*	*-*
	Max Dectection Limit	*200*	*200*	*200*	*200*	*200*	*200*	*300*

Sea Cucumber (Loli) Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*8*	*8*	*8*	*8*	*8*	*8*	*8*
	number of detections	*0*	*0*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	*-*	*-*	*-*	*-*	*-*	*-*	*-*
	Standard Deviation	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	Mean	*1000.00*	*1000.00*	*1000.00*	*1000.00*	*1000.00*	*1000.00*	*582.25*
	Sample of Max Detection	*-*	*-*	*-*	*-*	*-*	*-*	*-*
	Max Dectection Limit	*200*	*200*	*200*	*200*	*200*	*200*	*300*

Seaweed (Limu)Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*8*	*8*	*8*	*8*	*8*	*8*	*8*
	number of detections	*0*	*0*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	*-*	*-*	*-*	*-*	*-*	*-*	*-*
	Standard Deviation	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	Mean	*1000.00*	*1000.00*	*1000.00*	*1000.00*	*1000.00*	*1000.00*	*565.38*
	Sample of Max Detection	*-*	*-*	*-*	*-*	*-*	*-*	*-*
	Max Dectection Limit	*200*	*200*	*200*	*200*	*200*	*200*	*300*

Notes:

[1] Final screening values from fish advisories as listed in Table 9 of the *Final Supplemental Marine Resources Study Sampling and Analysis Plan* (August 2013).

[2] Results presented as "ND" in the the Applied Research Development Laboratory, Inc. (ARDL) and U.S. Army Engineer Research and Development Center-Environmental Chemistry Branch (ERDC-ECB) laboratory reports are presented in the Staged Electronic Data Deliverable files (ARDL) and Electronic Data Deliverable file (ERDC-ECB) with a "U" qualifier and are thus presented in this table with the LQ.

µg/kg-wet - micrograms per kilogram-wet weight
CAS - Chemical Abstracts Service
EPA - U.S. Environmental Protection Agency
ID - identification

ND - not detected
MDL - method detection limit
RL - reporting limit
U.S. - United States

Laboratory qualifier (LQ) - ARDL

[J] - Indicates an estimated value. This flag is used when estimating a concentration of a compound that meets identification criteria but the result is less than the quantitation or RL but greater than the MDL.

[U] - Indicates compound was analyzed for but not detected. The sample quantitation limit must be corrected for dilution and for percent moisture.

LQ - ERDC-ECB

[U] - Not detected at or above the RL.

Validator qualifier (VQ)

[J] - Indicates an estimated value.

[UJ] - Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

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Dioxins/Furans

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	Analyte	2,3,7,8-TCDF				Total TCDF				2,3,7,8-TCDD				Total TCDD				1,2,3,7,8-PeCDF				2,3,4,7,8-PeCDF				Total PeCDF				1,2,3,7,8-PeCDD				Total PeCDD				1,2,3,4,7,8-HxCDF				1,2,3,6,7,8-HxCDF				2,3,4,6,7,8-HxCDF			
	CAS Number	51207-31-9				30402-14-3				01746-01-6				41903-57-5				57117-41-6				57117-31-4				30402-15-4				40321-76-4				36088-22-9				70648-26-9				57117-44-9				60851-34-5			
	Units	ng/kg				ng/kg				ng/kg				ng/kg				ng/kg				ng/kg				ng/kg				ng/kg				ng/kg				ng/kg				ng/kg				ng/kg			
Lab ID	**Collection Date**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**		**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**
Mākua Beach																																																	
Octopus (He'e)																																																	
MAK101O	1/13/2014	0.074	JZ	J	0.028	0.1			0.028	0.034	U	0	0.034	0.034		U	0.034	0.052	U	U	0.052	0.039	U	U	0.039	0.045	U	U	0.045	0.049	U	U	0.049	0.049	U	U	0.049	0.034	JZ		0.028	0.029	U	U	0.029	0.037		U	0.027
MAK102O	1/13/2014	0.065	JZ	J	0.038	0.06			0.038	0.037	U	0	0.037	0.092			0.037	0.049	U	U	0.049	0.029	U	U	0.029	0.039	U	U	0.039	0.038	U	U	0.038	0.038	U	U	0.038	0.044	U	U	0.044	0.04	U	U	0.04	0.039	U	U	0.039
MAK103O	1/13/2014	0.07	JZ	J	0.04	0.11			0.04	0.038	U	0	0.038	0.038	U	U	0.038	0.056	U	U	0.056	0.038	U	U	0.038	0.047	U	U	0.047	0.034	U	U	0.034	0.034	U	U	0.034	0.041	U	U	0.041	0.038	U	U	0.038	0.036	U	U	0.036
MAK104O	1/13/2014	0.074			0.033	0.15			0.033	0.041	U	0	0.041	0.041	U	U	0.041	0.049	U	U	0.049	0.043	U	U	0.043	0.046	U	U	0.046	0.049	U	U	0.049	0.049	U	U	0.049	0.039	U	U	0.039	0.036	U	U	0.036	0.034	U	U	0.034
MAK105O	1/13/2014	0.075			0.039	0.075			0.039	0.034	U	0	0.034	0.034	U	U	0.034	0.052	U	U	0.052	0.035	U	U	0.035	0.043	U	U	0.043	0.043	U	U	0.043	0.043	U	U	0.043	0.04	U	U	0.04	0.034	U	U	0.034	0.036	U	U	0.036
MAK106O	1/13/2014	0.067	JZ	J	0.032	0.043			0.032	0.031	U	0	0.031	0.031	U	U	0.031	0.042	U	U	0.042	0.032	U	U	0.032	0.037	U	U	0.037	0.038	U	U	0.038	0.038	U	U	0.038	0.037	U	U	0.037	0.028	U	U	0.028	0.03	U	U	0.03
MAK107O	1/13/2014	0.051	U	U	0.051	0.072			0.051	0.049	U	0	0.049	0.049	U	U	0.049	0.062	U	U	0.062	0.049	U	U	0.049	0.056	U	U	0.056	0.045	U	U	0.045	0.045	U	U	0.045	0.053	U	U	0.053	0.042	U	U	0.042	0.039	U	U	0.039
MAK108O	1/13/2014	0.037	U	U	0.037	0.1			0.037	0.029	U	0	0.029	0.029	U	U	0.029	0.052	U	U	0.052	0.033	U	U	0.033	0.042	U	U	0.042	0.044	U	U	0.044	0.044	U	U	0.044	0.031	U	U	0.031	0.025	U	U	0.025	0.029	U	U	0.029
Sea Cucumber (Loli)																																																	
MAK102C	1/13/2014	0.063	BJZ	U	0.053	0.093		J	0.053	0.045	U	0	0.045	0.045	U	U	0.045	0.025	U	U	0.025	0.016	U	U	0.016	0.021	U	U	0.021	0.023	U	U	0.023	0.023	U	U	0.023	0.034	U	U	0.034	0.028	U	U	0.028	0.033	U	U	0.033
MAK103C	1/13/2014	0.072		U	0.046	0.14		J	0.046	0.036	U	0	0.036	0.036	U	U	0.036	0.023	U	U	0.023	0.022	JZ		0.019	0.021	U	U	0.021	0.02	U	U	0.02	0.02	U	U	0.02	0.028	U	U	0.028	0.024	U	U	0.024	0.028	U	U	0.028
MAK104C	1/13/2014	0.11		U	0.051	0.11		J	0.051	0.06	U	0	0.06	0.06	U	U	0.06	0.024	U	U	0.024	0.02	U	U	0.02	0.022	U	U	0.022	0.027	U	U	0.027	0.027	U	U	0.027	0.021	U	U	0.021	0.016	U	U	0.016	0.018	U	U	0.018
MAK105C	1/13/2014	0.052	BJZ	U	0.047	0.062		J	0.047	0.039	U	0	0.039	0.039	U	U	0.039	0.022	U	U	0.022	0.015	U	U	0.015	0.018	U	U	0.018	0.017	U	U	0.017	0.017	U	U	0.017	0.022	U	U	0.022	0.018	U	U	0.018	0.017	U	U	0.017
MAK106C	1/13/2014	0.07		U	0.046	0.14		J	0.046	0.034	U	0	0.034	0.034	U	U	0.034	0.026	U	U	0.026	0.019	U	U	0.019	0.022	U	U	0.022	0.023	U	U	0.023	0.023	U	U	0.023	0.022	U	U	0.022	0.017	U	U	0.017	0.018	U	U	0.018
MAK107C	1/13/2014	0.054	BJZ	U	0.05	0.05	U	U	0.05	0.058	U	0	0.058	0.058	U	U	0.058	0.022	U	U	0.022	0.016	U	U	0.016	0.019	U	U	0.019	0.016	U	U	0.016	0.016	U	U	0.016	0.024	U	U	0.024	0.021	U	U	0.021	0.02	U	U	0.02
MAK108C	1/13/2014	0.072	BJZ	U	0.048	0.062		J	0.048	0.048	U	0	0.048	0.048	U	U	0.048	0.042	U	U	0.042	0.038			0.033	0.038			0.037	0.043	U	U	0.043	0.043	U	U	0.043	0.049			0.03	0.028	U	U	0.028	0.061			0.024
MAK110C	1/14/2014	0.078	BJZ	U	0.043	0.043	U	U	0.043	0.038	U	0	0.038	0.038	U	U	0.038	0.051	U	U	0.051	0.04	U	U	0.04	0.046	U	U	0.046	0.038	U	U	0.038	0.038	U	U	0.038	0.033	JZ		0.031	0.021	U	U	0.021	0.03	JZ		0.021
Seaweed (Limu kohu)																																																	
MAK101L	1/13/2014	0.061	U	U	0.061	0.38			0.061	0.039	U	0	0.039	0.039	U	U	0.039	0.038	U	U	0.038	0.032	U	U	0.032	0.035	U	U	0.035	0.026	U	U	0.026	0.026	U	U	0.026	0.023	JZ		0.017	0.016	U	U	0.016	0.019	JZ		0.017
MAK102L	1/13/2014	0.067	BJZ	U	0.056	0.056	U	U	0.056	0.037	U	0	0.037	0.037	U	U	0.037	0.044	U	U	0.044	0.034	U	U	0.034	0.039	U	U	0.039	0.03	U	U	0.03	0.03	U	U	0.03	0.028	U	U	0.028	0.026	U	U	0.026	0.027	U	U	0.027
MAK105L	1/13/2014	0.094	U	U	0.094	0.094	U	U	0.094	0.053	U	0	0.053	0.053	U	U	0.053	0.06	U	U	0.06	0.043	U	U	0.043	0.051	U	U	0.051	0.042	U	U	0.042	0.042	U	U	0.042	0.029	U	U	0.029	0.029			0.025	0.022	U	U	0.022
MAK106L	1/14/2014	0.086	U	U	0.086	0.086	U	U	0.086	0.064	U	0	0.064	0.064	U	U	0.064	0.053	U	U	0.053	0.036	U	U	0.036	0.045	U	U	0.045	0.027	U	U	0.027	0.027	U	U	0.027	0.023	U	U	0.023	0.023			0.019	0.018	U	U	0.018
MAK108,109,110,113L	1/14/2014	0.13	U	U	0.13	0.13	U	U	0.13	0.056	U	0	0.056	0.056	U	U	0.056	0.047	U	U	0.047	0.035	U	U	0.035	0.1			0.041	0.053	U	U	0.053	0.053	U	U	0.053	0.034	U	U	0.034	0.03	U	U	0.03	0.03	U	U	0.03
MAK111L	1/14/2014	0.14	U	U	0.14	0.14	U	U	0.14	0.057	U	0	0.057	0.057	U	U	0.057	0.069	U	U	0.069	0.048	U	U	0.048	0.058	U	U	0.058	0.041	U	U	0.041	0.041	U	U	0.041	0.031	U	U	0.031	0.024	U	U	0.024	0.021	U	U	0.021
MAK112L	1/14/2014	0.13	U	U	0.13	0.13	U	U	0.13	0.055	U	0	0.055	0.055	U	U	0.055	0.047	U	U	0.047	0.037	U	U	0.037	0.067			0.042	0.036	U	U	0.036	0.036	U	U	0.036	0.044	U	U	0.044	0.043	U	U	0.043	0.034	U	U	0.034
MAK115L	1/14/2014	0.075	U	U	0.075	0.075	U	U	0.075	0.082	U	0	0.082	0.082	U	U	0.082	0.062	U	U	0.062	0.056	U	U	0.056	0.16			0.059	0.052	U	U	0.052	0.052	U	U	0.052	0.032	U	U	0.032	0.036	U	U	0.036	0.035	U	U	0.035

Octopus (He'e) Samples	*number of samples analyzed*	8	8	8	8	8	8	8	8	8	8	8	8
	number of non-detect	2	0	8	7	8	8	8	8	8	7	8	8
	number of detections	6	8	0	1	0	0	0	0	0	1	0	0
	Frequency of Detection	75.0%	100.0%	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%
	Maximum Detected	0.075	0.15	-	0.092	-	-	-	-	-	JZ 0.034	-	-
	Standard Deviation	0.013	0.033	0.006	0.021	0.006	0.006	0.006	0.01	0.01	0.01	0.01	0.00
	Mean	0.064	0.089	0.037	0.044	0.052	0.037	0.044	0.04	0.04	0.04	0.03	0.04
	Sample of Max Detection	MAK105O	MAK104O	-	MAK102O	-	-	-	-	-	MAK101O	-	-
	Max Dectection Limit	0.051	-	0.049	0.049	0.062	0.049	0.056	0.049	0.049	0.053	0.042	0.039

Sea Cucumber (Loli) Samples	*number of samples analyzed*	8	8	8	8	8	8	8	8	8	8	8	8
	number of non-detect	8	2	8	8	8	6	7	8	8	6	8	6
	number of detections	0	6	0	0	0	2	1	0	0	2	0	2
	Frequency of Detection	0.0%	75.0%	0.0%	0.0%	0.0%	25.0%	12.5%	0.0%	0.0%	25.0%	0.0%	25.0%
	Maximum Detected	-	J 0.14	-	-	-	0.038	0.038	-	-	0.049	-	0.061
	Standard Deviation	0.018	0.039	0.010	0.010	0.011	0.010	0.010	0.01	0.01	0.01	0.00	0.01
	Mean	0.071	0.088	0.045	0.045	0.029	0.023	0.026	0.03	0.03	0.03	0.02	0.03
	Sample of Max Detection	-	MAK103C	-	-	-	MAK108C	MAK108C	-	-	MAK108C	-	MAK108C
	Max Dectection Limit	0.053	0.053	0.06	0.06	0.051	0.04	0.046	0.043	0.043	0.034	0.028	0.033

Seaweed (Limu)Samples	*number of samples analyzed*	8	8	8	8	8	8	8	8	8	8	8	8
	number of non-detect	8	7	8	8	8	8	5	8	8	7	6	7
	number of detections	0	1	0	0	0	0	3	0	0	1	2	1
	Frequency of Detection	0.0%	12.5%	0.0%	0.0%	0.0%	0.0%	37.5%	0.0%	0.0%	12.5%	25.0%	12.5%
	Maximum Detected	-	0.38	-	-	-	-	0.16	-	-	JZ 0.023	0.029	0.019
	Standard Deviation	0.031	0.10	0.014	0.014	0.010	0.008	0.042	0.01	0.01	0.01	0.01	0.01
	Mean	0.098	0.14	0.055	0.055	0.053	0.040	0.069	0.04	0.04	0.03	0.03	0.03
	Sample of Max Detection	-	MAK101L	-	-	-	-	MAK115L	-	-	MAK101L	MAK105L	MAK101L
	Max Dectection Limit	0.14	0.14	0.082	0.082	0.069	0.056	0.059	0.053	0.053	0.044	0.043	0.035

Notes:

[2] Results presented as "ND" in the the Pace Analytical laboratory reports are presented in this table as the RL value with a "U" qualifier.

[3] For Hi-Res analysis, if results are outside of an ion-ratio comparison, then they are reported as Estimated Maximum Possible Concentration (EMPC), which will carry a laboratory "J" qualifier. EMPC results are indicated in the Staged Electronic Data Deliverable (SEDD), and thus in this table, with a "Z" qualifier. In the Pace Analytical laboratory reports, "J" qualifiers also define results that are greater than the sample specific estimated detection limit (EDL) but less than the laboratory contract required quantitation limit (CRQL). Per the analytical method, the limit of detection equals the estimated quantitation limit, therefore method detection limits and CRQLs did not apply; therefore, detects less than the CRQL were not flagged "J" in the SEDDs and thus in this data table.

[4] The RL value presented in the laboratory report is equivalent to the dioxin analysis' sample specific EDL.

CAS - Chemical Abstracts Service

ID - identification

ng/kg - nanograms per kilogram

ND - not detected

PCDE - polychlorinated diphenyl ethers

RL - reporting limit

Laboratory Qualifier (LQ)

[B] - Less than 10x higher than method blank level.

[J] - Estimated value.

[U] - Analyte not detected.

[Z] - Indicates an EMPC result. The result is qualified in the Pace Analytical laboratory report as a "J" with either an "I" (interference present) or "P" (PCDE interference) qualifier.

Validator Qualifier (VQ)

[J] - Indicates an estimated value.

[U] - Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

[UJ] - Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

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	Analyte	1,2,3,7,8,9-HxCDF				Total HxCDF				1,2,3,4,7,8-HxCDD				1,2,3,6,7,8-HxCDD				1,2,3,7,8,9-HxCDD				Total HxCDD				1,2,3,4,6,7,8-HpCDF				1,2,3,4,7,8,9-HpCDF				Total HpCDF				1,2,3,4,6,7,8-HpCDD				Total HpCDD			
	CAS Number	72918-21-9				55684-94-1				39227-28-6				57653-85-7				19408-74-3				34465-46-8				67562-39-4				55673-89-7				38998-75-3				35822-46-9				37871-00-4			
	Units	ng/kg				ng/kg				ng/kg				ng/kg				ng/kg				ng/kg				ng/kg				ng/kg				ng/kg				ng/kg				ng/kg			
Lab ID	Collection Date	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]
Mākua Beach																																													
Octopus (He'e)																																													
MAK101O	1/13/2014	0.034	U	U	0.034	0.037			0.029	0.04	U	U	0.04	0.047			0.041	0.037	U	U	0.037	0.047			0.039	0.045		U	0.03	0.057		U	0.034	0.1		J	0.032	0.093		U	0.034	0.21			0.034
MAK102O	1/13/2014	0.043	U	U	0.043	0.041	U	U	0.041	0.032	U	U	0.032	0.033	U	U	0.033	0.033	U	U	0.033	0.033	U	U	0.033	0.024	U	U	0.024	0.032	U	U	0.032	0.028	U	U	0.028	0.1	JZ	U	0.04	0.085			0.04
MAK103O	1/13/2014	0.042	U	U	0.042	0.04	U	U	0.04	0.041	U	U	0.041	0.043	U	U	0.043	0.043	U	U	0.043	0.042	U	U	0.042	0.036	U	U	0.036	0.042	U	U	0.042	0.039	U	U	0.039	0.068		U	0.05	0.13			0.05
MAK104O	1/13/2014	0.041	U	U	0.041	0.038	U	U	0.038	0.032	U	U	0.032	0.034	U	U	0.034	0.032	U	U	0.032	0.033	U	U	0.033	0.028	U	U	0.028	0.035	U	U	0.035	0.031	U	U	0.031	0.07		U	0.039	0.14			0.039
MAK105O	1/13/2014	0.05	U	U	0.05	0.04	U	U	0.04	0.046	U	U	0.046	0.046	U	U	0.046	0.041	U	U	0.041	0.044	U	U	0.044	0.032	U	U	0.032	0.046	U	U	0.046	0.039	U	U	0.039	0.069		U	0.048	0.15			0.048
MAK106O	1/13/2014	0.04	U	U	0.04	0.034	U	U	0.034	0.034	U	U	0.034	0.034	U	U	0.034	0.034	U	U	0.034	0.034	U	U	0.034	0.028	U	U	0.028	0.032	U	U	0.032	0.03	U	U	0.03	0.092		U	0.038	0.16			0.038
MAK107O	1/13/2014	0.06	U	U	0.06	0.049	U	U	0.049	0.049	U	U	0.049	0.052	U	U	0.052	0.047	U	U	0.047	0.049	U	U	0.049	0.036	U	U	0.036	0.053	U	U	0.053	0.045	U	U	0.045	0.07	U	U	0.07	0.07	U	U	0.07
MAK108O	1/13/2014	0.036	U	U	0.036	0.03	U	U	0.03	0.039	U	U	0.039	0.038	U	U	0.038	0.035	U	U	0.035	0.037	U	U	0.037	0.028	U	U	0.028	0.03	U	U	0.03	0.029	U	U	0.029	0.086	JZ	U	0.045	0.07			0.045
Sea Cucumber (Loli)																																													
MAK102C	1/13/2014	0.048	U	U	0.048	0.036	U	U	0.036	0.047	U	U	0.047	0.057	U	U	0.057	0.048	U	U	0.048	0.05	U	U	0.05	0.031	JZ		0.027	0.033	U	U	0.033	0.03	U	U	0.03	0.13	JZ		0.047	0.082			0.047
MAK103C	1/13/2014	0.038	U	U	0.038	0.03	U	U	0.03	0.036	U	U	0.036	0.042	U	U	0.042	0.036	U	U	0.036	0.038	U	U	0.038	0.025	U	U	0.025	0.048	U	U	0.048	0.037	U	U	0.037	0.14			0.054	0.14			0.054
MAK104C	1/13/2014	0.027	U	U	0.027	0.02	U	U	0.02	0.031	U	U	0.031	0.036	U	U	0.036	0.032	U	U	0.032	0.033	U	U	0.033	0.032	U	U	0.032	0.043	U	U	0.043	0.038	U	U	0.038	0.12			0.049	0.12			0.049
MAK105C	1/13/2014	0.027	U	U	0.027	0.021	U	U	0.021	0.024	U	U	0.024	0.026	U	U	0.026	0.026	U	U	0.026	0.025	U	U	0.025	0.024	U	U	0.024	0.036	U	U	0.036	0.03	U	U	0.03	0.073	JZ		0.043	0.087			0.043
MAK106C	1/13/2014	0.029	U	U	0.029	0.021	U	U	0.021	0.028	U	U	0.028	0.031	U	U	0.031	0.028	U	U	0.028	0.029	U	U	0.029	0.056			0.024	0.047	U	U	0.047	0.056			0.035	0.094			0.073	0.094			0.073
MAK107C	1/13/2014	0.035	U	U	0.035	0.025	U	U	0.025	0.026	U	U	0.026	0.024	U	U	0.024	0.024	U	U	0.024	0.025	U	U	0.025	0.021	U	U	0.021	0.037	U	U	0.037	0.029	U	U	0.029	0.082	JZ		0.036	0.036	U	U	0.036
MAK108C	1/13/2014	0.033	U	U	0.033	0.11			0.029	0.037			0.032	0.035	U	U	0.035	0.033	JZ		0.032	0.037			0.033	0.058	JZ		0.026	0.034	U	U	0.034	0.03	U	U	0.03	0.1	JZ		0.036	0.1			0.036
MAK110C	1/14/2014	0.038	JZ		0.027	0.025	U	U	0.025	0.031	U	U	0.031	0.03	U	U	0.03	0.029	U	U	0.029	0.03	U	U	0.03	0.065	JZ		0.03	0.036	U	U	0.036	0.033	U	U	0.033	0.15			0.058	0.15			0.058
Seaweed (Limu kohu)																																													
MAK101L	1/13/2014	0.024			0.023	0.024			0.018	0.09	JZ		0.048	0.059	U	U	0.059	0.049	U	U	0.049	0.052	U	U	0.052	0.04	JZ		0.025	0.034	U	U	0.034	0.03	U	U	0.03	0.045	JZ		0.024	0.024	U	U	0.024
MAK102L	1/13/2014	0.029	U	U	0.029	0.028	U	U	0.028	0.033	U	U	0.033	0.04	U	U	0.04	0.035	U	U	0.035	0.036	U	U	0.036	0.056			0.028	0.036	U	U	0.036	0.056			0.032	0.1	JZ		0.037	0.13			0.037
MAK105L	1/13/2014	0.028	U	U	0.028	0.029			0.026	0.056	JZ		0.045	0.059	U	U	0.059	0.049	U	U	0.049	0.051	U	U	0.051	0.035	U	U	0.035	0.038	U	U	0.038	0.037	U	U	0.037	0.065	JZ		0.043	0.043	U	U	0.043
MAK106L	1/14/2014	0.025	U	U	0.025	0.023			0.021	0.049	U	U	0.049	0.051	U	U	0.051	0.045	U	U	0.045	0.048	U	U	0.048	0.051			0.034	0.048	U	U	0.048	0.051			0.041	0.051	U	U	0.051	0.081			0.051
MAK108,109,110,113L	1/14/2014	0.037	U	U	0.037	0.033	U	U	0.033	0.055	U	U	0.055	0.053	U	U	0.053	0.049	U	U	0.049	0.052	U	U	0.052	0.049	JZ		0.042	0.056	U	U	0.056	0.049	U	U	0.049	0.082			0.075	0.082			0.075
MAK111L	1/14/2014	0.028	U	U	0.028	0.026	U	U	0.026	0.061	U	U	0.061	0.055	U	U	0.055	0.053	U	U	0.053	0.056	U	U	0.056	0.064	JZ		0.053	0.063	U	U	0.063	0.058	U	U	0.058	0.098	JZ		0.054	0.15			0.054
MAK112L	1/14/2014	0.04	U	U	0.04	0.04	U	U	0.04	0.048	U	U	0.048	0.056	U	U	0.056	0.049	U	U	0.049	0.051	U	U	0.051	0.054	JZ		0.053	0.057	U	U	0.057	0.055	U	U	0.055	0.07	JZ		0.065	0.14			0.065
MAK115L	1/14/2014	0.046	U	U	0.046	0.037	U	U	0.037	0.079	U	U	0.079	0.083	U	U	0.083	0.07	U	U	0.07	0.078	U	U	0.078	0.04	U	U	0.04	0.041	U	U	0.041	0.04	U	U	0.04	0.075	U	U	0.075	0.075			0.075

Octopus (He'e) Samples	*number of samples analyzed*	8	8	8	8	8	8	8	8	8	8	8
	number of non-detect	8	7	8	7	8	7	8	8	7	8	1
	number of detections	0	1	0	1	0	1	0	0	1	0	7
	Frequency of Detection	0.0%	12.5%	0.0%	12.5%	0.0%	12.5%	0.0%	0.0%	12.5%	0.0%	87.5%
	Maximum Detected	-	0.037	-	0.047	-	0.047	-	-	J 0.10	-	0.21
	Standard Deviation	0.01	0.01	0.01	0.01	0.01	0.006	0.007	0.010	0.024	0.013	0.049
	Mean	0.04	0.04	0.04	0.04	0.04	0.040	0.032	0.041	0.043	0.081	0.13
	Sample of Max Detection	-	MAK101O	-	MAK101O	-	MAK101O	-	-	MAK101O	-	MAK101O
	Max Dectection Limit	0.06	0.049	0.049	0.052	0.047	0.049	0.036	0.053	0.045	0.13	0.07

Sea Cucumber (Loli) Samples	*number of samples analyzed*	8	8	8	8	8	8	8	8	8	8	8
	number of non-detect	7	7	7	8	7	7	4	8	7	0	1
	number of detections	1	1	1	0	1	1	4	0	1	8	7
	Frequency of Detection	12.5%	12.5%	12.5%	0.0%	12.5%	12.5%	50.0%	0.0%	12.5%	100.0%	87.5%
	Maximum Detected	JZ 0.038	0.11	0.037	-	0.033	0.037	JZ 0.065	-	0.056	0.15	0.15
	Standard Deviation	0.01	0.03	0.01	0.01	0.01	0.008	0.018	0.006	0.009	0.028	0.036
	Mean	0.03	0.04	0.03	0.04	0.03	0.033	0.039	0.039	0.035	0.11	0.10
	Sample of Max Detection	MAK103C	MAK108C	MAK108C	-	MAK108C	MAK108C	MAK110C	-	MAK106C	MAK110C	MAK110C
	Max Dectection Limit	0.048	0.036	0.047	0.057	0.048	0.05	0.032	0.048	0.038	-	0.073

Seaweed (Limu)Samples	*number of samples analyzed*	8	8	8	8	8	8	8	8	8	8	8
	number of non-detect	7	5	6	8	8	8	2	8	6	2	2
	number of detections	1	3	2	0	0	0	6	0	2	6	6
	Frequency of Detection	12.5%	37.5%	25.0%	0.0%	0.0%	0.0%	75.0%	0.0%	25.0%	75.0%	75.0%
	Maximum Detected	0.024	0.029	JZ 0.090	-	-	-	JZ 0.064	-	0.056	JZ 0.10	0.15
	Standard Deviation	0.01	0.01	0.02	0.01	0.01	0.012	0.010	0.011	0.010	0.020	0.046
	Mean	0.03	0.03	0.06	0.06	0.05	0.053	0.049	0.047	0.047	0.073	0.091
	Sample of Max Detection	MAK101L	MAK105L	MAK101L	-	-	-	MAK111L	-	MAK102L	MAK102L	MAK111L
	Max Dectection Limit	0.046	0.04	0.079	0.083	0.07	0.078	0.053	0.063	0.058	0.075	0.075

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	Analyte	OCDF				OCDD			
	CAS Number	39001-02-0				03268-87-9			
	Units	ng/kg				ng/kg			
Lab ID	**Collection Date**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**
Mākua Beach									
Octopus (He'e)									
MAK101O	1/13/2014	0.17	JZ	U	0.17	0.3	BJZ	U	0.14
MAK102O	1/13/2014	0.11	U	U	0.11	0.27	BJZ	U	0.19
MAK103O	1/13/2014	0.14	U	U	0.14	0.28	BJZ	U	0.25
MAK104O	1/13/2014	0.13	U	U	0.13	0.4		U	0.21
MAK105O	1/13/2014	0.12	U	U	0.12	0.31		U	0.27
MAK106O	1/13/2014	0.1	U	U	0.1	0.28		U	0.19
MAK107O	1/13/2014	0.14	U	U	0.14	0.27	U	U	0.27
MAK108O	1/13/2014	0.091	U	U	0.091	0.33		U	0.16
Sea Cucumber (Loli)									
MAK102C	1/13/2014	0.081	U	U	0.081	0.4	JZ	U	0.21
MAK103C	1/13/2014	0.074	U	U	0.074	0.61			0.18
MAK104C	1/13/2014	0.094	U	U	0.094	0.29	JZ	U	0.18
MAK105C	1/13/2014	0.08	U	U	0.08	0.22	JZ	U	0.084
MAK106C	1/13/2014	0.043	U	U	0.043	0.37		U	0.065
MAK107C	1/13/2014	0.058	U	U	0.058	0.23	JZ	U	0.13
MAK108C	1/13/2014	0.24			0.075	0.65			0.11
MAK110C	1/14/2014	0.12	JZ		0.089	0.73			0.06
Seaweed (Limu kohu)									
MAK101L	1/13/2014	0.12	JZ		0.07	0.51		U	0.099
MAK102L	1/13/2014	0.14	U	U	0.14	0.8			0.1
MAK105L	1/13/2014	0.12	U	U	0.12	0.36		U	0.13
MAK106L	1/14/2014	0.13	U	U	0.13	0.25		U	0.12
MAK108,109,110,113L	1/14/2014	0.12	U	U	0.12	0.69			0.12
MAK111L	1/14/2014	0.14	U	U	0.14	0.79			0.16
MAK112L	1/14/2014	0.16	U	U	0.16	0.44	JZ	U	0.16
MAK115L	1/14/2014	0.13	U	U	0.13	0.4		U	0.23

Octopus (He'e) Samples	*number of samples analyzed*	*8*	*8*
	number of non-detect	*8*	*8*
	number of detections	*0*	*0*
	Frequency of Detection	*0.0%*	*0.0%*
	Maximum Detected	*-*	*-*
	Standard Deviation	*0.025*	*0.044*
	Mean	*0.13*	*0.31*
	Sample of Max Detection	*-*	*-*
	Max Dectection Limit	*0.17*	*0.27*

Sea Cucumber (Loli) Samples	*number of samples analyzed*	*8*	*8*
	number of non-detect	*6*	*5*
	number of detections	*2*	*3*
	Frequency of Detection	*25.0%*	*37.5%*
	Maximum Detected	*0.24*	*0.73*
	Standard Deviation	*0.061*	*0.20*
	Mean	*0.10*	*0.44*
	Sample of Max Detection	*MAK108C*	*MAK110C*
	Max Dectection Limit	*0.094*	*0.21*

Seaweed (Limu)Samples	*number of samples analyzed*	*8*	*8*
	number of non-detect	*7*	*5*
	number of detections	*1*	*3*
	Frequency of Detection	*12.5%*	*37.5%*
	Maximum Detected	JZ *0.12*	*0.800*
	Standard Deviation	*0.014*	*0.21*
	Mean	*0.13*	*0.53*
	Sample of Max Detection	*MAK101L*	*MAK102L*
	Max Dectection Limit	*0.16*	*0.23*

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Explosives

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Analyte		Perchlorate					2,4-Dinitrotoluene[3]					2,4-Dinitrotoluene[5]					Hexahydro-trinitro-triazine (RDX)					Nitroglycerine				
CAS Number		14797-73-0					121-14-2					121-14-2					121-82-4					55-63-0				
Units		µg/kg					µg/kg					µg/kg					µg/kg					µg/kg				
Laboratory/Analytical Method		TestAmerica Sacramento/EPA 6850					ARDL/EPA 8330A					ERDC/EPA 8330					ARDL/EPA 8330A					ARDL/EPA 8330A				
Lab ID	**Collection Date**	**Result[2]**	**LQ**	**VQ**	**RL**	**MDL**	**Result[4]**	**LQ**	**VQ**	**RL**	**MDL**	**Result[6,7]**	**LQ**	**VQ**	**RL[6]**	**MDL[6]**	**Result[4]**	**LQ**	**VQ**	**RL**	**MDL**	**Result[4]**	**LQ**	**VQ**	**RL**	**MDL**
Mākua Beach																										
Octopus (He'e)																										
MAK101O	1/13/2014	0.3	U	UJ	9.9	0.3	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK102O	1/13/2014	0.29	U	UJ	9.7	0.29	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK103O	1/13/2014	0.29	U	UJ	9.7	0.29	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK104O	1/13/2014	0.3	U	UJ	9.9	0.3	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK105O	1/13/2014	0.3	U	UJ	10	0.3	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK106O	1/13/2014	0.3	U	UJ	10	0.3	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK107O	1/13/2014	0.3	U	UJ	10	0.3	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK108O	1/13/2014	0.3	U	UJ	10	0.3	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
Sea Cucumber (Loli)																										
MAK102C	1/13/2014	0.3	U		10	0.3	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK103C	1/13/2014	0.3	U		10	0.3	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK104C	1/13/2014	0.29	U		9.7	0.29	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK105C	1/13/2014	0.3	U		10	0.3	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK106C	1/13/2014	0.3	U		10	0.3	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK107C	1/13/2014	0.29	U		9.8	0.29	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK108C	1/13/2014	0.29	U		9.7	0.29	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK110C	1/14/2014	0.29	U		9.8	0.29	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
Seaweed (Limu kohu)																										
MAK101L	1/13/2014	0.29	U	UJ	9.7	0.29	--			--	--	**200**	U		200	20	**500**	U		500	200	**500**	U		500	300
MAK102L	1/13/2014	0.3	U	UJ	9.9	0.3	--			--	--	**200**	U		200	20	**500**	U		500	200	**500**	U		500	300
MAK105L	1/13/2014	0.3	U	UJ	9.9	0.3	--			--	--	**200**	U		200	20	**500**	U		500	200	**500**	U		500	300
MAK106L	1/14/2014	0.29	U	UJ	9.7	0.29	--			--	--	**200**	U		200	20	**500**	U		500	200	**500**	U		500	300
MAK108,109,110,113L	1/14/2014	0.29	U	UJ	9.7	0.29	--			--	--	**200**	U		200	20	**500**	U		500	200	**500**	U		500	300
MAK111L	1/14/2014	0.3	U	UJ	9.9	0.3	--			--	--	**200**	U		200	20	**500**	U		500	200	**500**	U		500	300
MAK112L	1/14/2014	0.3	U	UJ	10	0.3	--			--	--	**200**	U		200	20	**500**	U		500	200	**500**	U		500	300
MAK115L	1/14/2014	0.29	U	UJ	9.6	0.29	--			--	--	**200**	U		200	20	**500**	U		500	200	**500**	U		500	300

Octopus (He'e) Samples	*number of samples analyzed*					*8*					*8*					*0*					*8*					*8*
	number of non-detect					*8*					*8*					*0*					*8*					*8*
	number of detections					*0*					*0*					*0*					*0*					*0*
	Frequency of Detection					*0.0%*					*0.0%*					*-*					*0.0%*					*0.0%*
	Maximum Detected					*-*					*-*					*-*					*-*					*-*
	Standard Deviation					*0.00*					*0.00*					*-*					*0.00*					*0.00*
	Mean					*0.30*					*500.00*					*-*					*500.00*					*500.00*
	Sample of Max Detection					*-*					*-*					*-*					*-*					*-*
	Max Dectection Limit					*0.3*					*100*					*-*					*200*					*300*

Sea Cucumber (Loli) Samples	*number of samples analyzed*					*8*					*8*					*0*					*8*					*8*
	number of non-detect					*8*					*8*					*0*					*8*					*8*
	number of detections					*0*					*0*					*0*					*0*					*0*
	Frequency of Detection					*0.0%*					*0.0%*					*-*					*0.0%*					*0.0%*
	Maximum Detected					*-*					*-*					*-*					*-*					*-*
	Standard Deviation					*0.01*					*0.00*					*-*					*0.00*					*0.00*
	Mean					*0.30*					*500.00*					*-*					*500.00*					*500.00*
	Sample of Max Detection					*-*					*-*					*-*					*-*					*-*
	Max Dectection Limit					*0.3*					*100*					*-*					*200*					*300*

Seaweed (Limu)Samples	*number of samples analyzed*					*8*					*0*					*8*					*8*					*8*
	number of non-detect					*8*					*0*					*8*					*8*					*8*
	number of detections					*0*					*0*					*0*					*0*					*0*
	Frequency of Detection					*0.0%*					*-*					*0.0%*					*0.0%*					*0.0%*
	Maximum Detected					*-*					*-*					*-*					*-*					*-*
	Standard Deviation					*0.01*					*-*					*0.00*					*0.00*					*0.00*
	Mean					*0.30*					*-*					*200.00*					*500.00*					*500.00*
	Sample of Max Detection					*-*					*-*					*-*					*-*					*-*
	Max Dectection Limit					*0.3*					*-*					*20*					*200*					*300*

Notes:

[2] Results presented as "ND" in the the TestAmerica laboratory reports are presented in the Staged Electronic Data Deliverable (SEDD) files, and thus in this table, as the MDL value with a "U" qualifier.

[3] Applied Research Development Laboratory, Inc. (ARDL) encountered matrix interference problems in seaweed samples with the 8330A (HPLC) analysis of this analyte .

[4] Results presented as "ND" in the the ARDL laboratory reports are presented in the SEDD files, and thus in this table, as the RL value with a "U" qualifier.

[5] U.S. Army Engineer Research and Development Center (ERDC) analyzed the seaweed samples for 2,4-dinitrotoluene using EPA Method 8330.

[6] For consistency, the results, RL, and MDL were converted to µg/kg.

[7] Results presented as "ND" in the the ERDC laboratory reports are presented in this table as the RL value with a "U" qualifier.

-- - not analyzed
µg/kg - micrograms per kilogram
CAS - Chemical Abstracts Service
EPA - United States Environmental Protection Agency
ID - identification
MDL - method detection limit
RL - reporting limit

Laboratory qualifier (LQ) - TestAmerica Sacramento

[J] - Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

[U] - Indicates the compound was not detected at the RL (or MDL is shown).

[I] - Ion Ratio outside of limits, value is estimated maximum potential concentration (EMPC).

LQ - ARDL

[U] - Indicates compound was analyzed for but not detected.

LQ - ERDC

[U] - Indicates a compound was analyzed for but not detected at or above the RL.

Validator qualifier (VQ)

[J] - Indicates an estimated value.

[UJ] - Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

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Metals

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	Analyte	Inorganic Arsenic					Arsenic(III)					Arsenic(V)					Dimethyl Arsenic					Monomethyl Arsenic				
	CAS Number	7440-38-2 (Inorg)					22569-72-8					12523-21-6					75-60-5					7440-38-2 (MMA)				
	Units	mg/kg					mg/kg					mg/kg					mg/kg					mg/kg				
Lab ID	Collection Date	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL
Mākua Beach																										
Octopus (He'e)																										
MAK101O	1/13/2014	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.024			0.011	0.004	0.004	U,N	UJ	0.011	0.004
MAK102O	1/13/2014	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.029			0.012	0.004	0.004	U	UJ	0.012	0.004
MAK103O	1/13/2014	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.018			0.011	0.004	0.004	U	UJ	0.011	0.004
MAK104O	1/13/2014	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.01	B	J	0.012	0.004	0.004	U	UJ	0.012	0.004
MAK105O	1/13/2014	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.008	B	J	0.011	0.004	0.004	U	UJ	0.011	0.004
MAK106O	1/13/2014	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.006	B	J	0.011	0.004	0.004	U	UJ	0.011	0.004
MAK107O	1/13/2014	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.007	B	J	0.011	0.004	0.004	U	UJ	0.011	0.004
MAK108O	1/13/2014	0.003	U		0.009	0.003	0.003	U		0.009	0.003	0.003	U		0.009	0.003	0.014			0.01	0.003	0.003	U	UJ	0.01	0.003
Sea Cucumber (Loli)																										
MAK102C	1/13/2014	0.01	B	J	0.01	0.004	0.004	U		0.01	0.004	0.006	B	J	0.01	0.004	0.004	U		0.011	0.004	0.004	U		0.011	0.004
MAK103C	1/13/2014	**0.055**		J	0.01	0.004	0.017			0.01	0.004	**0.039**		J	0.01	0.004	0.005	B	J	0.011	0.004	0.004	U		0.011	0.004
MAK104C	1/13/2014	0.013		J	0.009	0.004	0.006	B	J	0.009	0.004	0.007	B	J	0.009	0.004	0.004	U		0.011	0.004	0.004	U		0.011	0.004
MAK105C	1/13/2014	0.006	B	J	0.009	0.004	0.004	U		0.009	0.004	0.006	B	J	0.009	0.004	0.004	U		0.011	0.004	0.004	U		0.011	0.004
MAK106C	1/13/2014	**0.071**		J	0.009	0.004	0.019			0.009	0.004	**0.052**		J	0.009	0.004	0.004	U		0.011	0.004	0.004	U		0.011	0.004
MAK107C	1/13/2014	0.025		J	0.01	0.004	0.011			0.01	0.004	0.015		J	0.01	0.004	0.004	U		0.012	0.004	0.004	U		0.012	0.004
MAK108C	1/13/2014	**0.037**		J	0.01	0.004	0.01	B		0.01	0.004	**0.027**		J	0.01	0.004	0.004	U		0.012	0.004	0.004	U		0.012	0.004
MAK110C	1/14/2014	0.025		J	0.01	0.004	0.007	B	J	0.01	0.004	0.018		J	0.01	0.004	0.006	B	J	0.012	0.004	0.004	U		0.012	0.004
Seaweed (Limu kohu)																										
MAK101L	1/13/2014	**0.286**			0.095	0.038	**0.262**			0.095	0.038	**0.038**	U		0.095	0.038	0.208			0.011	0.004	0.004	U		0.011	0.004
MAK102L	1/13/2014	**0.822**			0.096	0.038	**0.652**			0.096	0.038	**0.17**			0.096	0.038	0.293			0.011	0.004	0.004	U		0.011	0.004
MAK105L	1/13/2014	**0.805**			0.095	0.038	**0.651**			0.095	0.038	**0.154**			0.095	0.038	0.248			0.011	0.004	0.004	U		0.011	0.004
MAK106L	1/14/2014	**0.258**			0.175	0.07	**0.232**			0.088	0.035	**0.07**	U		0.175	0.07	0.249			0.042	0.014	0.032	B	J	0.042	0.014
MAK108,109,110,113L	1/14/2014	**0.734**			0.084	0.034	**0.627**			0.084	0.034	**0.106**			0.084	0.034	0.24			0.01	0.003	0.003	U		0.01	0.003
MAK111L	1/14/2014	**1.43**			0.099	0.04	**0.848**			0.099	0.04	**0.581**			0.099	0.04	0.197			0.012	0.004	0.004	U		0.012	0.004
MAK112L	1/14/2014	**0.933**			0.087	0.035	**0.704**			0.087	0.035	**0.229**			0.087	0.035	0.175			0.01	0.003	0.003	U		0.01	0.003
MAK115L	1/14/2014	**0.175**			0.095	0.038	**0.159**			0.095	0.038	**0.038**	U		0.095	0.038	0.206			0.011	0.004	0.004	U		0.011	0.004

Octopus (He'e) Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*8*	*8*	*8*	*0*	*8*
	number of detections	*0*	*0*	*0*	*8*	*0*
	Frequency of Detection	*0.0%*	*0.0%*	*0.0%*	*100.0%*	*0.0%*
	Maximum Detected	*-*	*-*	*-*	*0.029*	*-*
	Standard Deviation	*0.00*	*0.00035*	*0.00035*	*0.008*	*0.00035*
	Mean	*0.00*	*0.0039*	*0.0039*	*0.015*	*0.004*
	Sample of Max Detection	*-*	*-*	*-*	*MAK102O*	*-*
	Max Dectection Limit	*0.004*	*0.004*	*0.004*	*-*	*0.004*

Sea Cucumber (Loli) Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*0*	*2*	*0*	*6*	*8*
	number of detections	*8*	*6*	*8*	*2*	*0*
	Frequency of Detection	*100.0%*	*75.0%*	*100.0%*	*25.0%*	*0.0%*
	Maximum Detected	J *0.071*	*0.019*	J *0.052*	B J *0.006*	*-*
	Standard Deviation	*0.023*	*0.006*	*0.017*	*0.0007*	*0.00*
	Mean	*0.030*	*0.010*	*0.021*	*0.0044*	*0.0040*
	Sample of Max Detection	*MAK106C*	*MAK106C*	*MAK106C*	*MAK110C*	*-*
	Max Dectection Limit	*-*	*0.004*	*-*	*0.004*	*0.004*

Seaweed (Limu)Samples	*number of samples analyzed*	*8*	*8*	*8*	*8.000*	*8*
	number of non-detect	*0*	*0*	*3*	*0*	*7*
	number of detections	*8*	*8*	*5*	*8*	*1*
	Frequency of Detection	*100.0%*	*100.0%*	*62.5%*	*100.0%*	*12.5%*
	Maximum Detected	*1.43*	*0.848*	*0.581*	*0.293*	B J *0.032*
	Standard Deviation	*0.42*	*0.26*	*0.18*	*0.04*	*0.010*
	Mean	*0.68*	*0.52*	*0.17*	*0.23*	*0.007*
	Sample of Max Detection	*MAK111L*	*MAK111L*	*MAK111L*	*MAK102L*	*MAK106L*
	Max Dectection Limit	*-*	*-*	*0.070*	*-*	*0.014*

Notes:

[2] For this result, the LQ is presented as "B" in the Brooks Rand Lab laboratory report but is reported as "J" in the Staged Electronic Data Deliverable file and thus in this table.

CAS - Chemical Abstracts Service
ID - identification
MDL - method detection limit
mg/kg - milligrams per kilogram
RL - reporting limit

Laboratory qualifier (LQ)

[B] - Detected by the instrument, the result is greater than the MDL but less than or equal to the RL. Result is reported and considered an estimate.
[J] - Estimated value. A full explanation is presented in the laboratory report case narrative (BRL Report 1408020, 1411043, or 1418004)
[N] - Spike recovery was not within acceptance criteria. Result is estimated.
[U] - Result is less than or equal to the MDL or client requested reporting limit (CRRL). Result is reported as the MDL or CRRL.

Validator qualifier (VQ)

[J] - Indicates an estimated value.
[UJ] - Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

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Lab ID	Collection Date	Aluminum Result	LQ	VQ	RL	MDL	Antimony Result	LQ	VQ	RL	MDL	Arsenic Result	LQ	VQ	RL	MDL	Barium Result	LQ	VQ	RL	MDL	Beryllium Result	LQ	VQ	RL	MDL	Cadmium Result	LQ	VQ	RL	MDL
	Analyte	Aluminum					Antimony					Arsenic					Barium					Beryllium					Cadmium				
	CAS Number	7429-90-5					7440-36-0					7440-38-2					7440-39-3					7440-41-7					7440-43-9				
	Units	mg/kg					mg/kg					mg/kg					mg/kg					mg/kg					mg/kg				
Mākua Beach																															
Octopus (He'e)																															
MAK101O	1/13/2014	0.13	U		0.77	0.13	0.007	U		0.02	0.007	30.1	J	J	0.039	0.013	0.03	U		0.15	0.03	0.03	U		0.09	0.03	0.009	B	J	0.02	0.007
MAK102O	1/13/2014	0.53	B	J	0.79	0.14	0.007	U		0.02	0.007	30.7	J	J	0.04	0.014	0.03	U		0.16	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007
MAK103O	1/13/2014	0.87			0.76	0.13	0.007	U		0.02	0.007	32.3	J	J	0.038	0.013	0.03	U		0.15	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007
MAK104O	1/13/2014	0.53	B	J	0.76	0.13	0.007	U		0.02	0.007	27.5	J	J	0.038	0.013	0.03	U		0.15	0.03	0.03	U		0.09	0.03	0.008	B	J	0.02	0.007
MAK105O	1/13/2014	0.77	B	J	0.78	0.14	0.007	U		0.02	0.007	24.2	J	J	0.039	0.014	0.03	U		0.16	0.03	0.03	U		0.09	0.03	0.008	B	J	0.02	0.007
MAK106O	1/13/2014	0.55	B	J	0.77	0.13	0.007	U		0.02	0.007	24.6	J	J	0.038	0.013	0.03	U		0.15	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007
MAK107O	1/13/2014	0.55	B	J	0.76	0.13	0.007	U		0.02	0.007	31.3	J	J	0.038	0.013	0.03	U		0.15	0.03	0.03	U		0.09	0.03	0.01	B	J	0.02	0.007
MAK108O	1/13/2014	0.14	U		0.78	0.14	0.007	U		0.02	0.007	29	J	J	0.039	0.014	0.03	U		0.16	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007
Sea Cucumber (Loli)																															
MAK102C	1/13/2014	0.68	B	J	0.8	0.14	0.007	U		0.02	0.007	0.454	J	J	0.04	0.014	0.06	B	J	0.16	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007
MAK103C	1/13/2014	14.2			0.77	0.13	0.007	U		0.02	0.007	0.59	J	J	0.038	0.013	0.05	B	J	0.15	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007
MAK104C	1/13/2014	4.07			0.79	0.14	0.007	U		0.02	0.007	0.462	J	J	0.039	0.014	0.04	B	J	0.16	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007
MAK105C	1/13/2014	1.4		J	0.8	0.14	0.007	U		0.02	0.007	0.34	J	J	0.04	0.014	0.05	B	J	0.16	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007
MAK106C	1/13/2014	15.4			0.77	0.13	0.007	U		0.02	0.007	0.75	J	J	0.038	0.013	0.1	B	J	0.15	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007
MAK107C	1/13/2014	8.65			0.81	0.14	0.007	U		0.02	0.007	0.54	J	J	0.04	0.014	0.11	B	J	0.16	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007
MAK108C	1/13/2014	4.5			0.76	0.13	0.007	U		0.02	0.007	0.432	J	J	0.038	0.013	0.05	B	J	0.15	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007
MAK110C	1/14/2014	7.62			0.8	0.14	0.007	U		0.02	0.007	0.395	J	J	0.04	0.014	0.08	B	J	0.16	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007
Seaweed (Limu kohu)																															
MAK101L	1/13/2014	25		J	0.75	0.13	0.01	B	J	0.02	0.007	2.17	J	J	0.037	0.013	1.66			0.15	0.03	0.03	U		0.08	0.03	0.03			0.02	0.007
MAK102L	1/13/2014	367		J	0.81	0.14	0.01	B	J	0.02	0.007	2.29	J	J	0.04	0.014	1.54			0.16	0.03	0.03	U		0.09	0.03	0.02	B		0.02	0.007
MAK105L	1/13/2014	26.3		J	0.79	0.14	0.009	B	J	0.02	0.007	2.01	J	J	0.039	0.014	0.89			0.16	0.03	0.03	U		0.09	0.03	0.02	B		0.02	0.007
MAK106L	1/14/2014	26.2		J	0.75	0.13	0.01	B	J	0.02	0.007	1.82	J	J	0.037	0.013	0.33			0.15	0.03	0.03	U		0.08	0.03	0.01	B	J	0.02	0.007
MAK108,109,110,113L	1/14/2014	411		J	0.8	0.14	0.02	B		0.02	0.007	2.5	J	J	0.04	0.014	1.46			0.16	0.03	0.03	U		0.09	0.03	0.03			0.02	0.007
MAK111L	1/14/2014	299		J	0.81	0.14	0.01	B	J	0.02	0.007	2.17	J	J	0.041	0.014	1.45			0.16	0.03	0.03	U		0.09	0.03	0.02	B		0.02	0.007
MAK112L	1/14/2014	438		J	0.8	0.14	0.007	U		0.02	0.007	2.52	J	J	0.04	0.014	0.03	U		0.16	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007
MAK115L	1/14/2014	26.5	M	J	0.77	0.14	0.01	B	J	0.02	0.007	1.75	J	J	0.039	0.014	0.96			0.15	0.03	0.03	U		0.09	0.03	0.02	B		0.02	0.007

		Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
Octopus (He'e) Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*2*	*8*	*0*	*8*	*8*	*4*
	number of detections	*6*	*0*	*8*	*0*	*0*	*4*
	Frequency of Detection	*75.0%*	*0.0%*	*100.0%*	*0.0%*	*0.0%*	*50.0%*
	Maximum Detected	*0.87*	*-*	*J J 32.3*	*-*	*-*	*B J 0.01*
	Standard Deviation	*0.26*	*0.00*	*3.03*	*0.00*	*0.00*	*0.00*
	Mean	*0.51*	*0.01*	*28.71*	*0.03*	*0.03*	*0.01*
	Sample of Max Detection	*MAK103O*	*-*	*MAK103O*	*-*	*-*	*MAK107O*
	Max Dectection Limit	*0.14*	*0.0070*	*-*	*0.030*	*0.030*	*0.0070*

		Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
Sea Cucumber (Loli) Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*0*	*8*	*0*	*0*	*8*	*8*
	number of detections	*8*	*0*	*8*	*8*	*0*	*0*
	Frequency of Detection	*100.0%*	*0.0%*	*100.0%*	*100.0%*	*0.0%*	*0.0%*
	Maximum Detected	*15.4*	*-*	*J J 0.75*	*B J 0.11*	*-*	*-*
	Standard Deviation	*5.50*	*0.00*	*0.13*	*0.03*	*0.00*	*0.00*
	Mean	*7.07*	*0.01*	*0.50*	*0.07*	*0.03*	*0.01*
	Sample of Max Detection	*MAK106C*	*-*	*MAK106C*	*MAK107C*	*-*	*-*
	Max Dectection Limit	*-*	*0.0070*	*-*	*-*	*0.030*	*0.0070*

		Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
Seaweed (Limu)Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*0*	*1*	*0*	*1*	*8*	*1*
	number of detections	*8*	*7*	*8*	*7*	*0*	*7*
	Frequency of Detection	*100.0%*	*87.5%*	*100.0%*	*87.5%*	*0.0%*	*87.5%*
	Maximum Detected	*J 438*	*B 0.02*	*J J 2.52*	*1.66*	*-*	*0.03*
	Standard Deviation	*192.69*	*0.00*	*0.28*	*0.60*	*0.00*	*0.01*
	Mean	*202.38*	*0.01*	*2.15*	*1.04*	*0.03*	*0.02*
	Sample of Max Detection	*MAK112L*	*MAK108,109,110,113L*	*MAK112L*	*MAK101L*	*-*	*MAK101L*
	Max Dectection Limit	*-*	*0.0070*	*-*	*0.030*	*0.030*	*0.0070*

Notes:

[2] For this result, the LQ is presented as "B" in the Brooks Rand Lab laboratory report but is reported as "J" in the Staged Electronic Data Deliverable file and thus in this table.

CAS - Chemical Abstracts Service
ID - identification
MDL - method detection limit
mg/kg - milligrams per kilogram
RL - reporting limit

Laboratory qualifier (LQ)

[B] - Detected by the instrument, the result is greater than the MDL but less than or equal to the RL. Result is reported and considered an estimate.
[J] - Estimated value. A full explanation is presented in the laboratory report case narrative (BRL Report 1408020, 1411043, or 1418004).
[M] - Duplicate precision (relative percent difference) was not within acceptance criteria. Result is estimated.
[U] - Result is less than or equal to the MDL or client requested reporting limit (CRRL). Result is reported as the MDL or CRRL.

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	Analyte	Chromium					Cobalt					Copper					Iron					Lead				
	CAS Number	*7440-47-3*					*7440-48-4*					*7440-50-8*					*7439-89-6*					*7439-92-1*				
	Units	*mg/kg*					*mg/kg*					*mg/kg*					*mg/kg*					*mg/kg*				
Lab ID	**Collection Date**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**
Mākua Beach																										
Octopus (He'e)																										
MAK101O	1/13/2014	0.017	U		0.116	0.017	0.02	U		0.15	0.02	6.13			0.15	0.03	1.19			0.771	0.077	0.03	B	J	0.04	0.004
MAK102O	1/13/2014	0.018	U		0.119	0.018	0.02	U		0.16	0.02	7.25			0.16	0.03	1.13			0.791	0.079	0.02	B	J	0.04	0.004
MAK103O	1/13/2014	0.017	U		0.115	0.017	0.02	U		0.15	0.02	4.14			0.15	0.03	1.36			0.763	0.076	0.007	B	J	0.04	0.004
MAK104O	1/13/2014	0.017	U		0.114	0.017	0.02	U		0.15	0.02	7.8			0.15	0.03	1.34			0.758	0.076	0.05			0.04	0.004
MAK105O	1/13/2014	0.019	B	J	0.117	0.018	0.02	U		0.16	0.02	6.9			0.16	0.03	2.78			0.781	0.078	0.03	B	J	0.04	0.004
MAK106O	1/13/2014	0.017	U		0.115	0.017	0.02	U		0.15	0.02	7.37			0.15	0.03	0.949			0.769	0.077	0.02	B	J	0.04	0.004
MAK107O	1/13/2014	0.027	B	J	0.114	0.017	0.02	U		0.15	0.02	6.32			0.15	0.03	1.73			0.762	0.076	0.02	B	J	0.04	0.004
MAK108O	1/13/2014	0.022	B	J	0.117	0.018	0.02	U		0.16	0.02	7.56			0.16	0.03	0.901			0.783	0.078	0.03	B	J	0.04	0.004
Sea Cucumber (Loli)																										
MAK102C	1/13/2014	0.046	B,M	J	0.12	0.018	0.02	U		0.16	0.02	0.47			0.16	0.03	2.66			0.798	0.08	0.07			0.04	0.004
MAK103C	1/13/2014	**0.141**			0.115	0.017	0.03	B	J	0.15	0.02	0.44			0.15	0.03	23.2			0.769	0.077	0.04	B		0.04	0.004
MAK104C	1/13/2014	**0.095**	B	J	0.118	0.018	0.02	U		0.16	0.02	0.44			0.16	0.03	7.32			0.786	0.079	0.03	B	J	0.04	0.004
MAK105C	1/13/2014	**0.144**			0.121	0.018	0.03	B	J	0.16	0.02	0.46			0.16	0.03	4.58	M	J	0.805	0.08	0.06			0.04	0.004
MAK106C	1/13/2014	**0.211**			0.115	0.017	0.04	B	J	0.15	0.02	0.69			0.15	0.03	29.1			0.768	0.077	0.09			0.04	0.004
MAK107C	1/13/2014	**0.326**			0.121	0.018	0.04	B	J	0.16	0.02	8.81			0.16	0.03	17.1			0.806	0.081	0.27			0.04	0.004
MAK108C	1/13/2014	**0.154**			0.114	0.017	0.02	U		0.15	0.02	0.52			0.15	0.03	9.23			0.762	0.076	0.05			0.04	0.004
MAK110C	1/14/2014	**0.198**			0.121	0.018	0.03	B	J	0.16	0.02	0.5			0.16	0.03	18.4			0.805	0.08	0.06			0.04	0.004
Seaweed (Limu kohu)																										
MAK101L	1/13/2014	**0.128**			0.112	0.017	0.05	B	J	0.15	0.02	0.55			0.15	0.03	36.9		J	0.749	0.075	0.16			0.04	0.004
MAK102L	1/13/2014	**2.58**			0.121	0.018	0.59			0.16	0.02	1.07			0.16	0.03	822		J	0.808	0.081	1.39			0.04	0.004
MAK105L	1/13/2014	**0.337**			0.118	0.018	0.11	B	J	0.16	0.02	0.64			0.16	0.03	104		J	0.786	0.079	0.16			0.04	0.004
MAK106L	1/14/2014	**0.244**			0.112	0.017	0.08	B	J	0.15	0.02	0.54			0.15	0.03	65.5		J	0.748	0.075	0.14			0.04	0.004
MAK108,109,110,113L	1/14/2014	**2.52**			0.12	0.018	0.47			0.16	0.02	1.18			0.16	0.03	821		J	0.802	0.08	1.58			0.04	0.004
MAK111L	1/14/2014	**2**			0.122	0.018	0.48			0.16	0.02	1.02			0.16	0.03	666		J	0.815	0.081	1.29			0.04	0.004
MAK112L	1/14/2014	**3.06**			0.121	0.018	0.02	U		0.16	0.02	0.03	U		0.16	0.03	957		J	0.805	0.08	1.25			0.04	0.004
MAK115L	1/14/2014	**0.146**			0.116	0.017	0.04	B	J	0.15	0.02	0.51			0.15	0.03	44.1	M	J	0.774	0.077	0.14			0.04	0.004

Octopus (He'e) Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*5*	*8*	*0*	*0*	*0*
	number of detections	*3*	*0*	*8*	*8*	*8*
	Frequency of Detection	*37.5%*	*0.0%*	*100.0%*	*100.0%*	*100.0%*
	Maximum Detected	B J *0.027*	*-*	*7.8*	*2.78*	*0.05*
	Standard Deviation	*0.00*	*0.00*	*1.18*	*0.61*	*0.01*
	Mean	*0.02*	*0.02*	*6.68*	*1.42*	*0.03*
	Sample of Max Detection	*MAK107O*	*-*	*MAK104O*	*MAK105O*	*MAK104O*
	Max Dectection Limit	*0.018*	*0.020*	*-*	*-*	*-*

Sea Cucumber (Loli) Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*0*	*3*	*0*	*0*	*0*
	number of detections	*8*	*5*	*8*	*8*	*8*
	Frequency of Detection	*100.0%*	*62.5%*	*100.0%*	*100.0%*	*100.0%*
	Maximum Detected	*0.326*	B J *0.04*	*8.81*	*29.1*	*0.27*
	Standard Deviation	*0.08*	*0.01*	*2.94*	*9.46*	*0.08*
	Mean	*0.16*	*0.03*	*1.54*	*13.95*	*0.08*
	Sample of Max Detection	*MAK107C*	*MAK106C*	*MAK107C*	*MAK106C*	*MAK107C*
	Max Dectection Limit	*-*	*0.020*	*-*	*-*	*-*

Seaweed (Limu)Samples	*number of samples analyzed*	*8*	*8*	*8*	*8*	*8*
	number of non-detect	*0*	*1*	*1*	*0*	*0*
	number of detections	*8*	*7*	*7*	*8*	*8*
	Frequency of Detection	*100.0%*	*87.5%*	*87.5%*	*100.0%*	*100.0%*
	Maximum Detected	*3.06*	*0.59*	*1.18*	J *957*	*1.58*
	Standard Deviation	*1.28*	*0.24*	*0.38*	*410.89*	*0.66*
	Mean	*1.38*	*0.23*	*0.69*	*439.56*	*0.76*
	Sample of Max Detection	*MAK112L*	*MAK102L*	*MAK108,109,110,113L*	*MAK112L*	*MAK108,109,110,113L*
	Max Dectection Limit	*-*	*0.020*	*0.030*	*-*	*-*

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	Analyte	Manganese					Mercury					Methyl Mercury					Selenium					Silver				
	CAS Number	7439-96-5					7439-97-6					22967-92-6					7782-49-2					7440-22-4				
	Units	mg/kg					ng/g					ng/g					mg/kg					mg/kg				
Lab ID	Collection Date	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL
Mākua Beach																										
Octopus (He'e)																										
MAK101O	1/13/2014	0.4			0.04	0.01	13.1			0.36	0.11	12			3.29	1.1	0.256			0.145	0.058	0.02	U		0.1	0.02
MAK102O	1/13/2014	0.25			0.04	0.01	8.41			0.4	0.12	7.99			2.75	0.92	0.241			0.148	0.059	0.02	U		0.1	0.02
MAK103O	1/13/2014	0.3			0.04	0.01	12.2			0.42	0.13	9.27			3.19	1.06	0.3			0.143	0.057	0.02	U		0.1	0.02
MAK104O	1/13/2014	0.42			0.04	0.01	14.9			0.4	0.12	14.1			3.04	1.01	0.311			0.142	0.057	0.02	U		0.09	0.02
MAK105O	1/13/2014	0.29			0.04	0.01	12.7			0.43	0.13	12.3			3.15	1.05	0.318			0.146	0.059	0.02	U		0.1	0.02
MAK106O	1/13/2014	0.26			0.04	0.01	18.7			0.42	0.13	15.9			2.9	0.97	0.296			0.144	0.058	0.02	U		0.1	0.02
MAK107O	1/13/2014	0.25			0.04	0.01	17.7			0.42	0.12	14.5			3.19	1.06	0.288			0.143	0.057	0.02	U		0.1	0.02
MAK108O	1/13/2014	0.22			0.04	0.01	9.82			0.39	0.12	9.6			3.06	1.02	0.267			0.147	0.059	0.02	U		0.1	0.02
Sea Cucumber (Loli)																										
MAK102C	1/13/2014	0.21			0.04	0.01	0.16	B	J	0.43	0.13	0.95	U		2.84	0.95	0.352			0.15	0.06	0.02	U		0.1	0.02
MAK103C	1/13/2014	0.4			0.04	0.01	0.26	B	J	0.43	0.13	1.05	U,N		3.14	1.05	0.349			0.144	0.058	0.02	U		0.1	0.02
MAK104C	1/13/2014	0.21			0.04	0.01	0.43			0.37	0.11	1.06	U		3.18	1.06	0.388			0.147	0.059	0.02	U		0.1	0.02
MAK105C	1/13/2014	0.18			0.04	0.01	0.32	B	J	0.43	0.13	0.94	U		2.81	0.94	0.261			0.151	0.06	0.02	U		0.1	0.02
MAK106C	1/13/2014	0.71			0.04	0.01	0.37	B	J	0.41	0.12	0.93	U		2.8	0.93	0.574			0.144	0.058	0.02	U		0.1	0.02
MAK107C	1/13/2014	0.43			0.04	0.01	0.19	B	J	0.41	0.12	1.1	U		3.3	1.1	0.362			0.151	0.06	0.02	U		0.1	0.02
MAK108C	1/13/2014	0.2			0.04	0.01	0.17	B	J	0.4	0.12	1.03	U		3.09	1.03	0.258			0.143	0.057	0.02	U		0.1	0.02
MAK110C	1/14/2014	0.53			0.04	0.01	0.31	B	J	0.44	0.13	1.02	U		3.06	1.02	0.238			0.151	0.06	0.02	U		0.1	0.02
Seaweed (Limu kohu)																										
MAK101L	1/13/2014	1.25		J	0.04	0.01	2.43			0.42	0.13	1.11	U		3.32	1.11	0.056	U		0.14	0.056	0.02	U		0.09	0.02
MAK102L	1/13/2014	12.5		J	0.04	0.01	3.67			0.4	0.12	1.09	U		3.26	1.09	0.061	U		0.152	0.061	0.02	U		0.1	0.02
MAK105L	1/13/2014	2.14		J	0.04	0.01	2.16			0.4	0.12	1.04	U		3.13	1.04	0.059	U		0.147	0.059	0.02	U		0.1	0.02
MAK106L	1/14/2014	1.62		J	0.04	0.01	2.43			0.41	0.12	1.01	U,N		3.04	1.01	0.056	U		0.14	0.056	0.02	U		0.09	0.02
MAK108,109,110,113L	1/14/2014	11.7		J	0.04	0.01	3.25			0.41	0.12	1.06	U		3.19	1.06	0.06	U		0.15	0.06	0.02	U		0.1	0.02
MAK111L	1/14/2014	11.1		J	0.04	0.01	2.46			0.43	0.13	1	U		3	1	0.061	U		0.153	0.061	0.02	U		0.1	0.02
MAK112L	1/14/2014	0.01	U	UJ	0.04	0.01	2.5			0.43	0.13	1.09	U		3.28	1.09	0.063	B	J	0.151	0.06	0.02	U		0.1	0.02
MAK115L	1/14/2014	1.1		J	0.04	0.01	1.88			0.42	0.13	1.04	U		3.12	1.04	0.058	U		0.145	0.058	0.02	U		0.1	0.02

Octopus (He'e) Samples	*number of samples analyzed*					*8*					*8*					*8*					*8*					*8*
	number of non-detect					*0*					*0*					*0*					*0*					*8*
	number of detections					*8*					*8*					*8*					*8*					*0*
	Frequency of Detection					*100.0%*					*100.0%*					*100.0%*					*100.0%*					*0.0%*
	Maximum Detected					*0.42*					*18.7*					*15.9*					*0.318*					*-*
	Standard Deviation					*0.07*					*3.56*					*2.81*					*0.03*					*0.00*
	Mean					*0.30*					*13.44*					*11.96*					*0.28*					*0.02*
	Sample of Max Detection					*MAK104O*					*MAK106O*					*MAK106O*					*MAK105O*					*-*
	Max Dectection Limit					*-*					*-*					*-*					*-*					*0.020*

Sea Cucumber (Loli) Samples	*number of samples analyzed*					*8*					*8*					*8*					*8*					*8*
	number of non-detect					*0*					*0*					*8*					*0*					*8*
	number of detections					*8*					*8*					*0*					*8*					*0*
	Frequency of Detection					*100.0%*					*100.0%*					*0.0%*					*100.0%*					*0.0%*
	Maximum Detected					*0.71*					*0.43*					*-*					*0.574*					*-*
	Standard Deviation					*0.19*					*0.10*					*0.06*					*0.11*					*0.00*
	Mean					*0.36*					*0.28*					*1.01*					*0.35*					*0.02*
	Sample of Max Detection					*MAK106C*					*MAK104C*					*-*					*MAK106C*					*-*
	Max Dectection Limit					*-*					*-*					*1.1*					*-*					*0.020*

Seaweed (Limu)Samples	*number of samples analyzed*					*8*					*8*					*8*					*8*					*8*
	number of non-detect					*1*					*0*					*8*					*7*					*8*
	number of detections					*7*					*8*					*0*					*1*					*0*
	Frequency of Detection					*87.5%*					*100.0%*					*0.0%*					*12.5%*					*0.0%*
	Maximum Detected			J		*12.5*					*3.67*					*-*		B	J		*0.063*					*-*
	Standard Deviation					*5.50*					*0.58*					*0.04*					*0.00*					*0.00*
	Mean					*5.18*					*2.60*					*1.06*					*0.06*					*0.02*
	Sample of Max Detection					*MAK102L*					*MAK102L*					*-*					*MAK112L*					*-*
	Max Dectection Limit					*0.010*					*-*					*1.11*					*0.061*					*0.020*

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	Analyte	Thallium					Vanadium					Zinc				
	CAS Number	*7440-28-0*					*7440-62-2*					*7440-66-6*				
	Units	*mg/kg*					*mg/kg*					*mg/kg*				
Lab ID	**Collection Date**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**
Mākua Beach																
Octopus (He'e)																
MAK101O	1/13/2014	0.002	U		0.008	0.002	0.013	U		0.116	0.013	16.2			0.96	0.19
MAK102O	1/13/2014	0.002	U		0.008	0.002	0.014	U		0.119	0.014	14.7			0.99	0.2
MAK103O	1/13/2014	0.002	U		0.008	0.002	0.013	U		0.115	0.013	13.7			0.95	0.19
MAK104O	1/13/2014	0.002	U		0.008	0.002	0.013	U		0.114	0.013	15.1			0.95	0.19
MAK105O	1/13/2014	0.002	U		0.008	0.002	0.014	U		0.117	0.014	14.2			0.98	0.2
MAK106O	1/13/2014	0.002	U		0.008	0.002	0.013	U		0.115	0.013	15.1			0.96	0.19
MAK107O	1/13/2014	0.002	U		0.008	0.002	0.013	U		0.114	0.013	16.2			0.95	0.19
MAK108O	1/13/2014	0.002	U		0.008	0.002	0.014	U		0.117	0.014	15			0.98	0.2
Sea Cucumber (Loli)																
MAK102C	1/13/2014	0.002	U		0.008	0.002	0.024	B	J	0.12	0.014	0.81	B	U	1	0.2
MAK103C	1/13/2014	0.002	U		0.008	0.002	0.101	B	J	0.115	0.013	1.07		U	0.96	0.19
MAK104C	1/13/2014	0.002	U		0.008	0.002	0.038	B	J	0.118	0.014	0.96	B	U	0.98	0.2
MAK105C	1/13/2014	0.002	U		0.008	0.002	0.037	B	J	0.121	0.014	0.96	B	U	1.01	0.2
MAK106C	1/13/2014	0.002	U		0.008	0.002	0.099	B	J	0.115	0.013	1.47		U	0.96	0.19
MAK107C	1/13/2014	0.002	U		0.008	0.002	0.075	B	J	0.121	0.014	20.3			1.01	0.2
MAK108C	1/13/2014	0.002	U		0.008	0.002	0.067	B	J	0.114	0.013	0.93	B	U	0.95	0.19
MAK110C	1/14/2014	0.002	U		0.008	0.002	0.062	B	J	0.121	0.014	0.86	B	U	1.01	0.2
Seaweed (Limu kohu)																
MAK101L	1/13/2014	0.004	B	J	0.007	0.002	1.35			0.112	0.013	2.15			0.94	0.19
MAK102L	1/13/2014	0.007	B	J	0.008	0.002	3.86			0.121	0.014	2.56			1.01	0.2
MAK105L	1/13/2014	0.003	B	J	0.008	0.002	1.86			0.118	0.014	1.27		U	0.98	0.2
MAK106L	1/14/2014	0.004	B	J	0.007	0.002	1.25			0.112	0.013	1.26		U	0.93	0.19
MAK108,109,110,113L	1/14/2014	0.008	B		0.008	0.002	3.44			0.12	0.014	3.17			1	0.2
MAK111L	1/14/2014	0.004	B	J	0.008	0.002	2.72			0.122	0.014	2.43			1.02	0.2
MAK112L	1/14/2014	0.002	U		0.008	0.002	3.85			0.121	0.014	0.2	U		1.01	0.2
MAK115L	1/14/2014	0.004	B	J	0.008	0.002	1.11			0.116	0.014	2.26			0.97	0.19

Octopus (He'e) Samples	*number of samples analyzed*					*8*					*8*					*8*
	number of non-detect					*8*					*8*					*0*
	number of detections					*0*					*0*					*8*
	Frequency of Detection					*0.0%*					*0.0%*					*100.0%*
	Maximum Detected					*-*					*-*					*16.2*
	Standard Deviation					*0.00*					*0.00*					*0.87*
	Mean					*0.002*					*0.01*					*15.03*
	Sample of Max Detection					*-*					*-*					*MAK101O*
	Max Dectection Limit					*0.0020*					*0.014*					*-*

Sea Cucumber (Loli) Samples	*number of samples analyzed*					*8*					*8*					*8*
	number of non-detect					*8*					*0*					*7*
	number of detections					*0*					*8*					*1*
	Frequency of Detection					*0.0%*					*100.0%*					*12.5%*
	Maximum Detected					*-*		B	J		*0.101*					*20.3*
	Standard Deviation					*0.00*					*0.03*					*6.82*
	Mean					*0.002*					*0.06*					*3.42*
	Sample of Max Detection					*-*					*MAK103C*					*MAK107C*
	Max Dectection Limit					*0.0020*					*-*					*0.200*

Seaweed (Limu)Samples	*number of samples analyzed*					*8*					*8*					*8*
	number of non-detect					*1*					*0*					*3*
	number of detections					*7*					*8*					*5*
	Frequency of Detection					*87.5%*					*100.0%*					*62.5%*
	Maximum Detected		B			*0.008*					*3.86*					*3.17*
	Standard Deviation					*0.00*					*1.18*					*0.94*
	Mean					*0.005*					*2.43*					*1.91*
	Sample of Max Detection					*MAK108,109,110,113L*					*MAK102L*					*MAK108,109,110,113L*
	Max Dectection Limit					*0.0020*					*-*					*0.200*

Draft

Background Sampling Locations - Ka‘ena Point and Mokulē‘ia Beach

Draft

Round 1 – September to October 2013

Draft

Organochlorine Pesticides

Draft

	Analyte	Aldrin					Alpha-BHC					Beta-BHC					Delta-BHC					Gamma-BHC (Lindane)					Heptachlor					Heptachlor Epoxide					p,p'-DDT				
	CAS Number	309-00-2					319-84-6					319-85-7					319-86-8					58-89-9					76-44-8					1024-57-3					50-29-3				
	Units	µg/kg					µg/kg					µg/kg					µg/kg					µg/kg					µg/kg					µg/kg					µg/kg				
Lab ID	Collection Date	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL
Mokulē'ia																																									
***Octopus* (*He'e*)**																																									
MAK009O	9/13/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK010O	9/16/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK011O	9/16/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK015O	9/22/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK016O	9/22/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK017O	9/22/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK018O	9/22/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK024O	9/27/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
***Sea Cucumber* (*Loli*)**																																									
MAK010C	9/13/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK014C	9/13/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK020C	9/16/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK022C	9/16/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK024C	9/22/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK025C	9/22/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK026C	9/22/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK027C	9/22/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
Seaweed (*Limu*)																																									
MAK007L	9/16/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK009L	9/16/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK010L (comp)	9/16/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK044L	10/15/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK045L	10/15/2013	4	U	U	4	4	**22.7**			4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK046L	10/15/2013	4	U	U	4	4	**9.80**			4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK047L	10/15/2013	4	U	U	4	4	**11.9**			4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK049L	10/15/2013	4	U	U	4	4	**12.5**			4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	UJ	4	4	4	U	U	4	4	4	U	U	4	4
Ka'ena Point																																									
***Octopus* (*He'e*)**																																									
MAK012O	9/22/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK013O	9/22/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK014O	9/23/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK019O	9/23/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK020O	9/23/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK021O	9/23/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK022O	9/23/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK023O	9/23/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
***Sea Cucumber* (*Loli*)**																																									
MAK015C	9/13/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK018C	9/16/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK019C	9/16/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK028C	9/22/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK029C	9/23/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK030C	9/23/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK031C	9/23/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK032C	9/23/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
Seaweed (*Limu*)																																									
MAK011L	9/16/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK030L	10/11/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK033L	10/11/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK034L	10/11/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK038L	10/11/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK041L	10/11/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK042L	10/11/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4
MAK043L	10/11/2013	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4	4	U	U	4	4

Octopus (He'e) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of detections	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*
	Standard Deviation	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	Mean	*4.00*	*4.00*	*4.00*	*4.00*	*4.00*	*4.00*	*4.00*	*4.00*

Sea Cucumber (Loli) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of detections	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	*4*	*4*	*4*	*4*	*4*	*4*	*4*	*4*
	Standard Deviation	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	Mean	*4.00*	*4.00*	*4.00*	*4.00*	*4.00*	*4.00*	*4.00*	*4.00*

Seaweed (Limu)Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*12*	*16*	*16*	*16*	*16*	*16*	*16*
	number of detections	*0*	*4*	*0*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*25.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	*4*	*22.7*	*4*	*4*	*4*	*4*	*4*	*4*
	Standard Deviation	*0.00*	*5.25*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	Mean	*4.00*	*6.56*	*4.00*	*4.00*	*4.00*	*4.00*	*4.00*	*4.00*

Notes:
µg/kg - micrograms per kilogram
BHC - benzene hexachloride
CAS - Chemical Abstracts Service
DDT - dichloro-diphenyl-trichloroethane
ID - identification
MDL - method detection limit
RL - reporting limit

Laboratory Qualifier (LQ)
U - Indicates compound was analyzed for but not detected. The sample quantitation limit must be corrected for dilution and for percent moisture. These results are presented as "ND" in the ARDL laboratory reports but are reported as the RL value with a "U" qualifier in the Staged Electronic Data Deliverable and this table.

Validator Qualifier (VQ)
U - Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
UJ - Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

Draft

Volatile Organic Compounds

Draft

Analyte		1,2,4-Trimethylbenzene					Ethyl Benzene					M,P-XYLENES					o-Xylene					Styrene					Toluene				
CAS Number		*95-63-6*					*100-41-4*					*108-38-3 & 106-42-3*					*95-47-6*					*100-42-5*					*108-88-3*				
Units		*µg/kg*					*µg/kg*					*µg/kg*					*µg/kg*					*µg/kg*					*µg/kg*				
Lab ID	**Collection Date**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**
Mokulēʻia																															
***Octopus* (*Heʻe*)**																															
MAK009O	9/13/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK010O	9/16/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK011O	9/16/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK015O	9/22/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK016O	9/22/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK017O	9/22/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK018O	9/22/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK024O	9/27/2013	12.5	U	U	12.5	2.5	12.5	U	U	12.5	2.5	25	U	U	25	5.0	12.5	U	U	12.5	2.5	12.5	U	U	12.5	2.5	12.5	U	U	12.5	2.5
***Sea Cucumber* (*Loli*)**																															
MAK010C	9/13/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK014C	9/13/2013	12.5	U	U	12.5	2.5	12.5	U	U	12.5	2.5	25	U	U	25	5.0	12.5	U	U	12.5	2.5	12.5	U	U	12.5	2.5	12.5	U	U	12.5	2.5
MAK020C	9/16/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK022C	9/16/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK024C	9/22/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK025C	9/22/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK026C	9/22/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK027C	9/22/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
Seaweed (*Limu*)																															
MAK007L	9/16/2013	12.5	U	U	12.5	2.5	12.5	U	U	12.5	2.5	25	U	U	25	5.0	12.5	U	U	12.5	2.5	12.5	U	U	12.5	2.5	12.5	U	U	12.5	2.5
MAK009L	9/16/2013	25	U	U	25	5.0	25	U	U	25	5.0	50	U	U	50	10.0	25	U	U	25	5.0	25	U	U	25	5.0	25	U	U	25.0	5.0
MAK010L (comp)	9/16/2013	25	U	U	25	5.0	25	U	U	25	5.0	50	U	U	50	10.0	25	U	U	25	5.0	25	U	U	25	5.0	25	U	U	25.0	5.0
MAK044L	10/15/2013	25	U	U	25	5.0	25	U	U	25	5.0	50	U	U	50	10.0	25	U	U	25	5.0	25	U	U	25	5.0	25	U	U	25.0	5.0
MAK045L	10/15/2013	25	U	U	25	5.0	25	U	U	25	5.0	50	U	U	50	10.0	25	U	U	25	5.0	25	U	U	25	5.0	25	U	U	25.0	5.0
MAK046L	10/15/2013	25	U	U	25	5.0	25	U	U	25	5.0	50	U	U	50	10.0	25	U	U	25	5.0	25	U	U	25	5.0	25	U	U	25.0	5.0
MAK047L	10/15/2013	12.5	U	U	12.5	2.5	12.5	U	U	12.5	2.5	25	U	U	25	5.0	12.5	U	U	12.5	2.5	12.5	U	UJ	12.5	2.5	12.5	U	U	12.5	2.5
MAK049L	10/15/2013	25	U	U	25	5.0	25	U	U	25	5.0	50	U	U	50	10.0	25	U	U	25	5.0	25	U	UJ	25	5.0	25	U	U	25.0	5.0
Kaʻena Point																															
***Octopus* (*Heʻe*)**																															
MAK012O	9/22/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK013O	9/22/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK014O	9/23/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK019O	9/23/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK020O	9/23/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK021O	9/23/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK022O	9/23/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK023O	9/23/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
***Sea Cucumber* (*Loli*)**																															
MAK015C	9/13/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK018C	9/16/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK019C	9/16/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK028C	9/22/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK029C	9/23/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK030C	9/23/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK031C	9/23/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
MAK032C	9/23/2013	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	25	U	U	25	5.0	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50	12.5	U	U	12.5	2.50
Seaweed (*Limu*)																															
MAK011L	9/16/2013	12.5	U	U	12.5	2.5	12.5	U	U	12.5	2.5	25	U	U	25	5.0	12.5	U	U	12.5	2.5	12.5	U	U	12.5	2.5	12.5	U	U	12.5	2.5
MAK030L	10/11/2013	12.5	U	U	12.5	2.5	12.5	U	U	12.5	2.5	25	U	U	25	5.0	12.5	U	U	12.5	2.5	12.5	U	U	12.5	2.5	12.5	U	U	12.5	2.5
MAK033L	10/11/2013	25	U	U	25	5.0	25	U	U	25	5.0	50	U	U	50	10.0	25	U	U	25	5.0	25	U	U	25	5.0	25	U	U	25.0	5.0
MAK034L	10/11/2013	25	U	U	25	5.0	25	U	U	25	5.0	50	U	U	50	10.0	25	U	U	25	5.0	25	U	U	25	5.0	25	U	U	25.0	5.0
MAK038L	10/11/2013	25	U	U	25	5.0	25	U	U	25	5.0	50	U	U	50	10.0	25	U	U	25	5.0	25	U	U	25	5.0	25	U	U	25.0	5.0
MAK041L	10/11/2013	25	U	U	25	5.0	25	U	U	25	5.0	50	U	U	50	10.0	25	U	U	25	5.0	25	U	U	25	5.0	25	U	U	25.0	5.0
MAK042L	10/11/2013	25	U	U	25	5.0	25	U	U	25	5.0	50	U	U	50	10.0	25	U	U	25	5.0	25	U	U	25	5.0	25	U	U	25.0	5.0
MAK043L	10/11/2013	25	U	U	25	5.0	25	U	U	25	5.0	50	U	U	50	10.0	25	U	U	25	5.0	25	U	U	25	5.0	25	U	U	25.0	5.0

Octopus (He'e) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*16*	*16*	*16*	*16*	*16*
	number of detections	*0*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	*12.5*	*12.5*	*25*	*12.5*	*12.5*	*12.5*
	Standard Deviation	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	Mean	*12.50*	*12.50*	*25.00*	*12.50*	*12.50*	*12.50*

Sea Cucumber (Loli) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*16*	*16*	*16*	*16*	*16*
	number of detections	*0*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	*12.5*	*12.5*	*25*	*12.5*	*12.5*	*12.5*
	Standard Deviation	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	Mean	*12.50*	*12.50*	*25.00*	*12.50*	*12.50*	*12.50*

Seaweed (Limu)Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*16*	*16*	*16*	*16*	*16*
	number of detections	*0*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	*25*	*25*	*50*	*25*	*25*	*25*
	Standard Deviation	*5.59*	*5.59*	*11.18*	*5.59*	*5.59*	*5.59*
	Mean	*21.88*	*21.88*	*43.75*	*21.88*	*21.88*	*21.88*

Notes:

µg/kg - micrograms per kilogram

CAS - Chemical Abstracts Service

ID - identification

MDL - method detection limit

RL - reporting limit

Laboratory Qualifier (LQ)

U - Indicates compound was analyzed for but not detected. The sample quantitation limit must be corrected for dilution and for percent moisture. These results are presented as "ND" in the ARDL laboratory reports but are reported as the RL value with a "U" qualifier in this table.

Validator Qualifier (VQ)

U - Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

UJ - Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

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Semivolatile Organic Compounds

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Analyte		Dimethylphthalate					Diethylphthalate					di-n-Butylphthalate					Pyrene					bis(2-Ethylhexyl)phthalate					di-n-Octylphthalate					Pentachlorophenol				
CAS Number		131-11-3					84-66-2					84-74-2					129-00-0					117-81-7					117-84-0					87-86-5				
Units		µg/kg-wet					µg/kg-wet					µg/kg-wet					µg/kg-wet					µg/kg-wet					µg/kg-wet					µg/kg-wet				
Lab ID	Collection Date	Result[2]	LQ	VQ	RL	MDL	Result[2]	LQ	VQ	RL	MDL	Result[2]	LQ	VQ	RL	MDL	Result[2]	LQ	VQ	RL	MDL	Result[2]	LQ	VQ	RL	MDL	Result[2]	LQ	VQ	RL	MDL	Result[2]	LQ	VQ	RL	MDL
Mokulēʻia																																				
Octopus (Heʻe)																																				
MAK009O	9/13/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		571	300
MAK010O	9/16/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		558	300
MAK011O	9/16/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		536	300
MAK015O	9/22/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		517	300
MAK016O	9/22/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		577	300
MAK017O	9/22/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		545	300
MAK018O	9/22/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		574	300
MAK024O	9/27/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		580	300
Sea Cucumber (Loli)																																				
MAK010C	9/13/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		580	300
MAK014C	9/13/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		561	300
MAK020C	9/16/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		556	300
MAK022C	9/16/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		588	300
MAK024C	9/22/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	588	300
MAK025C	9/22/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		580	300
MAK026C	9/22/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		548	300
MAK027C	9/22/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		548	300
Seaweed (Limu kohu)																																				
MAK007L	9/16/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		588	300
MAK009L	9/16/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		600	300
MAK010L (comp)	9/16/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		561	300
MAK044L	10/15/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		553	300
MAK045L	10/15/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		556	300
MAK046L	10/15/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		580	300
MAK047L	10/15/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	585	300
MAK049L	10/15/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		569	300
Kaʻena Point																																				
Octopus (Heʻe)																																				
MAK012O	9/22/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		585	300
MAK013O	9/22/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		566	300
MAK014O	9/23/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	588	300
MAK019O	9/23/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	214	J	J	1,000	200	ND	U		1,000	200	ND	U		545	300
MAK020O	9/23/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	413	J	J	1,000	200	ND	U		1,000	200	ND	U		580	300
MAK021O	9/23/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		580	300
MAK022O	9/23/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		591	300
MAK023O	9/23/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		591	300
Sea Cucumber (Loli)																																				
MAK015C	9/13/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		594	300
MAK018C	9/16/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		541	300
MAK019C	9/16/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		556	300
MAK028C	9/22/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		594	300
MAK029C	9/23/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		548	300
MAK030C	9/23/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		566	300
MAK031C	9/23/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		571	300
MAK032C	9/23/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		553	300
Seaweed (Limu kohu)																																				
MAK011L	9/16/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		597	300
MAK030L	10/11/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		566	300
MAK033L	10/11/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		588	300
MAK034L	10/11/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		594	300
MAK038L	10/11/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		574	300
MAK041L	10/11/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		558	300
MAK042L	10/11/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		558	300
MAK043L	10/11/2013	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		580	300

Octopus (Heʻe) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*16*	*16*	*16*	*14*	*16*	*16*
	number of detections	*0*	*0*	*0*	*0*	*2*	*0*	*0*
	Frequency of Detection	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*12.5%*	*0.0%*	*0.0%*
	Maximum Detected	*-*	*-*	*-*	*-*	*1000*	*-*	*-*
	Standard Deviation	*0.00*	*0.00*	*0.00*	*0.00*	*237.31*	*0.00*	*0.00*
	Mean	*1000*	*1000*	*1000.00*	*#####*	*914.18*	*1000.00*	*567.75*

Sea Cucumber (Loli) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of detections	*0*	*0*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	*-*	*-*	*-*	*-*	*1000*	*-*	*-*
	Standard Deviation	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	Mean	*#####*	*1000.00*	*1000.00*	*#####*	*1000.00*	*1000.00*	*567.00*

Seaweed (Limu)Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*15*	*16*	*16*	*16*	*16*	*16*
	number of detections	*0*	*1*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*6.3%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	*-*	*-*	*-*	*-*	*1000*	*-*	*-*
	Standard Deviation	*0.00*	*130.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	Mean	*#####*	*1032.50*	*1000.00*	*#####*	*1000.00*	*1000.00*	*575.44*

Notes:

[1] Final screening values from fish advisories as listed in Table 9 of the *Final Supplemental Marine Resources Study Sampling and Analysis Plan* (August 2013).

[2] Results presented as "ND" in the the Applied Research Development Laboratory, Inc. (ARDL) and U.S. Army Engineer Research and Development Center-Environmental Chemistry Branch (ERDC-ECB) laboratory reports are presented in the Staged Electronic Data Deliverable files (ARDL) and Electronic Data Deliverable file (ERDC-ECB) with a "U" qualifier and are thus presented in this table with the LQ.

µg/kg-wet - micrograms per kilogram-wet weight
CAS - Chemical Abstracts Service
EPA - U.S. Environmental Protection Agency
ID - identification
ND - not detected
MDL - method detection limit
RL - reporting limit
U.S. - United States

Laboratory qualifier (LQ) - ARDL
J - Indicates an estimated value. This flag is used when estimating a concentration of a compound that meets identification criteria but the result is less than the quantitation or RL but greater than the MDL.
U - Indicates compound was analyzed for but not detected. The sample quantitation limit must be corrected for dilution and for percent moisture.

LQ - ERDC-ECB
U - Not detected at or above the RL.

Validator qualifier (VQ)
J - Indicates an estimated value.
UJ - Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

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Dioxins/Furans

Draft

Analyte		2,3,7,8-TCDF				Total TCDF				2,3,7,8-TCDD				Total TCDD				1,2,3,7,8-PECDF			
CAS Number		*51207-31-9*				*30402-14-3*				*01746-01-6*				*41903-57-5*				*57117-41-6*			
Units		*ng/kg*				*ng/kg*				*ng/kg*				*ng/kg*				*ng/kg*			
Lab ID	**Collection Date**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**
Mokulēʻia																					
Octopus (Heʻe)																					
MAK009O	9/13/2013	0.11	JZ	UJ	0.033	0.033	U	U	0.033	0.043	U	U	0.043	0.13			0.043	0.057	U	U	0.057
MAK010O	9/16/2013	0.11	JZ	UJ	0.043	0.052			0.043	0.069	U	U	0.069	0.14			0.069	0.087	U	U	0.087
MAK011O	9/16/2013	0.098	JZ	U	0.04	0.057			0.04	0.053	U	U	0.053	0.053	U	U	0.053	0.059	U	U	0.059
MAK015O	9/22/2013	0.065	JZ	U	0.029	0.052			0.029	0.041	U	U	0.041	0.22			0.041	0.041	U	U	0.041
MAK016O	9/22/2013	0.079	JZ	U	0.03	0.062			0.03	0.057	U	U	0.057	0.057	U	U	0.057	0.058	U	U	0.058
MAK017O	9/22/2013	0.069	JZ	U	0.04	0.073			0.04	0.043	U	U	0.043	0.043	U	U	0.043	0.052	U	U	0.052
MAK018O	9/22/2013	0.084	JZ	UJ	0.038	0.038	U	U	0.038	0.049	U	U	0.049	0.16			0.049	0.063	U	U	0.063
MAK024O	9/27/2013	0.19	JZ	U	0.099	0.14			0.099	0.14	U	U	0.14	**0.59**			0.14	0.14	U	U	0.14
Sea Cucumber (Loli)																					
MAK010C	9/13/2013	0.16	U	U	0.16	0.16	U	U	0.16	0.16	U	U	0.16	0.16	U	U	0.16	0.15	U	U	0.15
MAK014C	9/13/2013	0.16	U	U	0.16	0.16	U	U	0.16	0.15	U	U	0.15	**1.4**			0.15	0.19	U	U	0.19
MAK020C	9/16/2013	0.12	JZ	J	0.064	0.32			0.064	0.059	U	U	0.059	**1.1**			0.059	0.082	U	U	0.082
MAK022C	9/16/2013	0.092	JZ		0.059	0.059	U	U	0.059	0.064	U	U	0.064	**1.4**			0.064	0.077	U	U	0.077
MAK024C	9/22/2013	0.072	JZ		0.054	0.054	U	U	0.054	0.063	U	U	0.063	**0.84**			0.063	0.042	U	U	0.042
MAK025C	9/22/2013	0.061	JZ		0.039	0.042			0.039	0.064	U	U	0.064	**0.58**			0.064	0.05	U	U	0.05
MAK026C	9/22/2013	0.077			0.044	0.12			0.044	0.061	U	U	0.061	**0.49**			0.061	0.058	U	U	0.058
MAK027C	9/22/2013	0.075			0.043	0.075			0.043	0.057	U	U	0.057	**0.65**			0.057	0.052	U	U	0.052
Seaweed (Limu)																					
MAK007L	9/16/2013	0.074	JZ		0.073	0.073	U	U	0.073	0.078	U	U	0.078	**0.63**			0.078	0.067	U	U	0.067
MAK009L	9/16/2013	0.12	U	U	0.12	0.12	U	U	0.12	0.088	U	U	0.088	**0.58**			0.088	0.069	U	U	0.069
MAK010L (comp)	9/16/2013	0.084	U	U	0.084	0.084	U	U	0.084	0.079	U	U	0.079	**0.64**			0.079	0.05	U	U	0.05
MAK044L	10/15/2013	0.13			0.095	0.28			0.095	0.08	U	U	0.08	**0.74**			0.08	0.072	U	U	0.072
MAK045L	10/15/2013	0.12	U	U	0.12	0.12	U	U	0.12	0.1	U	U	0.1	**0.79**			0.1	0.091	U	U	0.091
MAK046L	10/15/2013	0.12	U	U	0.12	0.14			0.12	0.1	U	U	0.1	**0.78**			0.1	0.098	U	U	0.098
MAK047L	10/15/2013	0.12			0.068	0.12			0.068	0.056	U	U	0.056	**0.96**			0.056	0.053	U	U	0.053
MAK049L	10/15/2013	0.11	U	U	0.11	0.11	U	U	0.11	0.062	U	U	0.062	**0.38**			0.062	0.074	U	U	0.074
Kaʻena Point																					
Octopus (Heʻe)																					
MAK012O	9/22/2013	0.09	JZ	UJ	0.039	0.052			0.039	0.055	U	U	0.055	**0.38**			0.055	0.054	U	U	0.054
MAK013O	9/22/2013	0.086	JZ	UJ	0.041	0.065			0.041	0.06	U	U	0.06	0.067	U	U	0.06	0.067	U	U	0.067
MAK014O	9/23/2013	0.063	JZ	U	0.036	0.036	U	U	0.036	0.046	U	U	0.046	**0.31**			0.046	0.06	U	U	0.06
MAK019O	9/23/2013	0.11		U	0.029	0.18			0.029	0.058	U	U	0.058	0.058	U	U	0.058	0.052	U	U	0.052
MAK020O	9/23/2013	0.092	JZ	UJ	0.041	0.065			0.041	0.059	U	U	0.059	**0.46**			0.059	0.056	U	U	0.056
MAK021O	9/23/2013	0.078	JZ	UJ	0.041	0.042			0.041	0.052	U	U	0.052	0.12			0.052	0.053	U	U	0.053
MAK022O	9/23/2013	0.075	JZ	UJ	0.031	0.031	U	U	0.031	0.058	U	U	0.058	**0.39**			0.058	0.048	U	U	0.048
MAK023O	9/23/2013	0.063	JZ	U	0.04	0.06			0.04	0.076	U	U	0.076	**0.44**			0.076	0.059	U	U	0.059
Sea Cucumber (Loli)																					
MAK015C	9/13/2013	0.19	U	U	0.19	0.19	U	U	0.19	0.23	U	U	0.23	**1.3**			0.23	0.2	U	U	0.2
MAK018C	9/16/2013	0.13	U	U	0.13	0.13	U	U	0.13	0.14	U	U	0.14	**1.2**			0.14	0.18	U	U	0.18
MAK019C	9/16/2013	0.12	U	U	0.12	0.33			0.12	0.11	U	U	0.11	**0.96**			0.11	0.15	U	U	0.15
MAK028C	9/22/2013	0.086			0.043	0.15			0.043	0.055	U	U	0.055	**0.98**			0.055	0.057	U	U	0.057
MAK029C	9/23/2013	0.066	JZ		0.033	0.058			0.033	0.054	U	U	0.054	**0.99**			0.054	0.052	U	U	0.052
MAK030C	9/23/2013	0.094			0.079	0.094			0.079	0.16	U	U	0.16	0.16	U	U	0.16	0.064	U	U	0.064
MAK031C	9/23/2013	0.058	JZ		0.042	0.057			0.042	0.041	U	U	0.041	**0.91**			0.041	0.048	U	U	0.048
MAK032C	9/23/2013	0.084			0.045	0.15			0.045	0.054	U	U	0.054	**1.2**			0.054	0.046	U	U	0.046
Seaweed (*Limu*)																					
MAK011L	9/16/2013	0.1	JZ		0.097	0.097	U	U	0.097	0.077	U	U	0.077	**0.65**			0.077	0.067	U	U	0.067
MAK030L	10/11/2013	0.081	U	U	0.081	0.081	U	U	0.081	0.069	U	U	0.069	**0.51**			0.069	0.059	U	U	0.059
MAK033L	10/11/2013	0.12	U	U	0.12	0.12	U	U	0.12	0.081	U	U	0.081	**0.42**			0.081	0.067	U	U	0.067
MAK034L	10/11/2013	0.088	U	U	0.088	0.088	U	U	0.088	0.078	U	U	0.078	**0.56**			0.078	0.047	U	U	0.047
MAK038L	10/11/2013	0.088			0.074	0.17			0.074	0.088	U	U	0.088	**0.52**			0.088	0.051	U	U	0.051
MAK041L	10/11/2013	0.13			0.099	1.4			0.099	0.083	U	U	0.083	**0.59**			0.083	0.065	U	U	0.065
MAK042L	10/11/2013	0.11			0.1	0.11			0.1	0.091	U	U	0.091	**0.38**			0.091	0.068	U	U	0.068
MAK043L	10/11/2013	0.12	U	U	0.12	0.12	U	U	0.12	0.069	U	U	0.069	**0.43**			0.069	0.06	U	U	0.06

Analyte		2,3,4,7,8-PeCDF				Total PeCDF				1,2,3,7,8-PeCDD				Total PeCDD				1,2,3,4,7,8-HxCDF			
CAS Number		*57117-31-4*				*30402-15-4*				*40321-76-4*				*36088-22-9*				*70648-26-9*			
Units		*ng/kg*				*ng/kg*				*ng/kg*				*ng/kg*				*ng/kg*			
Lab ID	**Collection Date**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**
Mokulēʻia																					
Octopus (Heʻe)																					
MAK009O	9/13/2013	0.046	U	U	0.046	0.051	U	U	0.051	0.061	U	U	0.061	0.061	U	U	0.061	0.038	U	U	0.038
MAK010O	9/16/2013	0.058	U	U	0.058	0.072	U	U	0.072	0.11	U	U	0.11	0.11	U	U	0.11	0.067		U	0.065
MAK011O	9/16/2013	0.048	U	U	0.048	0.053	U	U	0.053	0.06	U	U	0.06	0.06	U	U	0.06	0.056	U	U	0.056
MAK015O	9/22/2013	0.03	U	U	0.03	0.036	U	U	0.036	0.038	U	U	0.038	0.038	U	U	0.038	0.021	U	U	0.021
MAK016O	9/22/2013	0.048	U	U	0.048	0.053	U	U	0.053	0.055	U	U	0.055	0.055	U	U	0.055	0.032	JZ	U	0.03
MAK017O	9/22/2013	0.044	U	U	0.044	0.061			0.048	0.053	U	U	0.053	0.053	U	U	0.053	0.047	U	U	0.047
MAK018O	9/22/2013	0.041	U	U	0.041	0.052	U	U	0.052	0.052	U	U	0.052	0.052	U	U	0.052	0.038	U	U	0.038
MAK024O	9/27/2013	0.089	U	U	0.089	0.12	U	U	0.12	0.14	U	U	0.14	0.14	U	U	0.14	0.1	U	U	0.1
Sea Cucumber (Loli)																					
MAK010C	9/13/2013	0.13	U	U	0.13	0.14	U	U	0.14	0.18	U	U	0.18	0.18	U	U	0.18	0.14	U	U	0.14
MAK014C	9/13/2013	0.12	U	U	0.12	0.16	U	U	0.16	0.18	U	U	0.18	0.18	U	U	0.18	0.15	U	U	0.15
MAK020C	9/16/2013	0.06	U	U	0.06	0.23			0.071	0.058	U	U	0.058	0.11			0.058	0.047	U	U	0.047
MAK022C	9/16/2013	0.055	U	U	0.055	0.066	U	U	0.066	0.064	U	U	0.064	0.13			0.064	0.045	U	U	0.045
MAK024C	9/22/2013	0.035	U	U	0.035	0.038	U	U	0.038	0.042	U	U	0.042	0.096			0.042	0.041	U	U	0.041
MAK025C	9/22/2013	0.036	U	U	0.036	0.043	U	U	0.043	0.046	U	U	0.046	0.083			0.046	0.04	U	U	0.04
MAK026C	9/22/2013	0.051	U	U	0.051	0.055	U	U	0.055	0.045	U	U	0.045	0.1			0.045	0.037	U	U	0.037
MAK027C	9/22/2013	0.037	U	U	0.037	0.045	U	U	0.045	0.045	U	U	0.045	0.055			0.045	0.044	U	U	0.044
Seaweed (Limu)																					
MAK007L	9/16/2013	0.045	JZ	U	0.044	0.055	U	U	0.055	0.051	U	U	0.051	0.22			0.051	0.035	JZ	U	0.034
MAK009L	9/16/2013	0.055	U	U	0.055	0.062	U	U	0.062	0.046	U	U	0.046	0.079			0.046	0.05		U	0.042
MAK010L (comp)	9/16/2013	0.048	U	U	0.048	0.049	U	U	0.049	0.043	U	U	0.043	0.13			0.043	0.049	JZ	U	0.041
MAK044L	10/15/2013	0.057	U	U	0.057	0.065	U	U	0.065	0.068	U	U	0.068	0.22			0.068	0.048	U	U	0.048
MAK045L	10/15/2013	0.059	U	U	0.059	0.075	U	U	0.075	0.067	U	U	0.067	0.067	U	U	0.067	0.057	U	U	0.057
MAK046L	10/15/2013	0.072	U	U	0.072	0.085	U	U	0.085	0.063	U	U	0.063	0.1			0.063	0.061	U	U	0.061
MAK047L	10/15/2013	0.038	U	U	0.038	0.046	U	U	0.046	0.046	U	U	0.046	0.064			0.046	0.04	U	U	0.04
MAK049L	10/15/2013	0.048	U	U	0.048	0.061	U	U	0.061	0.044	U	U	0.044	0.044	U	U	0.044	0.066	U	U	0.066
Kaʻena Point																					
Octopus (Heʻe)																					
MAK012O	9/22/2013	0.039	U	U	0.039	0.047	U	U	0.047	0.043	U	U	0.043	0.046			0.043	0.038	JZ	U	0.034
MAK013O	9/22/2013	0.043	U	U	0.043	0.055	U	U	0.055	0.062	U	U	0.062	0.062	U	U	0.062	0.045	U	U	0.045
MAK014O	9/23/2013	0.045	U	U	0.045	0.053	U	U	0.053	0.045	U	U	0.045	0.045	U	U	0.045	0.031	U	U	0.031
MAK019O	9/23/2013	0.046	U	U	0.046	0.049	U	U	0.049	0.054	U	U	0.054	0.054	U	U	0.054	0.042	U	U	0.042
MAK020O	9/23/2013	0.04	U	U	0.04	0.048	U	U	0.048	0.071	U	U	0.071	0.071	U	U	0.071	0.035	U	U	0.035
MAK021O	9/23/2013	0.046	U	U	0.046	0.049	U	U	0.049	0.057	U	U	0.057	0.057	U	U	0.057	0.038	U	U	0.038
MAK022O	9/23/2013	0.041	U	U	0.041	0.045	U	U	0.045	0.073	U	U	0.073	0.073	U	U	0.073	0.037	U	U	0.037
MAK023O	9/23/2013	0.05	U	U	0.05	0.055	U	U	0.055	0.059	U	U	0.059	0.059	U	U	0.059	0.041	U	U	0.041
Sea Cucumber (Loli)																					
MAK015C	9/13/2013	0.14	U	U	0.14	0.17	U	U	0.17	0.19	U	U	0.19	0.19	U	U	0.19	0.18	U	U	0.18
MAK018C	9/16/2013	0.13	U	U	0.13	0.16	U	U	0.16	0.1	U	U	0.1	0.1	U	U	0.1	0.096	U	U	0.096
MAK019C	9/16/2013	0.11	U	U	0.11	0.13	U	U	0.13	0.15	U	U	0.15	0.15	U	U	0.15	0.11	U	U	0.11
MAK028C	9/22/2013	0.047	U	U	0.047	0.052	U	U	0.052	0.035	U	U	0.035	0.035			0.035	0.037	JZ		0.032
MAK029C	9/23/2013	0.041	U	U	0.041	0.046	U	U	0.046	0.034	U	U	0.034	0.085			0.034	0.03	U	U	0.03
MAK030C	9/23/2013	0.043	U	U	0.043	0.054	U	U	0.054	0.078	U	U	0.078	0.078	U	U	0.078	0.053	U	U	0.053
MAK031C	9/23/2013	0.032	U	U	0.032	0.057			0.04	0.032	U	U	0.032	0.18			0.032	0.027	U	U	0.027
MAK032C	9/23/2013	0.035	U	U	0.035	0.041	U	U	0.041	0.044	U	U	0.044	0.12			0.044	0.034	U	U	0.034
Seaweed (*Limu*)																					
MAK011L	9/16/2013	0.041	U	U	0.041	0.054	U	U	0.054	0.048	U	U	0.048	0.14			0.048	0.038	U	U	0.038
MAK030L	10/11/2013	0.036	U	U	0.036	0.048	U	U	0.048	0.046	U	U	0.046	0.1			0.046	0.042	U	U	0.042
MAK033L	10/11/2013	0.041		U	0.038	0.1			0.052	0.041	U	U	0.041	0.097			0.041	0.042	U	U	0.042
MAK034L	10/11/2013	0.041	U	U	0.041	0.081			0.044	0.04	U	U	0.04	0.045			0.04	0.057	U	U	0.057
MAK038L	10/11/2013	0.049	U	U	0.049	0.05	U	U	0.05	0.05	U	U	0.05	0.087			0.05	0.047	U	U	0.047
MAK041L	10/11/2013	0.057	JZ	U	0.046	0.37			0.055	0.056	U	U	0.056	0.056	U	U	0.056	0.044	U	U	0.044
MAK042L	10/11/2013	0.058	U	U	0.058	0.063	U	U	0.063	0.064	U	U	0.064	0.064	U	U	0.064	0.055	U	U	0.055
MAK043L	10/11/2013	0.054	U	U	0.054	0.057	U	U	0.057	0.071	U	U	0.071	0.071	U	U	0.071	0.059	U	U	0.059

Analyte		1,2,3,6,7,8-HxCDF				2,3,4,6,7,8-HxCDF				1,2,3,7,8,9-HxCDF				Total HxCDF			
CAS Number		*57117-44-9*				*60851-34-5*				*72918-21-9*				*55684-94-1*			
Units		*ng/kg*				*ng/kg*				*ng/kg*				*ng/kg*			
Lab ID	**Collection Date**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**
Mokulēʻia																	
Octopus (Heʻe)																	
MAK009O	9/13/2013	0.032	U	U	0.032	0.048		U	0.036	0.036	U	U	0.036	0.048			0.036
MAK010O	9/16/2013	0.06	U	U	0.06	0.059	U	U	0.059	0.07	U	U	0.07	0.067			0.063
MAK011O	9/16/2013	0.057	U	U	0.057	0.048	U	U	0.048	0.072	U	U	0.072	0.058	U	U	0.058
MAK015O	9/22/2013	0.026	U	U	0.026	0.026	U	U	0.026	0.028	U	U	0.028	0.025	U	U	0.025
MAK016O	9/22/2013	0.034		U	0.03	0.049		U	0.024	0.051		U	0.03	0.14			0.029
MAK017O	9/22/2013	0.046	U	U	0.046	0.041	U	U	0.041	0.045	U	U	0.045	0.045	U	U	0.045
MAK018O	9/22/2013	0.035	U	U	0.035	0.035	U	U	0.035	0.053	U	U	0.053	0.04	U	U	0.04
MAK024O	9/27/2013	0.087	U	U	0.087	0.094	U	U	0.094	0.091	U	U	0.091	0.093	U	U	0.093
Sea Cucumber (Loli)																	
MAK010C	9/13/2013	0.11	U	U	0.11	0.1	U	U	0.1	0.18	U	U	0.18	0.13	U	U	0.13
MAK014C	9/13/2013	0.13	U	U	0.13	0.14	U	U	0.14	0.19	U	U	0.19	0.15	U	U	0.15
MAK020C	9/16/2013	0.045	U	U	0.045	0.046	U	U	0.046	0.068	U	U	0.068	0.074			0.051
MAK022C	9/16/2013	0.036	U	U	0.036	0.04	U	U	0.04	0.051	U	U	0.051	0.043	U	U	0.043
MAK024C	9/22/2013	0.032	U	U	0.032	0.033	U	U	0.033	0.039	U	U	0.039	0.037	U	U	0.037
MAK025C	9/22/2013	0.038	U	U	0.038	0.037	U	U	0.037	0.05	U	U	0.05	0.042	U	U	0.042
MAK026C	9/22/2013	0.037	U	U	0.037	0.039	U	U	0.039	0.048	U	U	0.048	0.04	U	U	0.04
MAK027C	9/22/2013	0.035	U	U	0.035	0.04	U	U	0.04	0.046	U	U	0.046	0.041	U	U	0.041
Seaweed (Limu)																	
MAK007L	9/16/2013	0.058			0.032	0.039	BJZ	U	0.029	0.035	U	U	0.035	0.058		J	0.033
MAK009L	9/16/2013	0.038	U	U	0.038	0.039	U	U	0.039	0.044	BJZ	U	0.044	0.05		J	0.041
MAK010L (comp)	9/16/2013	0.037	U	U	0.037	0.042	U	U	0.042	0.045	U	U	0.045	0.041	U	U	0.041
MAK044L	10/15/2013	0.049	U	U	0.049	0.05	U	U	0.05	0.058	U	U	0.058	0.051	U	U	0.051
MAK045L	10/15/2013	0.052	U	U	0.052	0.06	U	U	0.06	0.064	U	U	0.064	0.058	U	U	0.058
MAK046L	10/15/2013	0.062	U	U	0.062	0.057	U	U	0.057	0.055	U	U	0.055	0.058	U	U	0.058
MAK047L	10/15/2013	0.038	U	U	0.038	0.04	U	U	0.04	0.04	U	U	0.04	0.04	U	U	0.04
MAK049L	10/15/2013	0.059	U	U	0.059	0.055	U	U	0.055	0.066	U	U	0.066	0.061	U	U	0.061
Kaʻena Point																	
Octopus (Heʻe)																	
MAK012O	9/22/2013	0.033	U	U	0.033	0.028	U	U	0.028	0.042	U	U	0.042	0.036	JZ		0.034
MAK013O	9/22/2013	0.04	U	U	0.04	0.04	U	U	0.04	0.048	U	U	0.048	0.043	U	U	0.043
MAK014O	9/23/2013	0.025	U	U	0.025	0.03	U	U	0.03	0.034	U	U	0.034	0.03	U	U	0.03
MAK019O	9/23/2013	0.037	U	U	0.037	0.04	U	U	0.04	0.044	U	U	0.044	0.04	U	U	0.04
MAK020O	9/23/2013	0.04	U	U	0.04	0.035	U	U	0.035	0.034	U	U	0.034	0.036	U	U	0.036
MAK021O	9/23/2013	0.04	U	U	0.04	0.037	U	U	0.037	0.045	U	U	0.045	0.04	U	U	0.04
MAK022O	9/23/2013	0.034	U	U	0.034	0.038	U	U	0.038	0.039	U	U	0.039	0.037	U	U	0.037
MAK023O	9/23/2013	0.044	U	U	0.044	0.044	U	U	0.044	0.054	U	U	0.054	0.046	U	U	0.046
Sea Cucumber (Loli)																	
MAK015C	9/13/2013	0.15	U	U	0.15	0.13	U	U	0.13	0.18	U	U	0.18	0.16	U	U	0.16
MAK018C	9/16/2013	0.074	U	U	0.074	0.087	U	U	0.087	0.13	U	U	0.13	0.096	U	U	0.096
MAK019C	9/16/2013	0.093	U	U	0.093	0.092	U	U	0.092	0.15	U	U	0.15	0.11	U	U	0.11
MAK028C	9/22/2013	0.041			0.025	0.073			0.026	0.054	JZ		0.039	0.11			0.03
MAK029C	9/23/2013	0.029	U	U	0.029	0.033			0.03	0.034	U	U	0.034	0.033			0.031
MAK030C	9/23/2013	0.051	U	U	0.051	0.052	U	U	0.052	0.087	U	U	0.087	0.061	U	U	0.061
MAK031C	9/23/2013	0.024	U	U	0.024	0.037			0.028	0.035	U	U	0.035	0.037			0.028
MAK032C	9/23/2013	0.03	U	U	0.03	0.035	U	U	0.035	0.043	U	U	0.043	0.036	U	U	0.036
Seaweed (*Limu*)																	
MAK011L	9/16/2013	0.034	U	U	0.034	0.033	U	U	0.033	0.041	U	U	0.041	0.037	U	U	0.037
MAK030L	10/11/2013	0.042	U	U	0.042	0.044	U	U	0.044	0.053	BJZ	U	0.05	0.044	U	U	0.044
MAK033L	10/11/2013	0.043	U	U	0.043	0.043	U	U	0.043	0.055	U	U	0.055	0.046	U	U	0.046
MAK034L	10/11/2013	0.054	U	U	0.054	0.048	U	U	0.048	0.059	U	U	0.059	0.054	U	U	0.054
MAK038L	10/11/2013	0.052	U	U	0.052	0.049	U	U	0.049	0.065	U	U	0.065	0.053	U	U	0.053
MAK041L	10/11/2013	0.044	U	U	0.044	0.042	U	U	0.042	0.069	U	U	0.069	0.054			0.05
MAK042L	10/11/2013	0.056	U	U	0.056	0.051	U	U	0.051	0.074	U	U	0.074	0.059	U	U	0.059
MAK043L	10/11/2013	0.051	U	U	0.051	0.053	U	U	0.053	0.073	U	U	0.073	0.059	U	U	0.059

		2,3,7,8-TCDF	Total TCDF	2,3,7,8-TCDD	Total TCDD	1,2,3,7,8-PECDF	2,3,4,7,8-PeCDF	Total PeCDF	1,2,3,7,8-PeCDD	Total PeCDD	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	2,3,4,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	Total HxCDF
Octopus (Heʻe) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*4*	*16*	*5*	*16*	*16*	*15*	*16*	*15*	*16*	*16*	*16*	*16*	*12*
	number of detections	*0*	*12*	*0*	*11*	*0*	*0*	*1*	*0*	*1*	*0*	*0*	*0*	*0*	*4*
	Frequency of Detection	*0.0%*	*75.0%*	*0.0%*	*68.8%*	*0.0%*	*0.0%*	*6.3%*	*0.0%*	*6.3%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*25.0%*
	Maximum Detected	*0.19*	*0.18*	*0.14*	*0.59*	*0.14*	*0.09*	*0.12*	*0.14*	*0.14*	*0.10*	*0.09*	*0.09*	*0.09*	*0.14*
	Standard Deviation	*0.031*	*0.040*	*0.023*	*0.18*	*0.023*	*0.013*	*0.019*	*0.026*	*0.026*	*0.018*	*0.015*	*0.016*	*0.016*	*0.029*
	Mean	*0.091*	*0.065*	*0.060*	*0.23*	*0.063*	*0.047*	*0.056*	*0.065*	*0.065*	*0.044*	*0.042*	*0.043*	*0.049*	*0.052*
Sea Cucumber (Loli) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*5*	*6*	*16*	*2*	*16*	*16*	*14*	*16*	*6*	*15*	*15*	*13*	*15*	*12*
	number of detections	*11*	*10*	*0*	*14*	*0*	*0*	*2*	*0*	*10*	*1*	*1*	*3*	*1*	*4*
	Frequency of Detection	*68.8%*	*62.5%*	*0.0%*	*87.5%*	*0.0%*	*0.0%*	*12.5%*	*0.0%*	*62.5%*	*6.3%*	*6.3%*	*18.8%*	*6.3%*	*25.0%*
	Maximum Detected	*0.19*	*0.33*	*0.23*	*1.40*	*0.20*	*0.14*	*0.23*	*0.19*	*0.19*	*0.18*	*0.15*	*0.14*	*0.19*	*0.16*
	Standard Deviation	*0.040*	*0.088*	*0.056*	*0.39*	*0.058*	*0.041*	*0.061*	*0.058*	*0.05*	*0.049*	*0.040*	*0.036*	*0.058*	*0.044*
	Mean	*0.10*	*0.13*	*0.10*	*0.90*	*0.094*	*0.069*	*0.093*	*0.083*	*0.12*	*0.069*	*0.060*	*0.063*	*0.087*	*0.075*
Seaweed (Limu)Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*9*	*10*	*16*	*0*	*16*	*16*	*13*	*16*	*5*	*16*	*15*	*16*	*16*	*13*
	number of detections	*7*	*6*	*0*	*16*	*0*	*0*	*3*	*0*	*11*	*0*	*1*	*0*	*0*	*3*
	Frequency of Detection	*43.8%*	*37.5%*	*0.0%*	*100.0%*	*0.0%*	*0.0%*	*18.8%*	*0.0%*	*68.8%*	*0.0%*	*6.3%*	*0.0%*	*0.0%*	*18.8%*
	Maximum Detected	*0.13*	*1.40*	*0.10*	*0.96*	*0.10*	*0.072*	*0.37*	*0.071*	*0.22*	*0.07*	*0.06*	*0.06*	*0.07*	*0.06*
	Standard Deviation	*0.019*	*0.32*	*0.012*	*0.16*	*0.014*	*0.010*	*0.078*	*0.010*	*0.054*	*0.009*	*0.009*	*0.008*	*0.012*	*0.008*
	Mean	*0.11*	*0.20*	*0.080*	*0.60*	*0.066*	*0.050*	*0.083*	*0.053*	*0.10*	*0.049*	*0.048*	*0.047*	*0.056*	*0.051*

Notes:

[2] Results presented as "ND" in the the Pace Analytical laboratory reports are presented in this table as the RL value with a "U" qualifier

[3] For Hi-Res analysis, if results are outside of an ion-ratio comparison, then they are reported as Estimated Maximum Possible Concentration (EMPC), which will carry a laboratory "J" qualifier. EMPC results are indicated in the Staged Electronic Data Deliverable (SEDD), and thus in this table, with a "Z" qualifier. In the Pace Analytical laboratory reports, "J" qualifiers also define results are greater than the sample specific estimated detection limit (EDL) but less than the laboratory contract required quantitation limit (CRQL). Per the analytical method, the limit of detection equals the estimated quantitation limit, therefore method detection limits and CRQLs did not apply; therefore, detects less than the CRQL were not flagged "J" in the SEDDs and thus in this data table.

[4] The RL value presented in the laboratory report is equivalent to the dioxin analysis' sample specific EDL.

CAS - Chemical Abstracts Service
ID - identification
ng/kg - nanograms per kilogram
ND - not detected
PCDE - polychlorinated diphenyl ethers
RL - reporting limit

Laboratory Qualifier (LQ)
B - Less than 10x higher than method blank level.
J - Estimated value.
U - Analyte not detected
Z - Indicates an EMPC result. The result is qualified in the Pace Analytical laboratory report as a "J" with either an "I" (interference present) or "P" (PCDE interference) qualifier.

Validator Qualifier (VQ)
J - Indicates an estimated value
U - Indicates the compound or analyte was analyzed for but not detected at or above the stated limit
UJ - Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated valu

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Analyte		1,2,3,4,7,8-HxCDD				1,2,3,6,7,8-HxCDD				1,2,3,7,8,9-HxCDD				Total HxCDD			
CAS Number		39227-28-6				57653-85-7				19408-74-3				34465-46-8			
Units		ng/kg				ng/kg				ng/kg				ng/kg			
Lab ID	Collection Date	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]
Mokulē'ia																	
Octopus (He'e)																	
MAK009O	9/13/2013	0.072			0.029	0.094		U	0.042	0.047	JZ	U	0.035	0.17		J	0.036
MAK010O	9/16/2013	0.075	U	U	0.075	0.089	BJZ	U	0.07	0.074	U	U	0.074	0.073	U	U	0.073
MAK011O	9/16/2013	0.06	U	U	0.06	0.07	U	U	0.07	0.068	U	U	0.068	0.079			0.066
MAK015O	9/22/2013	0.037	U	U	0.037	0.047	U	U	0.047	0.042	U	U	0.042	0.042	U	U	0.042
MAK016O	9/22/2013	0.041	U	U	0.041	0.044	U	U	0.044	0.037	U	U	0.037	0.086			0.041
MAK017O	9/22/2013	0.044	U	U	0.044	0.05	U	U	0.05	0.049	U	U	0.049	0.1			0.048
MAK018O	9/22/2013	0.042	U	U	0.042	0.041	U	U	0.041	0.036	U	U	0.036	0.088			0.04
MAK024O	9/27/2013	0.097	U	U	0.097	0.11	U	U	0.11	0.13	U	U	0.13	0.27			0.11
Sea Cucumber (Loli)																	
MAK010C	9/13/2013	0.18	U	U	0.18	0.19	U	U	0.19	0.18	U	U	0.18	0.19	U	U	0.19
MAK014C	9/13/2013	0.18	U	U	0.18	0.24	U	U	0.24	0.24	U	U	0.24	0.22	U	U	0.22
MAK020C	9/16/2013	0.073	U	U	0.073	0.078	U	U	0.078	0.096			0.057	0.55			0.069
MAK022C	9/16/2013	0.071	U	U	0.071	0.066	U	U	0.066	0.068	U	U	0.068	0.068	U	U	0.068
MAK024C	9/22/2013	0.045	U	U	0.045	0.059	U	U	0.059	0.05	U	U	0.05	0.13			0.051
MAK025C	9/22/2013	0.051	U	U	0.051	0.087			0.054	0.045	U	U	0.045	0.087			0.05
MAK026C	9/22/2013	0.08	U	U	0.08	0.073	U	U	0.073	0.064	U	U	0.064	0.072	U	U	0.072
MAK027C	9/22/2013	0.046	U	U	0.046	0.05	U	U	0.05	0.043	U	U	0.043	0.047	U	U	0.047
Seaweed (Limu)																	
MAK007L	9/16/2013	0.062	U	U	0.062	0.071	U	U	0.071	0.09		U	0.071	0.21		J	0.068
MAK009L	9/16/2013	0.12	U	U	0.12	0.14	U	U	0.14	0.24	JZ	U	0.13	0.13	U	U	0.13
MAK010L (comp)	9/16/2013	0.066	U	U	0.066	0.083	U	U	0.083	0.076	U	U	0.076	0.15			0.075
MAK044L	10/15/2013	0.068	U	U	0.068	0.064	JZ		0.059	0.066	U	U	0.066	0.18			0.064
MAK045L	10/15/2013	0.15	U	U	0.15	0.13	U	U	0.13	0.32	JZ		0.13	0.14	U	U	0.14
MAK046L	10/15/2013	0.089	U	U	0.089	0.095	U	U	0.095	0.081	U	U	0.081	0.088	U	U	0.088
MAK047L	10/15/2013	0.079	U	U	0.079	0.072	U	U	0.072	0.067	U	U	0.067	0.21			0.072
MAK049L	10/15/2013	0.13	U	U	0.13	0.15	U	U	0.15	0.55	JZ		0.18	0.15	U	U	0.15
Ka'ena Point																	
Octopus (He'e)																	
MAK012O	9/22/2013	0.042	U	U	0.042	0.043	U	U	0.043	0.042	U	U	0.042	0.042	U	U	0.042
MAK013O	9/22/2013	0.046	U	U	0.046	0.046	U	U	0.046	0.053	U	U	0.053	0.076			0.048
MAK014O	9/23/2013	0.035	U	U	0.035	0.043	U	U	0.043	0.047	U	U	0.047	0.082			0.042
MAK019O	9/23/2013	0.039	U	U	0.039	0.041	U	U	0.041	0.039	U	U	0.039	0.04	U	U	0.04
MAK020O	9/23/2013	0.041	U	U	0.041	0.042	U	U	0.042	0.04	U	U	0.04	0.041	U	U	0.041
MAK021O	9/23/2013	0.041	U	U	0.041	0.051	U	U	0.051	0.05	U	U	0.05	0.047	U	U	0.047
MAK022O	9/23/2013	0.041	U	U	0.041	0.044	U	U	0.044	0.042	U	U	0.042	0.042	U	U	0.042
MAK023O	9/23/2013	0.036	U	U	0.036	0.036	U	U	0.036	0.036	U	U	0.036	0.036	U	U	0.036
Sea Cucumber (Loli)																	
MAK015C	9/13/2013	0.24	U	U	0.24	0.25	U	U	0.25	0.26	U	U	0.26	0.25	U	U	0.25
MAK018C	9/16/2013	0.14	U	U	0.14	0.15	U	U	0.15	0.14	U	U	0.14	0.14	U	U	0.14
MAK019C	9/16/2013	0.18	U	U	0.18	0.18	U	U	0.18	0.18	U	U	0.18	0.18	U	U	0.18
MAK028C	9/22/2013	0.036	JZ		0.035	0.047	U	U	0.047	0.066			0.04	0.18			0.041
MAK029C	9/23/2013	0.045	U	U	0.045	0.048	U	U	0.048	0.044	U	U	0.044	0.14			0.046
MAK030C	9/23/2013	0.13	U	U	0.13	0.15	U	U	0.15	0.11	U	U	0.11	0.13	U	U	0.13
MAK031C	9/23/2013	0.04	U	U	0.04	0.041	U	U	0.041	0.044	U	U	0.044	0.042	U	U	0.042
MAK032C	9/23/2013	0.046	U	U	0.046	0.054	U	U	0.054	0.048	U	U	0.048	0.049	U	U	0.049
Seaweed (*Limu*)																	
MAK011L	9/16/2013	0.15	U	U	0.15	0.2	U	U	0.2	0.79	JZ		0.14	0.16	U	U	0.16
MAK030L	10/11/2013	0.084	U	U	0.084	0.09	U	U	0.09	0.084	U	U	0.084	0.086	U	U	0.086
MAK033L	10/11/2013	0.14	U	U	0.14	0.16	U	U	0.16	0.16	JZ	U	0.14	0.15	U	U	0.15
MAK034L	10/11/2013	0.086	U	U	0.086	0.11	U	U	0.11	0.12	U	U	0.12	0.1	U	U	0.1
MAK038L	10/11/2013	0.13	U	U	0.13	0.14	U	U	0.14	0.12	JZ	U	0.12	0.13	U	U	0.13
MAK041L	10/11/2013	0.09	U	U	0.09	0.098	U	U	0.098	0.09	U	U	0.09	0.093	U	U	0.093
MAK042L	10/11/2013	0.086	U	U	0.086	0.1	U	U	0.1	0.091	U	U	0.091	0.092	U	U	0.092
MAK043L	10/11/2013	0.11	U	U	0.11	0.096	U	U	0.096	0.093	U	U	0.093	0.1	U	U	0.1

Analyte		1,2,3,4,6,7,8-HpCDF				1,2,3,4,7,8,9-HpCDF				Total HpCDF				1,2,3,4,6,7,8-HpCDD			
CAS Number		67562-39-4				55673-89-7				38998-75-3				35822-46-9			
Units		ng/kg				ng/kg				ng/kg				ng/kg			
Lab ID	Collection Date	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]
Mokulē'ia																	
Octopus (He'e)																	
MAK009O	9/13/2013	0.084		U	0.033	0.051		U	0.04	0.14		J	0.037	0.31		U	0.046
MAK010O	9/16/2013	0.089		U	0.058	0.078	U	U	0.078	0.089		J	0.068	0.21	BJZ	U	0.079
MAK011O	9/16/2013	0.044	U	U	0.044	0.051	U	U	0.051	0.048	U	U	0.048	0.18		U	0.054
MAK015O	9/22/2013	0.04		U	0.029	0.033	U	U	0.033	0.088		J	0.031	0.13		U	0.036
MAK016O	9/22/2013	0.064		U	0.039	0.049	U	U	0.049	0.11		J	0.044	0.18		U	0.037
MAK017O	9/22/2013	0.045		U	0.032	0.046	U	U	0.046	0.093		J	0.039	0.091	BJZ	U	0.039
MAK018O	9/22/2013	0.041	BJZ	U	0.034	0.031	U	U	0.031	0.032	U	U	0.032	0.11		U	0.039
MAK024O	9/27/2013	0.11	BJZ	U	0.074	0.1	U	U	0.1	0.088	U	U	0.088	1.2			0.18
Sea Cucumber (Loli)																	
MAK010C	9/13/2013	0.17	U	U	0.17	0.22	U	U	0.22	0.19	U	U	0.19	0.23	U	U	0.23
MAK014C	9/13/2013	0.18	U	U	0.18	0.24	U	U	0.24	0.21	U	U	0.21	0.28	U	U	0.28
MAK020C	9/16/2013	0.068			0.05	0.059	U	U	0.059	0.22			0.055	0.77			0.11
MAK022C	9/16/2013	0.041	U	U	0.041	0.054	U	U	0.054	0.048	U	U	0.048	0.2	JZ		0.051
MAK024C	9/22/2013	0.035	U	U	0.035	0.041	U	U	0.041	0.038	U	U	0.038	0.27			0.033
MAK025C	9/22/2013	0.043	JZ		0.032	0.049	U	U	0.049	0.065			0.04	0.89			0.043
MAK026C	9/22/2013	0.037	U	U	0.037	0.072	U	U	0.072	0.055	U	U	0.055	0.15			0.049
MAK027C	9/22/2013	0.047			0.037	0.053	U	U	0.053	0.047			0.045	0.11			0.044
Seaweed (Limu)																	
MAK007L	9/16/2013	0.13			0.049	0.049	U	U	0.049	0.23			0.049	0.29		U	0.062
MAK009L	9/16/2013	0.08			0.032	0.042	U	U	0.042	0.08			0.037	0.18		U	0.052
MAK010L (comp)	9/16/2013	0.11			0.042	0.051	U	U	0.051	0.22			0.046	0.23		U	0.057
MAK044L	10/15/2013	0.12			0.049	0.062	U	U	0.062	0.12			0.056	0.22	JZ	U	0.053
MAK045L	10/15/2013	0.11	JZ		0.052	0.071	U	U	0.071	0.092			0.061	0.18		U	0.075
MAK046L	10/15/2013	0.12			0.053	0.07	U	U	0.07	0.12			0.062	0.2	JZ	U	0.079
MAK047L	10/15/2013	0.11			0.037	0.044	U	U	0.044	0.24			0.041	0.32		U	0.043
MAK049L	10/15/2013	0.11	JZ		0.052	0.058	U	U	0.058	0.055	U	U	0.055	0.34		U	0.064
Ka'ena Point																	
Octopus (He'e)																	
MAK012O	9/22/2013	0.05	BJZ	U	0.028	0.042	JZ	U	0.036	0.032	U	U	0.032	0.12		U	0.046
MAK013O	9/22/2013	0.061	BJZ	U	0.047	0.067	U	U	0.067	0.069		J	0.057	0.24		U	0.074
MAK014O	9/23/2013	0.041	BJZ	U	0.03	0.036	U	U	0.036	0.072		J	0.033	0.13		U	0.045
MAK019O	9/23/2013	0.043		U	0.031	0.044	U	U	0.044	0.043		J	0.038	0.1		U	0.033
MAK020O	9/23/2013	0.056		U	0.031	0.045	U	U	0.045	0.099		J	0.038	0.13		U	0.038
MAK021O	9/23/2013	0.049		U	0.026	0.032	U	U	0.032	0.049		J	0.029	0.098		U	0.037
MAK022O	9/23/2013	0.047		U	0.031	0.04	U	U	0.04	0.047		J	0.035	0.11		U	0.046
MAK023O	9/23/2013	0.1	BJZ	U	0.035	0.044	U	U	0.044	0.37		J	0.039	0.23		U	0.041
Sea Cucumber (Loli)																	
MAK015C	9/13/2013	0.15	U	U	0.15	0.21	U	U	0.21	0.18	U	U	0.18	0.25	U	U	0.25
MAK018C	9/16/2013	0.072	U	U	0.072	0.11	U	U	0.11	0.093	U	U	0.093	0.27			0.13
MAK019C	9/16/2013	0.098	U	U	0.098	0.12	U	U	0.12	0.11	U	U	0.11	0.15	U	U	0.15
MAK028C	9/22/2013	0.064			0.028	0.057	JZ		0.04	0.064			0.034	0.13	JZ		0.04
MAK029C	9/23/2013	0.038	U	U	0.038	0.05	U	U	0.05	0.044	U	U	0.044	0.12			0.042
MAK030C	9/23/2013	0.063	U	U	0.063	0.1	U	U	0.1	0.081	U	U	0.081	0.089	U	U	0.089
MAK031C	9/23/2013	0.035			0.021	0.034	U	U	0.034	0.035			0.028	0.1			0.046
MAK032C	9/23/2013	0.029	JZ		0.025	0.054	U	U	0.054	0.039	U	U	0.039	0.12			0.046
Seaweed (*Limu*)																	
MAK011L	9/16/2013	0.073	JZ		0.042	0.043	U	U	0.043	0.042	U	U	0.042	0.093		U	0.041
MAK030L	10/11/2013	0.11			0.043	0.061	U	U	0.061	0.11			0.052	0.15		U	0.042
MAK033L	10/11/2013	0.091			0.05	0.053	U	U	0.053	0.091			0.051	0.18		U	0.054
MAK034L	10/11/2013	0.089			0.056	0.084	U	U	0.084	0.089			0.07	0.13	BJZ	U	0.062
MAK038L	10/11/2013	0.077	JZ		0.064	0.065	U	U	0.065	0.091			0.065	0.15	BJZ	U	0.052
MAK041L	10/11/2013	0.088	JZ		0.054	0.069	U	U	0.069	0.072			0.061	0.19		U	0.065
MAK042L	10/11/2013	0.064	JZ		0.062	0.064	U	U	0.064	0.063	U	U	0.063	0.13	BJZ	U	0.079
MAK043L	10/11/2013	0.093	JZ		0.057	0.069	U	U	0.069	0.063			0.063	0.23		U	0.057

Analyte		Total HpCDD				OCDF				OCDD			
CAS Number		37871-00-4				39001-02-0				03268-87-9			
Units		ng/kg				ng/kg				ng/kg			
Lab ID	Collection Date	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]	Result[2]	LQ[3]	VQ	RL[4]
Mokulē'ia													
Octopus (He'e)													
MAK009O	9/13/2013	0.41		J	0.046	0.23		U	0.089	1.8		U	0.078
MAK010O	9/16/2013	0.12		J	0.079	0.29	BJZ	U	0.16	1.2		U	0.27
MAK011O	9/16/2013	0.28		J	0.054	0.28		U	0.13	1.2		U	0.22
MAK015O	9/22/2013	0.13		J	0.036	0.16	BJZ	U	0.053	0.86		U	0.11
MAK016O	9/22/2013	0.18		J	0.037	0.2	BJZ	U	0.062	1.2		U	0.11
MAK017O	9/22/2013	0.039	U	U	0.039	0.16	BJZ	U	0.058	0.88		U	0.2
MAK018O	9/22/2013	0.11		J	0.039	0.14	BJZ	U	0.082	0.88		U	0.16
MAK024O	9/27/2013	1.2			0.18	0.57		U	0.2	4.1		U	0.39
Sea Cucumber (Loli)													
MAK010C	9/13/2013	0.23	U	U	0.23	0.47	U	U	0.47	0.76	U	U	0.76
MAK014C	9/13/2013	0.51			0.28	0.53	U	U	0.53	1.9	JZ		0.78
MAK020C	9/16/2013	1.7			0.11	0.23			0.11	3.5			0.13
MAK022C	9/16/2013	0.2			0.051	0.092	U	U	0.092	0.88			0.12
MAK024C	9/22/2013	0.27			0.033	0.084	JZ		0.064	0.9			0.12
MAK025C	9/22/2013	1.4			0.043	0.097	U	U	0.097	3.5			0.13
MAK026C	9/22/2013	0.25			0.049	0.11	U	U	0.11	0.61	JZ		0.15
MAK027C	9/22/2013	0.11			0.044	0.088	U	U	0.088	0.49			0.15
Seaweed (Limu)													
MAK007L	9/16/2013	0.66		J	0.062	0.33		U	0.12	1.9		U	0.11
MAK009L	9/16/2013	0.38		J	0.052	0.18	JZ	U	0.11	1.1		U	0.096
MAK010L (comp)	9/16/2013	0.23		J	0.057	0.22		U	0.1	1.1		U	0.14
MAK044L	10/15/2013	0.37			0.053	0.18	BJZ	U	0.12	1.8		U	0.13
MAK045L	10/15/2013	0.46			0.075	0.26	BJZ	U	0.15	1.3		U	0.21
MAK046L	10/15/2013	0.3			0.079	0.23	BJZ	U	0.13	1.4		U	0.15
MAK047L	10/15/2013	0.73			0.043	0.24		U	0.079	2.2		U	0.079
MAK049L	10/15/2013	0.34		J	0.064	0.37		U	0.18	2.6			0.2
Ka'ena Point													
Octopus (He'e)													
MAK012O	9/22/2013	0.12		J	0.046	0.17	BJZ	U	0.077	1		U	0.11
MAK013O	9/22/2013	0.44		J	0.074	0.26	BJZ	U	0.12	2.5		U	0.14
MAK014O	9/23/2013	0.24		J	0.045	0.12	BJZ	U	0.066	0.95		U	0.18
MAK019O	9/23/2013	0.19		J	0.033	0.17	BJZ	U	0.069	0.84		U	0.13
MAK020O	9/23/2013	0.22		J	0.038	0.19		U	0.076	0.87		U	0.14
MAK021O	9/23/2013	0.2		J	0.037	0.18		U	0.068	0.83		U	0.14
MAK022O	9/23/2013	0.22		J	0.046	0.19		U	0.081	0.78	BJZ	U	0.14
MAK023O	9/23/2013	0.46		J	0.041	1.4		U	0.12	2.5		U	0.15
Sea Cucumber (Loli)													
MAK015C	9/13/2013	0.25	U	U	0.25	0.45	U	U	0.45	0.63	U	U	0.63
MAK018C	9/16/2013	0.27			0.13	0.3	U	U	0.3	1			0.41
MAK019C	9/16/2013	0.15	U	U	0.15	0.31	U	U	0.31	0.72	U	U	0.72
MAK028C	9/22/2013	0.04	U	U	0.04	0.36			0.076	0.54			0.098
MAK029C	9/23/2013	0.12			0.042	0.13			0.09	0.61			0.12
MAK030C	9/23/2013	0.089	U	U	0.089	0.14	U	U	0.14	0.31	U	U	0.31
MAK031C	9/23/2013	0.1			0.046	0.11			0.1	0.46			0.12
MAK032C	9/23/2013	0.2			0.046	0.09	JZ		0.077	0.44			0.07
Seaweed (*Limu*)													
MAK011L	9/16/2013	0.093		J	0.041	0.16	JZ	U	0.098	0.53		U	0.17
MAK030L	10/11/2013	0.3		J	0.042	0.18		U	0.091	1		U	0.14
MAK033L	10/11/2013	0.18		J	0.054	0.25		U	0.2	1.2		U	0.2
MAK034L	10/11/2013	0.19		J	0.062	0.18	U	U	0.18	1.1		U	0.18
MAK038L	10/11/2013	0.052	U	U	0.052	0.17	U	U	0.17	0.98		U	0.19
MAK041L	10/11/2013	0.19		J	0.065	0.23		U	0.17	0.74		U	0.2
MAK042L	10/11/2013	0.2		J	0.079	0.15	JZ	U	0.12	0.72		U	0.19
MAK043L	10/11/2013	0.23		J	0.057	0.15	JZ	U	0.14	1.6		U	0.15

		1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	Total HxCDD	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	Total HpCDF	1,2,3,4,6,7,8-HpCDD	Total HpCDD	OCDF	OCDD
Octopus (He'e) Samples	*number of samples analyzed*	16	16	16	16	16	16	16	16	16	16	16
	number of non-detect	15	16	16	8	16	16	4	15	1	16	16
	number of detections	1	0	0	8	0	0	12	1	15	0	0
	Frequency of Detection	6.3%	0.0%	0.0%	50.0%	0.0%	0.0%	75.0%	6.3%	93.8%	0.0%	0.0%
	Maximum Detected	0.10	0.11	0.13	0.27	0.11	0.10	0.37	1.20	1.20	1.40	4.10
	Standard Deviation	0.018	0.022	0.023	0.061	0.023	0.018	0.080	0.27	0.27	0.31	0.91
	Mean	0.049	0.056	0.052	0.082	0.060	0.049	0.092	0.22	0.28	0.29	1.40
Sea Cucumber (Loli) Samples	*number of samples analyzed*	16	16	16	16	16	16	16	16	16	16	16
	number of non-detect	15	15	14	11	10	15	11	5	5	10	4
	number of detections	1	1	2	5	6	1	5	11	11	6	12
	Frequency of Detection	6.3%	6.3%	12.5%	31.3%	37.5%	6.3%	31.3%	68.8%	68.8%	37.5%	75.0%
	Maximum Detected	0.24	0.25	0.26	0.55	0.18	0.24	0.22	0.89	1.70	0.53	3.50
	Standard Deviation	0.066	0.072	0.073	0.12	0.050	0.068	0.066	0.23	0.48	0.16	1.01
	Mean	0.10	0.11	0.10	0.15	0.073	0.10	0.095	0.26	0.37	0.22	1.08
Seaweed (Limu)Samples	*number of samples analyzed*	16	16	16	16	16	16	16	16	16	16	16
	number of non-detect	16	15	13	12	0	16	3	16	1	16	15
	number of detections	0	1	3	4	16	0	13	0	15	0	1
	Frequency of Detection	0.0%	6.3%	18.8%	25.0%	100.0%	0.0%	81.3%	0.0%	93.8%	0.0%	6.3%
	Maximum Detected	0.15	0.20	0.79	0.21	0.13	0.08	0.24	0.34	0.73	0.37	2.60
	Standard Deviation	0.030	0.038	0.20	0.041	0.019	0.012	0.063	0.069	0.19	0.063	0.56
	Mean	0.10	0.11	0.19	0.14	0.10	0.06	0.11	0.20	0.31	0.22	1.33

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Explosives

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	Analyte	Perchlorate					2,4-Dinitrotoluene[2]					2,4-Dinitrotoluene[3]					2,4-Dinitrotoluene[4]					Hexahydro-trinitro-triazine (RDX)					Nitroglycerine				
	CAS Number	14797-73-0					121-14-2					121-14-2					121-14-2					121-82-4					55-63-0				
	Units	µ g/Kg					µg/Kg					µg/Kg					µg/Kg					µg/Kg					µg/Kg				
	Laboratory/Analytical Method	TestAmerica Sacramento/EPA 6850					ARDL/EPA 8330A					ARDL/EPA 8270C					ERDC/EPA 8330					ARDL/EPA 8330A					ARDL/EPA 8330A				
Lab ID	Collection Date	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result[5]	LQ	VQ	RL[5]	MDL[5]	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL
Mokulē'ia																															
Octopus (He'e)																															
MAK009O	9/13/2013	0.29	U	UJ	9.6	0.29	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
MAK010O	9/16/2013	0.29	U	UJ	9.7	0.29	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
MAK011O	9/16/2013	0.29	U	UJ	9.8	0.29	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
MAK015O	9/22/2013	0.29	U	UJ	9.7	0.29	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
MAK016O	9/22/2013	0.29	U	UJ	9.7	0.29	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
MAK017O	9/22/2013	0.28	U	UJ	9.5	0.28	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
MAK018O	9/22/2013	0.30	U	UJ	10	0.30	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
MAK024O	9/27/2013	0.29	U	UJ	9.6	0.29	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
Sea Cucumber (Loli)																															
MAK010C	9/13/2013	0.29	U		9.7	0.29	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
MAK014C	9/13/2013	0.29	U		9.8	0.29	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
MAK020C	9/16/2013	0.30	U		9.9	0.30	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
MAK022C	9/16/2013	0.29	U		9.7	0.29	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
MAK024C	9/22/2013	0.29	U		9.8	0.29	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
MAK025C	9/22/2013	0.29	U		9.8	0.29	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
MAK026C	9/22/2013	0.30	U		10	0.30	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
MAK027C	9/22/2013	0.29	U		9.7	0.29	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
Seaweed (Limu kohu)																															
MAK007L	9/16/2013	0.32	J	J	9.8	0.29	--			--	--	**1000**		U	1000	200	100		U	100	10	**500**	U	U	500	200	**500**	U	U	500	300
MAK009L	9/16/2013	2.1	J	J	9.6	0.29	--			--	--	**1000**		U	1000	200	100		U	100	10	**500**	U	U	500	200	**500**	U	U	500	300
MAK010L (comp)	9/16/2013	0.70	J	J	9.8	0.29	--			--	--	**1000**		U	1000	200	100		U	100	10	**500**	U	U	500	200	**500**	U	U	500	300
MAK044L	10/15/2013	0.29	U	UJ	9.7	0.29	--			--	--	**1000**		U	1000	200	100		U	100	10	**500**	U	U	500	200	**500**	U	U	500	300
MAK045L	10/15/2013	3.9	J	J	10	0.30	--			--	--	**1000**		U	1000	200	100		U	100	10	**500**	U	U	500	200	**500**	U	U	500	300
MAK046L	10/15/2013	0.38	J	J	9.8	0.29	--			--	--	**1000**		U	1000	200	100		U	100	10	**500**	U	U	500	200	**500**	U	U	500	300
MAK047L	10/15/2013	1.3	J	J	9.5	0.28	--			--	--	**1000**		U	1000	200	100		U	100	10	**500**	U	U	500	200	**500**	U	U	500	300
MAK049L	10/15/2013	1.7	J	J	9.8	0.29	--			--	--	**1000**		U	1000	200	100		U	100	10	**500**	U	U	500	200	**500**	U	U	500	300
Ka'ena Point																															
Octopus (He'e)																															
MAK012O	9/22/2013	0.29	U	UJ	9.6	0.29	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
MAK013O	9/22/2013	0.28	U	UJ	9.5	0.29	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
MAK014O	9/23/2013	0.29	U	UJ	9.7	0.29	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
MAK019O	9/23/2013	0.29	U	UJ	9.8	0.29	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
MAK020O	9/23/2013	0.29	U	UJ	9.6	0.29	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
MAK021O	9/23/2013	0.29	U	UJ	9.6	0.29	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
MAK022O	9/23/2013	0.29	U	UJ	9.7	0.29	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
MAK023O	9/23/2013	0.30	U	UJ	9.9	0.30	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
Sea Cucumber (Loli)																															
MAK015C	9/13/2013	0.30	U		9.9	0.30	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
MAK018C	9/16/2013	0.29	U		9.6	0.29	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
MAK019C	9/16/2013	0.30	U		9.9	0.30	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
MAK028C	9/22/2013	0.30	U		9.9	0.30	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
MAK029C	9/23/2013	0.58	J	J	10	0.30	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
MAK030C	9/23/2013	0.29	U		9.7	0.29	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
MAK031C	9/23/2013	0.29	U		9.7	0.29	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
MAK032C	9/23/2013	0.30	U		10	0.30	**500**	U	U	500	100	--			--	--	--			--	--	**500**	U	U	500	200	**500**	U	U	500	300
Seaweed (Limu kohu)																															
MAK011L	9/16/2013	0.30	U	UJ	9.9	0.30	--			--	--	**1000**		U	1000	200	100		U	100	10	**500**	U	U	500	200	**500**	U	U	500	300
MAK030L	10/11/2013	0.29	U	UJ	9.8	0.29	--			--	--	**1000**		U	1000	200	100		U	100	10	**500**	U	U	500	200	**500**	U	U	500	300
MAK033L	10/11/2013	0.38	J	J	9.5	0.28	--			--	--	**1000**		U	1000	200	100		U	100	10	**500**	U	U	500	200	**500**	U	U	500	300
MAK034L	10/11/2013	0.53	J	J	9.8	0.29	--			--	--	**1000**		U	1000	200	100		U	100	10	**500**	U	U	500	200	**500**	U	U	500	300
MAK038L	10/11/2013	0.30	U	UJ	10	0.30	--			--	--	**1000**		U	1000	200	100		U	100	10	**500**	U	U	500	200	**500**	U	U	500	300
MAK041L	10/11/2013	0.30	J	J	9.9	0.30	--			--	--	**1000**		U	1000	200	100		U	100	10	**500**	U	U	500	200	**500**	U	U	500	300
MAK042L	10/11/2013	0.55	J	J	9.6	0.29	--			--	--	**1000**		U	1000	200	100		U	100	10	**500**	U	U	500	200	**500**	U	U	500	300
MAK043L	10/11/2013	0.45	J	J	9.7	0.29	--			--	--	**1000**		U	1000	200	100		U	100	10	**500**	U	U	500	200	**500**	U	U	500	300

Octopus (He'e) Samples	*number of samples analyzed*	*16*	*16*	*0*	*0*	*16*	*16*
	number of non-detect	*16*	*16*	*0*	*0*	*16*	*16*
	number of detections	*0*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*0.0%*	*-*	*-*	*0.0%*	*0.0%*
	Maximum Detected	*0.30*	*500*	*0*	*0*	*500*	*500*
	Standard Deviation	*0.005*	*0.00*	*-*	*-*	*0.00*	*0.00*
	Mean	*0.29*	*500.00*	*-*	*-*	*500.00*	*500.00*

Sea Cucumber (Loli) Samples	*number of samples analyzed*	*16*	*16*	*0*	*0*	*16*	*16*
	number of non-detect	*15*	*16*	*0*	*0*	*16*	*16*
	number of detections	*1*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*6.3%*	*0.0%*	*-*	*-*	*0.0%*	*0.0%*
	Maximum Detected	*0.58*	*500*	*0*	*0*	*500*	*500*
	Standard Deviation	*0.072*	*0.00*	*-*	*-*	*0.00*	*0.00*
	Mean	*0.31*	*500.00*	*-*	*-*	*500.00*	*500.00*

Seaweed (Limu)Samples	*number of samples analyzed*	*16*	*0*	*16*	*16*	*16*	*16*
	number of non-detect	*4*	*0*	*16*	*16*	*16*	*16*
	number of detections	*12*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*75.0%*	*-*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	*3.9*	*0*	*1000*	*100*	*500*	*500*
	Standard Deviation	*0.98*	*-*	*0.00*	*0.00*	*0.00*	*0.00*
	Mean	*0.86*	*-*	*1000.00*	*100.00*	*500.00*	*500.00*

Notes:

[2] Applied Research Development Laboratory, Inc. (ARDL) encountered matrix interference problems in seaweed samples with the 8330A (HPLC) analysis of this analyte . Therefore the 8270C data for these samples were reprocessed to add a result for 2,4-dinitro

[3] 2,4-dinitrotoluene results for seaweed from reprocessed 8270C data (conducted by ARDL

[4] U.S. Army Engineer Research and Development Center (ERDC) analyzed the seaweed samples for 2,4-dinitrotoluene using EPA Method 833

[5] For consistency, the results, RL, and MDL were converted to µg/Kg. The RL was converted from 0.100 mg/Kg to 100 µg/Kg and the MDL was converted from 0.010 mg/kg to 10 µg

Bold results exceed the project screening values.

CAS - Chemical Abstracts Service

ID - identification

-- - not analyzed

EPA - United States Environmental Protection Agency

µg/Kg - micrograms per kilogram

MDL - method detection limit

RL - reporting limit

Laboratory qualifier (LQ) - ARDL

J - Indicates an estimated value. This flag is used when estimating a concentration of a compound that meets identification criteria but the result is less than the quantitation or reporting limit but greater than the method detection limit.

U - Indicates compound was analyzed for but not detected. The sample quantitation limit must be corrected for dilutionand for percent moisture. These results are presented as "ND" in the ARDL laboratory reports but are reported as the RL value with a "U" qualifier in this table.

LQ - TestAmerica Sacramento

J - Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate val

U - Indicates the compound was not detected at the RL (or MDL is shown). The results are presented as "ND" in the TestAmerica laboratory reports but are reported as the MDL value with a "U" qualifier in the SEDD and thus this

LQ - ERDC

U - Indicates a compound was analyzed for but not detected at or above the RL. These results are presented as "ND" in the ERDC laboratory report but are reported as the RL value with a "U" qualifier in this

Validator qualifier (VQ)

J - Indicates an estimated value.

U - Indicates the compound or analyte was analyzed for but not detected at or above the stated lin

UJ - Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated va

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Metals

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	Analyte	Inorganic Arsenic					Arsenic(III)					Arsenic(V)					Dimethyl Arsenic					Monomethyl Arsenic				
	CAS Number	7440-38-2 (Inorg)					22569-72-8					12523-21-6					75-60-5					7440-38-2 (MMA)				
	Units	mg/kg					mg/kg					mg/kg					mg/kg					mg/kg				
Lab ID	**Collection Date**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**
Mokulēʻia																										
***Octopus* (*Heʻe*)**																										
MAK009O	9/13/2013	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.024			0.011	0.004	0.004	U		0.011	0.004
MAK010O	9/16/2013	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.016			0.011	0.004	0.004	U		0.011	0.004
MAK011O	9/16/2013	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.016			0.011	0.004	0.004	U		0.011	0.004
MAK015O	9/22/2013	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.023			0.011	0.004	0.004	U		0.011	0.004
MAK016O	9/22/2013	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.031			0.011	0.004	0.004	U		0.011	0.004
MAK017O	9/22/2013	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.019			0.011	0.004	0.004	U		0.011	0.004
MAK018O	9/22/2013	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.012			0.011	0.004	0.004	U		0.011	0.004
MAK024O	9/27/2013	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.01	B	J	0.011	0.004	0.004	U		0.011	0.004
***Sea Cucumber* (*Loli*)**																										
MAK010C	9/13/2013	0.015			0.01	0.004	0.004	U		0.01	0.004	0.011			0.01	0.004	0.004	U		0.012	0.004	0.004	U		0.012	0.004
MAK014C	9/13/2013	0.014			0.01	0.004	0.007	B	J	0.01	0.004	0.008	B	J	0.01	0.004	0.009	B	J	0.011	0.004	0.004	U		0.011	0.004
MAK020C	9/16/2013	0.024			0.01	0.004	0.012			0.01	0.004	0.012			0.01	0.004	0.007	B	J	0.012	0.004	0.004	U		0.012	0.004
MAK022C	9/16/2013	0.022			0.009	0.004	0.019			0.009	0.004	0.004	U		0.009	0.004	0.016			0.011	0.004	0.004	U		0.011	0.004
MAK024C	9/22/2013	0.01			0.009	0.003	0.004	B	J	0.009	0.003	0.006	B	J	0.009	0.003	0.006	B	J	0.01	0.003	0.003	U		0.01	0.003
MAK025C	9/22/2013	0.023			0.009	0.004	0.014			0.009	0.004	0.009			0.009	0.004	0.007	B	J	0.011	0.004	0.004	U		0.011	0.004
MAK026C	9/22/2013	0.008	B	J	0.009	0.004	0.004	U		0.009	0.004	0.008	B	J	0.009	0.004	0.004	U		0.011	0.004	0.004	U		0.011	0.004
MAK027C	9/22/2013	0.012			0.009	0.004	0.004	U		0.009	0.004	0.012			0.009	0.004	0.005	B	J	0.011	0.004	0.004	U		0.011	0.004
Seaweed (Limu)																										
MAK007L	9/16/2013	1.46			0.196	0.078	1.28			0.196	0.078	0.182	B	J	0.196	0.078	0.3		J	0.023	0.008	0.008	U		0.023	0.008
MAK009L	9/16/2013	1.11			0.198	0.079	0.941			0.198	0.079	0.174	B	J	0.198	0.079	0.267		J	0.024	0.008	0.008	U		0.024	0.008
MAK010L (comp)	9/16/2013	1.54			0.197	0.079	1.32			0.197	0.079	0.217			0.197	0.079	0.276		J	0.024	0.008	0.008	U		0.024	0.008
MAK044L	10/15/2013	1.66			0.198	0.079	1.12			0.198	0.079	0.535			0.198	0.079	0.103		J	0.024	0.008	0.008	U		0.024	0.008
MAK045L	10/15/2013	0.727			0.195	0.078	0.666			0.195	0.078	0.078	U		0.195	0.078	0.287		J	0.023	0.008	0.008	U		0.023	0.008
MAK046L	10/15/2013	0.744			0.195	0.078	0.644			0.195	0.078	0.1	B	J	0.195	0.078	0.193		J	0.023	0.008	0.008	U		0.023	0.008
MAK047L	10/15/2013	0.945			0.197	0.079	0.748			0.197	0.079	0.196	B	J	0.197	0.079	0.258		J	0.024	0.008	0.008	U		0.024	0.008
MAK049L	10/15/2013	0.619			0.195	0.078	0.53			0.195	0.078	0.089	B	J	0.195	0.078	0.218		J	0.023	0.008	0.008	U		0.023	0.008
Kaʻena Point																										
***Octopus* (*Heʻe*)**																										
MAK012O	9/22/2013	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.007	B	J	0.011	0.004	0.004	U		0.011	0.004
MAK013O	9/22/2013	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.008	B	J	0.011	0.004	0.004	U		0.011	0.004
MAK014O	9/23/2013	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.018			0.012	0.004	0.004	U		0.012	0.004
MAK019O	9/23/2013	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.013			0.011	0.004	0.007	B	J	0.011	0.004
MAK020O	9/23/2013	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.018			0.011	0.004	0.004	U		0.011	0.004
MAK021O	9/23/2013	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.021			0.012	0.004	0.004	U		0.012	0.004
MAK022O	9/23/2013	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.026			0.011	0.004	0.004	U		0.011	0.004
MAK023O	9/23/2013	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.018			0.012	0.004	0.004	U		0.012	0.004
***Sea Cucumber* (*Loli*)**																										
MAK015C	9/13/2013	0.016			0.009	0.004	0.014			0.009	0.004	0.004	U		0.009	0.004	0.006	B	J	0.011	0.004	0.004	U		0.011	0.004
MAK018C	9/16/2013	0.017			0.009	0.004	0.016			0.009	0.004	0.004	U		0.009	0.004	0.008	B	J	0.011	0.004	0.004	U		0.011	0.004
MAK019C	9/16/2013	0.019			0.009	0.004	0.011			0.009	0.004	0.009			0.009	0.004	0.008	B	J	0.011	0.004	0.004	U		0.011	0.004
MAK028C	9/22/2013	0.01	B		0.01	0.004	0.004	U		0.01	0.004	0.01			0.01	0.004	0.004	U		0.012	0.004	0.004	U		0.012	0.004
MAK029C	9/23/2013	0.009	B	J	0.01	0.004	0.004	U		0.01	0.004	0.009	B	J	0.01	0.004	0.004	U		0.012	0.004	0.004	U		0.012	0.004
MAK030C	9/23/2013	0.009	B		0.009	0.004	0.004	U		0.009	0.004	0.005	B	J	0.009	0.004	0.004	U		0.011	0.004	0.004	U		0.011	0.004
MAK031C	9/23/2013	0.016			0.009	0.004	0.004	U		0.009	0.004	0.013			0.009	0.004	0.004	U		0.011	0.004	0.004	U		0.011	0.004
MAK032C	9/23/2013	0.008	B	J	0.01	0.004	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.004	U		0.012	0.004	0.004	U		0.012	0.004
Seaweed (*Limu*)																										
MAK011L	9/16/2013	0.512			0.197	0.079	0.42			0.197	0.079	0.092	B	J	0.197	0.079	0.287		J	0.024	0.008	0.008	U		0.024	0.008
MAK030L	10/11/2013	1.3			0.195	0.078	1.11			0.195	0.078	0.189	B	J	0.195	0.078	0.141		J	0.023	0.008	0.008	U		0.023	0.008
MAK033L	10/11/2013	1.61			0.199	0.08	1.45			0.199	0.08	0.165	B	J	0.199	0.08	0.142		J	0.024	0.008	0.008	U		0.024	0.008
MAK034L	10/11/2013	1.36			0.195	0.078	1.19			0.195	0.078	0.177	B	J	0.195	0.078	0.138		J	0.023	0.008	0.008	U		0.023	0.008
MAK038L	10/11/2013	1.03			0.197	0.079	0.844			0.197	0.079	0.183	B	J	0.197	0.079	0.124		J	0.024	0.008	0.008	U		0.024	0.008
MAK041L	10/11/2013	0.757			0.199	0.08	0.703			0.199	0.08	0.08	U		0.199	0.08	0.161		J	0.024	0.008	0.011	B	J	0.024	0.008
MAK042L	10/11/2013	0.765			0.199	0.08	0.678			0.199	0.08	0.087	B	J	0.199	0.08	0.19		J	0.024	0.008	0.008	U		0.024	0.008
MAK043L	10/11/2013	0.766			0.2	0.08	0.733			0.2	0.08	0.08	U		0.2	0.08	0.197		J	0.024	0.008	0.008	U		0.024	0.008

Octopus (Heʻe) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*16*	*16*	*0*	*15*
	number of detections	*0*	*0*	*0*	*16*	*1*
	Frequency of Detection	*0.0%*	*0.0%*	*0.0%*	*100.0%*	*6.3%*
	Maximum Detected	*0.004*	*0.004*	*0.004*	*0.031*	*0.007*
	Standard Deviation	*0.00*	*0.00*	*0.00*	*0.007*	*0.0008*
	Mean	*0.0040*	*0.0040*	*0.0040*	*0.018*	*0.004*

Sea Cucumber (Loli) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*0*	*8*	*4*	*7*	*16*
	number of detections	*16*	*8*	*12*	*9*	*0*
	Frequency of Detection	*100.0%*	*50.0%*	*75.0%*	*56.3%*	*0.0%*
	Maximum Detected	*0.024*	*0.019*	*0.013*	*0.016*	*0.004*
	Standard Deviation	*0.005*	*0.005*	*0.0032*	*0.0031*	*0.00025*
	Mean	*0.015*	*0.008*	*0.008*	*0.006*	*0.004*

Seaweed (Limu)Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*0*	*0*	*3*	*0*	*15*
	number of detections	*16*	*16*	*13*	*16*	*1*
	Frequency of Detection	*100.0%*	*100.0%*	*81.3%*	*100.0%*	*6.3%*
	Maximum Detected	*1.66*	*1.45*	*0.535*	*0.300*	*0.011*
	Standard Deviation	*0.38*	*0.31*	*0.11*	*0.066*	*0.00075*
	Mean	*1.06*	*0.90*	*0.16*	*0.21*	*0.008*

Notes:

CAS - Chemical Abstracts Service
ID - identification
MDL - method detection limit
mg/kg - milligrams per kilogram
RL - reporting limit

Laboratory qualifier (LQ)

B - Detected by the instrument, the result is greater than the MDL but less than or equal to the RL. Result is reported and considered an estimate.
N - Spike recovery was not within acceptance criteria. Result is estimated.
U - Result is less than or equal to the MDL or client requested reporting limit (CRRL). Result is reported as the MDL or CRRL.

Validator qualifier (VQ)

J - Indicates an estimated value.
UJ - Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

Draft

Lab ID	Collection Date	Aluminum					Antimony					Arsenic					Barium					Beryllium					Cadmium					Chromium					Cobalt					Copper					Iron				
Analyte		Aluminum					Antimony					Arsenic					Barium					Beryllium					Cadmium					Chromium					Cobalt					Copper					Iron				
CAS Number		7429-90-5					7440-36-0					7440-38-2					7440-39-3					7440-41-7					7440-43-9					7440-47-3					7440-48-4					7440-50-8					7439-89-6				
Units		mg/kg					mg/kg					mg/kg					mg/kg					mg/kg					mg/kg					mg/kg					mg/kg					mg/kg					mg/kg				
		Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL
Mokulê'ia																																																			
Octopus (He'e)																																																			
MAK009O	9/13/2013	0.71			0.68	0.12	0.006	U		0.02	0.006	18.2			0.034	0.012	0.03	U		0.14	0.03	0.03	U		0.08	0.03	0.006	U		0.02	0.006	**0.106**	U		0.102	0.015	0.02	U		0.14	0.02	7.49			0.14	0.03	1.51	U		0.681	0.068
MAK010O	9/16/2013	0.29	B	J	0.72	0.13	0.006	U		0.02	0.006	21.7	J		0.036	0.013	0.03	U		0.14	0.03	0.03	U		0.08	0.03	0.006	U		0.02	0.006	0.03	B	U	0.107	0.016	0.02	U		0.14	0.02	7.25			0.14	0.03	1.38	U		0.716	0.072
MAK011O	9/16/2013	0.24	B	J	0.7	0.12	0.006	U		0.02	0.006	22.8			0.035	0.012	0.03	U		0.14	0.03	0.03	U		0.08	0.03	0.006	U		0.02	0.006	0.016	U		0.106	0.016	0.02	U		0.14	0.02	5.99			0.14	0.03	0.873	U		0.704	0.07
MAK015O	9/22/2013	0.56	B	J	0.79	0.14	0.007	U		0.02	0.007	36.2			0.039	0.014	0.03	U		0.16	0.03	0.03	U		0.09	0.03	0.05			0.02	0.007	0.018	U		0.118	0.018	0.02	U		0.16	0.02	6.35			0.16	0.03	1.41	U		0.789	0.079
MAK016O	9/22/2013	4.27			0.74	0.13	0.006	U		0.02	0.006	29.3			0.037	0.013	0.03	U		0.15	0.03	0.03	U		0.08	0.03	0.006	U		0.02	0.006	**0.094**	B	U	0.111	0.017	0.02	U		0.15	0.02	12.2			0.15	0.03	1.51	U		0.738	0.074
MAK017O	9/22/2013	0.66	B	J	0.74	0.13	0.007	U		0.02	0.007	37.5			0.037	0.013	0.03	U		0.15	0.03	0.03	U		0.08	0.03	0.008	B	J	0.02	0.007	**0.388**			0.112	0.017	0.02	U		0.15	0.02	8.89			0.15	0.03	1.02	U		0.743	0.074
MAK018O	9/22/2013	0.52	B	J	0.7	0.12	0.006	U		0.02	0.006	40.3			0.035	0.012	0.03	U		0.14	0.03	0.03	U		0.08	0.03	0.006	U		0.02	0.006	0.024	B	U	0.105	0.016	0.02	U		0.14	0.02	5.72			0.14	0.03	1.06	U		0.698	0.07
MAK024O	9/27/2013	0.29	B	J	0.7	0.12	0.006	U		0.02	0.006	35.1			0.035	0.012	0.03	U		0.14	0.03	0.03	U		0.08	0.03	0.006	U		0.02	0.006	0.027	B	U	0.105	0.016	0.02	U		0.14	0.02	4.13			0.14	0.03	1.42	U		0.699	0.07
Sea Cucumber (Loli)																																																			
MAK010C	9/13/2013	0.4	B	J	0.74	0.13	0.006	U		0.02	0.006	0.584			0.037	0.013	0.07	B	J	0.15	0.03	0.03	U		0.08	0.03	0.006	U		0.02	0.006	0.062	B	U	0.111	0.017	0.02	U		0.15	0.02	0.35			0.15	0.03	2.37	U		0.742	0.074
MAK014C	9/13/2013	0.86			0.71	0.12	0.006	U		0.02	0.006	6.01			0.036	0.012	0.03	U		0.14	0.03	0.03	U		0.08	0.03	0.006	U		0.02	0.006	0.065	B	U	0.107	0.016	0.02	U		0.14	0.02	11.2			0.14	0.03	1.96	U		0.71	0.071
MAK020C	9/16/2013	2.84			0.78	0.14	0.007	U		0.02	0.007	8.71			0.039	0.014	0.03	U		0.16	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007	0.05	B	U	0.117	0.018	0.02	U		0.16	0.02	52.7			0.16	0.03	6.34			0.783	0.078
MAK022C	9/16/2013	0.35	B	J	0.74	0.13	0.006	U		0.02	0.006	16.6			0.037	0.013	0.05	B	J	0.15	0.03	0.03	U		0.08	0.03	0.006	U		0.02	0.006	0.069	B	U	0.11	0.017	0.02	U		0.15	0.02	0.6			0.15	0.03	2.32	U		0.737	0.074
MAK024C	9/22/2013	1.53			0.75	0.13	0.007	U		0.02	0.007	0.7			0.038	0.013	0.05	B	J	0.15	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007	**0.105**	B	U	0.113	0.017	0.02	U		0.15	0.02	0.48			0.15	0.03	3.5			0.752	0.075
MAK025C	9/22/2013	0.61	B	J	0.8	0.14	0.007	U		0.02	0.007	5.28			0.04	0.014	0.03	U		0.16	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007	0.04	B	U	0.12	0.018	0.02	U		0.16	0.02	4.09			0.16	0.03	2.97	U		0.8	0.08
MAK026C	9/22/2013	0.59	B	J	0.71	0.12	0.006	U		0.02	0.006	0.526			0.035	0.012	0.05	B	J	0.14	0.03	0.03	U		0.08	0.03	0.006	U		0.02	0.006	0.065	B	U	0.106	0.016	0.02	U		0.142	0.02	0.35			0.14	0.03	2.11	U		0.709	0.071
MAK027C	9/22/2013	1.72			0.69	0.12	0.006	U		0.02	0.006	0.483			0.034	0.012	0.07	B	J	0.14	0.03	0.03	U		0.08	0.03	0.006	U		0.02	0.006	0.062	B	U	0.103	0.015	0.02	U		0.14	0.02	0.44			0.14	0.03	3.74			0.688	0.069
Seaweed (Limu)																																																			
MAK007L	9/16/2013	630	M	J	0.8	0.14	0.03	N	J	0.02	0.007	3.76			0.04	0.014	2.05			0.16	0.03	0.03	U		0.09	0.03	0.09			0.02	0.007	**4.19**	M	J	0.12	0.018	0.32			0.16	0.02	0.87			0.16	0.03	932	M	J	0.797	0.08
MAK009L	9/16/2013	190			0.75	0.13	0.008	B	J	0.02	0.007	2.62			0.038	0.013	1.56			0.15	0.03	0.03	U		0.08	0.03	0.05			0.02	0.007	**1.71**			0.113	0.017	0.13	B	J	0.15	0.02	0.55			0.15	0.03	312			0.752	0.075
MAK010L (comp)	9/16/2013	423			0.79	0.14	0.01	B	J	0.02	0.007	3.2			0.04	0.014	2.09			0.16	0.03	0.03	U		0.09	0.03	0.08			0.02	0.007	**3.08**			0.119	0.018	0.23			0.16	0.02	0.66			0.16	0.03	641			0.791	0.079
MAK044L	10/15/2013	269			0.78	0.14	0.007	U		0.02	0.007	2.15			0.039	0.014	1.33			0.16	0.03	0.03	U		0.09	0.03	0.06			0.02	0.007	**2.01**			0.117	0.018	0.14	B	J	0.16	0.02	0.4			0.16	0.03	422			0.778	0.078
MAK045L	10/15/2013	117			0.79	0.14	0.007	U		0.02	0.007	2.55			0.04	0.014	3.11			0.16	0.03	0.03	U		0.09	0.03	0.04			0.02	0.007	**0.766**			0.119	0.018	0.09	B	J	0.16	0.02	0.41			0.16	0.03	184			0.794	0.079
MAK046L	10/15/2013	276			0.76	0.13	0.007	UJ,N	UJ	0.02	0.007	2.21			0.038	0.013	1.95			0.15	0.03	0.03	U		0.09	0.03	0.06			0.02	0.007	**2.34**			0.113	0.017	0.16			0.15	0.02	0.49			0.15	0.03	469			0.756	0.076
MAK047L	10/15/2013	397			0.73	0.13	0.02	B		0.02	0.006	2.14			0.037	0.013	1.77			0.15	0.03	0.03	U		0.08	0.03	0.03			0.02	0.006	**1.93**			0.11	0.017	0.21			0.15	0.02	0.66			0.15	0.03	592			0.734	0.073
MAK049L	10/15/2013	448			0.76	0.13	0.01	B	J	0.02	0.007	2.68			0.038	0.013	1.4			0.15	0.03	0.03	U		0.09	0.03	0.04			0.02	0.007	**2.04**			0.114	0.017	0.21			0.15	0.02	0.83			0.15	0.03	645			0.762	0.076
Ka'ena Point																																																			
Octopus (He'e)																																																			
MAK012O	9/22/2013	0.76	B		0.76	0.13	0.007	U		0.02	0.007	21.8			0.038	0.013	0.03	U		0.15	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007	**0.192**			0.115	0.017	0.02	U		0.15	0.02	5.49			0.15	0.03	2.46	U		0.765	0.076
MAK013O	9/22/2013	0.97			0.74	0.13	0.006	U		0.02	0.006	28			0.037	0.013	0.03	U		0.15	0.03	0.03	U		0.08	0.03	0.006	U		0.02	0.006	**0.116**		U	0.111	0.017	0.02	U		0.15	0.02	8			0.15	0.03	1.76	U		0.741	0.074
MAK014O	9/23/2013	0.63	B	J	0.68	0.12	0.006	U		0.02	0.006	29.8			0.034	0.012	0.03	U		0.14	0.03	0.03	U		0.08	0.03	0.006	U		0.02	0.006	0.019	B	U	0.101	0.015	0.02	U		0.14	0.02	6.8			0.14	0.03	0.826	U		0.676	0.068
MAK019O	9/23/2013	0.16	B	J	0.75	0.13	0.007	U		0.02	0.007	23.7			0.037	0.013	0.03	U		0.15	0.03	0.03	U		0.08	0.03	0.02	B	J	0.02	0.007	**0.142**		U	0.112	0.017	0.02	U		0.15	0.02	4.68			0.15	0.03	2.36	U		0.749	0.075
MAK020O	9/23/2013	0.13	U		0.76	0.13	0.007	U		0.02	0.007	24.8			0.038	0.013	0.03	U		0.15	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007	0.018	B	U	0.114	0.017	0.02	U		0.15	0.02	10.7			0.15	0.03	0.849	U		0.76	0.076
MAK021O	9/23/2013	0.19	B	J	0.78	0.14	0.007	U		0.02	0.007	23.7			0.039	0.014	0.03	U		0.16	0.03	0.03	U		0.09	0.03	0.01	B	J	0.02	0.007	0.033	B	U	0.117	0.018	0.02	U		0.16	0.02	3.63			0.16	0.03	0.813	U		0.778	0.078
MAK022O	9/23/2013	0.57	B	J	0.8	0.14	0.007	U		0.02	0.007	26.8			0.04	0.014	0.03	U		0.16	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007	0.04	B	U	0.119	0.018	0.02	U		0.16	0.02	5.73			0.16	0.03	0.901	U		0.795	0.08
MAK023O	9/23/2013	0.23	B	J	0.69	0.12	0.01	B	J	0.02	0.006	26.3			0.034	0.012	0.03	U		0.14	0.03	0.03	U		0.08	0.03	0.007	B	J	0.02	0.006	0.015	U		0.103	0.015	0.02	U		0.14	0.02	4.28			0.14	0.03	0.892	U		0.687	0.069
Sea Cucumber (Loli)																																																			
MAK015C	9/13/2013	1.64			0.77	0.14	0.007	U		0.02	0.007	11.6			0.039	0.014	0.03	U		0.15	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007	**0.089**	B	U	0.116	0.017	0.04	B	J	0.15	0.02	0.49			0.15	0.03	3.24	U		0.774	0.077
MAK018C	9/16/2013	0.38	B	J	0.73	0.13	0.006	U		0.02	0.006	18.4			0.036	0.013	0.03	U		0.15	0.03	0.03	U		0.08	0.03	0.006	U		0.02	0.006	0.034	B	U	0.109	0.016	0.02	U		0.15	0.02	0.44			0.15	0.03	1.93	U		0.729	0.073
MAK019C	9/16/2013	0.29	B	J	0.73	0.13	0.006	U		0.02	0.006	18.5			0.036	0.013	0.03	U		0.15	0.03	0.03	U		0.08	0.03	0.006	U		0.02	0.006	0.038	B	U	0.109	0.016	0.02	U		0.15	0.02	12.4			0.15	0.03	1.4	U		0.73	0.073
MAK028C	9/22/2013	0.95			0.86	0.15	0.008	U		0.02	0.008	0.38			0.043	0.015	0.07	B	J	0.17	0.03	0.03	U		0.10	0.03	0.008	U		0.02	0.008	**0.084**	B	U	0.129	0.019	0.02	U		0.17	0.02	0.5			0.17	0.03	2.34	U		0.862	0.086
MAK029C	9/23/2013	0.6	B	J	0.72	0.13	0.006	U		0.02	0.006	0.516			0.036	0.013	0.08	B	J	0.14	0.03	0.03	U		0.08	0.03	0.006	U		0.02	0.006	0.069	B	U	0.108	0.016	0.02	U		0.14	0.02	3.21			0.14	0.03	3.34			0.722	0.072
MAK030C	9/23/2013	0.22	B	J	0.8	0.14	0.007	U		0.02	0.007	0.508			0.04	0.014	0.04	B	J	0.16	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007	0.036	B	U	0.12	0.018	0.02	U		0.16	0.02	0.95	M,N	J	0.16	0.03	1.27	U		0.797	0.08
MAK031C	9/23/2013	2.75			0.75	0.13	0.007	U		0.02	0.007	0.688			0.037	0.013	0.06	B	J	0.15	0.03	0.03	U		0.08	0.03	0.007	U		0.02	0.007	**0.107**	B	U	0.112	0.017	0.02	U		0.15	0.02	0.51			0.15	0.03	14.7			0.749	0.075
MAK032C	9/23/2013	0.55	B	J	0.7	0.12	0.006	U		0.02	0.006	0.477			0.035	0.012	0.06	B	J	0.14	0.03	0.03	U		0.08	0.03	0.006	U		0.02	0.006	**0.121**		U	0.105	0.016	0.02	U		0.14	0.02	0.4			0.14	0.03	2.53	U		0.7	0.07
Seaweed (Limu)																																																			
MAK011L	9/16/2013	31.6			0.79	0.14	0.007	U		0.02	0.007	2.25			0.039	0.014	0.44			0.16	0.03	0.03	U		0.09	0.03	0.07			0.02	0.007	**0.164**			0.118	0.018	0.05	B	J	0.16	0.02	0.43			0.16	0.03	46.6			0.786	0.079
MAK030L	10/11/2013	156			0.77	0.13	0.007	U		0.02	0.007	1.93			0.038	0.013	1.06			0.15	0.03	0.03	U		0.09	0.03	0.06			0.02	0.007	**1.4**			0.115	0.017	0.16			0.15	0.02	0.41			0.15	0.03	345			0.768	0.077
MAK033L	10/11/2013	240			0.78	0.14	0.008	B	J	0.02	0.007	2.72			0.039	0.014	1.65			0.16	0.03	0.03	U		0.09	0.03	0.07			0.02	0.007	**1.55**			0.117	0.018	0.17			0.16	0.02	0.71			0.16	0.03	457			0.778	0.078
MAK034L	10/11/2013	222			0.77	0.13	0.007	U		0.02	0.007	2.29			0.038	0.013	1.26			0.15	0.03	0.03	U		0.09	0.03	0.07			0.02	0.007	**1.43**			0.115	0.017	0.16			0.15	0.02	0.57			0.15	0.03	445			0.768	0.077
MAK038L	10/11/2013	273			0.74	0.13	0.02	B		0.02	0.006	2.06			0.037	0.013	1.52			0.15	0.03	0.03	U		0.08	0.03	0.05			0.02	0.006	**2.1**			0.111	0.017	0.35			0.15	0.02	0.56			0.15	0.03	761			0.742	0.074
MAK041L	10/11/2013	204			0.79	0.14	0.008	B	J	0.02	0.007	1.8			0.04	0.014	0.79			0.16	0.03	0.03	U		0.09	0.03	0.08			0.02	0.007	**1.34**			0.119	0.018	0.16	B		0.16	0.02	0.54			0.16	0.03	411			0.791	0.079
MAK042L	10/11/2013	245			0.79	0.14	0.008	B	J	0.02	0.007	1.93			0.04	0.014	0.94			0.16	0.03	0.03	U		0.09	0.03	0.08			0.02	0.007	**1.66**			0.119	0.018	0.19			0.16	0.02	0.67			0.16	0.03	489			0.791	0.079
MAK043L	10/11/2013	334			0.83	0.15	0.009	B	J	0.02	0.007	2.2			0.042	0.015	1.12			0.17	0.03	0.03	U		0.09	0.03	0.08			0.02	0.007	**2.24**			0.125	0.019	0.22			0.17	0.02	0.73			0.17	0.03	684			0.833	0.083

		Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Octopus (He'e) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*1*	*15*	*0*	*16*	*16*	*11*	*14*	*16*	*0*	*16*
	number of detections	*15*	*1*	*16*	*0*	*0*	*5*	*2*	*0*	*16*	*0*
	Frequency of Detection	*93.8%*	*6.3%*	*100.0%*	*0.0%*	*0.0%*	*31.3%*	*12.5%*	*0.0%*	*100.0%*	*0.0%*
	Maximum Detected	*4.27*	*0.01*	*40.3*	*0.03*	*0.03*	*0.05*	*0.388*	*0.02*	*12.2*	*2.46*
	Standard Deviation	*0.98*	*0.00*	*6.41*	*0.00*	*0.00*	*0.01*	*0.10*	*0.00*	*2.36*	*0.52*
	Mean	*0.70*	*0.0067*	*27.88*	*0.0300*	*0.0276*	*0.0101*	*0.0799*	*0.0188*	*6.71*	*1.32*

		Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Sea Cucumber (Loli) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*0*	*16*	*0*	*6*	*16*	*16*	*16*	*15*	*0*	*11*
	number of detections	*16*	*0*	*16*	*10*	*0*	*0*	*0*	*1*	*16*	*5*
	Frequency of Detection	*100.0%*	*0.0%*	*100.0%*	*62.5%*	*0.0%*	*0.0%*	*0.0%*	*6.3%*	*100.0%*	*31.3%*
	Maximum Detected	*2.84*	*0.008*	*18.5*	*0.08*	*0.032*	*0.008*	*0.121*	*0.037*	*52.7*	*14.7*
	Standard Deviation	*0.84*	*0.00*	*6.97*	*0.02*	*0.00*	*0.00*	*0.03*	*0.00*	*13.14*	*3.22*
	Mean	*1.02*	*0.0065*	*5.62*	*0.049*	*0.028*	*0.007*	*0.069*	*0.021*	*5.57*	*3.50*

		Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron
Seaweed (Limu)Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*0*	*6*	*0*	*0*	*16*	*0*	*0*	*0*	*0*	*0*
	number of detections	*16*	*10*	*16*	*16*	*0*	*16*	*16*	*16*	*16*	*16*
	Frequency of Detection	*100.0%*	*62.5%*	*100.0%*	*100.0%*	*0.0%*	*100.0%*	*100.0%*	*100.0%*	*100.0%*	*100.0%*
	Maximum Detected	*630*	*0.03*	*3.76*	*3.11*	*0.03*	*0.09*	*4.19*	*0.35*	*0.87*	*932*
	Standard Deviation	*144.14*	*0.01*	*0.51*	*0.63*	*0.00*	*0.02*	*0.91*	*0.08*	*0.15*	*219.25*
	Mean	*278.48*	*0.011*	*2.41*	*1.50*	*0.030*	*0.063*	*1.87*	*0.18*	*0.59*	*489.73*

Notes:

CAS - Chemical Abstracts Service
ID - identification
ng/g - nanograms per gram
MDL - method detection limit
mg/kg - milligrams per kilogram
RL - reporting limit

Laboratory qualifier (LQ)

B - Detected by the instrument, the result is greater than the MDL but less than or equal to the RL. Result is reported and considered an estimate.
J - Estimated value. A full explanation is presented in the laboratory report case narrative (BRL Report 1345019 or BRL Report 1343025).
M - Duplicate precision (relative percent difference) was not within acceptance criteria. Result is estimated.
N - Spike recovery was not within acceptance criteria. Result is estimated.
U - Result is less than or equal to the MDL or client requested reporting limit (CRRL). Result is reported as the MDL or CRRL.

Validator qualifier (VQ)

J - Indicates an estimated value.
U - Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
UJ - Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

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Analyte		Lead					Manganese					Mercury					Methyl Mercury					Selenium					Silver					Thallium					Vanadium					Zinc				
CAS Number		7439-92-1					7439-96-5					7439-97-6					22967-92-6					7782-49-2					7440-22-4					7440-28-0					7440-62-2					7440-66-6				
Units		mg/kg					mg/kg					ng/g					ng/g					mg/kg					mg/kg					mg/kg					mg/kg					mg/kg				
Lab ID	Collection Date	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL
Mokulê'ia																																														
***Octopus* (*He'e*)**																																														
MAK009O	9/13/2013	0.03	B		0.03	0.003	0.24			0.03	0.01	7.28			1.71	0.51	6.53			2.65	0.88	0.253			0.128	0.051	0.02	UJ	UJ	0.09	0.02	0.002	U		0.007	0.002	0.012	U		0.102	0.012	13.4			0.9	0.17
MAK010O	9/16/2013	0.01	B	J	0.04	0.004	0.23			0.04	0.01	9.06			1.88	0.56	7.83			2.73	0.91	0.226			0.134	0.054	0.02	UJ	UJ	0.09	0.02	0.002	U		0.007	0.002	0.013	U		0.107	0.013	13.5			0.9	0.18
MAK011O	9/16/2013	0.009	B	J	0.04	0.004	0.34			0.04	0.01	5.58			1.74	0.52	4.25			2.9	0.97	0.308			0.132	0.053	0.02	UJ	UJ	0.09	0.02	0.002	U		0.007	0.002	0.012	U		0.106	0.012	13.9			0.9	0.18
MAK015O	9/22/2013	0.02	B	J	0.04	0.004	0.27			0.04	0.01	9.95			1.9	0.57	8.32			2.96	0.99	0.353			0.148	0.059	0.02	UJ	UJ	0.10	0.02	0.002	U		0.008	0.002	0.014	U		0.118	0.014	13.4			1	0.2
MAK016O	9/22/2013	0.16			0.04	0.004	0.29			0.04	0.01	8.18			1.9	0.57	6.76			2.95	0.98	0.283			0.138	0.055	0.02	UJ	UJ	0.09	0.02	0.002	U		0.007	0.002	0.013	U		0.111	0.013	14.5			0.9	0.18
MAK017O	9/22/2013	0.11			0.04	0.004	0.26			0.04	0.01	16.4			1.88	0.56	11.6			2.59	0.86	0.308			0.139	0.056	0.02	UJ	UJ	0.09	0.02	0.002	U		0.007	0.002	0.013	U		0.112	0.013	16.1			0.9	0.19
MAK018O	9/22/2013	0.03	B		0.03	0.003	0.27			0.03	0.01	11.7			1.92	0.57	9.3			2.81	0.94	0.285			0.131	0.052	0.02	UJ	UJ	0.09	0.02	0.002	U		0.007	0.002	0.012	U		0.105	0.012	14.8			0.9	0.17
MAK024O	9/27/2013	0.004	B	J	0.03	0.003	0.25			0.03	0.01	14.2			1.94	0.58	15.3			2.84	0.95	0.235			0.131	0.052	0.02	UJ	UJ	0.09	0.02	0.002	U		0.007	0.002	0.012	U		0.105	0.012	13.4			0.9	0.17
***Sea Cucumber* (*Loli*)**																																														
MAK010C	9/13/2013	0.02	B	J	0.04	0.004	0.19			0.04	0.01	0.22	J2	J	0.4	0.12	0.95	B	J	2.82	0.94	0.385			0.139	0.056	0.02	UJ	UJ	0.09	0.02	0.002	U		0.007	0.002	0.033	B	J	0.111	0.013	0.63	B	U	0.9	0.19
MAK014C	9/13/2013	0.47			0.04	0.004	0.34			0.04	0.01	1.48			0.39	0.12	0.99	U		2.98	0.99	1.81			0.133	0.053	0.02	UJ	UJ	0.09	0.02	0.002	U		0.007	0.002	0.036	B	J	0.107	0.012	7.56			0.9	0.18
MAK020C	9/16/2013	2.14			0.04	0.004	0.29			0.04	0.01	2.49			0.37	0.11	0.95	U		2.86	0.95	1.87			0.147	0.059	0.02	UJ	UJ	0.10	0.02	0.002	U		0.008	0.002	0.048	B	J	0.117	0.014	27.8			1	0.2
MAK022C	9/16/2013	0.07			0.04	0.004	0.25			0.04	0.01	1.83			0.38	0.11	0.97	U		2.91	0.97	2.37			0.138	0.055	0.02	UJ	UJ	0.09	0.02	0.002	U		0.007	0.002	0.044	B	J	0.11	0.013	2.92			0.9	0.18
MAK024C	9/22/2013	0.02	B	J	0.04	0.004	0.48			0.04	0.01	0.51			0.34	0.1	0.89	U		2.67	0.89	0.333			0.141	0.056	0.02	UJ	UJ	0.09	0.02	0.002	U		0.008	0.002	0.026	B	J	0.113	0.013	3.21			0.9	0.19
MAK025C	9/22/2013	0.04	B		0.04	0.004	0.49			0.04	0.01	2.88			0.38	0.11	0.95	U		2.85	0.95	1.26			0.15	0.06	0.02	UJ	UJ	0.10	0.02	0.002	U		0.008	0.002	0.075	B	J	0.12	0.014	2			1	0.2
MAK026C	9/22/2013	0.01	B	J	0.04	0.004	0.22			0.04	0.01	0.47			0.39	0.12	0.97	U		2.91	0.97	0.303			0.133	0.053	0.02	UJ	UJ	0.09	0.02	0.002	U		0.007	0.002	0.03	B	J	0.106	0.012	1.02			0.9	0.18
MAK027C	9/22/2013	0.03	B		0.03	0.003	0.25			0.03	0.01	0.26	J2	J	0.38	0.11	0.94	U		2.81	0.94	0.358			0.129	0.052	0.02	UJ	UJ	0.09	0.02	0.002	U		0.007	0.002	0.03	B	J	0.103	0.012	0.76	B	U	0.9	0.17
Seaweed (Limu)																																														
MAK007L	9/16/2013	0.66	M	J	0.04	0.004	17.8	M	J	0.04	0.01	3.12			0.79	0.24	0.99	U		2.96	0.99	0.093	B	J	0.149	0.06	0.02	UJ	UJ	0.1	0.02	0.005	B	J	0.008	0.002	5.02	M	J	0.12	0.014	2.11			1	0.2
MAK009L	9/16/2013	0.46			0.04	0.004	6.53			0.04	0.01	2.83			0.8	0.24	0.94	U		2.82	0.94	0.067	B	J	0.141	0.056	0.02	UJ	UJ	0.09	0.02	0.004	B	J	0.008	0.002	2.82			0.113	0.013	1.64			0.9	0.19
MAK010L (comp)	9/16/2013	0.58			0.04	0.004	10.2			0.04	0.01	2.29			0.79	0.24	0.97	U		2.91	0.97	0.068	B	J	0.148	0.059	0.02	UJ	UJ	0.1	0.02	0.006	B	J	0.008	0.002	3.38			0.119	0.014	1.89			1	0.2
MAK044L	10/15/2013	0.31			0.04	0.004	8.15			0.04	0.01	2.19			0.79	0.24	0.98	U		2.93	0.98	0.058	U		0.146	0.058	0.02	UJ	UJ	0.1	0.02	0.004	B	J	0.008	0.002	2.53			0.117	0.014	1.75			1	0.19
MAK045L	10/15/2013	0.34			0.04	0.004	3.5			0.04	0.01	2.16			0.79	0.24	0.98	U		2.94	0.98	0.06	U		0.149	0.06	0.02	UJ	UJ	0.1	0.02	0.004	B	J	0.008	0.002	2.09			0.119	0.014	1.64			1	0.2
MAK046L	10/15/2013	0.67			0.04	0.004	8.61			0.04	0.01	2.42			0.8	0.24	0.95	U		2.86	0.95	0.059	B	J	0.142	0.057	0.02	UJ	UJ	0.09	0.02	0.004	B	J	0.008	0.002	2.58			0.113	0.013	1.85			1	0.19
MAK047L	10/15/2013	0.43			0.04	0.004	11.8			0.04	0.01	3.24			0.79	0.24	0.9	U		2.7	0.9	0.067	B	J	0.138	0.055	0.02	UJ	UJ	0.09	0.02	0.005	B	U	0.007	0.002	2.7			0.11	0.013	2.14			0.9	0.18
MAK049L	10/15/2013	0.56			0.04	0.004	9.73			0.04	0.01	3.33			0.74	0.22	0.94	U		2.82	0.94	0.068	B	J	0.143	0.057	0.02	UJ	UJ	0.1	0.02	0.004	B	U	0.008	0.002	2.64			0.114	0.013	2.64			1	0.19
Ka'ena Point																																														
***Octopus* (*He'e*)**																																														
MAK012O	9/22/2013	0.01	B	J	0.04	0.004	0.28			0.04	0.01	9.02			1.92	0.58	4.36			2.67	0.89	0.269			0.143	0.057	0.02	UJ	UJ	0.10	0.02	0.002	U		0.008	0.002	0.013	U		0.115	0.013	14.2			1	0.19
MAK013O	9/22/2013	0.03	B	J	0.04	0.004	0.25			0.04	0.01	8.53			1.82	0.55	4.91			2.6	0.87	0.281			0.139	0.056	0.02	UJ	UJ	0.09	0.02	0.002	U		0.007	0.002	0.013	U		0.111	0.013	15.2			0.9	0.19
MAK014O	9/23/2013	0.01	B	J	0.03	0.003	0.23			0.03	0.01	13.4			1.89	0.57	6.68			2.88	0.96	0.274			0.127	0.051	0.02	UJ	UJ	0.08	0.02	0.002	U		0.007	0.002	0.012	U		0.101	0.012	15.2			0.8	0.17
MAK019O	9/23/2013	0.02	B	J	0.04	0.004	0.19			0.04	0.01	12.3			1.96	0.59	10.6			2.67	0.89	0.163			0.14	0.056	0.02	UJ	UJ	0.09	0.02	0.002	U		0.007	0.002	0.013	U		0.112	0.013	11.3			0.9	0.19
MAK020O	9/23/2013	0.07			0.04	0.004	0.24			0.04	0.01	8.08			1.81	0.54	8.58			2.89	0.96	0.235			0.143	0.057	0.02	UJ	UJ	0.10	0.02	0.002	U		0.008	0.002	0.013	U		0.114	0.013	14.7			1	0.19
MAK021O	9/23/2013	0.007	B	J	0.04	0.004	0.21			0.04	0.01	6.31			1.77	0.53	4.67			2.78	0.93	0.279			0.146	0.058	0.02	UJ	UJ	0.10	0.02	0.002	U		0.008	0.002	0.014	U		0.117	0.014	12.9			1	0.19
MAK022O	9/23/2013	0.01	B	J	0.04	0.004	0.27			0.04	0.01	9.53			1.97	0.59	8.45			2.74	0.91	0.313			0.149	0.06	0.02	UJ	UJ	0.10	0.02	0.002	U		0.008	0.002	0.014	U		0.119	0.014	15.8			1	0.2
MAK023O	9/23/2013	0.01	B	J	0.03	0.003	0.29			0.03	0.01	8.83			1.92	0.57	8.46			2.93	0.98	0.272			0.129	0.052	0.02	UJ	UJ	0.09	0.02	0.002	U		0.007	0.002	0.012	U		0.103	0.012	13.4			0.9	0.17
***Sea Cucumber* (*Loli*)**																																														
MAK015C	9/13/2013	0.17			0.04	0.004	0.68			0.04	0.01	2.7			0.38	0.12	0.96	U		2.89	0.96	1.76			0.145	0.058	0.02	UJ	UJ	0.10	0.02	0.002	U		0.008	0.002	0.049	B	J	0.116	0.014	3.03			1	0.19
MAK018C	9/16/2013	0.22			0.04	0.004	0.26			0.04	0.01	1.42			0.36	0.11	0.9	U		2.71	0.9	2.29			0.137	0.055	0.02	UJ	UJ	0.09	0.02	0.002	U		0.007	0.002	0.038	B	J	0.109	0.013	2.09			0.9	0.18
MAK019C	9/16/2013	0.42			0.04	0.004	0.26			0.04	0.01	1.65			0.34	0.1	0.86	U		2.58	0.86	1.91			0.137	0.055	0.02	UJ	UJ	0.09	0.02	0.002	U		0.007	0.002	0.028	B	J	0.109	0.013	6.04			0.9	0.18
MAK028C	9/22/2013	0.02	B	J	0.04	0.004	0.07			0.04	0.01	0.19	J2	J	0.36	0.11	0.97	U		2.9	0.97	0.216			0.162	0.065	0.02	UJ	UJ	0.11	0.02	0.002	U		0.009	0.002	0.03	B	J	0.129	0.015	1.01	B	J	1.1	0.22
MAK029C	9/23/2013	0.1			0.04	0.004	0.23			0.04	0.01	0.4			0.38	0.11	0.91	U		2.74	0.91	0.377			0.135	0.054	0.02	UJ	UJ	0.09	0.02	0.002	U		0.007	0.002	0.029	B	J	0.108	0.013	1.53			0.9	0.18
MAK030C	9/23/2013	0.02	B	J	0.04	0.004	0.11			0.04	0.01	0.21	J2	J	0.39	0.12	1.38	U		4.15	1.38	0.308			0.149	0.06	0.02	UJ	UJ	0.10	0.02	0.002	U		0.008	0.002	0.017	B	J	0.12	0.014	0.85	B	U	1	0.2
MAK031C	9/23/2013	0.02	B	J	0.04	0.004	0.26			0.04	0.01	0.27	J2	J	0.39	0.12	0.93	U		2.79	0.93	0.397			0.14	0.056	0.02	UJ	UJ	0.09	0.02	0.002	U		0.007	0.002	0.053	B	J	0.112	0.013	0.76	B	U	0.9	0.19
MAK032C	9/23/2013	0.03	B	J	0.04	0.004	0.15			0.04	0.01	0.24	J2	J	0.37	0.11	1.45	U		4.34	1.45	0.322			0.132	0.053	0.02	UJ	UJ	0.09	0.02	0.002	U		0.007	0.002	0.021	B	J	0.105	0.012	0.9		U	0.9	0.18
Seaweed (*Limu*)																																														
MAK011L	9/16/2013	0.3			0.04	0.004	1.56			0.04	0.01	1.02			0.39	0.12	0.94	U		2.82	0.94	0.059	U		0.147	0.059	0.02	UJ	UJ	0.1	0.02	0.005	B	J	0.008	0.002	1.12			0.118	0.014	1.75			1	0.2
MAK030L	10/11/2013	0.35			0.04	0.004	5.3			0.04	0.01	1.83			0.78	0.23	0.99	U		2.97	0.99	0.058	U		0.144	0.058	0.02	UJ	UJ	0.1	0.02	0.009			0.008	0.002	2.46			0.115	0.013	2.65			1	0.19
MAK033L	10/11/2013	0.54			0.04	0.004	6.01			0.04	0.01	2.08			0.78	0.23	0.97	U		2.92	0.97	0.058	U		0.146	0.058	0.02	UJ	UJ	0.1	0.02	0.007	B	J	0.008	0.002	4.01			0.117	0.014	1.26			1	0.19
MAK034L	10/11/2013	0.45			0.04	0.004	5.65			0.04	0.01	1.91			0.75	0.22	0.91	U		2.72	0.91	0.058	U		0.144	0.058	0.02	UJ	UJ	0.1	0.02	0.007	B	J	0.008	0.002	2.96			0.115	0.013	1.46			1	0.19
MAK038L	10/11/2013	0.7			0.04	0.004	9.84			0.04	0.01	1.69			0.78	0.23	0.91	U		2.73	0.91	0.056	U		0.139	0.056	0.02	UJ	UJ	0.09	0.02	0.008			0.007	0.002	3.87			0.111	0.013	1.83			0.9	0.19
MAK041L	10/11/2013	0.56			0.04	0.004	5.69			0.04	0.01	1.98			0.75	0.22	0.99	U		2.96	0.99	0.059	U		0.148	0.059	0.02	UJ	UJ	0.1	0.02	0.005	B	J	0.008	0.002	2.4			0.119	0.014	1.94			1	0.2
MAK042L	10/11/2013	0.67			0.04	0.004	6.55			0.04	0.01	1.87			0.78	0.23	0.98	U		2.94	0.98	0.059	U		0.148	0.059	0.02	UJ	UJ	0.1	0.02	0.008	B		0.008	0.002	2.64			0.119	0.014	2.02			1	0.2
MAK043L	10/11/2013	0.81			0.04	0.004	11.9			0.04	0.01	2.48			0.8	0.24	0.99	U		2.96	0.99	0.064	U	J	0.156	0.062	0.02	UJ	UJ	0.1	0.02	0.007	B	J	0.008	0.002	3.59			0.125	0.015	1.95			1	0.21

		Lead	Manganese	Mercury	Methyl Mercury	Selenium	Silver	Thallium	Vanadium	Zinc
Octopus (He'e) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*0*	*0*	*0*	*0*	*0*	*16*	*16*	*16*	*0*
	number of detections	*16*	*16*	*16*	*16*	*16*	*0*	*0*	*0*	*16*
	Frequency of Detection	*100.0%*	*100.0%*	*100.0%*	*100.0%*	*100.0%*	*0.0%*	*0.0%*	*0.0%*	*100.0%*
	Maximum Detected	*0.16*	*0.339*	*16.4*	*15.3*	*0.353*	*0.02*	*0.002*	*0.014*	*16.1*
	Standard Deviation	*0.04*	*0.04*	*2.96*	*2.93*	*0.043*	*0.0011*	*0.00*	*0.0008*	*1.21*
	Mean	*0.034*	*0.26*	*9.90*	*7.91*	*0.27*	*0.018*	*0.00200*	*0.0128*	*14.11*
Sea Cucumber (Loli) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*0*	*0*	*0*	*15*	*0*	*16*	*16*	*0*	*5*
	number of detections	*16*	*16*	*16*	*1*	*16*	*0*	*0*	*16*	*11*
	Frequency of Detection	*100.0%*	*100.0%*	*100.0%*	*6.3%*	*100.0%*	*0.0%*	*0.0%*	*100.0%*	*68.8%*
	Maximum Detected	*2.14*	*0.68*	*2.88*	*1.45*	*2.37*	*0.022*	*0.002*	*0.075*	*27.8*
	Standard Deviation	*0.53*	*0.15*	*0.98*	*0.17*	*0.83*	*0.0012*	*0.00*	*0.014*	*6.68*
	Mean	*0.24*	*0.28*	*1.08*	*0.998*	*1.02*	*0.019*	*0.0020*	*0.0367*	*3.88*
Seaweed (Limu)Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*0*	*0*	*0*	*16*	*9*	*16*	*2*	*0*	*0*
	number of detections	*16*	*16*	*16*	*0*	*7*	*0*	*14*	*16*	*16*
	Frequency of Detection	*100.0%*	*100.0%*	*100.0%*	*0.0%*	*43.8%*	*0.0%*	*87.5%*	*100.0%*	*100.0%*
	Maximum Detected	*0.81*	*17.8*	*3.33*	*0.99*	*0.093*	*0.020*	*0.0090*	*5.02*	*2.65*
	Standard Deviation	*0.15*	*3.88*	*0.62*	*0.031*	*0.009*	*0.00*	*0.0017*	*0.90*	*0.37*
	Mean	*0.52*	*8.05*	*2.28*	*0.96*	*0.06*	*0.020*	*0.0058*	*2.93*	*1.91*

Draft

Round 2 – January to March 2014

Draft

Organochlorine Pesticides

Draft

Analyte		Alpha-BHC					Gamma-BHC (Lindane)					Delta-BHC					Heptachlor					Aldrin					Heptachlor Epoxide					p,p'-DDT					Beta-BHC				
CAS Number		319-84-6					58-89-9					319-86-8					76-44-8					309-00-2					1024-57-3					50-29-3					319-85-7				
Units		µg/kg					µg/kg					µg/kg					µg/kg					µg/kg					µg/kg					µg/kg					µg/kg				
Lab ID	Collection Date	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL
Mokulê'ia																																									
Octopus (He'e)																																									
MAK109O	1/31/2014	4.04	U		4.04	4.04	4.04	U		4.04	4.04	4.04	U		4.04	4.04	4.04	U		4.04	4.04	**4.04**	U		4.04	4.04	4.04	U		4.04	4.04	4.04	U		4.04	4.04	4.04	U		4.04	4.04
MAK118O	3/27/2014	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	**3.98**	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98
MAK119O	3/27/2014	4.03	U		4.03	4.03	4.03	U		4.03	4.03	4.03	U		4.03	4.03	4.03	U		4.03	4.03	**4.03**	U		4.03	4.03	4.03	U		4.03	4.03	4.03	U		4.03	4.03	4.03	U		4.03	4.03
MAK120O	3/27/2014	4.04	U		4.04	4.04	4.04	U		4.04	4.04	4.04	U		4.04	4.04	4.04	U		4.04	4.04	**4.04**	U		4.04	4.04	4.04	U		4.04	4.04	4.04	U		4.04	4.04	4.04	U		4.04	4.04
MAK121O	3/27/2014	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	**3.98**	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98
MAK122O	3/27/2014	3.97	U		3.97	3.97	3.97	U		3.97	3.97	3.97	U		3.97	3.97	3.97	U		3.97	3.97	**3.97**	U		3.97	3.97	3.97	U		3.97	3.97	3.97	U		3.97	3.97	3.97	U		3.97	3.97
MAK123O	3/27/2014	4.03	U		4.03	4.03	4.03	U		4.03	4.03	4.03	U		4.03	4.03	4.03	U		4.03	4.03	**4.03**	U		4.03	4.03	4.03	U		4.03	4.03	4.03	U		4.03	4.03	4.03	U		4.03	4.03
MAK124O	3/28/2014	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	**3.98**	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98
Sea Cucumber (Loli)																																									
MAK111C	1/31/2014	4	U		4	4	4	U		4	4	4	U		4	4	4	U		4	4	**4**	U		4	4	4	U		4	4	4	U		4	4	4	U		4	4
MAK113C	1/31/2014	4	U		4	4	4	U		4	4	4	U		4	4	4	U		4	4	**4**	U		4	4	4	U		4	4	4	U		4	4	4	U		4	4
MAK114C	1/31/2014	4	U		4	4	4	U		4	4	4	U		4	4	4	U		4	4	**4**	U		4	4	4	U		4	4	4	U		4	4	4	U		4	4
MAK115C	1/31/2014	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	**3.98**	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98
MAK116C	1/31/2014	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	**3.98**	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98
MAK117C	1/31/2014	3.97	U		3.97	3.97	3.97	U		3.97	3.97	3.97	U		3.97	3.97	3.97	U		3.97	3.97	**3.97**	U		3.97	3.97	3.97	U		3.97	3.97	3.97	U		3.97	3.97	3.97	U		3.97	3.97
MAK118C	1/31/2014	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	**3.98**	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98
MAK120C	2/11/2014	4	U		4	4	4	U		4	4	4	U		4	4	4	U		4	4	**4**	U		4	4	4	U		4	4	4	U		4	4	4	U		4	4
Seaweed (Limu kohu)																																									
MAK120L	1/31/2014	3.99	U	R	3.99	3.99	3.99	U	R	3.99	3.99	3.99	U	R	3.99	3.99	3.99	U	R	3.99	3.99	**3.99**	U	R	3.99	3.99	3.99	U	R	3.99	3.99	3.99	U	R	3.99	3.99	3.99	U	R	3.99	3.99
MAK121L	1/31/2014	3.98	U	UJ	3.98	3.98	3.98	U	UJ	3.98	3.98	3.98	U	UJ	3.98	3.98	3.98	U	UJ	3.98	3.98	**3.98**	U	UJ	3.98	3.98	3.98	U	UJ	3.98	3.98	3.98	U	UJ	3.98	3.98	3.98	U	UJ	3.98	3.98
MAK122L	1/31/2014	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	**3.98**	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98
MAK123L	1/31/2014	3.99	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99	**3.99**	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99
MAK124L	1/31/2014	3.97	U	UJ	3.97	3.97	3.97	U	UJ	3.97	3.97	3.97	U	UJ	3.97	3.97	3.97	U	UJ	3.97	3.97	**3.97**	U	UJ	3.97	3.97	3.97	U	UJ	3.97	3.97	3.97	U	UJ	3.97	3.97	3.97	U	UJ	3.97	3.97
MAK126L	1/31/2014	3.99	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99	**3.99**	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99
MAK127L	2/11/2014	3.99	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99	**3.99**	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99
MAK128L	2/11/2014	4	U		4	4	4	U		4	4	4	U		4	4	4	U		4	4	**4**	U		4	4	4	U		4	4	4	U		4	4	4	U		4	4
Ka'ena Point																																									
Octopus (He'e)																																									
MAK110O	3/28/2014	3.99	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99	**3.99**	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99
MAK111O	3/28/2014	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	**3.98**	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98
MAK112O	3/28/2014	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	**3.98**	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98
MAK113O	3/28/2014	3.97	U		3.97	3.97	3.97	U		3.97	3.97	3.97	U		3.97	3.97	3.97	U		3.97	3.97	**3.97**	U		3.97	3.97	3.97	U		3.97	3.97	3.97	U		3.97	3.97	3.97	U		3.97	3.97
MAK114O	3/28/2014	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	**3.98**	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98
MAK115O	3/28/2014	3.97	U		3.97	3.97	3.97	U		3.97	3.97	3.97	U		3.97	3.97	3.97	U		3.97	3.97	**3.97**	U		3.97	3.97	3.97	U		3.97	3.97	3.97	U		3.97	3.97	3.97	U		3.97	3.97
MAK116O	3/28/2014	4.02	U		4.02	4.02	4.02	U		4.02	4.02	4.02	U		4.02	4.02	4.02	U		4.02	4.02	**4.02**	U		4.02	4.02	4.02	U		4.02	4.02	4.02	U		4.02	4.02	4.02	U		4.02	4.02
MAK117O	3/28/2014	3.96	U		3.96	3.96	3.96	U		3.96	3.96	3.96	U		3.96	3.96	3.96	U		3.96	3.96	**3.96**	U		3.96	3.96	3.96	U		3.96	3.96	3.96	U		3.96	3.96	3.96	U		3.96	3.96
Sea Cucumber (Loli)																																									
MAK121C	3/28/2014	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	**3.98**	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98
MAK122C	3/28/2014	4.02	U		4.02	4.02	4.02	U		4.02	4.02	4.02	U		4.02	4.02	4.02	U		4.02	4.02	**4.02**	U		4.02	4.02	4.02	U		4.02	4.02	4.02	U		4.02	4.02	4.02	U		4.02	4.02
MAK123C	3/28/2014	3.97	U		3.97	3.97	3.97	U		3.97	3.97	3.97	U		3.97	3.97	3.97	U		3.97	3.97	**3.97**	U		3.97	3.97	3.97	U		3.97	3.97	3.97	U		3.97	3.97	3.97	U		3.97	3.97
MAK124C	3/28/2014	3.99	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99	**3.99**	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99
MAK125C	3/28/2014	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	**3.98**	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98
MAK126C	3/28/2014	4.01	U		4.01	4.01	4.01	U		4.01	4.01	4.01	U		4.01	4.01	4.01	U		4.01	4.01	**4.01**	U		4.01	4.01	4.01	U		4.01	4.01	4.01	U		4.01	4.01	4.01	U		4.01	4.01
MAK127C	3/28/2014	4.03	U		4.03	4.03	4.03	U		4.03	4.03	4.03	U		4.03	4.03	4.03	U		4.03	4.03	**4.03**	U		4.03	4.03	4.03	U		4.03	4.03	4.03	U		4.03	4.03	4.03	U		4.03	4.03
MAK128C	3/28/2014	4.02	U		4.02	4.02	4.02	U		4.02	4.02	4.02	U		4.02	4.02	4.02	U		4.02	4.02	**4.02**	U		4.02	4.02	4.02	U		4.02	4.02	4.02	U		4.02	4.02	4.02	U		4.02	4.02
Seaweed (Limu kohu)																																									
MAK116L	1/31/2014	4	U		4	4	4	U		4	4	4	U		4	4	4	U		4	4	**4**	U		4	4	4	U		4	4	4	U		4	4	4	U		4	4
MAK117L	1/31/2014	**23.5**		J	3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99	**3.99**	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99	3.99	U		3.99	3.99
MAK118L	1/31/2014	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	**3.98**	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98	3.98	U		3.98	3.98
MAK130L	3/27/2014	**42.2**		J	8	8	8	U		8	8	8	U		8	8	8	U		8	8	**8**	U		8	8	8	U		8	8	8	U		8	8	8	U		8	8
MAK132L	3/28/2014	**19.9**	U		19.9	19.9	19.9	U		19.9	19.9	19.9	U		19.9	19.9	**19.9**	U		19.9	19.9	**19.9**	U		19.9	19.9	**19.9**	U		19.9	19.9	19.9	U		19.9	19.9	19.9	U		19.9	19.9
MAK134L	3/28/2014	**7.94**	U		7.94	7.94	7.94	U		7.94	7.94	7.94	U		7.94	7.94	7.94	U		7.94	7.94	**7.94**	U		7.94	7.94	**7.94**	U		7.94	7.94	7.94	U		7.94	7.94	7.94	U		7.94	7.94
MAK135L	3/28/2014	**20**	U		20	20	20	U		20	20	20	U		20	20	**20**	U		20	20	**20**	U		20	20	**20**	U		20	20	20	U		20	20	20	U		20	20
MAK138L	3/28/2014	**20**	U		20	20	20	U		20	20	20	U		20	20	**20**	U		20	20	**20**	U		20	20	**20**	U		20	20	20	U		20	20	20	U		20	20

Octopus (He'e) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*16*	*16*	*16*	*16*	*16*
	number of detections	*0*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	*4.04*	*4.04*	*4.04*	*4.04*	*4.04*	*4.04*
	Standard Deviation	*0.028*	*0.028*	*0.028*	*0.028*	*0.028*	*0.028*
	Mean	*3.99*	*3.99*	*3.99*	*3.99*	*3.99*	*3.99*

Sea Cucumber (Loli) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*16*	*16*	*16*	*16*	*16*
	number of detections	*0*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	*4.03*	*4.03*	*4.03*	*4.03*	*4.03*	*4.03*
	Standard Deviation	*0.019*	*0.019*	*0.019*	*0.019*	*0.019*	*0.019*
	Mean	*3.99*	*3.99*	*3.99*	*3.99*	*3.99*	*3.99*

Seaweed (Limu)Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*14*	*16*	*16*	*16*	*16*	*16*
	number of detections	*2*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*12.5%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	*42.2*	*20*	*20*	*20*	*20*	*20*
	Standard Deviation	*11.17*	*6.34*	*6.34*	*6.34*	*6.34*	*6.34*
	Mean	*10.84*	*7.48*	*7.48*	*7.48*	*7.48*	*7.48*

Notes:

[2] As noted in Table 9 of the *Final Supplemental Marine Resources Study Sampling and Analysis Plan* , the RLs for aldrin exceed the project screening value.

µg/kg - micrograms per kilogram

BHC - benzene hexachloride

CAS - Chemical Abstracts Service

DDT - dichloro-diphenyl-trichloroethane

ID - identification

ND - not detected

MDL - method detection limit

RL - reporting limit

Laboratory Qualifier (LQ)

U - Indicates compound was analyzed for but not detected. The sample quantitation limit must be corrected for dilution and for percent moisture. These results are presented as "ND" in the ARDL laboratory reports but are reported as the RL value with a "U" qualifier in the Staged Electronic Data Deliverable and this table.

Validator Qualifier (VQ)

J - Indicates an estimated value.

R - Quality control indicates the data is not usable.

UJ - Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

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Volatile Organic Compounds

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	Analyte	Toluene					Ethyl Benzene					M,P-Xylenes					Styrene					o-Xylene					1,2,4-Trimethylbenzene			
	CAS Number	108-88-3					100-41-4					108-38-3					100-42-5					95-47-6					95-63-6			
	Units	µg/kg					µg/kg					µg/kg					µg/kg					µg/kg					µg/kg			
Lab ID	Collection Date	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	MDL
Mokulē'ia																														
Octopus (He'e)																														
MAK109O	1/31/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
MAK118O	3/27/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
MAK119O	3/27/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
MAK120O	3/27/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
MAK121O	3/27/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
MAK122O	3/27/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
MAK123O	3/27/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
MAK124O	3/28/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
Sea Cucumber (Loli)																														
MAK111C	1/31/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
MAK113C	1/31/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
MAK114C	1/31/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
MAK115C	1/31/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
MAK116C	1/31/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
MAK117C	1/31/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
MAK118C	1/31/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
MAK120C	2/11/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
Seaweed (Limu kohu)																														
MAK120L	1/31/2014	25	U		25	5	25	U		25	5	50	U		50	10	25	U		25	5	25	U		25	5	25	U	0	5
MAK121L	1/31/2014	25	U		25	5	25	U		25	5	50	U		50	10	25	U		25	5	25	U		25	5	25	U	0	5
MAK122L	1/31/2014	25	U		25	5	25	U		25	5	50	U		50	10	25	U		25	5	25	U		25	5	25	U	0	5
MAK123L	1/31/2014	25	U		25	5	25	U		25	5	50	U		50	10	25	U	UJ	25	5	25	U		25	5	25	U	0	5
MAK124L	1/31/2014	25	U		25	5	25	U		25	5	50	U		50	10	25	U		25	5	25	U		25	5	25	U	0	5
MAK126L	1/31/2014	25	U		25	5	25	U		25	5	50	U		50	10	25	U		25	5	25	U		25	5	25	U	0	5
MAK127L	2/11/2014	25	U		25	5	25	U		25	5	50	U		50	10	25	U		25	5	25	U		25	5	25	U	0	5
MAK128L	2/11/2014	25	U		25	5	25	U		25	5	50	U		50	10	25	U		25	5	25	U		25	5	25	U	0	5
Ka'ena Point																														
Octopus (He'e)																														
MAK110O	3/28/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
MAK111O	3/28/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
MAK112O	3/28/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
MAK113O	3/28/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
MAK114O	3/28/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
MAK115O	3/28/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
MAK116O	3/28/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
MAK117O	3/28/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
Sea Cucumber (Loli)																														
MAK121C	3/28/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
MAK122C	3/28/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
MAK123C	3/28/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
MAK124C	3/28/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
MAK125C	3/28/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
MAK126C	3/28/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
MAK127C	3/28/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
MAK128C	3/28/2014	12.5	U		12.5	2.5	12.5	U		12.5	2.5	25	U		25	5	12.5	U		12.5	2.5	12.5	U		12.5	2.5	12.5	U	0	2.5
Seaweed (Limu kohu)																														
MAK116L	1/31/2014	25	U		25	5	25	U		25	5	50	U		50	10	25	U		25	5	25	U		25	5	25	U	0	5
MAK117L	1/31/2014	25	U		25	5	25	U		25	5	50	U		50	10	25	U		25	5	25	U		25	5	25	U	0	5
MAK118L	1/31/2014	25	U		25	5	25	U		25	5	50	U		50	10	25	U		25	5	25	U		25	5	25	U	0	5
MAK130L	3/27/2014	25	U		25	5	25	U		25	5	50	U		50	10	25	U		25	5	25	U		25	5	25	U	0	5
MAK132L	3/28/2014	25	U		25	5	25	U		25	5	50	U		50	10	25	U		25	5	25	U		25	5	25	U	0	5
MAK134L	3/28/2014	25	U		25	5	25	U		25	5	50	U		50	10	25	U		25	5	25	U		25	5	25	U	0	5
MAK135L	3/28/2014	25	U		25	5	25	U		25	5	50	U		50	10	25	U		25	5	25	U		25	5	25	U	0	5
MAK138L	3/28/2014	25	U		25	5	25	U		25	5	50	U		50	10	25	U		25	5	25	U		25	5	25	U	0	5

Octopus (He'e) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*16*	*16*	*16*	*16*	*16*
	number of detections	*0*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	*12.5*	*12.5*	*25*	*12.5*	*12.5*	*12.5*
	Standard Deviation	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	Mean	*12.50*	*12.50*	*25.00*	*12.50*	*12.50*	*12.50*

Sea Cucumber (Loli) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*16*	*16*	*16*	*16*	*16*
	number of detections	*0*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	*12.5*	*12.5*	*25*	*12.5*	*12.5*	*12.5*
	Standard Deviation	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	Mean	*12.50*	*12.50*	*25.00*	*12.50*	*12.50*	*12.50*

Seaweed (Limu)Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*16*	*16*	*16*	*16*	*16*
	number of detections	*0*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	*25*	*25*	*50*	*25*	*25*	*25*
	Standard Deviation	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	Mean	*25.00*	*25.00*	*50.00*	*25.00*	*25.00*	*25.00*

Notes:

µg/kg - micrograms per kilogram
CAS - Chemical Abstracts Service
ID - identification
ND - not detected
MDL - method detection limit
RL - reporting limit

Laboratory Qualifier (LQ)

U - Indicates compound was analyzed for but not detected. These results are presented as "ND" in the ARDL laboratory reports but are reported as the RL value with a "U" qualifier in this tabl

Validator Qualifier (VQ)

UJ - Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated val

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Semivolatile Organic Compounds

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Analyte		Dimethylphthalate					Diethylphthalate					di-n-Butylphthalate					Pyrene					bis(2-Ethylhexyl)phthalate					di-n-Octylphthalate					Pentachlorophenol				
CAS Number		131-11-3					84-66-2					84-74-2					129-00-0					117-81-7					117-84-0					87-86-5				
Units		µg/kg-wet					µg/kg-wet					µg/kg-wet					µg/kg-wet					µg/kg-wet					µg/kg-wet					µg/kg-wet				
Lab ID	Collection Date	Result[2]	LQ	VQ	RL	MDL	Result[2]	LQ	VQ	RL	MDL	Result[2]	LQ	VQ	RL	MDL	Result[2]	LQ	VQ	RL	MDL	Result[2]	LQ	VQ	RL	MDL	Result[2]	LQ	VQ	RL	MDL	Result[2]	LQ	VQ	RL	MDL
Mokulē'ia																																				
Octopus (He'e)																																				
MAK109O	1/31/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		538	300
MAK118O	3/27/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		548	300
MAK119O	3/27/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		566	300
MAK120O	3/27/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		533	300
MAK121O	3/27/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		536	300
MAK122O	3/27/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		594	300
MAK123O	3/27/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		515	300
MAK124O	3/28/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		517	300
Sea Cucumber (Loli)																																				
MAK111C	1/31/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		566	300
MAK113C	1/31/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		541	300
MAK114C	1/31/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		524	300
MAK115C	1/31/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		563	300
MAK116C	1/31/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		517	300
MAK117C	1/31/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		558	300
MAK118C	1/31/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		563	300
MAK120C	2/11/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		566	300
Seaweed (Limu kohu)																																				
MAK120L	1/31/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	574	300
MAK121L	1/31/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	569	300
MAK122L	1/31/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	583	300
MAK123L	1/31/2014	ND	U		1,000	200	1,520		J	1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	574	300
MAK124L	1/31/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	580	300
MAK126L	1/31/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	563	300
MAK127L	2/11/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		553	300
MAK128L	2/11/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		545	300
Ka'ena Point																																				
Octopus (He'e)																																				
MAK110O	3/28/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		563	300
MAK111O	3/28/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		526	300
MAK112O	3/28/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		574	300
MAK113O	3/28/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		545	300
MAK114O	3/28/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		519	300
MAK115O	3/28/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		536	300
MAK116O	3/28/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		571	300
MAK117O	3/28/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		597	300
Sea Cucumber (Loli)																																				
MAK121C	3/28/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		561	300
MAK122C	3/28/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		594	300
MAK123C	3/28/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		550	300
MAK124C	3/28/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		594	300
MAK125C	3/28/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		541	300
MAK126C	3/28/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		606	300
MAK127C	3/28/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		563	300
MAK128C	3/28/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		606	300
Seaweed (Limu kohu)																																				
MAK116L	1/31/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		569	300
MAK117L	1/31/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		553	300
MAK118L	1/31/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U	UJ	543	300
MAK130L	3/27/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		550	300
MAK132L	3/28/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		526	300
MAK134L	3/28/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		580	300
MAK135L	3/28/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		536	300
MAK138L	3/28/2014	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		1,000	200	ND	U		543	300

Octopus (He'e) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of detections	*0*	*0*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	-	-	-	-	-	-	-
	Standard Deviation	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	Mean	*1000*	*1000*	*1000.00*	*1000.00*	*1000.00*	*1000.00*	*548.63*

Sea Cucumber (Loli) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of detections	*0*	*0*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	-	-	-	-	-	-	-
	Standard Deviation	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	Mean	*#####*	*1000.00*	*1000.00*	*1000.00*	*1000.00*	*1000.00*	*563.31*

Seaweed (Limu)Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*15*	*16*	*16*	*16*	*16*	*16*
	number of detections	*0*	*1*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*6.3%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	-	-	-	-	-	-	-
	Standard Deviation	*0.00*	*130.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
	Mean	*#####*	*1032.50*	*1000.00*	*1000.00*	*1000.00*	*1000.00*	*558.81*

Notes:

[1] Final screening values from fish advisories as listed in Table 9 of the *Final Supplemental Marine Resources Study Sampling and Analysis Plan* (August 2013).

[2] Results presented as "ND" in the the Applied Research Development Laboratory, Inc. (ARDL) and U.S. Army Engineer Research and Development Center-Environmental Chemistry Branch (ERDC-ECB) laboratory reports are presented in the Staged Electronic Data Deliverable files (ARDL) and Electronic Data Deliverable file (ERDC-ECB) with a "U" qualifier and are thus presented in this table with the LQ.

µg/kg-wet - micrograms per kilogram-wet weight
CAS - Chemical Abstracts Service
EPA - U.S. Environmental Protection Agency
ID - identification

ND - not detected
MDL - method detection limit
RL - reporting limit
U.S. - United States

Laboratory qualifier (LQ) - ARDL
J - Indicates an estimated value. This flag is used when estimating a concentration of a compound that meets identification criteria but the result is less than the quantitation or RL but greater than the MDL.
U - Indicates compound was analyzed for but not detected. The sample quantitation limit must be corrected for dilution and for percent moisture.

LQ - ERDC-ECB
U - Not detected at or above the RL.

Validator qualifier (VQ)
J - Indicates an estimated value.
UJ - Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

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Dioxins/Furans

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Lab ID	Collection Date	2,3,7,8-TCDF Result[2]	LQ[3]	VQ	RL[4]	Total TCDF Result[2]	LQ[3]	VQ	RL[4]	2,3,7,8-TCDD Result[2]	LQ[3]	VQ	RL[4]	Total TCDD Result[2]	LQ[3]	VQ	RL[4]
CAS Number		51207-31-9				30402-14-3				01746-01-6				41903-57-5			
Units		ng/kg				ng/kg				ng/kg				ng/kg			
Mokulēʻia																	
Octopus (Heʻe)																	
MAK109O	1/31/2014	0.12	JZ	U	0.1	0.1	U	U	0.1	0.092	U	U	0.092	0.092	U	U	0.092
MAK118O	3/27/2014	0.14	JZ	U	0.064	0.11		J	0.064	0.065	U	U	0.065	0.16			0.065
MAK119O	3/27/2014	0.19	JZ	UJ	0.1	0.1	U	U	0.1	0.14	U	U	0.14	0.14	U	U	0.14
MAK120O	3/27/2014	0.12	U	U	0.12	0.12	U	U	0.12	0.11	U	U	0.11	0.2			0.11
MAK121O	3/27/2014	0.13	JZ	U	0.1	0.1	U	U	0.1	0.14	U	U	0.14	0.14	U	U	0.14
MAK122O	3/27/2014	0.11	JZ	U	0.1	0.1	U	U	0.1	0.11	U	U	0.11	0.11	U	U	0.11
MAK123O	3/27/2014	0.18	JZ	UJ	0.095	0.095	U	U	0.095	0.16	U	U	0.16	0.17			0.16
MAK124O	3/28/2014	0.11	JZ	U	0.089	0.1		J	0.089	0.13	U	U	0.13	0.13	U	U	0.13
Sea Cucumber (Loli)																	
MAK111C	1/31/2014	0.067		U	0.046	0.6		J	0.046	0.051	U	U	0.051	0.051	U	U	0.051
MAK113C	1/31/2014	0.091		U	0.028	0.54		J	0.028	0.042	U	U	0.042	0.12			0.042
MAK114C	1/31/2014	0.056		U	0.044	0.58		J	0.044	0.048	U	U	0.048	0.048	U	U	0.048
MAK115C	1/31/2014	0.054	BJZ	U	0.042	0.48		J	0.042	0.053	U	U	0.053	0.13			0.053
MAK116C	1/31/2014	0.079		U	0.051	0.69		J	0.051	0.065	U	U	0.065	0.065	U	U	0.065
MAK117C	1/31/2014	0.052	BJZ	U	0.042	0.059		J	0.042	0.057	U	U	0.057	0.087			0.057
MAK118C	1/31/2014	0.066	BJZ	U	0.04	0.58		J	0.04	0.034	U	U	0.034	0.034	U	U	0.034
MAK120C	2/11/2014	0.085		U	0.051	0.21		J	0.051	0.047	U	U	0.047	0.1			0.047
Seaweed (Limu kohu)																	
MAK120L	1/31/2014	0.094	BJZ	UJ	0.074	0.074	U	U	0.074	0.079	U	U	0.079	0.079	U	U	0.079
MAK121L	1/31/2014	0.11	U	U	0.11	0.27			0.11	0.058	U	U	0.058	0.14			0.058
MAK122L	1/31/2014	0.084	BJZ	UJ	0.08	0.08	U	U	0.08	0.074	U	U	0.074	0.17			0.074
MAK123L	1/31/2014	0.056	U	U	0.056	0.26			0.056	0.056	U	U	0.056	0.056	U	U	0.056
MAK124L	1/31/2014	0.087	U	U	0.087	0.087	U	U	0.087	0.048	U	U	0.048	0.13			0.048
MAK126L	1/31/2014	0.072	U	U	0.072	0.35			0.072	0.072	U	U	0.072	0.11			0.072
MAK127L	2/11/2014	0.07	BJZ	U	0.045	0.045	U	U	0.045	0.028	U	U	0.028	0.21			0.028
MAK128L	2/11/2014	0.061	BJZ	U	0.041	0.041	U	U	0.041	0.02	U	U	0.02	0.13			0.02
Kaʻena Point																	
Octopus (Heʻe)																	
MAK110O	3/28/2014	0.14		U	0.092	0.14		J	0.092	0.096	U	U	0.096	0.096	U	U	0.096
MAK111O	3/28/2014	0.12		U	0.085	0.12		J	0.085	0.11	U	U	0.11	0.23			0.11
MAK112O	3/28/2014	0.12	U	U	0.12	0.12	U	U	0.12	0.099	U	U	0.099	0.099	U	U	0.099
MAK113O	3/28/2014	0.14		U	0.092	0.14		J	0.092	0.076	U	U	0.076	0.27			0.076
MAK114O	3/28/2014	0.14	JZ	U	0.1	0.1	U	U	0.1	0.082	U	U	0.082	0.48			0.082
MAK115O	3/28/2014	0.11	U	U	0.11	0.11	U	U	0.11	0.087	U	U	0.087	0.23			0.087
MAK116O	3/28/2014	0.19		U	0.065	0.19		J	0.065	0.072	U	U	0.072	0.072	U	U	0.072
MAK117O	3/28/2014	0.097	JZ	U	0.066	0.074		J	0.066	0.048	U	U	0.048	0.2			0.048
Sea Cucumber (Loli)																	
MAK121C	3/28/2014	0.15	JZ	U	0.069	0.069	U	U	0.069	0.05	U	U	0.05	0.05	U	U	0.05
MAK122C	3/28/2014	0.15		U	0.047	0.15		J	0.047	0.046	U	U	0.046	0.15			0.046
MAK123C	3/28/2014	0.12	JZ	U	0.06	0.11		J	0.06	0.066	U	U	0.066	0.13			0.066
MAK124C	3/28/2014	0.14	JZ	U	0.086	0.11		J	0.086	0.066	U	U	0.066	0.066	U	U	0.066
MAK125C	3/28/2014	0.11	U	U	0.11	0.11	U	U	0.11	0.19	U	U	0.19	0.19	U	U	0.19
MAK126C	3/28/2014	0.13		U	0.087	0.13		J	0.087	0.12	U	U	0.12	0.12			0.12
MAK127C	3/28/2014	0.11	U	U	0.11	0.17			0.11	0.12	U	U	0.12	0.18			0.12
MAK128C	3/28/2014	0.15		U	0.076	0.15		J	0.076	0.087	U	U	0.087	0.087	U	U	0.087
Seaweed (Limu kohu)																	
MAK116L	1/31/2014	0.094		U	0.032	0.16		J	0.032	0.03	U	U	0.03	0.03	U	U	0.03
MAK117L	1/31/2014	0.088		U	0.03	0.18		J	0.03	0.024	U	U	0.024	0.13			0.024
MAK118L	1/31/2014	0.095		U	0.036	0.45		J	0.036	0.03	U	U	0.03	0.16			0.03
MAK130L	3/27/2014	0.16	JZ	U	0.14	0.14	U	U	0.14	0.16	U	U	0.16	0.16	U	U	0.16
MAK132L	3/28/2014	0.12	U	U	0.12	0.12	U	U	0.12	0.12	U	U	0.12	0.12	U	U	0.12
MAK134L	3/28/2014	0.081	U	U	0.081	0.097			0.081	0.055	U	U	0.055	0.11			0.055
MAK135L	3/28/2014	0.15	JZ	U	0.074	0.074	U	U	0.074	0.053	U	U	0.053	0.14			0.053
MAK138L	3/28/2014	0.19		U	0.1	0.31		J	0.1	0.052	U	U	0.052	0.052	U	U	0.052

Lab ID	1,2,3,7,8-PeCDF Result[2]	LQ[3]	VQ	RL[4]	2,3,4,7,8-PeCDF Result[2]	LQ[3]	VQ	RL[4]	Total PeCDF Result[2]	LQ[3]	VQ	RL[4]
CAS Number	57117-41-6				57117-31-4				30402-15-4			
Units	ng/kg				ng/kg				ng/kg			
Mokulēʻia												
Octopus (Heʻe)												
MAK109O	0.08	U	U	0.08	0.059	U	U	0.059	0.069	U	U	0.069
MAK118O	0.055	U	U	0.055	0.042	U	U	0.042	0.049	U	U	0.049
MAK119O	0.13	U	U	0.13	0.15	U	U	0.15	0.14	U	U	0.14
MAK120O	0.13	U	U	0.13	0.17	U	U	0.17	0.15	U	U	0.15
MAK121O	0.13	U	U	0.13	0.19	U	U	0.19	0.16	U	U	0.16
MAK122O	0.11	U	U	0.11	0.14	U	U	0.14	0.13	U	U	0.13
MAK123O	0.17	U	U	0.17	0.17	U	U	0.17	0.17	U	U	0.17
MAK124O	0.17	U	U	0.17	0.17	U	U	0.17	0.17	U	U	0.17
Sea Cucumber (Loli)												
MAK111C	0.061	U	U	0.061	0.04	U	U	0.04	0.051	U	U	0.051
MAK113C	0.041	U	U	0.041	0.031	U	U	0.031	0.036	U	U	0.036
MAK114C	0.045	U	U	0.045	0.036	U	U	0.036	0.04	U	U	0.04
MAK115C	0.047	U	U	0.047	0.039	U	U	0.039	0.043	U	U	0.043
MAK116C	0.053	U	U	0.053	0.042	U	U	0.042	0.048	U	U	0.048
MAK117C	0.066	U	U	0.066	0.046	U	U	0.046	0.056	U	U	0.056
MAK118C	0.047	U	U	0.047	0.035	U	U	0.035	0.041	U	U	0.041
MAK120C	0.054	U	U	0.054	0.039	U	U	0.039	0.046	U	U	0.046
Seaweed (Limu kohu)												
MAK120L	0.079	U	U	0.079	0.055	U	U	0.055	0.067	U	U	0.067
MAK121L	0.081	U	U	0.081	0.068	U	U	0.068	0.21			0.074
MAK122L	0.055	U	U	0.055	0.05	U	U	0.05	0.052	U	U	0.052
MAK123L	0.048	U	U	0.048	0.041	U	U	0.041	0.045	U	U	0.045
MAK124L	0.049	U	U	0.049	0.048	U	U	0.048	0.048	U	U	0.048
MAK126L	0.069	U	U	0.069	0.053	U	U	0.053	0.061	U	U	0.061
MAK127L	0.023	U	U	0.023	0.029	BJZ	U	0.017	0.02	U	U	0.02
MAK128L	0.022	U	U	0.022	0.014	U	U	0.014	0.018	U	U	0.018
Kaʻena Point												
Octopus (Heʻe)												
MAK110O	0.081	U	U	0.081	0.069	U	U	0.069	0.075	U	U	0.075
MAK111O	0.075	U	U	0.075	0.062	U	U	0.062	0.068	U	U	0.068
MAK112O	0.081	U	U	0.081	0.067	U	U	0.067	0.074	U	U	0.074
MAK113O	0.056	U	U	0.056	0.061	U	U	0.061	0.059	U	U	0.059
MAK114O	0.07	U	U	0.07	0.042	U	U	0.042	0.056	U	U	0.056
MAK115O	0.064	U	U	0.064	0.057	U	U	0.057	0.061	U	U	0.061
MAK116O	0.065	U	U	0.065	0.057	U	U	0.057	0.061	U	U	0.061
MAK117O	0.052	U	U	0.052	0.046	U	U	0.046	0.049	U	U	0.049
Sea Cucumber (Loli)												
MAK121C	0.031	U	U	0.031	0.026	U	U	0.026	0.029	U	U	0.029
MAK122C	0.028	U	U	0.028	0.024	U	U	0.024	0.026	U	U	0.026
MAK123C	0.05	U	U	0.05	0.035	U	U	0.035	0.043	U	U	0.043
MAK124C	0.05	U	U	0.05	0.04	U	U	0.04	0.045	U	U	0.045
MAK125C	0.072	U	U	0.072	0.061	U	U	0.061	0.067	U	U	0.067
MAK126C	0.088	U	U	0.088	0.072	U	U	0.072	0.08	U	U	0.08
MAK127C	0.099	U	U	0.099	0.085	U	U	0.085	0.092	U	U	0.092
MAK128C	0.11	U	U	0.11	0.085	U	U	0.085	0.097	U	U	0.097
Seaweed (Limu kohu)												
MAK116L	0.024	U	U	0.024	0.017	BJZ	U	0.016	0.02	U	U	0.02
MAK117L	0.015	U	U	0.015	0.011	U	U	0.011	0.013	U	U	0.013
MAK118L	0.022	U	U	0.022	0.019		U	0.015	0.019		J	0.019
MAK130L	0.1	U	U	0.1	0.17	U	U	0.17	0.14	U	U	0.14
MAK132L	0.12	U	U	0.12	0.13	U	U	0.13	0.13	U	U	0.13
MAK134L	0.036	U	U	0.036	0.026	U	U	0.026	0.031	U	U	0.031
MAK135L	0.037	U	U	0.037	0.029	U	U	0.029	0.033	U	U	0.033
MAK138L	0.055	U	U	0.055	0.039	U	U	0.039	0.047	U	U	0.047

Lab ID	1,2,3,7,8-PeCDD Result[2]	LQ[3]	VQ	RL[4]	Total PeCDD Result[2]	LQ[3]	VQ	RL[4]	1,2,3,4,7,8-HxCDF Result[2]	LQ[3]	VQ	RL[4]	1,2,3,6,7,8-HxCDF Result[2]	LQ[3]	VQ	RL[4]
CAS Number	40321-76-4				36088-22-9				70648-26-9				57117-44-9			
Units	ng/kg				ng/kg				ng/kg				ng/kg			
Mokulēʻia																
Octopus (Heʻe)																
MAK109O	0.078	U	U	0.078	0.078	U	U	0.078	0.057	U	U	0.057	0.07	U	U	0.07
MAK118O	0.084	U	U	0.084	0.084	U	U	0.084	0.08	U	U	0.08	0.065	U	U	0.065
MAK119O	0.23	U	U	0.23	0.23	U	U	0.23	0.13	U	U	0.13	0.11	U	U	0.11
MAK120O	0.2	U	U	0.2	0.2	U	U	0.2	0.1	U	U	0.1	0.091	U	U	0.091
MAK121O	0.21	U	U	0.21	0.21	U	U	0.21	0.12	U	U	0.12	0.11	U	U	0.11
MAK122O	0.18	U	U	0.18	0.18	U	U	0.18	0.13	U	U	0.13	0.098	U	U	0.098
MAK123O	0.19	U	U	0.19	0.19	U	U	0.19	0.11	U	U	0.11	0.089	U	U	0.089
MAK124O	0.26	U	U	0.26	0.26	U	U	0.26	0.13	U	U	0.13	0.11	U	U	0.11
Sea Cucumber (Loli)																
MAK111C	0.06	U	U	0.06	0.06	U	U	0.06	0.048	U	U	0.048	0.038	U	U	0.038
MAK113C	0.045	U	U	0.045	0.045	U	U	0.045	0.04	U	U	0.04	0.034	U	U	0.034
MAK114C	0.071	U	U	0.071	0.071	U	U	0.071	0.042	U	U	0.042	0.037	U	U	0.037
MAK115C	0.064	U	U	0.064	0.064	U	U	0.064	0.033	U	U	0.033	0.026	U	U	0.026
MAK116C	0.054	U	U	0.054	0.054	U	U	0.054	0.049	U	U	0.049	0.04	U	U	0.04
MAK117C	0.053	U	U	0.053	0.053	U	U	0.053	0.044	U	U	0.044	0.043	U	U	0.043
MAK118C	0.045	U	U	0.045	0.045	U	U	0.045	0.032	U	U	0.032	0.035	U	U	0.035
MAK120C	0.042	U	U	0.042	0.042	U	U	0.042	0.047	U	U	0.047	0.045	U	U	0.045
Seaweed (Limu kohu)																
MAK120L	0.094	U	U	0.094	0.094	U	U	0.094	0.056	U	U	0.056	0.042	U	U	0.042
MAK121L	0.096	U	U	0.096	0.096	U	U	0.096	0.049	U	U	0.049	0.054	U	U	0.054
MAK122L	0.067	U	U	0.067	0.067	U	U	0.067	0.047	U	U	0.047	0.035	U	U	0.035
MAK123L	0.056	U	U	0.056	0.056	U	U	0.056	0.034	U	U	0.034	0.029	U	U	0.029
MAK124L	0.05	U	U	0.05	0.05	U	U	0.05	0.033	U	U	0.033	0.034	U	U	0.034
MAK126L	0.064	U	U	0.064	0.064	U	U	0.064	0.05	U	U	0.05	0.045	U	U	0.045
MAK127L	0.021	U	U	0.021	0.021	U	U	0.021	0.024	U	U	0.024	0.023	U	U	0.023
MAK128L	0.017	U	U	0.017	0.017	U	U	0.017	0.02	U	U	0.02	0.017	U	U	0.017
Kaʻena Point																
Octopus (Heʻe)																
MAK110O	0.11	U	U	0.11	0.11	U	U	0.11	0.067	U	U	0.067	0.058	U	U	0.058
MAK111O	0.16	U	U	0.16	0.16	U	U	0.16	0.097	U	U	0.097	0.07	U	U	0.07
MAK112O	0.14	U	U	0.14	0.14	U	U	0.14	0.089	U	U	0.089	0.073	U	U	0.073
MAK113O	0.12	U	U	0.12	0.12	U	U	0.12	0.075	U	U	0.075	0.1	U	U	0.1
MAK114O	0.11	U	U	0.11	0.11	U	U	0.11	0.057	U	U	0.057	0.074	U	U	0.074
MAK115O	0.12	U	U	0.12	0.12	U	U	0.12	0.085	U	U	0.085	0.075	U	U	0.075
MAK116O	0.1	U	U	0.1	0.1	U	U	0.1	0.06	U	U	0.06	0.08	U	U	0.08
MAK117O	0.12	U	U	0.12	0.12	U	U	0.12	0.036	U	U	0.036	0.033	U	U	0.033
Sea Cucumber (Loli)																
MAK121C	0.029	U	U	0.029	0.029	U	U	0.029	0.029	U	U	0.029	0.021	U	U	0.021
MAK122C	0.03	U	U	0.03	0.03	U	U	0.03	0.021	U	U	0.021	0.015	U	U	0.015
MAK123C	0.031	U	U	0.031	0.031	U	U	0.031	0.027	U	U	0.027	0.024	U	U	0.024
MAK124C	0.043	U	U	0.043	0.043	U	U	0.043	0.041	U	U	0.041	0.029	U	U	0.029
MAK125C	0.064	U	U	0.064	0.064	U	U	0.064	0.058	U	U	0.058	0.068	U	U	0.068
MAK126C	0.048	U	U	0.048	0.048	U	U	0.048	0.042	U	U	0.042	0.036	U	U	0.036
MAK127C	0.052	U	U	0.052	0.052	U	U	0.052	0.048	U	U	0.048	0.042	U	U	0.042
MAK128C	0.045	U	U	0.045	0.045	U	U	0.045	0.046	U	U	0.046	0.045	U	U	0.045
Seaweed (Limu kohu)																
MAK116L	0.014	U	U	0.014	0.014	U	U	0.014	0.013	U	U	0.013	0.013	JZ	U	0.012
MAK117L	0.014	U	U	0.014	0.014	U	U	0.014	0.012	U	U	0.012	0.018	JZ	U	0.011
MAK118L	0.016	U	U	0.016	0.016	U	U	0.016	0.027	JZ		0.011	0.012	JZ	U	0.011
MAK130L	0.17	U	U	0.17	0.17	U	U	0.17	0.11	U	U	0.11	0.091	U	U	0.091
MAK132L	0.16	U	U	0.16	0.16	U	U	0.16	0.09	U	U	0.09	0.078	U	U	0.078
MAK134L	0.034	U	U	0.034	0.034	U	U	0.034	0.028	U	U	0.028	0.025	U	U	0.025
MAK135L	0.04	U	U	0.04	0.04	U	U	0.04	0.023	U	U	0.023	0.022	U	U	0.022
MAK138L	0.049	U	U	0.049	0.049	U	U	0.049	0.03	U	U	0.03	0.025	U	U	0.025

		2,3,7,8-TCDF	Total TCDF	2,3,7,8-TCDD	Total TCDD	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	Total PeCDF	1,2,3,7,8-PeCDD	Total PeCDD	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF
Octopus (Heʻe) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*9*	*16*	*8*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of detections	*0*	*7*	*0*	*8*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*43.8%*	*0.0%*	*50.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	*0.19*	*0.19*	*0.16*	*0.48*	*0.17*	*0.19*	*0.17*	*0.26*	*0.26*	*0.13*	*0.11*
	Standard Deviation	*0.029*	*0.026*	*0.03*	*0.10*	*0.040*	*0.056*	*0.047*	*0.055*	*0.055*	*0.030*	*0.021*
	Mean	*0.13*	*0.11*	*0.101*	*0.18*	*0.095*	*0.10*	*0.10*	*0.15*	*0.15*	*0.089*	*0.082*
Sea Cucumber (Loli) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*2*	*16*	*8*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of detections	*0*	*14*	*0*	*8*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
	Frequency of Detection	*0.0%*	*87.5%*	*0.0%*	*50.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	*0.15*	*0.69*	*0.19*	*0.19*	*0.11*	*0.085*	*0.10*	*0.071*	*0.071*	*0.058*	*0.068*
	Standard Deviation	*0.036*	*0.23*	*0.04*	*0.048*	*0.02*	*0.019*	*0.021*	*0.012*	*0.012*	*0.010*	*0.012*
	Mean	*0.1006*	*0.2961*	*0.0714*	*0.1005*	*0.0589*	*0.0460*	*0.0525*	*0.0485*	*0.0485*	*0.0404*	*0.0361*
Seaweed (Limu)Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*8*	*16*	*6*	*16*	*16*	*14*	*16*	*16*	*15*	*16*
	number of detections	*0*	*8*	*0*	*10*	*0*	*0*	*2*	*0*	*0*	*1*	*0*
	Frequency of Detection	*0.0%*	*50.0%*	*0.0%*	*62.5%*	*0.0%*	*0.0%*	*12.5%*	*0.0%*	*0.0%*	*6.3%*	*0.0%*
	Maximum Detected	*0.19*	*0.45*	*0.16*	*0.21*	*0.12*	*0.17*	*0.21*	*0.17*	*0.17*	*0.11*	*0.09*
	Standard Deviation	*0.037*	*0.12*	*0.037*	*0.047*	*0.031*	*0.043*	*0.055*	*0.049*	*0.049*	*0.027*	*0.023*
	Mean	*0.10*	*0.17*	*0.06*	*0.12*	*0.052*	*0.050*	*0.060*	*0.060*	*0.060*	*0.040*	*0.035*

Notes:

[2] Results presented as "ND" in the the Pace Analytical laboratory reports are presented in this table as the RL value with a "U" qualifier.

[3] For Hi-Res analysis, if results are outside of an ion-ratio comparison, then they are reported as Estimated Maximum Possible Concentration (EMPC), which will carry a laboratory "J" qualifier. EMPC results are indicated in the Staged Electronic Data Deliverable (SEDD), and thus in this table, with a "Z" qualifier. In the Pace Analytical laboratory reports, "J" qualifiers also define results that are greater than the sample specific estimated detection limit (EDL) but less than the laboratory contract required quantitation limit (CRQL). Per the analytical method, the limit of detection equals the estimated quantitation limit, therefore method detection limits and CRQLs did not apply; therefore,detects less than the CRQL were not flagged "J" in the SEDDs and thus in this data table.

[4] The RL value presented in the laboratory report is equivalent to the dioxin analysis' sample specific EDL.

CAS - Chemical Abstracts Service
ID - identification
ng/kg - nanograms per kilogram
ND - not detected
PCDE - polychlorinated diphenyl ethers
RL - reporting limit

Laboratory Qualifier (LQ)
B - Less than 10x higher than method blank level.
J - Estimated value.
U - Analyte not detected.
Z - Indicates an EMPC result. The result is qualified in the Pace Analytical laboratory report as a "J" with either an "I" (interference present) or "P" (PCDE interference) qualifier.

Validator Qualifier (VQ)
J - Indicates an estimated value.
U - Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
UJ - Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

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Analyte		2,3,4,6,7,8-HxCDF				1,2,3,7,8,9-HxCDF				Total HxCDF				1,2,3,4,7,8-HxCDD				1,2,3,6,7,8-HxCDD			
CAS Number		*60851-34-5*				*72918-21-9*				*55684-94-1*				*39227-28-6*				*57653-85-7*			
Units		*ng/kg*				*ng/kg*				*ng/kg*				*ng/kg*				*ng/kg*			
Lab ID	**Collection Date**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**
Mokulē'ia																					
Octopus (He'e)																					
MAK109O	1/31/2014	0.079	U	U	0.079	0.088	U	U	0.088	0.073	U	U	0.073	0.071	U	U	0.071	0.068	U	U	0.068
MAK118O	3/27/2014	0.076	U	U	0.076	0.088	U	U	0.088	0.077	U	U	0.077	0.051	U	U	0.051	0.069	JZ		0.053
MAK119O	3/27/2014	0.1	U	U	0.1	0.16			0.14	0.16			0.12	0.16	U	U	0.16	0.18	U	U	0.18
MAK120O	3/27/2014	0.081	U	U	0.081	0.11	JZ		0.1	0.095	U	U	0.095	0.12	U	U	0.12	0.1	U	U	0.1
MAK121O	3/27/2014	0.1	U	U	0.1	0.13	JZ		0.12	0.11	U	U	0.11	0.12	U	U	0.12	0.14	JZ		0.13
MAK122O	3/27/2014	0.1	U	U	0.1	0.13	U	U	0.13	0.11	U	U	0.11	0.14	U	U	0.14	0.15	U	U	0.15
MAK123O	3/27/2014	0.088	U	U	0.088	0.11	U	U	0.11	0.099	U	U	0.099	0.11	U	U	0.11	0.12	U	U	0.12
MAK124O	3/28/2014	0.093	U	U	0.093	0.13	U	U	0.13	0.12	U	U	0.12	0.13	U	U	0.13	0.16	U	U	0.16
Sea Cucumber (Loli)																					
MAK111C	1/31/2014	0.04	U	U	0.04	0.052	U	U	0.052	0.045	U	U	0.045	0.065	U	U	0.065	0.059	U	U	0.059
MAK113C	1/31/2014	0.037	U	U	0.037	0.043	U	U	0.043	0.038	U	U	0.038	0.052	U	U	0.052	0.049	JZ		0.048
MAK114C	1/31/2014	0.039	U	U	0.039	0.048	U	U	0.048	0.041	U	U	0.041	0.05	U	U	0.05	0.052	U	U	0.052
MAK115C	1/31/2014	0.03	U	U	0.03	0.041	U	U	0.041	0.032	U	U	0.032	0.051	U	U	0.051	0.054	U	U	0.054
MAK116C	1/31/2014	0.04	U	U	0.04	0.062	U	U	0.062	0.048	U	U	0.048	0.079	U	U	0.079	0.088			0.083
MAK117C	1/31/2014	0.037	U	U	0.037	0.059	U	U	0.059	0.046	U	U	0.046	0.06	U	U	0.06	0.087			0.071
MAK118C	1/31/2014	0.037	U	U	0.037	0.047	U	U	0.047	0.038	U	U	0.038	0.055			0.046	0.099	JZ		0.044
MAK120C	2/11/2014	0.046	U	U	0.046	0.053	U	U	0.053	0.048	U	U	0.048	0.063			0.042	0.1	JZ		0.056
Seaweed (Limu kohu)																					
MAK120L	1/31/2014	0.044	U	U	0.044	0.054	U	U	0.054	0.11			0.049	0.086	U	U	0.086	0.094	U	U	0.094
MAK121L	1/31/2014	0.056	U	U	0.056	0.07	U	U	0.07	0.057	U	U	0.057	0.089	U	U	0.089	0.081	U	U	0.081
MAK122L	1/31/2014	0.042	U	U	0.042	0.055	U	U	0.055	0.045	U	U	0.045	0.086	U	U	0.086	0.075	U	U	0.075
MAK123L	1/31/2014	0.029	U	U	0.029	0.038	U	U	0.038	0.033	U	U	0.033	0.057	U	U	0.057	0.073	U	U	0.073
MAK124L	1/31/2014	0.038	U	U	0.038	0.041	U	U	0.041	0.1			0.037	0.045	U	U	0.045	0.062	U	U	0.062
MAK126L	1/31/2014	0.044	U	U	0.044	0.059	U	U	0.059	0.1			0.05	0.069	U	U	0.069	0.077	U	U	0.077
MAK127L	2/11/2014	0.02	U	U	0.02	0.03	U	U	0.03	0.024	U	U	0.024	0.034	U	U	0.034	0.031	U	U	0.031
MAK128L	2/11/2014	0.015	U	U	0.015	0.019	U	U	0.019	0.018	U	U	0.018	0.026	U	U	0.026	0.024	U	U	0.024
Ka'ena Point																					
Octopus (He'e)																					
MAK110O	3/28/2014	0.061	U	U	0.061	0.087	U	U	0.087	0.068	U	U	0.068	0.075	U	U	0.075	0.069	U	U	0.069
MAK111O	3/28/2014	0.071	U	U	0.071	0.085	U	U	0.085	0.081	U	U	0.081	0.051	U	U	0.051	0.079	U	U	0.079
MAK112O	3/28/2014	0.083	U	U	0.083	0.12	U	U	0.12	0.09	U	U	0.09	0.055	U	U	0.055	0.067	U	U	0.067
MAK113O	3/28/2014	0.085	U	U	0.085	0.084	U	U	0.084	0.086	U	U	0.086	0.062	U	U	0.062	0.089	U	U	0.089
MAK114O	3/28/2014	0.054	U	U	0.054	0.085	U	U	0.085	0.068	U	U	0.068	0.069	U	U	0.069	0.054	U	U	0.054
MAK115O	3/28/2014	0.074	U	U	0.074	0.1	U	U	0.1	0.084	U	U	0.084	0.072	U	U	0.072	0.079	U	U	0.079
MAK116O	3/28/2014	0.067	U	U	0.067	0.099	U	U	0.099	0.076	U	U	0.076	0.06	U	U	0.06	0.06	U	U	0.06
MAK117O	3/28/2014	0.03	U	U	0.03	0.048	U	U	0.048	0.037	U	U	0.037	0.031	U	U	0.031	0.043	U	U	0.043
Sea Cucumber (Loli)																					
MAK121C	3/28/2014	0.021	U	U	0.021	0.028	U	U	0.028	0.025	U	U	0.025	0.025	U	U	0.025	0.029	U	U	0.029
MAK122C	3/28/2014	0.017	U	U	0.017	0.02	U	U	0.02	0.018	U	U	0.018	0.025	U	U	0.025	0.026	U	U	0.026
MAK123C	3/28/2014	0.025	U	U	0.025	0.038	U	U	0.038	0.029	U	U	0.029	0.042	U	U	0.042	0.055	U	U	0.055
MAK124C	3/28/2014	0.033	U	U	0.033	0.032	U	U	0.032	0.034	U	U	0.034	0.051	U	U	0.051	0.062	U	U	0.062
MAK125C	3/28/2014	0.059	U	U	0.059	0.074	U	U	0.074	0.065	U	U	0.065	0.087	U	U	0.087	0.086	U	U	0.086
MAK126C	3/28/2014	0.037	U	U	0.037	0.046	U	U	0.046	0.04	U	U	0.04	0.045	U	U	0.045	0.051	U	U	0.051
MAK127C	3/28/2014	0.055	U	U	0.055	0.063	U	U	0.063	0.052	U	U	0.052	0.081	U	U	0.081	0.094	U	U	0.094
MAK128C	3/28/2014	0.046	U	U	0.046	0.049	U	U	0.049	0.047	U	U	0.047	0.067	U	U	0.067	0.071	U	U	0.071
Seaweed (Limu kohu)																					
MAK116L	1/31/2014	0.018	JZ		0.012	0.012	U	U	0.012	0.012	U	U	0.012	0.016	U	U	0.016	0.02	U	U	0.02
MAK117L	1/31/2014	0.01	U	U	0.01	0.011	U	U	0.011	0.011	U	U	0.011	0.018	U	U	0.018	0.024	JZ		0.021
MAK118L	1/31/2014	0.0097	U	U	0.0097	0.014	U	U	0.014	0.011	U	U	0.011	0.015	U	U	0.015	0.018	JZ		0.017
MAK130L	3/27/2014	0.11	U	U	0.11	0.11	U	U	0.11	0.11	U	U	0.11	0.17	U	U	0.17	0.17	U	U	0.17
MAK132L	3/28/2014	0.082	U	U	0.082	0.099	U	U	0.099	0.087	U	U	0.087	0.12	U	U	0.12	0.11	U	U	0.11
MAK134L	3/28/2014	0.032	U	U	0.032	0.036	U	U	0.036	0.03	U	U	0.03	0.034	U	U	0.034	0.038	U	U	0.038
MAK135L	3/28/2014	0.02	U	U	0.02	0.028	U	U	0.028	0.023	U	U	0.023	0.056	U	U	0.056	0.059	U	U	0.059
MAK138L	3/28/2014	0.024	U	U	0.024	0.032	U	U	0.032	0.028	U	U	0.028	0.026	U	U	0.026	0.032	U	U	0.032

Analyte	1,2,3,7,8,9-HxCDD				Total HxCDD				1,2,3,4,6,7,8-HpCDF				1,2,3,4,7,8,9-HpCDF				Total HpCDF				1,2,3,4,6,7,8-HpCDD			
CAS Number	*19408-74-3*				*34465-46-8*				*67562-39-4*				*55673-89-7*				*38998-75-3*				*35822-46-9*			
Units	*ng/kg*				*ng/kg*				*ng/kg*				*ng/kg*				*ng/kg*				*ng/kg*			
Lab ID	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**	**Result[2]**	**LQ[3]**	**VQ**	**RL[4]**
Mokulē'ia																								
Octopus (He'e)																								
MAK109O	0.069	U	U	0.069	0.069	U	U	0.069	0.084	U	U	0.084	0.12	U	U	0.12	0.1	U	U	0.1	0.11	JZ		0.066
MAK118O	0.06	U	U	0.06	0.054	U	U	0.054	0.057	U	U	0.057	0.075	U	U	0.075	0.066	U	U	0.066	0.17			0.066
MAK119O	0.15	U	U	0.15	0.16	U	U	0.16	0.11	JZ		0.098	0.14	U	U	0.14	0.12	U	U	0.12	0.21	JZ		0.13
MAK120O	0.097	U	U	0.097	0.1	U	U	0.1	0.094	U	U	0.094	0.12	U	U	0.12	0.11	U	U	0.11	0.12	U	U	0.12
MAK121O	0.12	U	U	0.12	0.12	U	U	0.12	0.13			0.11	0.14	U	U	0.14	0.13			0.13	0.14	U	U	0.14
MAK122O	0.14	U	U	0.14	0.14	U	U	0.14	0.084	U	U	0.084	0.12	U	U	0.12	0.1	U	U	0.1	0.13	JZ		0.12
MAK123O	0.1	U	U	0.1	0.11	U	U	0.11	0.069	U	U	0.069	0.089	U	U	0.089	0.079	U	U	0.079	0.15	U	U	0.15
MAK124O	0.15	U	U	0.15	0.14	U	U	0.14	0.075	U	U	0.075	0.086	U	U	0.086	0.081	U	U	0.081	0.087	U	U	0.087
Sea Cucumber (Loli)																								
MAK111C	0.071	U	U	0.071	0.065	U	U	0.065	0.041	U	U	0.041	0.061	U	U	0.061	0.051	U	U	0.051	0.14		U	0.076
MAK113C	0.049	U	U	0.049	0.05	U	U	0.05	0.034	U	U	0.034	0.048	U	U	0.048	0.041	U	U	0.041	0.32		U	0.077
MAK114C	0.064	U	U	0.064	0.055	U	U	0.055	0.075			0.046	0.067	U	U	0.067	0.075			0.056	0.34		U	0.096
MAK115C	0.058			0.047	0.058			0.051	0.041	JZ		0.039	0.05	U	U	0.05	0.044	U	U	0.044	0.37	JZ	U	0.068
MAK116C	0.071			0.066	0.16			0.076	0.05	U	U	0.05	0.072	U	U	0.072	0.061	U	U	0.061	0.55		U	0.08
MAK117C	0.058	U	U	0.058	0.087			0.063	0.049	JZ		0.044	0.057	U	U	0.057	0.05	U	U	0.05	0.51		U	0.063
MAK118C	0.084			0.039	0.3			0.043	0.032	U	U	0.032	0.043	U	U	0.043	0.038	U	U	0.038	0.75			0.076
MAK120C	0.058	JZ		0.057	0.12			0.052	0.067			0.038	0.046	U	U	0.046	0.067			0.042	0.67	JZ		0.097
Seaweed (Limu kohu)																								
MAK120L	0.065	U	U	0.065	0.082	U	U	0.082	0.099	JZ		0.045	0.083	U	U	0.083	0.14			0.064	0.25		U	0.094
MAK121L	0.089	U	U	0.089	0.086	U	U	0.086	0.061	U	U	0.061	0.081	U	U	0.081	0.071	U	U	0.071	0.15		U	0.092
MAK122L	0.083	U	U	0.083	0.081	U	U	0.081	0.045	U	U	0.045	0.06	U	U	0.06	0.052	U	U	0.052	0.092	U	U	0.092
MAK123L	0.057	U	U	0.057	0.062	U	U	0.062	0.035	U	U	0.035	0.042	U	U	0.042	0.039	U	U	0.039	0.094	JZ	U	0.061
MAK124L	0.064	U	U	0.064	0.057	U	U	0.057	0.16			0.054	0.079	U	U	0.079	0.46			0.067	0.63			0.095
MAK126L	0.069	U	U	0.069	0.2			0.071	0.19			0.049	0.085	U	U	0.085	0.19			0.067	0.58		U	0.12
MAK127L	0.03	U	U	0.03	0.031	U	U	0.031	0.048	JZ		0.024	0.048			0.035	0.048			0.03	0.11		U	0.022
MAK128L	0.023	U	U	0.023	0.024	U	U	0.024	0.061			0.018	0.019	U	U	0.019	0.061			0.019	0.081		U	0.019
Ka'ena Point																								
Octopus (He'e)																								
MAK110O	0.062	U	U	0.062	0.068	U	U	0.068	0.059	U	U	0.059	0.069	U	U	0.069	0.064	U	U	0.064	0.072	U	U	0.072
MAK111O	0.095	U	U	0.095	0.075	U	U	0.075	0.05	U	U	0.05	0.083	U	U	0.083	0.066	U	U	0.066	0.11	U	U	0.11
MAK112O	0.065	U	U	0.065	0.062	U	U	0.062	0.091	U	U	0.091	0.095	U	U	0.095	0.093	U	U	0.093	0.13	U	U	0.13
MAK113O	0.078	U	U	0.078	0.076	U	U	0.076	0.071	U	U	0.071	0.11	U	U	0.11	0.092	U	U	0.092	0.067	U	U	0.067
MAK114O	0.053	U	U	0.053	0.059	U	U	0.059	0.064	JZ		0.05	0.089	U	U	0.089	0.07	U	U	0.07	0.12	U	U	0.12
MAK115O	0.056	U	U	0.056	0.069	U	U	0.069	0.052	U	U	0.052	0.088	U	U	0.088	0.07	U	U	0.07	0.087			0.083
MAK116O	0.064	U	U	0.064	0.062	U	U	0.062	0.076	U	U	0.076	0.098	U	U	0.098	0.087	U	U	0.087	0.07	U	U	0.07
MAK117O	0.041	U	U	0.041	0.038	U	U	0.038	0.034	U	U	0.034	0.049	U	U	0.049	0.042	U	U	0.042	0.052	JZ		0.044
Sea Cucumber (Loli)																								
MAK121C	0.026	U	U	0.026	0.046			0.027	0.032	JZ		0.025	0.044	U	U	0.044	0.034	U	U	0.034	0.064	BJZ	U	0.048
MAK122C	0.024	U	U	0.024	0.039			0.025	0.04			0.03	0.043	U	U	0.043	0.04			0.036	0.12	BJZ	U	0.046
MAK123C	0.043	U	U	0.043	0.047	U	U	0.047	0.035	U	U	0.035	0.052	U	U	0.052	0.044	U	U	0.044	0.067	U	U	0.067
MAK124C	0.059	U	U	0.059	0.057	U	U	0.057	0.043	U	U	0.043	0.058	U	U	0.058	0.051	U	U	0.051	0.084	U	U	0.084
MAK125C	0.084	U	U	0.084	0.086	U	U	0.086	0.053	U	U	0.053	0.077	U	U	0.077	0.065	U	U	0.065	0.11	U	U	0.11
MAK126C	0.048	U	U	0.048	0.048	U	U	0.048	0.032	U	U	0.032	0.054	U	U	0.054	0.043	U	U	0.043	0.087	U	U	0.087
MAK127C	0.088	U	U	0.088	0.088	U	U	0.088	0.06	U	U	0.06	0.072	U	U	0.072	0.066	U	U	0.066	0.089	U	U	0.089
MAK128C	0.064	U	U	0.064	0.067	U	U	0.067	0.034	U	U	0.034	0.062	U	U	0.062	0.048	U	U	0.048	0.1		U	0.082
Seaweed (Limu kohu)																								
MAK116L	0.016	U	U	0.016	0.018	U	U	0.018	0.061			0.015	0.019	U	U	0.019	0.061			0.017	0.3			0.023
MAK117L	0.018	U	U	0.018	0.023			0.019	0.065	JZ		0.019	0.02	U	U	0.02	0.019	U	U	0.019	0.1		U	0.015
MAK118L	0.016	U	U	0.016	0.016	U	U	0.016	0.035	JZ		0.012	0.015	U	U	0.015	0.013	U	U	0.013	0.052	JZ	U	0.016
MAK130L	0.17	U	U	0.17	0.17	U	U	0.17	0.082	U	U	0.082	0.11	U	U	0.11	0.096	U	U	0.096	0.14	U	U	0.14
MAK132L	0.097	U	U	0.097	0.11	U	U	0.11	0.08	U	U	0.08	0.1	U	U	0.1	0.091	U	U	0.091	0.17			0.14
MAK134L	0.037	U	U	0.037	0.036	U	U	0.036	0.025	U	U	0.025	0.047	U	U	0.047	0.036	U	U	0.036	0.042	BJZ	U	0.038
MAK135L	0.048	U	U	0.048	0.054	U	U	0.054	0.021	U	U	0.021	0.03	U	U	0.03	0.026	U	U	0.026	0.088		U	0.046
MAK138L	0.029	U	U	0.029	0.029	U	U	0.029	0.034	JZ		0.028	0.04	U	U	0.04	0.034	U	U	0.034	0.04	U	U	0.04

		2,3,4,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	Total HxCDF	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	Total HxCDD	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	Total HpCDF	1,2,3,4,6,7,8-HpCDD
Octopus (He'e) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*13*	*15*	*16*	*14*	*16*	*16*	*13*	*16*	*15*	*10*
	number of detections	*0*	*3*	*1*	*0*	*2*	*0*	*0*	*3*	*0*	*1*	*6*
	Frequency of Detection	*0.0%*	*18.8%*	*6.3%*	*0.0%*	*12.5%*	*0.0%*	*0.0%*	*18.8%*	*0.0%*	*6.3%*	*37.5%*
	Maximum Detected	*0.10*	*0.16*	*0.16*	*0.16*	*0.18*	*0.15*	*0.16*	*0.13*	*0.14*	*0.13*	*0.21*
	Standard Deviation	*0.019*	*0.027*	*0.027*	*0.038*	*0.042*	*0.036*	*0.036*	*0.024*	*0.025*	*0.023*	*0.042*
	Mean	*0.078*	*0.10*	*0.090*	*0.09*	*0.10*	*0.088*	*0.088*	*0.075*	*0.10*	*0.09*	*0.11*
Sea Cucumber (Loli) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*16*	*16*	*14*	*11*	*12*	*9*	*10*	*16*	*13*	*14*
	number of detections	*0*	*0*	*0*	*2*	*5*	*4*	*7*	*6*	*0*	*3*	*2*
	Frequency of Detection	*0.0%*	*0.0%*	*0.0%*	*12.5%*	*31.3%*	*25.0%*	*43.8%*	*37.5%*	*0.0%*	*18.8%*	*12.5%*
	Maximum Detected	*0.059*	*0.074*	*0.065*	*0.09*	*0.10*	*0.088*	*0.30*	*0.075*	*0.077*	*0.075*	*0.75*
	Standard Deviation	*0.011*	*0.014*	*0.011*	*0.018*	*0.024*	*0.019*	*0.065*	*0.013*	*0.011*	*0.012*	*0.23*
	Mean	*0.0374*	*0.0472*	*0.0404*	*0.0561*	*0.0664*	*0.059*	*0.086*	*0.045*	*0.057*	*0.051*	*0.27*
Seaweed (Limu)Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*15*	*16*	*13*	*16*	*14*	*16*	*14*	*7*	*15*	*10*	*13*
	number of detections	*1*	*0*	*3*	*0*	*2*	*0*	*2*	*9*	*1*	*6*	*3*
	Frequency of Detection	*6.3%*	*0.0%*	*18.8%*	*0.0%*	*12.5%*	*0.0%*	*12.5%*	*56.3%*	*6.3%*	*37.5%*	*18.8%*
	Maximum Detected	*0.11*	*0.11*	*0.11*	*0.17*	*0.17*	*0.17*	*0.20*	*0.19*	*0.11*	*0.46*	*0.63*
	Standard Deviation	*0.027*	*0.029*	*0.038*	*0.043*	*0.041*	*0.040*	*0.054*	*0.047*	*0.031*	*0.11*	*0.18*
	Mean	*0.037*	*0.044*	*0.050*	*0.059*	*0.062*	*0.057*	*0.067*	*0.069*	*0.055*	*0.09*	*0.18*

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	Analyte	Total HpCDD				OCDF				OCDD			
	CAS Number	*37871-00-4*				*39001-02-0*				*03268-87-9*			
	Units	*ng/kg*				*ng/kg*				*ng/kg*			
Lab ID	**Collection Date**	**Result***	**LQ***	**VQ**	**RL***	**Result***	**LQ***	**VQ**	**RL***	**Result***	**LQ***	**VQ**	**RL***
Mokuleʻia													
Octopus (Heʻe)													
MAK109O	1/31/2014	0.066	U	U	0.066	0.18	U	U	0.18	0.37	U	U	0.37
MAK118O	3/27/2014	0.17			0.066	0.17	U	U	0.17	0.52	JZ		0.29
MAK119O	3/27/2014	0.17			0.13	0.38			0.23	0.47	JZ		0.46
MAK120O	3/27/2014	0.12	U	U	0.12	0.2	U	U	0.2	0.38	U	U	0.38
MAK121O	3/27/2014	0.14			0.14	0.27	U	U	0.27	0.41	U	U	0.41
MAK122O	3/27/2014	0.14			0.12	0.25	U	U	0.25	0.4	U	U	0.4
MAK123O	3/27/2014	0.15	U	U	0.15	0.23	U	U	0.23	0.36	U	U	0.36
MAK124O	3/28/2014	0.087	U	U	0.087	0.19	U	U	0.19	0.34	U	U	0.34
Sea Cucumber (Loli)													
MAK111C	1/31/2014	0.14			0.076	0.11	U	U	0.11	0.4		U	0.18
MAK113C	1/31/2014	0.32			0.077	0.1	U	U	0.1	0.95		U	0.14
MAK114C	1/31/2014	0.34			0.096	0.11	U	U	0.11	1.3		U	0.21
MAK115C	1/31/2014	0.068	U	U	0.068	0.11			0.1	1.7			0.14
MAK116C	1/31/2014	0.55			0.08	0.13	U	U	0.13	1.6	JZ		0.12
MAK117C	1/31/2014	0.51			0.063	0.11	U	U	0.11	1.7			0.15
MAK118C	1/31/2014	0.84			0.076	0.096	U	U	0.096	2.3			0.14
MAK120C	2/11/2014	0.13			0.097	0.12			0.08	2.2			0.13
Seaweed (Limu kohu)													
MAK120L	1/31/2014	0.55			0.094	0.24			0.16	2.4			0.16
MAK121L	1/31/2014	0.15			0.092	0.15	U	U	0.15	1.1		U	0.23
MAK122L	1/31/2014	0.092	U	U	0.092	0.13	U	U	0.13	0.62	JZ	U	0.21
MAK123L	1/31/2014	0.11			0.061	0.11	U	U	0.11	0.97		U	0.17
MAK124L	1/31/2014	1.2			0.095	0.49			0.15	6.9			0.16
MAK126L	1/31/2014	1.2			0.12	0.54			0.14	6.9			0.17
MAK127L	2/11/2014	0.26			0.022	0.2		U	0.055	0.73		U	0.1
MAK128L	2/11/2014	0.19			0.019	0.082	JZ	U	0.042	0.44		U	0.066
Kaʻena Point													
Octopus (Heʻe)													
MAK110O	3/28/2014	0.072	U	U	0.072	0.26	U	U	0.26	0.39			0.39
MAK111O	3/28/2014	0.11	U	U	0.11	0.27	U	U	0.27	0.78	U	U	0.78
MAK112O	3/28/2014	0.13	U	U	0.13	0.26	U	U	0.26	0.7	U	U	0.7
MAK113O	3/28/2014	0.067	U	U	0.067	0.22	U	U	0.22	0.45	U	U	0.45
MAK114O	3/28/2014	0.12	U	U	0.12	0.26	U	U	0.26	0.53	U	U	0.53
MAK115O	3/28/2014	0.087			0.083	0.17	U	U	0.17	0.38	U	U	0.38
MAK116O	3/28/2014	0.07	U	U	0.07	0.17	U	U	0.17	0.82	JZ		0.44
MAK117O	3/28/2014	0.078			0.044	0.14	U	U	0.14	0.31	JZ		0.22
Sea Cucumber (Loli)													
MAK121C	3/28/2014	0.048	U	U	0.048	0.073	U	U	0.073	0.21		U	0.098
MAK122C	3/28/2014	0.046	U	U	0.046	0.061	U	U	0.061	0.27	JZ	U	0.15
MAK123C	3/28/2014	0.067	U	U	0.067	0.096	JZ		0.079	0.39	JZ	U	0.11
MAK124C	3/28/2014	0.084	U	U	0.084	0.18	U	U	0.18	0.29		U	0.19
MAK125C	3/28/2014	0.11	U	U	0.11	0.14	U	U	0.14	0.39	JZ	U	0.18
MAK126C	3/28/2014	0.087	U	U	0.087	0.2	U	U	0.2	0.25	U	U	0.25
MAK127C	3/28/2014	0.089	U	U	0.089	0.16	U	U	0.16	0.39	U	U	0.39
MAK128C	3/28/2014	0.1		J	0.082	0.24	U	U	0.24	0.46		U	0.27
Seaweed (Limu kohu)													
MAK116L	1/31/2014	0.87			0.023	0.17		U	0.041	6.7			0.036
MAK117L	1/31/2014	0.24			0.015	0.085	JZ	U	0.028	0.68		U	0.026
MAK118L	1/31/2014	0.092			0.016	0.073	JZ	U	0.036	0.38		U	0.027
MAK130L	3/27/2014	0.14	U	U	0.14	0.3	U	U	0.3	0.48	U	U	0.48
MAK132L	3/28/2014	0.36			0.14	0.24	U	U	0.24	0.55	JZ		0.21
MAK134L	3/28/2014	0.038	U	U	0.038	0.12	U	U	0.12	0.35		U	0.16
MAK135L	3/28/2014	0.088		J	0.046	0.13	U	U	0.13	0.53		U	0.17
MAK138L	3/28/2014	0.084			0.04	0.098	U	U	0.098	0.38		U	0.12

Octopus (Heʻe) Samples	*number of samples analyzed*	*16*	*16*	*16*
	number of non-detect	*10*	*15*	*11*
	number of detections	*6*	*1*	*5*
	Frequency of Detection	*37.5%*	*6.3%*	*31.3%*
	Maximum Detected	*0.17*	*0.38*	*0.82*
	Standard Deviation	*0.037*	*0.059*	*0.16*
	Mean	*0.11*	*0.23*	*0.48*

Sea Cucumber (Loli) Samples	*number of samples analyzed*	*16*	*16*	*16*
	number of non-detect	*8*	*13*	*11*
	number of detections	*8*	*3*	*5*
	Frequency of Detection	*50.0%*	*18.8%*	*31.3%*
	Maximum Detected	*0.84*	*0.24*	*2.30*
	Standard Deviation	*0.23*	*0.047*	*0.75*
	Mean	*0.22*	*0.13*	*0.93*

Seaweed (Limu)Samples	*number of samples analyzed*	*16*	*16*	*16*
	number of non-detect	*3*	*13*	*11*
	number of detections	*13*	*3*	*5*
	Frequency of Detection	*81.3%*	*18.8%*	*31.3%*
	Maximum Detected	*1.20*	*0.54*	*6.90*
	Standard Deviation	*0.39*	*0.14*	*2.51*
	Mean	*0.35*	*0.20*	*1.88*

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Explosives

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Analyte		Perchlorate					2,4-Dinitrotoluene[3]					2,4-Dinitrotoluene[5]					Hexahydro-trinitro-triazine (RDX)					Nitroglycerine				
CAS Number		14797-73-0					121-14-2					121-14-2					121-82-4					55-63-0				
Units		µg/kg					µg/kg					µg/kg					µg/kg					µg/kg				
Laboratory/Analytical Method		TestAmerica Sacramento/EPA 6850					ARDL/EPA 8330A					ERDC/EPA 8330					ARDL/EPA 8330A					ARDL/EPA 8330A				
Lab ID	Collection Date	Result[2]	LQ	VQ	RL	MDL	Result[4]	LQ	VQ	RL	MDL	Result[6,7]	LQ	VQ	RL[6]	MDL[6]	Result[4]	LQ	VQ	RL	MDL	Result[4]	LQ	VQ	RL	MDL
Mokule'ia																										
Octopus (He'e)																										
MAK109O	1/31/2014	0.29	U	UJ	9.8	0.29	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK118O	3/27/2014	0.45	J	J	9.6	0.29	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK119O	3/27/2014	0.29	IU	UJ	9.7	0.29	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK120O	3/27/2014	0.3	U	UJ	10	0.3	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK121O	3/27/2014	0.28	U	UJ	9.5	0.28	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK122O	3/27/2014	0.29	U	UJ	9.8	0.29	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK123O	3/27/2014	0.29	U	UJ	9.7	0.29	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK124O	3/28/2014	0.29	U	UJ	9.8	0.29	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
Sea Cucumber (Loli)																										
MAK111C	1/31/2014	0.29	U		9.7	0.29	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK113C	1/31/2014	0.3	U		9.9	0.3	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK114C	1/31/2014	0.3	U		9.9	0.3	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK115C	1/31/2014	0.29	U		9.6	0.29	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK116C	1/31/2014	0.3	IU		9.9	0.3	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK117C	1/31/2014	0.29	U		9.7	0.29	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK118C	1/31/2014	0.29	U		9.7	0.29	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK120C	2/11/2014	0.3	U		10	0.3	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
Seaweed (Limu kohu)																										
MAK120L	1/31/2014	2	J	J	9.7	0.29	--			--	--	**200**	U		200	20	**500**	U		500	200	**500**	U		500	300
MAK121L	1/31/2014	2.2	J	J	10	0.3	--			--	--	**200**	U		200	20	**500**	U		500	200	**500**	U		500	300
MAK122L	1/31/2014	1.8	J	J	9.9	0.3	--			--	--	**200**	U		200	20	**500**	U		500	200	**500**	U		500	300
MAK123L	1/31/2014	0.28	U	UJ	9.5	0.28	--			--	--	**200**	U		200	20	**500**	U		500	200	**500**	U		500	300
MAK124L	1/31/2014	8.7	J	J	9.9	0.3	--			--	--	**200**	U		200	20	**500**	U		500	200	**500**	U		500	300
MAK126L	1/31/2014	12			9.7	0.29	--			--	--	**200**	U		200	20	**500**	U		500	200	**500**	U		500	300
MAK127L	2/11/2014	0.65	J I	J	9.8	0.29	--			--	--	**200**	U		200	20	**500**	U		500	200	**500**	U		500	300
MAK128L	2/11/2014	0.41	J	J	9.9	0.3	--			--	--	**200**	U		200	20	**500**	U		500	200	**500**	U		500	300
Ka'ena Point																										
Octopus (He'e)																										
MAK110O	3/28/2014	0.3	U	UJ	10	0.3	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK111O	3/28/2014	0.29	U	UJ	9.8	0.29	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK112O	3/28/2014	0.29	U	UJ	9.6	0.29	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK113O	3/28/2014	0.29	U	UJ	9.7	0.29	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK114O	3/28/2014	0.29	U	UJ	9.8	0.29	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK115O	3/28/2014	0.29	U	UJ	9.7	0.29	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK116O	3/28/2014	0.3	U	UJ	9.9	0.3	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK117O	3/28/2014	0.29	U	UJ	9.7	0.29	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
Sea Cucumber (Loli)																										
MAK121C	3/28/2014	0.79	J	J	9.7	0.29	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK122C	3/28/2014	0.3	U		10	0.3	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK123C	3/28/2014	0.3	U		10	0.3	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK124C	3/28/2014	0.3	U		9.9	0.3	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK125C	3/28/2014	0.3	IU		9.9	0.3	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK126C	3/28/2014	0.31	J I	J	9.9	0.3	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK127C	3/28/2014	0.72	J	J	9.9	0.3	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
MAK128C	3/28/2014	0.35	J	J	9.7	0.29	**500**	U		500	100	--			--	--	**500**	U		500	200	**500**	U		500	300
Seaweed (Limu kohu)																										
MAK116L	1/31/2014	0.3	U	UJ	9.9	0.3	--			--	--	**200**	U		200	20	**500**	U		500	200	**500**	U		500	300
MAK117L	1/31/2014	0.3	U	UJ	10	0.3	--			--	--	**200**	U		200	20	**500**	U		500	200	**500**	U		500	300
MAK118L	1/31/2014	0.28	U		9.4	0.28	--			--	--	**200**	U		200	20	**500**	U		500	200	**500**	U		500	300
MAK130L	3/27/2014	0.56	J	J	10	0.3	--			--	--	**200**	U		200	20	**500**	U		500	200	**500**	U		500	300
MAK132L	3/28/2014	0.32	J I	J	10	0.3	--			--	--	**200**	U		200	20	**500**	U		500	200	**500**	U		500	300
MAK134L	3/28/2014	0.34	J I	J	10	0.3	--			--	--	**200**	U		200	20	**500**	U		500	200	**500**	U		500	300
MAK135L	3/28/2014	0.74	J	J	9.7	0.29	--			--	--	**200**	U		200	20	**500**	U		500	200	**500**	U		500	300
MAK138L	3/28/2014	0.32	J	J	9.6	0.29	--			--	--	**200**	U		200	20	**500**	U		500	200	**500**	U		500	300

Octopus (He'e) Samples	*number of samples analyzed*	*16*	*16*	*0*	*16*	*16*
	number of non-detect	*15*	*16*	*0*	*16*	*16*
	number of detections	*1*	*0*	*0*	*0*	*0*
	Frequency of Detection	*6.3%*	*0.0%*	*-*	*0.0%*	*0.0%*
	Maximum Detected	*0.45*	*500*	*0*	*500*	*500*
	Standard Deviation	*0.040*	*0.00*	*-*	*0.00*	*0.00*
	Mean	*0.30*	*500.00*	*-*	*500.00*	*500.00*

Sea Cucumber (Loli) Samples	*number of samples analyzed*	*16*	*16*	*0*	*16*	*16*
	number of non-detect	*10*	*16*	*0*	*16*	*16*
	number of detections	*6*	*0*	*0*	*0*	*0*
	Frequency of Detection	*37.5%*	*0.0%*	*-*	*0.0%*	*0.0%*
	Maximum Detected	*0.79*	*500*	*0*	*500*	*500*
	Standard Deviation	*0.16*	*0.00*	*-*	*0.00*	*0.00*
	Mean	*0.36*	*500.00*	*-*	*500.00*	*500.00*

Seaweed (Limu)Samples	*number of samples analyzed*	*16*	*0*	*16*	*16*	*16*
	number of non-detect	*4*	*0*	*16*	*16*	*16*
	number of detections	*12*	*0*	*0*	*0*	*0*
	Frequency of Detection	*75.0%*	*-*	*0.0%*	*0.0%*	*0.0%*
	Maximum Detected	*12*	*0*	*200*	*500*	*500*
	Standard Deviation	*3.40*	*-*	*0.00*	*0.00*	*0.00*
	Mean	*1.95*	*-*	*200.00*	*500.00*	*500.00*

Notes:

[2] Results presented as "ND" in the the TestAmerica laboratory reports are presented in the Staged Electronic Data Deliverable (SEDD) files, and thus in this table, as the MDL value with a "U" qualifier.

[3] Applied Research Development Laboratory, Inc. (ARDL) encountered matrix interference problems in seaweed samples with the 8330A (HPLC) analysis of this analyte .

[4] Results presented as "ND" in the the ARDL laboratory reports are presented in the SEDD files, and thus in this table, as the RL value with a "U" qualifier.

[5] U.S. Army Engineer Research and Development Center (ERDC) analyzed the seaweed samples for 2,4-dinitrotoluene using EPA Method 8330.

[6] For consistency, the results, RL, and MDL were converted to µg/kg.

[7] Results presented as "ND" in the the ERDC laboratory reports are presented in this table as the RL value with a "U" qualifier.

-- - not analyzed

µg/kg - micrograms per kilogram

CAS - Chemical Abstracts Service

EPA - United States Environmental Protection Agency

ID - identification

MDL - method detection limit

RL - reporting limit

Laboratory qualifier (LQ) - TestAmerica Sacramento

[J] - Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

[U] - Indicates the compound was not detected at the RL (or MDL is shown).

[I] - Ion Ratio outside of limits, value is estimated maximum potential concentration (EMPC).

LQ - ARDL

[U] - Indicates compound was analyzed for but not detected.

LQ - ERDC

[U] - Indicates a compound was analyzed for but not detected at or above the RL.

Validator qualifier (VQ)

[J] - Indicates an estimated value.

[UJ] - Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

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Metals

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	Analyte	Inorganic Arsenic					Arsenic(III)					Arsenic(V)					Dimethyl Arsenic					Monomethyl Arsenic				
	CAS Number	*7440-38-2 (Inorg)*					*22569-72-8*					*12523-21-6*					*75-60-5*					*7440-38-2 (MMA)*				
	Units	*mg/kg*					*mg/kg*					*mg/kg*					*mg/kg*					*mg/kg*				
Lab ID	**Collection Date**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**
Mokulēʻia																										
Octopus (Heʻe)																										
MAK109O	1/31/2014	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.019			0.012	0.005	0.004	U		0.012	0.004
MAK118O	3/27/2014	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.013			0.012	0.005	0.004	U		0.012	0.004
MAK119O	3/27/2014	0.003	U		0.009	0.003	0.003	U		0.009	0.003	0.003	U		0.009	0.003	0.01	B		0.01	0.004	0.003	U		0.01	0.003
MAK120O	3/27/2014	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.017			0.012	0.005	0.004	U		0.012	0.004
MAK121O	3/27/2014	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.018			0.011	0.005	0.004	U		0.011	0.004
MAK122O	3/27/2014	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.014			0.011	0.005	0.004	U		0.011	0.004
MAK123O	3/27/2014	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.01	B	J	0.012	0.005	0.004	U		0.012	0.004
MAK124O	3/28/2014	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.008	B	J	0.011	0.005	0.004	U		0.011	0.004
Sea Cucumber (Loli)																										
MAK111C	1/31/2014	**0.049**			0.01	0.004	0.011			0.01	0.004	**0.038**			0.01	0.004	0.005	U		0.012	0.005	0.004	U		0.012	0.004
MAK113C	1/31/2014	0.018			0.01	0.004	0.006	J2	J	0.01	0.004	0.012			0.01	0.004	0.005	U		0.012	0.005	0.004	U		0.012	0.004
MAK114C	1/31/2014	0.015			0.009	0.004	0.006	J2	J	0.009	0.004	0.009			0.009	0.004	0.005	U		0.011	0.005	0.004	U		0.011	0.004
MAK115C	1/31/2014	**0.029**			0.01	0.004	0.009	J2	J	0.01	0.004	0.02			0.01	0.004	0.005	U		0.012	0.005	0.004	U		0.012	0.004
MAK116C	1/31/2014	**0.072**			0.009	0.004	0.021			0.009	0.004	**0.051**			0.009	0.004	0.005	U		0.011	0.005	0.004	U		0.011	0.004
MAK117C	1/31/2014	**0.029**			0.011	0.004	0.008	J2	J	0.011	0.004	0.021			0.011	0.004	0.005	U		0.013	0.005	0.004	U		0.013	0.004
MAK118C	1/31/2014	**0.032**			0.01	0.004	0.014			0.01	0.004	0.018			0.01	0.004	0.005	U		0.012	0.005	0.004	U		0.012	0.004
MAK120C	2/11/2014	0.017			0.009	0.003	0.007	J2	J	0.009	0.003	0.01			0.009	0.003	0.004	U		0.01	0.004	0.003	U		0.01	0.003
Seaweed (Limu kohu)																										
MAK120L	1/31/2014	**1.42**		J	0.093	0.037	**1.39**			0.186	0.075	**0.075**	U	UJ	0.186	0.075	0.27			0.112	0.047	0.037	U		0.112	0.037
MAK121L	1/31/2014	**0.639**		J	0.095	0.038	**0.621**			0.095	0.038	**0.038**	U	UJ	0.095	0.038	0.213			0.045	0.019	0.015	U		0.045	0.015
MAK122L	1/31/2014	**0.43**		J	0.097	0.039	**0.428**			0.097	0.039	**0.039**	U	UJ	0.097	0.039	0.231			0.046	0.019	0.015	U		0.046	0.015
MAK123L	1/31/2014	**0.273**		J	0.095	0.038	**0.261**			0.095	0.038	**0.038**	U	UJ	0.095	0.038	0.225			0.045	0.019	0.015	U		0.045	0.015
MAK124L	1/31/2014	**1.28**		J	0.097	0.039	**1.05**			0.097	0.039	**0.236**		J	0.097	0.039	0.185			0.047	0.019	0.016	U		0.047	0.016
MAK126L	1/31/2014	**1.38**		J	0.098	0.039	**1.05**			0.098	0.039	**0.332**		J	0.098	0.039	0.235			0.047	0.02	0.016	U		0.047	0.016
MAK127L	2/11/2014	**0.271**		J	0.092	0.037	**0.272**			0.092	0.037	**0.037**	U	UJ	0.092	0.037	0.194			0.044	0.018	0.015	U		0.044	0.015
MAK128L	2/11/2014	**0.224**		J	0.097	0.039	**0.217**			0.097	0.039	**0.039**	U	UJ	0.097	0.039	0.245			0.046	0.019	0.015	U		0.046	0.015
Kaʻena Point																										
Octopus (Heʻe)																										
MAK110O	3/28/2014	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.004	B	J	0.01	0.004	0.017			0.012	0.005	0.004	U		0.012	0.004
MAK111O	3/28/2014	0.003	U		0.008	0.003	0.003	U		0.008	0.003	0.003	U		0.008	0.003	0.006	B	J	0.01	0.004	0.003	U		0.01	0.003
MAK112O	3/28/2014	0.003	U		0.009	0.003	0.003	U		0.009	0.003	0.003	U		0.009	0.003	0.015			0.01	0.004	0.003	U		0.01	0.003
MAK113O	3/28/2014	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.004	U		0.01	0.004	0.016			0.012	0.005	0.004	U		0.012	0.004
MAK114O	3/28/2014	0.003	U		0.009	0.003	0.003	U		0.009	0.003	0.003	U		0.009	0.003	0.016			0.01	0.004	0.003	U		0.01	0.003
MAK115O	3/28/2014	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.016			0.011	0.005	0.004	U		0.011	0.004
MAK116O	3/28/2014	0.003	U		0.009	0.003	0.003	U		0.009	0.003	0.003	U		0.009	0.003	0.015			0.01	0.004	0.003	U		0.01	0.003
MAK117O	3/28/2014	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.004	U		0.009	0.004	0.014			0.011	0.005	0.004	U		0.011	0.004
Sea Cucumber (Loli)																										
MAK121C	3/28/2014	0.006	B	J	0.01	0.004	0.004	U		0.01	0.004	0.006	B	J	0.01	0.004	0.005	U		0.012	0.005	0.004	U		0.012	0.004
MAK122C	3/28/2014	0.024			0.008	0.003	0.007	J,B	J	0.008	0.003	0.016			0.008	0.003	0.004	U		0.01	0.004	0.003	U		0.01	0.003
MAK123C	3/28/2014	0.018			0.01	0.004	0.006	J,B	J	0.01	0.004	0.012			0.01	0.004	0.006	B	J	0.011	0.005	0.004	U		0.011	0.004
MAK124C	3/28/2014	**0.067**			0.009	0.004	0.009	J,B		0.009	0.004	**0.057**			0.009	0.004	0.005	U		0.011	0.005	0.004	U		0.011	0.004
MAK125C	3/28/2014	**0.059**			0.009	0.004	0.014	J		0.009	0.004	**0.045**			0.009	0.004	0.005	B	J	0.011	0.004	0.004	U		0.011	0.004
MAK126C	3/28/2014	**0.056**			0.009	0.004	0.008	J,B	J	0.009	0.004	**0.048**			0.009	0.004	0.005	U		0.011	0.005	0.004	U		0.011	0.004
MAK127C	3/28/2014	**0.071**			0.01	0.004	0.019	J		0.01	0.004	**0.053**			0.01	0.004	0.006	B	J	0.012	0.005	0.004	U		0.012	0.004
MAK128C	3/28/2014	**0.04**			0.01	0.004	0.008	J,B	J	0.01	0.004	**0.032**			0.01	0.004	0.005	U		0.011	0.005	0.006	B	J	0.011	0.004
Seaweed (Limu kohu)																										
MAK116L	1/31/2014	**0.35**		J	0.1	0.04	**0.287**			0.1	0.04	**0.063**	J2	J	0.1	0.04	0.202			0.048	0.02	0.016	U		0.048	0.016
MAK117L	1/31/2014	**0.468**		J	0.089	0.036	**0.41**			0.089	0.036	**0.058**	J2	J	0.089	0.036	0.229			0.043	0.018	0.014	U		0.043	0.014
MAK118L	1/31/2014	**0.184**		J	0.103	0.041	**0.163**			0.103	0.041	**0.041**	U	UJ	0.103	0.041	0.186			0.049	0.021	0.016	U		0.049	0.016
MAK130L	3/27/2014	**0.381**			0.04	0.016	**0.309**			0.04	0.016	**0.072**			0.04	0.016	0.116			0.048	0.02	0.016	U		0.048	0.016
MAK132L	3/28/2014	**0.482**			0.035	0.014	**0.4**			0.035	0.014	**0.082**			0.035	0.014	0.131			0.042	0.017	0.014	U		0.042	0.014
MAK134L	3/28/2014	**0.296**			0.039	0.016	**0.246**			0.039	0.016	**0.05**			0.039	0.016	0.149			0.047	0.019	0.016	U		0.047	0.016
MAK135L	3/28/2014	**0.3**			0.039	0.015	**0.259**			0.039	0.015	**0.041**			0.039	0.015	0.134			0.046	0.019	0.015	U		0.046	0.015
MAK138L	3/28/2014	**0.423**			0.037	0.015	**0.363**			0.037	0.015	**0.061**			0.037	0.015	0.142			0.045	0.019	0.015	U		0.045	0.015

Octopus (Heʻe) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*16*	*15*	*0*	*16*
	number of detections	*0*	*0*	*1*	*16*	*0*
	Frequency of Detection	*0.0%*	*0.0%*	*6.3%*	*100.0%*	*0.0%*
	Maximum Detected	*0.004*	*0.004*	*0.004*	*0.019*	*0.004*
	Standard Deviation	*0.00048*	*0.00048*	*0.00048*	*0.0037*	*0.00048*
	Mean	*0.004*	*0.004*	*0.004*	*0.014*	*0.0037*

Sea Cucumber (Loli) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*0*	*1*	*0*	*13*	*15*
	number of detections	*16*	*15*	*16*	*3*	*1*
	Frequency of Detection	*100.0%*	*93.8%*	*100.0%*	*18.8%*	*6.3%*
	Maximum Detected	*0.072*	*0.021*	*0.057*	*0.006*	*0.006*
	Standard Deviation	*0.022*	*0.0048*	*0.018*	*0.0005*	*0.0006*
	Mean	*0.038*	*0.010*	*0.028*	*0.0050*	*0.0040*

Seaweed (Limu)Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*0*	*0*	*7*	*0*	*16*
	number of detections	*16*	*16*	*9*	*16*	*0*
	Frequency of Detection	*100.0%*	*100.0%*	*56.3%*	*100.0%*	*0.0%*
	Maximum Detected	*1.42*	*1.39*	*0.332*	*0.27*	*0.037*
	Standard Deviation	*0.42*	*0.36*	*0.082*	*0.047*	*0.0055*
	Mean	*0.55*	*0.483*	*0.081*	*0.193*	*0.017*

Notes:

[2] For this result, the LQ is presented as "B" in the Brooks Rand Lab laboratory report but is reported as "J" in the Staged Electronic Data Deliverable file and thus in this table.

CAS - Chemical Abstracts Service

ID - identification

MDL - method detection limit

mg/kg - milligrams per kilogram

RL - reporting limit

Laboratory qualifier (LQ)

[B] - Detected by the instrument, the result is greater than the MDL but less than or equal to the RL. Result is reported and considered an estimate.

[J] - Estimated value. A full explanation is presented in the laboratory report case narrative (BRL Report 1408020, 1411043, or 1418004)

[N] - Spike recovery was not within acceptance criteria. Result is estimated.

[U] - Result is less than or equal to the MDL or client requested reporting limit (CRRL). Result is reported as the MDL or CRRL.

Validator qualifier (VQ)

[J] - Indicates an estimated value.

[UJ] - Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

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Analyte		Aluminum					Antimony					Arsenic					Barium					Beryllium					Cadmium					Chromium					Cobalt				
CAS Number		7429-90-5					7440-36-0					7440-38-2					7440-39-3					7440-41-7					7440-43-9					7440-47-3					7440-48-4				
Units		mg/kg					mg/kg					mg/kg					mg/kg					mg/kg					mg/kg					mg/kg					mg/kg				
Lab ID	Collection Date	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL
Mokulē'ia																																									
Octopus (He'e)																																									
MAK109O	1/31/2014	0.14	B	U	0.73	0.13	0.006	U		0.018	0.006	30.7			0.036	0.013	0.03	U		0.15	0.03	0.027	U		0.082	0.027	0.029			0.018	0.006	0.023	B	J	0.109	0.016	0.018	U		0.145	0.018
MAK118O	3/27/2014	1.16		U	0.8	0.14	0.007	U		0.02	0.007	46.2			0.04	0.014	0.03	U		0.16	0.03	0.03	U		0.09	0.03	0.037			0.02	0.007	0.018	U		0.12	0.018	0.02	U		0.16	0.02
MAK119O	3/27/2014	0.77	B	U	0.77	0.13	0.007	U		0.019	0.007	37.3			0.038	0.013	0.03	U		0.15	0.03	0.029	U		0.086	0.029	0.013	B	J	0.019	0.007	0.017	U		0.115	0.017	0.019	U		0.154	0.019
MAK120O	3/27/2014	0.56	B	U	0.77	0.14	0.007	U		0.019	0.007	39			0.039	0.014	0.03	U		0.15	0.03	0.029	U		0.087	0.029	0.011	B	J	0.019	0.007	0.017	U		0.116	0.017	0.019	U		0.155	0.019
MAK121O	3/27/2014	0.61	B	U	0.77	0.14	0.007	U		0.019	0.007	39.8			0.039	0.014	0.03	U		0.15	0.03	0.029	U		0.087	0.029	0.02			0.019	0.007	0.047	B	J	0.116	0.017	0.019	U		0.155	0.019
MAK122O	3/27/2014	0.43	B	U	0.78	0.14	0.007	U		0.02	0.007	29.9			0.039	0.014	0.03	U		0.16	0.03	0.029	U		0.088	0.029	0.009	B	J	0.02	0.007	0.018	U		0.117	0.018	0.02	U		0.157	0.02
MAK123O	3/27/2014	0.15	B	U	0.76	0.13	0.007	U		0.019	0.007	28.2			0.038	0.013	0.03	U		0.15	0.03	0.028	U		0.085	0.028	0.021			0.019	0.007	0.025	B	J	0.114	0.017	0.019	U		0.152	0.019
MAK124O	3/28/2014	0.18	B	U	0.74	0.13	0.007	U		0.019	0.007	37			0.037	0.013	0.03	U		0.15	0.03	0.028	U		0.084	0.028	0.012	B	J	0.019	0.007	0.017	U		0.112	0.017	0.019	U		0.149	0.019
Sea Cucumber (Loli)																																									
MAK111C	1/31/2014	4.4	M	J	0.8	0.14	0.007	U		0.02	0.007	0.798			0.04	0.014	0.18			0.16	0.03	0.03	U		0.09	0.03	0.007	U		0.02	0.007	**0.596**			0.12	0.018	0.047	J2	J	0.16	0.02
MAK113C	1/31/2014	1.84		J	0.77	0.14	0.007	U		0.019	0.007	0.844			0.039	0.014	0.1	J2	J	0.15	0.03	0.029	U		0.087	0.029	0.007	U		0.019	0.007	**0.191**			0.116	0.017	0.042	J2	J	0.155	0.019
MAK114C	1/31/2014	2.71		J	0.72	0.13	0.006	U		0.018	0.006	0.911			0.036	0.013	0.1	J2	J	0.14	0.03	0.027	U		0.081	0.027	0.006	U		0.018	0.006	**0.159**			0.108	0.016	0.038	J2	J	0.144	0.018
MAK115C	1/31/2014	2.57		J	0.7	0.12	0.009	J2	J	0.018	0.006	1.38			0.035	0.012	0.07	J2	J	0.14	0.03	0.026	U		0.079	0.026	0.006	U		0.018	0.006	**0.181**			0.105	0.016	0.053	J2	J	0.14	0.018
MAK116C	1/31/2014	6.85		J	0.78	0.14	0.007	U		0.019	0.007	1			0.039	0.014	0.24			0.16	0.03	0.029	U		0.088	0.029	0.007	U		0.019	0.007	**0.566**			0.117	0.018	0.056	J2	J	0.156	0.019
MAK117C	1/31/2014	11.4		J	0.76	0.13	0.007	U		0.019	0.007	0.586			0.038	0.013	0.21			0.15	0.03	0.028	U		0.085	0.028	0.007	U		0.019	0.007	**0.224**			0.113	0.017	0.041	J2	J	0.151	0.019
MAK118C	1/31/2014	10.5		J	0.72	0.13	0.006	U		0.018	0.006	1.32			0.036	0.013	0.12	J2	J	0.14	0.03	0.027	U		0.081	0.027	0.006	U		0.018	0.006	**0.119**			0.108	0.016	0.047	J2	J	0.144	0.018
MAK120C	2/11/2014	9.41		J	0.75	0.13	0.007	U		0.019	0.007	0.396			0.038	0.013	0.11	J2	J	0.15	0.03	0.028	U		0.085	0.028	0.007	U		0.019	0.007	**0.152**			0.113	0.017	0.049	J2	J	0.151	0.019
Seaweed (Limu kohu)																																									
MAK120L	1/31/2014	290			0.74	0.13	0.02			0.018	0.006	3.12			0.037	0.013	3.59		J	0.15	0.03	0.028	U		0.083	0.028	0.025			0.018	0.006	**1.41**			0.111	0.017	0.185			0.148	0.018
MAK121L	1/31/2014	152			0.77	0.13	0.015	J2	J	0.019	0.007	2.17			0.038	0.013	1.46		J	0.15	0.03	0.029	U		0.086	0.029	0.031			0.019	0.007	**0.963**			0.115	0.017	0.09	J2	J	0.154	0.019
MAK122L	1/31/2014	71.9			0.75	0.13	0.014	J2	J	0.019	0.007	2.03			0.038	0.013	34.9	M	J	0.15	0.03	0.028	U		0.085	0.028	0.038			0.019	0.007	**0.534**	M		0.113	0.017	0.111	J2	J	0.151	0.019
MAK123L	1/31/2014	55			0.78	0.14	0.015	J2	J	0.02	0.007	1.85			0.039	0.014	2.84		J	0.16	0.03	0.029	U		0.088	0.029	0.042			0.02	0.007	**0.301**			0.117	0.018	0.08	J2	J	0.157	0.02
MAK124L	1/31/2014	543			0.78	0.14	0.028			0.02	0.007	2.25			0.039	0.014	22.8		J	0.16	0.03	0.029	U		0.088	0.029	0.016	J2	J	0.02	0.007	**2.48**			0.117	0.018	0.325			0.157	0.02
MAK126L	1/31/2014	838			0.78	0.14	0.022			0.02	0.007	2.64			0.039	0.014	3.94		J	0.16	0.03	0.029	U		0.088	0.029	0.026			0.02	0.007	**3.65**			0.118	0.018	0.523			0.157	0.02
MAK127L	2/11/2014	71.9			0.78	0.14	0.011	J2	J	0.019	0.007	1.64			0.039	0.014	1.96		J	0.16	0.03	0.029	U		0.087	0.029	0.037			0.019	0.007	**0.571**			0.117	0.017	0.066	J2	J	0.155	0.019
MAK128L	2/11/2014	45.7			0.76	0.13	0.009	J2	J	0.019	0.007	1.55			0.038	0.013	1.58		J	0.15	0.03	0.029	U		0.086	0.029	0.027			0.019	0.007	**0.319**			0.114	0.017	0.047	J2	J	0.152	0.019
Ka'ena Point																																									
Octopus (He'e)																																									
MAK110O	3/28/2014	0.95		U	0.78	0.14	0.007	U		0.02	0.007	25.1			0.039	0.014	0.03	U		0.16	0.03	0.029	U		0.088	0.029	0.008	B	J	0.02	0.007	0.018	U		0.118	0.018	0.02	U		0.157	0.02
MAK111O	3/28/2014	1.08		U	0.74	0.13	0.006	U		0.018	0.006	32.2			0.037	0.013	0.03	U		0.15	0.03	0.028	U		0.083	0.028	0.026			0.018	0.006	**0.108**	B	J	0.11	0.017	0.018	U		0.147	0.018
MAK112O	3/28/2014	0.97		U	0.75	0.13	0.007	U		0.019	0.007	29.3			0.038	0.013	0.03	U		0.15	0.03	0.028	U		0.085	0.028	0.017	B	J	0.019	0.007	0.017	U		0.113	0.017	0.019	U		0.151	0.019
MAK113O	3/28/2014	0.32	B	U	0.79	0.14	0.007	U		0.02	0.007	28.9			0.04	0.014	0.03	U		0.16	0.03	0.03	U		0.089	0.03	0.008	B	J	0.02	0.007	**0.249**			0.119	0.018	0.02	U		0.159	0.02
MAK114O	3/28/2014	0.94		U	0.79	0.14	0.007	U		0.02	0.007	35.8			0.039	0.014	0.03	U		0.16	0.03	0.03	U		0.089	0.03	0.01	B	J	0.02	0.007	**0.202**			0.118	0.018	0.02	U		0.157	0.02
MAK115O	3/28/2014	0.13	U		0.74	0.13	0.006	U		0.019	0.006	36.1			0.037	0.013	0.03	U		0.15	0.03	0.028	U		0.083	0.028	0.006	U		0.019	0.006	0.017	U		0.111	0.017	0.019	U		0.148	0.019
MAK116O	3/28/2014	0.21	B	U	0.75	0.13	0.007	U		0.019	0.007	31.9			0.037	0.013	0.03	U		0.15	0.03	0.028	U		0.084	0.028	0.014	B	J	0.019	0.007	0.017	U		0.112	0.017	0.019	U		0.149	0.019
MAK117O	3/28/2014	0.21	B	U	0.72	0.13	0.006	U		0.018	0.006	29.4			0.036	0.013	0.03	U		0.14	0.03	0.027	U		0.082	0.027	0.07			0.018	0.006	0.017	B	J	0.109	0.016	0.018	U		0.145	0.018
Sea Cucumber (Loli)																																									
MAK121C	3/28/2014	0.28	B	U	0.76	0.13	0.007	U		0.019	0.007	0.374			0.038	0.013	0.04	B	J	0.15	0.03	0.029	U		0.086	0.029	0.007	U		0.019	0.007	0.046	B	J	0.115	0.017	0.019	U		0.153	0.019
MAK122C	3/28/2014	2.58			0.76	0.13	0.007	U		0.019	0.007	0.544			0.038	0.013	0.12	B	J	0.15	0.03	0.029	U		0.086	0.029	0.007	U		0.019	0.007	**0.199**			0.114	0.017	0.019	U		0.152	0.019
MAK123C	3/28/2014	1.53		U	0.74	0.13	0.006	U		0.018	0.006	0.525			0.037	0.013	0.08	B	J	0.15	0.03	0.028	U		0.083	0.028	0.006	U		0.018	0.006	**0.157**			0.11	0.017	0.018	U		0.147	0.018
MAK124C	3/28/2014	24.3			0.76	0.13	0.007	U		0.019	0.007	0.852			0.038	0.013	0.28			0.15	0.03	0.029	U		0.086	0.029	0.007	U		0.019	0.007	**0.243**			0.114	0.017	0.031	B	J	0.152	0.019
MAK125C	3/28/2014	8.78			0.76	0.13	0.007	U		0.019	0.007	0.671			0.038	0.013	0.21			0.15	0.03	0.029	U		0.086	0.029	0.007	U		0.019	0.007	**0.317**			0.114	0.017	0.064	B	J	0.152	0.019
MAK126C	3/28/2014	13.5			0.75	0.13	0.007	U		0.019	0.007	0.687			0.037	0.013	0.2			0.15	0.03	0.028	U		0.084	0.028	0.034			0.019	0.007	**0.27**			0.112	0.017	0.044	B	J	0.15	0.019
MAK127C	3/28/2014	14.2			0.78	0.14	0.007	U		0.019	0.007	1.11			0.039	0.014	0.21			0.16	0.03	0.029	U		0.087	0.029	0.007	U		0.019	0.007	**0.266**			0.116	0.017	0.068	B	J	0.155	0.019
MAK128C	3/28/2014	3.99			0.73	0.13	0.006	U		0.018	0.006	0.514			0.037	0.013	0.14	B	J	0.15	0.03	0.027	U		0.082	0.027	0.006	U		0.018	0.006	**0.148**			0.11	0.016	0.019	B	J	0.147	0.018
Seaweed (Limu kohu)																																									
MAK116L	1/31/2014	77.2			0.71	0.12	0.011	J2	J	0.018	0.006	1.57			0.035	0.012	0.37		J	0.14	0.03	0.027	U		0.08	0.027	0.039			0.018	0.006	**0.484**			0.106	0.016	0.132	J2	J	0.142	0.018
MAK117L	1/31/2014	123			0.68	0.12	0.011	J2	J	0.017	0.006	1.56			0.034	0.012	0.81		J	0.14	0.03	0.025	U		0.076	0.025	0.042			0.017	0.006	**0.479**			0.101	0.015	0.131	J2	J	0.135	0.017
MAK118L	1/31/2014	21.1			0.77	0.14	0.007	U		0.019	0.007	1.2			0.039	0.014	1.91		J	0.15	0.03	0.029	U		0.087	0.029	0.021			0.019	0.007	**0.081**	J2	J	0.116	0.017	0.037	J2	J	0.154	0.019
MAK130L	3/27/2014	151			0.8	0.14	0.009	B	J	0.02	0.007	1.7			0.04	0.014	5.39		J	0.16	0.03	0.03	U		0.089	0.03	0.039			0.02	0.007	**1.14**			0.119	0.018	0.128	B	J	0.159	0.02
MAK132L	3/28/2014	138			0.79	0.14	0.009	B	J	0.02	0.007	1.54			0.04	0.014	2.22		J	0.16	0.03	0.03	U		0.089	0.03	0.046			0.02	0.007	**0.938**			0.119	0.018	0.089	B	J	0.159	0.02
MAK134L	3/28/2014	72			0.78	0.14	0.007	U		0.02	0.007	1.25			0.039	0.014	1.17		J	0.16	0.03	0.029	U		0.088	0.029	0.033			0.02	0.007	**0.506**			0.117	0.018	0.065	B	J	0.157	0.02
MAK135L	3/28/2014	74.1			0.77	0.14	0.007	U		0.019	0.007	1.35			0.039	0.014	1.03		J	0.15	0.03	0.029	U		0.087	0.029	0.053			0.019	0.007	**0.634**			0.116	0.017	0.055	B	J	0.154	0.019
MAK138L	3/28/2014	164			0.75	0.13	0.01	B	J	0.019	0.007	1.68			0.037	0.013	4.73		J	0.15	0.03	0.028	U		0.084	0.028	0.052			0.019	0.007	**1.03**			0.112	0.017	0.149	B		0.149	0.019

		Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Octopus (He'e) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*16*	*0*	*16*	*16*	*1*	*9*	*16*
	number of detections	*0*	*0*	*16*	*0*	*0*	*15*	*7*	*0*
	Frequency of Detection	*0.0%*	*0.0%*	*100.0%*	*0.0%*	*0.0%*	*93.8%*	*43.8%*	*0.0%*
	Maximum Detected	*1.16*	*0.007*	*46.2*	*0.03*	*0.03*	*0.07*	*0.249*	*0.02*
	Standard Deviation	*0.38*	*0.0004*	*5.47*	*0.00*	*0.00*	*0.016*	*0.072*	*0.0007*
	Mean	*0.55*	*0.007*	*33.55*	*0.030*	*0.029*	*0.019*	*0.052*	*0.019*

		Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Sea Cucumber (Loli) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*2*	*15*	*0*	*0*	*16*	*15*	*0*	*3*
	number of detections	*14*	*1*	*16*	*16*	*0*	*1*	*16*	*13*
	Frequency of Detection	*87.5%*	*6.3%*	*100.0%*	*100.0%*	*0.0%*	*6.3%*	*100.0%*	*81.3%*
	Maximum Detected	*24.3*	*0.009*	*1.38*	*0.28*	*0.03*	*0.034*	*0.596*	*0.068*
	Standard Deviation	*6.36*	*0.0007*	*0.31*	*0.069*	*0.0011*	*0.01*	*0.15*	*0.02*
	Mean	*7.43*	*0.007*	*0.78*	*0.15*	*0.028*	*0.008*	*0.24*	*0.04*

		Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt
Seaweed (Limu)Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*0*	*3*	*0*	*0*	*16*	*0*	*0*	*0*
	number of detections	*16*	*13*	*16*	*16*	*0*	*16*	*16*	*16*
	Frequency of Detection	*100.0%*	*81.3%*	*100.0%*	*100.0%*	*0.0%*	*100.0%*	*100.0%*	*100.0%*
	Maximum Detected	*838*	*0.028*	*3.12*	*34.9*	*0.03*	*0.053*	*3.65*	*0.523*
	Standard Deviation	*215.94*	*0.006*	*0.52*	*9.42*	*0.0012*	*0.011*	*0.91*	*0.12*
	Mean	*180.49*	*0.013*	*1.82*	*5.67*	*0.029*	*0.035*	*0.97*	*0.14*

Notes:

[2] For this result, the LQ is presented as "B" in the Brooks Rand Lab laboratory report but is reported as "J" in the Staged Electronic Data Deliverable file and thus in this table.

CAS - Chemical Abstracts Service
ID - identification
MDL - method detection limit
mg/kg - milligrams per kilogram
RL - reporting limit

Laboratory qualifier (LQ)

[B] - Detected by the instrument, the result is greater than the MDL but less than or equal to the RL. Result is reported and considered an estimate.
[J] - Estimated value. A full explanation is presented in the laboratory report case narrative (BRL Report 1408020, 1411043, or 1418004).
[M] - Duplicate precision (relative percent difference) was not within acceptance criteria. Result is estimated.
[U] - Result is less than or equal to the MDL or client requested reporting limit (CRRL). Result is reported as the MDL or CRRL.

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	Analyte	Copper					Iron					Lead					Manganese					Mercury					Methyl Mercury					Selenium				
	CAS Number	*7440-50-8*					*7439-89-6*					*7439-92-1*					*7439-96-5*					*7439-97-6*					*22967-92-6*					*7782-49-2*				
	Units	*mg/kg*					*mg/kg*					*mg/kg*					*mg/kg*					*ng/g*					*ng/g*					*mg/kg*				
Lab ID	**Collection Date**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**	**Result**	**LQ**	**VQ**	**RL**	**MDL**
Mokulē‘ia																																				
Octopus (He‘e)																																				
MAK109O	1/31/2014	40	M	J	0.18	0.09	1.2			0.75	0.07	0.345	M	J	0.039	0.004	0.23			0.037	0.011	8.96	N	J	0.37	0.11	7.2			2.9	1	0.17		U	0.14	0.06
MAK118O	3/27/2014	6.47		J	0.2	0.1	14			0.75	0.07	0.046		J	0.034	0.003	0.359			0.037	0.011	14.6		J	0.4	0.12	12.6			3.3	1.1	0.29		U	0.14	0.06
MAK119O	3/27/2014	6.43		J	0.19	0.1	1.64			0.8	0.08	0.005	B	UJ	0.039	0.004	0.291			0.04	0.012	15.8		J	0.38	0.12	12.6			3	1	0.14	B	U	0.15	0.06
MAK120O	3/27/2014	6.29		J	0.19	0.1	1.47			0.72	0.07	0.03	B	UJ	0.034	0.003	0.25			0.036	0.011	12.8		J	0.43	0.13	10.7			2.8	0.9	0.17		U	0.14	0.05
MAK121O	3/27/2014	4.39		J	0.19	0.1	1.57			0.78	0.08	0.126		J	0.034	0.003	0.353			0.039	0.012	12.2		J	0.4	0.12	8.5			3.2	1.1	0.28		U	0.15	0.06
MAK122O	3/27/2014	5.65		J	0.2	0.1	1.46			0.85	0.08	0.025	B	UJ	0.033	0.003	0.308			0.038	0.011	10.3		J	0.38	0.12	7.7			3.1	1	0.16	B	U	0.16	0.06
MAK123O	3/27/2014	5.77		J	0.19	0.09	1.7			0.75	0.07	0.031	B	UJ	0.034	0.003	0.229			0.037	0.011	18.6		J	0.4	0.12	12.1			2.7	0.9	0.14	B	U	0.14	0.06
MAK124O	3/28/2014	5.27		J	0.19	0.09	221			0.75	0.07	0.051		J	0.037	0.004	0.389			0.037	0.011	13		J	0.4	0.12	10.9			3	1	0.17		U	0.14	0.06
Sea Cucumber (Loli)																																				
MAK111C	1/31/2014	0.45			0.16	0.03	17.2	M		3.99	1.3	0.07			0.04	0.004	0.742			0.04	0.012	0.37	J2	J	0.41	0.12	1.09	U		3.28	1.09	0.43			0.15	0.06
MAK113C	1/31/2014	0.5			0.15	0.03	7.86			3.87	1.26	0.01	J2	J	0.04	0.004	0.303			0.039	0.012	0.46			0.39	0.12	0.91	U		2.73	0.91	0.41			0.15	0.06
MAK114C	1/31/2014	0.47			0.14	0.03	7.54			3.61	1.17	0.02	J2	J	0.04	0.004	0.32			0.036	0.011	0.47			0.41	0.12	0.99	U		2.97	0.99	0.56			0.14	0.05
MAK115C	1/31/2014	0.39			0.14	0.03	7.35			3.5	1.14	0.009	J2	J	0.04	0.004	0.384			0.035	0.011	0.67			0.41	0.12	0.94	U		2.81	0.94	0.62			0.13	0.05
MAK116C	1/31/2014	0.63			0.16	0.03	16.1			3.89	1.26	0.05			0.04	0.004	0.804			0.039	0.012	0.51			0.39	0.12	1.04	U		3.12	1.04	0.62			0.15	0.06
MAK117C	1/31/2014	0.56			0.15	0.03	19.5			3.78	1.23	0.11			0.04	0.004	0.691			0.038	0.011	3.12			0.39	0.12	0.92	U		2.77	0.92	0.36			0.14	0.06
MAK118C	1/31/2014	0.49			0.14	0.03	20.3			3.6	1.17	0.02	J2	J	0.04	0.004	0.743			0.036	0.011	0.42			0.39	0.12	0.98	U		2.94	0.98	0.56			0.13	0.05
MAK120C	2/11/2014	0.42			0.15	0.03	16.2			3.77	1.22	0.008	J2	J	0.04	0.004	0.41			0.038	0.011	0.54			0.39	0.12	0.94	U		2.81	0.94	0.42			0.14	0.06
Seaweed (Limu kohu)																																				
MAK120L	1/31/2014	0.73			0.15	0.03	394		J	3.69	1.2	0.35			0.04	0.004	6.99		J	0.037	0.011	3.54			0.38	0.11	0.97	U		2.92	0.97	0.08	J2	J	0.14	0.06
MAK121L	1/31/2014	0.63			0.15	0.03	221		J	3.84	1.25	0.25			0.04	0.004	3.57		J	0.038	0.012	4.38			0.39	0.12	1.07	U		3.2	1.07	0.06	U		0.14	0.06
MAK122L	1/31/2014	0.53			0.15	0.03	114	M	J	3.77	1.23	0.31			0.04	0.004	2.95	M	J	0.038	0.011	2.7			0.39	0.12	0.97	U		2.92	0.97	0.06	U		0.14	0.06
MAK123L	1/31/2014	0.48			0.16	0.03	70.1		J	3.91	1.27	0.16			0.04	0.004	1.93		J	0.039	0.012	2.02			0.41	0.12	0.92	U		2.76	0.92	0.06	U		0.15	0.06
MAK124L	1/31/2014	1.04			0.16	0.03	729		J	3.91	1.27	0.54			0.04	0.004	12.3		J	0.039	0.012	3.53			0.37	0.11	0.85	U		2.54	0.85	0.11	J2	J	0.15	0.06
MAK126L	1/31/2014	1.17			0.16	0.03	1140		J	3.92	1.27	0.7			0.04	0.004	27.4		J	0.039	0.012	3.94			0.42	0.13	0.92	U		2.76	0.92	0.09	J2	J	0.15	0.06
MAK127L	2/11/2014	0.51			0.16	0.03	112		J	3.88	1.26	0.2			0.04	0.004	2.44		J	0.039	0.012	2.15			0.4	0.12	1.08	U		3.23	1.08	0.06	U		0.15	0.06
MAK128L	2/11/2014	0.47			0.15	0.03	66.7		J	3.8	1.24	0.17			0.04	0.004	2.05		J	0.038	0.011	1.7			0.38	0.11	1.06	U		3.19	1.06	0.06	U		0.14	0.06
Ka‘ena Point																																				
Octopus (He‘e)																																				
MAK110O	3/28/2014	7.36		J	0.2	0.1	2.7			0.74	0.07	0.031	B	UJ	0.035	0.003	0.274			0.037	0.011	8.11		J	0.44	0.13	6.4			2.9	1	0.22		U	0.14	0.06
MAK111O	3/28/2014	15.3		J	0.18	0.09	1.64			0.75	0.07	0.778		J	0.041	0.004	0.288			0.037	0.011	12.3		J	0.42	0.13	10.1			3.2	1.1	0.17		U	0.14	0.06
MAK112O	3/28/2014	6.5		J	0.19	0.09	1.57			0.8	0.08	0.015	B	UJ	0.039	0.004	0.247			0.04	0.012	10.8		J	0.4	0.12	8.6			3	1	0.16		U	0.15	0.06
MAK113O	3/28/2014	4.49		J	0.2	0.1	2.54			0.71	0.07	0.061		J	0.039	0.004	0.252			0.036	0.011	11.5		J	0.38	0.11	8.8			2.9	1	0.15		U	0.13	0.05
MAK114O	3/28/2014	5.87		J	0.2	0.1	3.6			0.73	0.07	0.034	B	UJ	0.037	0.004	0.321			0.036	0.011	11.3		J	0.41	0.12	9.5			2.7	0.9	0.15		U	0.14	0.05
MAK115O	3/28/2014	7.06		J	0.19	0.09	1.32			0.71	0.07	0.14		J	0.034	0.003	0.225			0.036	0.011	11		J	0.43	0.13	9			3	1	0.24		U	0.13	0.05
MAK116O	3/28/2014	6.64		J	0.19	0.09	1.16			0.83	0.08	0.045		J	0.04	0.004	0.217			0.042	0.012	14.1		J	0.43	0.13	12.1			3	1	0.19		U	0.16	0.06
MAK117O	3/28/2014	6.71		J	0.18	0.09	2.08			0.78	0.08	0.062		J	0.039	0.004	0.228			0.039	0.012	9.3		J	0.43	0.13	6.8			2.9	1	0.15	B	U	0.15	0.06
Sea Cucumber (Loli)																																				
MAK121C	3/28/2014	0.47			0.19	0.1	9.34	M	J	0.76	0.08	0.016	B	U	0.04	0.004	0.136			0.038	0.011	0.31	B	UJ	0.38	0.11	1	U		3.1	1	0.41			0.14	0.06
MAK122C	3/28/2014	0.72			0.19	0.1	4.63		J	0.78	0.08	0.02	B	U	0.038	0.004	0.214			0.039	0.012	0.31	B	UJ	0.41	0.12	1	U		3.1	1	0.45			0.15	0.06
MAK123C	3/28/2014	38.9			0.18	0.09	7.1		J	0.78	0.08	2.25			0.038	0.004	0.201			0.039	0.012	0.14	B	UJ	0.41	0.12	1	U		3	1	0.42			0.15	0.06
MAK124C	3/28/2014	0.48			0.19	0.1	42		J	0.73	0.07	0.229			0.035	0.004	0.972			0.037	0.011	0.4	B	UJ	0.41	0.12	1.1	U		3.3	1.1	0.48			0.14	0.05
MAK125C	3/28/2014	0.58			0.19	0.1	34.8		J	0.72	0.07	0.078			0.035	0.004	0.727			0.036	0.011	0.42		UJ	0.38	0.12	0.9	U		2.7	0.9	0.54			0.14	0.05
MAK126C	3/28/2014	0.59			0.19	0.09	62.8		J	0.83	0.08	0.114			0.038	0.004	2.37			0.042	0.012	0.49		UJ	0.42	0.13	0.9	U		2.8	0.9	0.48			0.16	0.06
MAK127C	3/28/2014	0.36			0.19	0.1	46.3		J	0.91	0.09	0.172			0.041	0.004	0.981			0.04	0.012	0.49		UJ	0.42	0.13	1.1	U		3.2	1.1	0.68			0.17	0.07
MAK128C	3/28/2014	0.39			0.18	0.09	10		J	0.76	0.08	0.031	B	U	0.037	0.004	0.281			0.038	0.011	0.35	B	UJ	0.39	0.12	1	U		3	1	0.34			0.14	0.06
Seaweed (Limu kohu)																																				
MAK116L	1/31/2014	0.56			0.14	0.03	135		J	3.55	1.15	0.24			0.04	0.004	2.42		J	0.035	0.011	2.25			0.39	0.12	1.06	U		3.18	1.06	0.05	U		0.13	0.05
MAK117L	1/31/2014	0.73			0.14	0.03	274		J	3.38	1.1	0.45			0.03	0.003	3.75		J	0.034	0.01	2.79			0.38	0.11	0.89	U		2.68	0.89	0.05	U		0.13	0.05
MAK118L	1/31/2014	0.35			0.15	0.03	29.1		J	3.86	1.25	0.1			0.04	0.004	0.973		J	0.039	0.012	2.29			0.39	0.12	0.98	U		2.95	0.98	0.06	U		0.14	0.06
MAK130L	3/27/2014	0.51			0.2	0.1	303			0.74	0.07	0.409			0.042	0.004	4.49			0.037	0.011	2.28			0.43	0.13	1.1	U		3.2	1.1	0.11	B	J	0.14	0.06
MAK132L	3/28/2014	0.55			0.2	0.1	276			0.81	0.08	0.406			0.035	0.003	3.76			0.041	0.012	3.07			0.42	0.13	0.9	U		2.8	0.9	0.12	B	J	0.15	0.06
MAK134L	3/28/2014	0.46			0.2	0.1	541			0.7	0.07	0.229			0.036	0.004	4.59			0.035	0.011	2.4		U	0.38	0.12	1	U		2.9	1	0.1	B	J	0.13	0.05
MAK135L	3/28/2014	0.44			0.19	0.1	189			0.79	0.08	0.269			0.043	0.004	2.64			0.04	0.012	2.47		U	0.37	0.11	1.1	U		3.3	1.1	0.11	B	J	0.15	0.06
MAK138L	3/28/2014	0.48			0.19	0.09	414			0.8	0.08	0.208	M		0.039	0.004	4.77			0.04	0.012	2.72		U	0.36	0.11	1.1	U		3.2	1.1	0.11	B	J	0.15	0.06

Octopus (He‘e) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*0*	*0*	*7*	*0*	*0*	*0*	*16*
	number of detections	*16*	*16*	*9*	*16*	*16*	*16*	*0*
	Frequency of Detection	*100.0%*	*100.0%*	*56.3%*	*100.0%*	*100.0%*	*100.0%*	*0.0%*
	Maximum Detected	*40*	*221*	*0.778*	*0.389*	*18.6*	*12.6*	*0.29*
	Standard Deviation	*8.68*	*54.68*	*0.20*	*0.054*	*2.69*	*2.07*	*0.05*
	Mean	*8.76*	*16.29*	*0.11*	*0.28*	*12.17*	*9.60*	*0.18*

Sea Cucumber (Loli) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*0*	*0*	*3*	*0*	*8*	*16*	*0*
	number of detections	*16*	*16*	*13*	*16*	*8*	*0*	*16*
	Frequency of Detection	*100.0%*	*100.0%*	*81.3%*	*100.0%*	*50.0%*	*0.0%*	*100.0%*
	Maximum Detected	*38.9*	*62.8*	*2.25*	*2.37*	*3.12*	*1.1*	*0.68*
	Standard Deviation	*9.60*	*17.01*	*0.55*	*0.54*	*0.68*	*0.068*	*0.10*
	Mean	*2.90*	*20.56*	*0.20*	*0.64*	*0.59*	*0.99*	*0.49*

Seaweed (Limu)Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	number of non-detect	*0*	*0*	*0*	*0*	*3*	*16*	*8*
	number of detections	*16*	*16*	*16*	*16*	*13*	*0*	*8*
	Frequency of Detection	*100.0%*	*100.0%*	*100.0%*	*100.0%*	*81.3%*	*0.0%*	*50.0%*
	Maximum Detected	*1.17*	*1140*	*0.7*	*27.4*	*4.38*	*1.1*	*0.12*
	Standard Deviation	*0.22*	*290.35*	*0.16*	*6.42*	*0.74*	*0.085*	*0.026*
	Mean	*0.60*	*312.99*	*0.31*	*5.44*	*2.76*	*1.00*	*0.08*

Draft

	Analyte	Silver					Thallium					Vanadium					Zinc				
	CAS Number	7440-22-4					7440-28-0					7440-62-2					7440-66-6				
	Units	mg/kg					mg/kg					mg/kg					mg/kg				
Lab ID	Collection Date	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL	Result	LQ	VQ	RL	MDL
Mokulēʻia																					
Octopus (Heʻe)																					
MAK109O	1/31/2014	0.018	U		0.091	0.018	0.002	U		0.008	0.002	0.013	U		0.112	0.013	30	M	J	0.91	0.36
MAK118O	3/27/2014	0.02	U		0.1	0.02	0.002	U		0.007	0.002	0.013	U		0.112	0.013	13.1		J	1	0.4
MAK119O	3/27/2014	0.019	U		0.096	0.019	0.002	U		0.008	0.002	0.014	U		0.119	0.014	13.3		J	0.96	0.38
MAK120O	3/27/2014	0.019	U		0.097	0.019	0.002	U		0.007	0.002	0.016	B	J	0.108	0.013	14.5		J	0.97	0.39
MAK121O	3/27/2014	0.019	U		0.097	0.019	0.002	U		0.007	0.002	0.014	U		0.117	0.014	13.1		J	0.97	0.39
MAK122O	3/27/2014	0.02	U		0.098	0.02	0.002	U		0.007	0.002	0.015	U		0.127	0.015	13.3		J	0.98	0.39
MAK123O	3/27/2014	0.019	U		0.095	0.019	0.002	U		0.007	0.002	0.013	U		0.112	0.013	11.5		J	0.95	0.38
MAK124O	3/28/2014	0.019	U		0.093	0.019	0.002	U		0.007	0.002	0.013	U		0.112	0.013	13.2		J	0.93	0.37
Sea Cucumber (Loli)																					
MAK111C	1/31/2014	0.02	U		0.1	0.02	0.002	U		0.008	0.002	0.077	J2	J	0.12	0.014	1.56			1	0.2
MAK113C	1/31/2014	0.019	U		0.097	0.019	0.002	U		0.008	0.002	0.034	J2	J	0.116	0.014	0.94	J2	U	0.97	0.19
MAK114C	1/31/2014	0.018	U		0.09	0.018	0.002	U		0.007	0.002	0.055	J2	J	0.108	0.013	1.7			0.9	0.18
MAK115C	1/31/2014	0.018	U		0.088	0.018	0.002	U		0.007	0.002	0.04	J2	J	0.105	0.012	1.19			0.88	0.18
MAK116C	1/31/2014	0.019	U		0.097	0.019	0.002	U		0.008	0.002	0.081	J2	J	0.117	0.014	1.84			0.97	0.19
MAK117C	1/31/2014	0.019	U		0.095	0.019	0.002	U		0.008	0.002	0.092	J2	J	0.113	0.013	0.83	J2	U	0.95	0.19
MAK118C	1/31/2014	0.018	U		0.09	0.018	0.002	U		0.007	0.002	0.064	J2	J	0.108	0.013	1.78			0.9	0.18
MAK120C	2/11/2014	0.019	U		0.094	0.019	0.002	U		0.008	0.002	0.051	J2	J	0.113	0.013	0.57	J2	U	0.94	0.19
Seaweed (Limu kohu)																					
MAK120L	1/31/2014	0.018	U		0.092	0.018	0.004	J2	J	0.007	0.002	2.95			0.111	0.013	2.44			0.92	0.18
MAK121L	1/31/2014	0.019	U		0.096	0.019	0.004	J2	J	0.008	0.002	1.8			0.115	0.013	1.74			0.96	0.19
MAK122L	1/31/2014	0.019	U		0.094	0.019	0.004	J2	J	0.008	0.002	2.61	M		0.113	0.013	1.68			0.94	0.19
MAK123L	1/31/2014	0.02	U		0.098	0.02	0.003	J2	J	0.008	0.002	2.06			0.117	0.014	1.24			0.98	0.2
MAK124L	1/31/2014	0.02	U		0.098	0.02	0.005	J2	J	0.008	0.002	4.09			0.117	0.014	2.5			0.98	0.2
MAK126L	1/31/2014	0.02	U		0.098	0.02	0.008	J2		0.008	0.002	8.41			0.118	0.014	2.81			0.98	0.2
MAK127L	2/11/2014	0.019	U		0.097	0.019	0.005	J2	J	0.008	0.002	1.77			0.117	0.014	1.12			0.97	0.19
MAK128L	2/11/2014	0.019	U		0.095	0.019	0.004	J2	J	0.008	0.002	1.29			0.114	0.013	1.24			0.95	0.19
Kaʻena Point																					
Octopus (Heʻe)																					
MAK110O	3/28/2014	0.02	U		0.098	0.02	0.002	U		0.007	0.002	0.021	B	J	0.11	0.013	13		J	0.98	0.39
MAK111O	3/28/2014	0.018	U		0.092	0.018	0.002	U		0.008	0.002	0.013	U		0.112	0.013	20.5		J	0.92	0.37
MAK112O	3/28/2014	0.019	U		0.094	0.019	0.002	U		0.008	0.002	0.014	U		0.12	0.014	12.5		J	0.94	0.38
MAK113O	3/28/2014	0.02	U		0.099	0.02	0.002	U		0.008	0.002	0.012	U		0.107	0.012	13.5		J	0.99	0.4
MAK114O	3/28/2014	0.02	U		0.098	0.02	0.002	U		0.007	0.002	0.013	U		0.109	0.013	13.5		J	0.98	0.39
MAK115O	3/28/2014	0.019	U		0.093	0.019	0.002	U		0.007	0.002	0.012	U		0.107	0.012	13.2		J	0.93	0.37
MAK116O	3/28/2014	0.019	U		0.093	0.019	0.002	U		0.008	0.002	0.015	U		0.125	0.015	13.6		J	0.93	0.37
MAK117O	3/28/2014	0.018	U		0.091	0.018	0.002	U		0.008	0.002	0.014	U		0.117	0.014	12.3		J	0.91	0.36
Sea Cucumber (Loli)																					
MAK121C	3/28/2014	0.019	U		0.096	0.019	0.002	U		0.008	0.002	0.039	B	J	0.114	0.013	0.61	B	J	0.96	0.38
MAK122C	3/28/2014	0.019	U		0.095	0.019	0.002	U		0.008	0.002	0.035	B	J	0.117	0.014	0.83	B	J	0.95	0.38
MAK123C	3/28/2014	0.018	U		0.092	0.018	0.002	U		0.008	0.002	0.044	B	J	0.117	0.014	21.6			0.92	0.37
MAK124C	3/28/2014	0.019	U		0.095	0.019	0.002	U		0.007	0.002	0.124			0.11	0.013	0.7	B	J	0.95	0.38
MAK125C	3/28/2014	0.019	U		0.095	0.019	0.002	U		0.007	0.002	0.118			0.108	0.013	1.24			0.95	0.38
MAK126C	3/28/2014	0.019	U		0.094	0.019	0.002	U		0.008	0.002	0.19			0.125	0.015	0.89	B	J	0.94	0.37
MAK127C	3/28/2014	0.019	U		0.097	0.019	0.002	U		0.008	0.002	0.166			0.137	0.016	0.98			0.97	0.39
MAK128C	3/28/2014	0.018	U		0.092	0.018	0.002	U		0.007	0.002	0.04	B	J	0.113	0.013	0.62	B	J	0.92	0.37
Seaweed (Limu kohu)																					
MAK116L	1/31/2014	0.018	U		0.089	0.018	0.005	J2	J	0.007	0.002	1.26			0.106	0.012	1.54			0.89	0.18
MAK117L	1/31/2014	0.017	U		0.084	0.017	0.003	J2	J	0.007	0.002	1.86			0.101	0.012	1.88			0.84	0.17
MAK118L	1/31/2014	0.019	U		0.097	0.019	0.003	J2	J	0.008	0.002	0.906			0.116	0.014	0.9	J2	U	0.97	0.19
MAK130L	3/27/2014	0.02	U		0.099	0.02	0.005	B	J	0.008	0.002	2.51			0.11	0.013	0.88	B	J	0.99	0.4
MAK132L	3/28/2014	0.02	U		0.099	0.02	0.006	B	J	0.007	0.002	2.44			0.122	0.014	0.83	B	J	0.99	0.4
MAK134L	3/28/2014	0.02	U		0.098	0.02	0.005	B	J	0.007	0.002	2.9			0.105	0.012	0.6	B	J	0.98	0.39
MAK135L	3/28/2014	0.019	U		0.097	0.019	0.005	B	J	0.009	0.002	1.66			0.119	0.014	0.65	B	J	0.97	0.39
MAK138L	3/28/2014	0.019	U		0.093	0.019	0.006	B	J	0.008	0.002	2.7			0.12	0.014	0.95			0.93	0.37

Octopus (Heʻe) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*16*	*14*	*0*
	number of detections	*0*	*0*	*2*	*16*
	Frequency of Detection	*0.0%*	*0.0%*	*12.5%*	*100.0%*
	Maximum Detected	*0.02*	*0.002*	*0.021*	*30*
	Standard Deviation	*0.0007*	*0.00*	*0.0021*	*4.54*
	Mean	*0.019*	*0.002*	*0.014*	*14.63*

Sea Cucumber (Loli) Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*16*	*0*	*3*
	number of detections	*0*	*0*	*16*	*13*
	Frequency of Detection	*0.0%*	*0.0%*	*100.0%*	*81.3%*
	Maximum Detected	*0.02*	*0.002*	*0.19*	*21.6*
	Standard Deviation	*0.0006*	*0.00*	*0.048*	*5.15*
	Mean	*0.019*	*0.0020*	*0.08*	*2.37*

Seaweed (Limu)Samples	*number of samples analyzed*	*16*	*16*	*16*	*16*
	number of non-detect	*16*	*0*	*0*	*1*
	number of detections	*0*	*16*	*16*	*15*
	Frequency of Detection	*0.0%*	*100.0%*	*100.0%*	*93.8%*
	Maximum Detected	*0.02*	*0.008*	*8.41*	*2.81*
	Standard Deviation	*0.0009*	*0.0013*	*1.74*	*0.69*
	Mean	*0.019*	*0.005*	*2.58*	*1.44*

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Appendix B
Background Evaluation – 95% UTL Calculations

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Round 1 – September to October 2013

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Octopus (he‘e)

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Aldrin

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	4
Maximum Detect	N/A	Maximum Non-Detect	4
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Aldrin was not processed!

Alpha-BHC

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	4
Maximum Detect	N/A	Maximum Non-Detect	4
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Alpha-BHC was not processed!

Beta-BHC

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	4
Maximum Detect	N/A	Maximum Non-Detect	4
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Beta-BHC was not processed!

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Delta-BHC

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	4
Maximum Detect	N/A	Maximum Non-Detect	4
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Delta-BHC was not processed!

Gamma-BHC (Lindane)

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	4
Maximum Detect	N/A	Maximum Non-Detect	4
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gamma-BHC (Lindane) was not processed!

Heptachlor

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	4
Maximum Detect	N/A	Maximum Non-Detect	4
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Heptachlor was not processed!

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Heptachlor Epoxide

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	4
Maximum Detect	N/A	Maximum Non-Detect	4
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Heptachlor Epoxide was not processed!

p,p'-DDT

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	4
Maximum Detect	N/A	Maximum Non-Detect	4
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable p,p'-DDT was not processed!

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1,2,4-Trimethylbenzene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	12.5
Maximum Detect	N/A	Maximum Non-Detect	12.5
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,4-Trimethylbenzene was not processed!

Ethyl Benzene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	12.5
Maximum Detect	N/A	Maximum Non-Detect	12.5
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Ethyl Benzene was not processed!

M,P-XYLENES

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	25
Maximum Detect	N/A	Maximum Non-Detect	25
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable M,P-XYLENES was not processed!

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o-Xylene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	12.5
Maximum Detect	N/A	Maximum Non-Detect	12.5
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable o-Xylene was not processed!

Styrene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	12.5
Maximum Detect	N/A	Maximum Non-Detect	12.5
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Styrene was not processed!

Toluene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	12.5
Maximum Detect	N/A	Maximum Non-Detect	12.5
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Toluene was not processed!

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bis(2-Ethylhexyl) phthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	3		
Number of Detects	2	Number of Non-Detects	14
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	213.8	Minimum Non-Detect	1000
Maximum Detect	413.1	Maximum Non-Detect	1000
Variance Detected	19854	Percent Non-Detects	87.5%
Mean Detected	313.4	SD Detected	140.9
Mean of Detected Logged Data	5.694	SD of Detected Logged Data	0.466

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	313.4	SD	99.64
95% UTL95% Coverage	564.9	95% KM UPL (t)	493.5
90% KM Percentile (z)	441.1	95% KM Percentile (z)	477.3
99% KM Percentile (z)	545.2	95% KM USL	556.9

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	476.7	SD	73.38
95% UTL95% Coverage	661.9	95% UPL (t)	609.3
90% Percentile (z)	570.7	95% Percentile (z)	597.4
99% Percentile (z)	647.4	95% USL	656

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	9.552	k star (bias corrected MLE)	N/A
Theta hat (MLE)	32.82	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	38.21	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A		
MLE Sd (bias corrected)	N/A	95% Percentile of Chisquare (2k)	N/A

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	9.897		nu hat (KM)	316.7
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	628.5	640	95% Approx. Gamma UPL	519.7	524
95% Gamma USL	615.6	626.1			

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	355.8	Mean in Log Scale	5.694
SD in Original Scale	226.2	SD in Log Scale	0.626
95% UTL95% Coverage	1442	95% BCA UTL95% Coverage	936.3
95% Bootstrap (%) UTL95% Coverage	936.3	95% UPL (t)	920.7
90% Percentile (z)	662.7	95% Percentile (z)	831.9
99% Percentile (z)	1274	95% USL	1371

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	476.7	Mean in Log Scale	6.15
SD in Original Scale	73.38	SD in Log Scale	0.215
95% UTL95% Coverage	805.2	95% UPL (t)	690.4
90% Percentile (z)	616.8	95% Percentile (z)	666.8
99% Percentile (z)	771.8	95% USL	791.4

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	1000
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	1000	95% USL	1000
95% KM Chebyshev UPL	761.1		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

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Diethyl phthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Diethyl phthalate was not processed!

Dimethyl phthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Dimethyl phthalate was not processed!

Di-n-butyl phthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Di-n-butyl phthalate was not processed!

Draft

Di-n-octyl phthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Di-n-octyl phthalate was not processed!

Pyrene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Pyrene was not processed!

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2,3,7,8-TCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	13
Minimum Detect	N/A	Minimum Non-Detect	0.063
Maximum Detect	N/A	Maximum Non-Detect	0.19
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,3,7,8-TCDF was not processed!

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Total TCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	12	Number of Non-Detects	4
Number of Distinct Detects	9	Number of Distinct Non-Detects	4
Minimum Detect	0.042	Minimum Non-Detect	0.031
Maximum Detect	0.18	Maximum Non-Detect	0.038
Variance Detected	0.00171	Percent Non-Detects	25%
Mean Detected	0.075	SD Detected	0.0414
Mean of Detected Logged Data	-2.689	SD of Detected Logged Data	0.424

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.673	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.859	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.353	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.256	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.064	SD	0.0393
95% UTL95% Coverage	0.163	95% KM UPL (t)	0.135
90% KM Percentile (z)	0.114	95% KM Percentile (z)	0.129
99% KM Percentile (z)	0.155	95% KM USL	0.16

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0606	SD	0.0439
95% UTL95% Coverage	0.171	95% UPL (t)	0.14
90% Percentile (z)	0.117	95% Percentile (z)	0.133
99% Percentile (z)	0.163	95% USL	0.168

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.403	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.732	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.318	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.246	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	5.245	k star (bias corrected MLE)	3.99
Theta hat (MLE)	0.0143	Theta star (bias corrected MLE)	0.0188
nu hat (MLE)	125.9	nu star (bias corrected)	95.75
MLE Mean (bias corrected)	0.075		
MLE Sd (bias corrected)	0.0375	95% Percentile of Chisquare (2k)	15.48

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.0588
Maximum	0.18	Median	0.0545
SD	0.0458	CV	0.78
k hat (MLE)	1.647	k star (bias corrected MLE)	1.38
Theta hat (MLE)	0.0357	Theta star (bias corrected MLE)	0.0426
nu hat (MLE)	52.71	nu star (bias corrected)	44.16
MLE Mean (bias corrected)	0.0588	MLE Sd (bias corrected)	0.05
95% Percentile of Chisquare (2k)	7.394	90% Percentile	0.125
95% Percentile	0.157	99% Percentile	0.231

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.244	0.269	95% Approx. Gamma UPL	0.167	0.176
95% Gamma USL	0.234	0.257			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	2.658		nu hat (KM)	85.06
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.175	0.178	95% Approx. Gamma UPL	0.133	0.133
95% Gamma USL	0.17	0.172			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.794	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.859	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.292	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.256	Data Not Lognormal at 5% Significance Level

Data Not Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0629	Mean in Log Scale	-2.922
SD in Original Scale	0.0415	SD in Log Scale	0.554
95% UTL95% Coverage	0.218	95% BCA UTL95% Coverage	0.18
95% Bootstrap (%) UTL95% Coverage	0.18	95% UPL (t)	0.146
90% Percentile (z)	0.109	95% Percentile (z)	0.134
99% Percentile (z)	0.195	95% USL	0.208

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0606	Mean in Log Scale	-3.032
SD in Original Scale	0.0439	SD in Log Scale	0.715
95% UTL95% Coverage	0.293	95% UPL (t)	0.176
90% Percentile (z)	0.121	95% Percentile (z)	0.156
99% Percentile (z)	0.255	95% USL	0.277

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.18
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.18	95% USL	0.18
95% KM Chebyshev UPL	0.24		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

2,3,7,8-TCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	14
Minimum Detect	N/A	Minimum Non-Detect	0.041
Maximum Detect	N/A	Maximum Non-Detect	0.14
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,3,7,8-TCDD was not processed!

Draft

Total TCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	16		
Number of Detects	11	Number of Non-Detects	5
Number of Distinct Detects	11	Number of Distinct Non-Detects	5
Minimum Detect	0.12	Minimum Non-Detect	0.043
Maximum Detect	0.59	Maximum Non-Detect	0.067
Variance Detected	0.0257	Percent Non-Detects	31.25%
Mean Detected	0.304	SD Detected	0.16
Mean of Detected Logged Data	-1.334	SD of Detected Logged Data	0.578

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.914	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.179	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.267	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.222	SD	0.175
95% UTL95% Coverage	0.664	95% KM UPL (t)	0.538
90% KM Percentile (z)	0.446	95% KM Percentile (z)	0.51
99% KM Percentile (z)	0.629	95% KM USL	0.65

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.217	SD	0.186
95% UTL95% Coverage	0.687	95% UPL (t)	0.553
90% Percentile (z)	0.456	95% Percentile (z)	0.523
99% Percentile (z)	0.65	95% USL	0.672

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.478	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.733	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.186	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.257	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	3.667	k star (bias corrected MLE)	2.727
Theta hat (MLE)	0.0828	Theta star (bias corrected MLE)	0.111
nu hat (MLE)	80.67	nu star (bias corrected)	60
MLE Mean (bias corrected)	0.304		
MLE Sd (bias corrected)	0.184	95% Percentile of Chisquare (2k)	11.77

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.212
Maximum	0.59	Median	0.15
SD	0.192	CV	0.906
k hat (MLE)	0.745	k star (bias corrected MLE)	0.647
Theta hat (MLE)	0.285	Theta star (bias corrected MLE)	0.328
nu hat (MLE)	23.83	nu star (bias corrected)	20.69
MLE Mean (bias corrected)	0.212	MLE Sd (bias corrected)	0.263
95% Percentile of Chisquare (2k)	4.53	90% Percentile	0.542
95% Percentile	0.742	99% Percentile	1.224

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	1.332	1.639	95% Approx. Gamma UPL	0.815	0.92
95% Gamma USL	1.265	1.542			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	1.611		nu hat (KM)	51.57
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.962	1.057	95% Approx. Gamma UPL	0.647	0.679
95% Gamma USL	0.922	1.008			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.902	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.192	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.267	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.23	Mean in Log Scale	-1.763
SD in Original Scale	0.173	SD in Log Scale	0.808
95% UTL95% Coverage	1.319	95% BCA UTL95% Coverage	0.59
95% Bootstrap (%) UTL95% Coverage	0.59	95% UPL (t)	0.739
90% Percentile (z)	0.483	95% Percentile (z)	0.648
99% Percentile (z)	1.124	95% USL	1.236

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-1.901	95% KM UTL (Lognormal)95% Coverage	1.669
KM SD of Logged Data	0.956	95% KM UPL (Lognormal)	0.841
95% KM Percentile Lognormal (z)	0.72	95% KM USL (Lognormal)	1.545

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.217	Mean in Log Scale	-2.04
SD in Original Scale	0.186	SD in Log Scale	1.183
95% UTL95% Coverage	2.572	95% UPL (t)	1.101
90% Percentile (z)	0.592	95% Percentile (z)	0.909
99% Percentile (z)	2.036	95% USL	2.337

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.59
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.59	95% USL	0.59
95% KM Chebyshev UPL	1.009		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,7,8-PECDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	14
Minimum Detect	N/A	Minimum Non-Detect	0.041
Maximum Detect	N/A	Maximum Non-Detect	0.14
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,7,8-PECDF was not processed!

2,3,4,7,8-PeCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	12		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	12
Minimum Detect	N/A	Minimum Non-Detect	0.03
Maximum Detect	N/A	Maximum Non-Detect	0.089
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,3,4,7,8-PeCDF was not processed!

Total PeCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	12		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	11
Minimum Detect	0.061	Minimum Non-Detect	0.036
Maximum Detect	0.061	Maximum Non-Detect	0.12
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	0.061	SD Detected	N/A
Mean of Detected Logged Data	-2.797	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Total PeCDF was not processed!

1,2,3,7,8-PeCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	16		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	16
Minimum Detect	N/A	Minimum Non-Detect	0.033
Maximum Detect	N/A	Maximum Non-Detect	0.14
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,7,8-PeCDD was not processed!

Total PeCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	16		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	15
Minimum Detect	0.046	Minimum Non-Detect	0.038
Maximum Detect	0.046	Maximum Non-Detect	0.14
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	0.046	SD Detected	N/A
Mean of Detected Logged Data	-3.079	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Total PeCDD was not processed!

1,2,3,4,7,8-HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	13
Minimum Detect	N/A	Minimum Non-Detect	0.021
Maximum Detect	N/A	Maximum Non-Detect	0.1
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,4,7,8-HxCDF was not processed!

Draft

1,2,3,6,7,8-HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	13
Minimum Detect	N/A	Minimum Non-Detect	0.025
Maximum Detect	N/A	Maximum Non-Detect	0.087
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,6,7,8-HxCDF was not processed!

2,3,4,6,7,8-HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	13
Minimum Detect	N/A	Minimum Non-Detect	0.026
Maximum Detect	N/A	Maximum Non-Detect	0.094
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,3,4,6,7,8-HxCDF was not processed!

1,2,3,7,8,9-HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	14
Minimum Detect	N/A	Minimum Non-Detect	0.028
Maximum Detect	N/A	Maximum Non-Detect	0.091
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,7,8,9-HxCDF was not processed!

Draft

Total HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	4	Number of Non-Detects	12
Number of Distinct Detects	4	Number of Distinct Non-Detects	10
Minimum Detect	0.036	Minimum Non-Detect	0.025
Maximum Detect	0.14	Maximum Non-Detect	0.093
Variance Detected	0.00217	Percent Non-Detects	75%
Mean Detected	0.0728	SD Detected	0.0466
Mean of Detected Logged Data	-2.757	SD of Detected Logged Data	0.585

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.855	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.299	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.443	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0389	SD	0.0285
95% UTL95% Coverage	0.111	95% KM UPL (t)	0.0905
90% KM Percentile (z)	0.0754	95% KM Percentile (z)	0.0858
99% KM Percentile (z)	0.105	95% KM USL	0.109

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0348	SD	0.0316
95% UTL95% Coverage	0.115	95% UPL (t)	0.092
90% Percentile (z)	0.0754	95% Percentile (z)	0.0869
99% Percentile (z)	0.108	95% USL	0.112

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.327	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.659	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.244	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.396	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	3.815	k star (bias corrected MLE)	1.12
Theta hat (MLE)	0.0191	Theta star (bias corrected MLE)	0.0649
nu hat (MLE)	30.52	nu star (bias corrected)	8.962
MLE Mean (bias corrected)	0.0728		
MLE Sd (bias corrected)	0.0687	95% Percentile of Chisquare (2k)	6.45

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.0257
Maximum	0.14	Median	0.01
SD	0.035	CV	1.361
k hat (MLE)	1.177	k star (bias corrected MLE)	0.998
Theta hat (MLE)	0.0218	Theta star (bias corrected MLE)	0.0257
nu hat (MLE)	37.67	nu star (bias corrected)	31.94
MLE Mean (bias corrected)	0.0257	MLE Sd (bias corrected)	0.0257
95% Percentile of Chisquare (2k)	5.984	90% Percentile	0.0592
95% Percentile	0.077	99% Percentile	0.118

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.122	0.125	95% Approx. Gamma UPL	0.0793	0.0783
95% Gamma USL	0.116	0.119			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	1.853		nu hat (KM)	59.3
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.109	0.109	95% Approx. Gamma UPL	0.082	0.0811
95% Gamma USL	0.105	0.105			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.952	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.213	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.443	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0292	Mean in Log Scale	-3.884
SD in Original Scale	0.0335	SD in Log Scale	0.76
95% UTL95% Coverage	0.14	95% BCA UTL95% Coverage	0.14
95% Bootstrap (%) UTL95% Coverage	0.14	95% UPL (t)	0.0812
90% Percentile (z)	0.0545	95% Percentile (z)	0.0718
99% Percentile (z)	0.12	95% USL	0.132

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-3.395	95% KM UTL (Lognormal)95% Coverage	0.11
KM SD of Logged Data	0.471	95% KM UPL (Lognormal)	0.0785
95% KM Percentile Lognormal (z)	0.0728	95% KM USL (Lognormal)	0.106

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0348	Mean in Log Scale	-3.586
SD in Original Scale	0.0316	SD in Log Scale	0.625
95% UTL95% Coverage	0.134	95% UPL (t)	0.0858
90% Percentile (z)	0.0618	95% Percentile (z)	0.0775
99% Percentile (z)	0.119	95% USL	0.128

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.14
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.14	95% USL	0.14
95% KM Chebyshev UPL	0.167		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,4,7,8-HxCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	12		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	11
Minimum Detect	0.072	Minimum Non-Detect	0.035
Maximum Detect	0.072	Maximum Non-Detect	0.097
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	0.072	SD Detected	N/A
Mean of Detected Logged Data	-2.631	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,4,7,8-HxCDD was not processed!

1,2,3,6,7,8-HxCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	13
Minimum Detect	N/A	Minimum Non-Detect	0.036
Maximum Detect	N/A	Maximum Non-Detect	0.11
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,6,7,8-HxCDD was not processed!

1,2,3,7,8,9-HxCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	12		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	12
Minimum Detect	N/A	Minimum Non-Detect	0.036
Maximum Detect	N/A	Maximum Non-Detect	0.13
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,7,8,9-HxCDD was not processed!

Draft

Total HxCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	8	Number of Non-Detects	8
Number of Distinct Detects	8	Number of Distinct Non-Detects	6
Minimum Detect	0.076	Minimum Non-Detect	0.036
Maximum Detect	0.27	Maximum Non-Detect	0.073
Variance Detected	0.00466	Percent Non-Detects	50%
Mean Detected	0.119	SD Detected	0.0683
Mean of Detected Logged Data	-2.236	SD of Detected Logged Data	0.454

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.684	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.359	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0774	SD	0.0613
95% UTL95% Coverage	0.232	95% KM UPL (t)	0.188
90% KM Percentile (z)	0.156	95% KM Percentile (z)	0.178
99% KM Percentile (z)	0.22	95% KM USL	0.227

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0708	SD	0.0683
95% UTL95% Coverage	0.243	95% UPL (t)	0.194
90% Percentile (z)	0.158	95% Percentile (z)	0.183
99% Percentile (z)	0.23	95% USL	0.238

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.066	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.719	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.336	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.295	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	4.885	k star (bias corrected MLE)	3.137
Theta hat (MLE)	0.0243	Theta star (bias corrected MLE)	0.0379
nu hat (MLE)	78.16	nu star (bias corrected)	50.19
MLE Mean (bias corrected)	0.119		
MLE Sd (bias corrected)	0.0671	95% Percentile of Chisquare (2k)	13

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.0644
Maximum	0.27	Median	0.043
SD	0.0731	CV	1.134
k hat (MLE)	0.866	k star (bias corrected MLE)	0.745
Theta hat (MLE)	0.0744	Theta star (bias corrected MLE)	0.0865
nu hat (MLE)	27.71	nu star (bias corrected)	23.85
MLE Mean (bias corrected)	0.0644	MLE Sd (bias corrected)	0.0746
95% Percentile of Chisquare (2k)	4.96	90% Percentile	0.159
95% Percentile	0.214	99% Percentile	0.345

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.37	0.418	95% Approx. Gamma UPL	0.23	0.243
95% Gamma USL	0.352	0.395			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	1.596		nu hat (KM)	51.08
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.257	0.264	95% Approx. Gamma UPL	0.185	0.186
95% Gamma USL	0.248	0.254			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.758	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.309	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Approximate Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0753	Mean in Log Scale	-2.85
SD in Original Scale	0.0649	SD in Log Scale	0.718
95% UTL95% Coverage	0.354	95% BCA UTL95% Coverage	0.27
95% Bootstrap (%) UTL95% Coverage	0.27	95% UPL (t)	0.212
90% Percentile (z)	0.145	95% Percentile (z)	0.189
99% Percentile (z)	0.308	95% USL	0.334

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.78	95% KM UTL (Lognormal)95% Coverage	0.298
KM SD of Logged Data	0.622	95% KM UPL (Lognormal)	0.191
95% KM Percentile Lognormal (z)	0.172	95% KM USL (Lognormal)	0.283

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0708	Mean in Log Scale	-3.022
SD in Original Scale	0.0683	SD in Log Scale	0.882
95% UTL95% Coverage	0.451	95% UPL (t)	0.24
90% Percentile (z)	0.151	95% Percentile (z)	0.208
99% Percentile (z)	0.379	95% USL	0.42

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.27
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.27	95% USL	0.27
95% KM Chebyshev UPL	0.353		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,4,6,7,8-HpCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	15
Minimum Detect	N/A	Minimum Non-Detect	0.04
Maximum Detect	N/A	Maximum Non-Detect	0.11
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,4,6,7,8-HpCDF was not processed!

1,2,3,4,7,8,9-HpCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	14
Minimum Detect	N/A	Minimum Non-Detect	0.031
Maximum Detect	N/A	Maximum Non-Detect	0.1
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,4,7,8,9-HpCDF was not processed!

Draft

Total HpCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	12	Number of Non-Detects	4
Number of Distinct Detects	12	Number of Distinct Non-Detects	3
Minimum Detect	0.043	Minimum Non-Detect	0.032
Maximum Detect	0.37	Maximum Non-Detect	0.088
Variance Detected	0.00772	Percent Non-Detects	25%
Mean Detected	0.106	SD Detected	0.0879
Mean of Detected Logged Data	-2.436	SD of Detected Logged Data	0.579

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.628	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.859	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.314	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.256	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0887	SD	0.0788
95% UTL95% Coverage	0.288	95% KM UPL (t)	0.231
90% KM Percentile (z)	0.19	95% KM Percentile (z)	0.218
99% KM Percentile (z)	0.272	95% KM USL	0.281

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0856	SD	0.0837
95% UTL95% Coverage	0.297	95% UPL (t)	0.237
90% Percentile (z)	0.193	95% Percentile (z)	0.223
99% Percentile (z)	0.28	95% USL	0.29

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.813	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.74	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.228	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.248	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	2.799	k star (bias corrected MLE)	2.155
Theta hat (MLE)	0.0378	Theta star (bias corrected MLE)	0.0491
nu hat (MLE)	67.18	nu star (bias corrected)	51.72
MLE Mean (bias corrected)	0.106		
MLE Sd (bias corrected)	0.072	95% Percentile of Chisquare (2k)	9.986

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.0824
Maximum	0.37	Median	0.0705
SD	0.0861	CV	1.045
k hat (MLE)	1.276	k star (bias corrected MLE)	1.078
Theta hat (MLE)	0.0646	Theta star (bias corrected MLE)	0.0764
nu hat (MLE)	40.83	nu star (bias corrected)	34.51
MLE Mean (bias corrected)	0.0824	MLE Sd (bias corrected)	0.0794
95% Percentile of Chisquare (2k)	6.291	90% Percentile	0.186
95% Percentile	0.24	99% Percentile	0.365

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.384	0.423	95% Approx. Gamma UPL	0.254	0.265
95% Gamma USL	0.367	0.402			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	1.268		nu hat (KM)	49.58
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.297	0.304	95% Approx. Gamma UPL	0.214	0.213
95% Gamma USL	0.287	0.292			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.889	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.18	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.256	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.087	Mean in Log Scale	-2.707
SD in Original Scale	0.0825	SD in Log Scale	0.709
95% UTL95% Coverage	0.399	95% BCA UTL95% Coverage	0.37
95% Bootstrap (%) UTL95% Coverage	0.37	95% UPL (t)	0.24
90% Percentile (z)	0.165	95% Percentile (z)	0.214
99% Percentile (z)	0.347	95% USL	0.377

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.654	95% KM UTL (Lognormal)95% Coverage	0.338
KM SD of Logged Data	0.622	95% KM UPL (Lognormal)	0.216
95% KM Percentile Lognormal (z)	0.196	95% KM USL (Lognormal)	0.322

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0856	Mean in Log Scale	-2.772
SD in Original Scale	0.0837	SD in Log Scale	0.809
95% UTL95% Coverage	0.481	95% UPL (t)	0.27
90% Percentile (z)	0.176	95% Percentile (z)	0.236
99% Percentile (z)	0.41	95% USL	0.451

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.37
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.37	95% USL	0.37
95% KM Chebyshev UPL	0.443		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,4,6,7,8-HpCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	12		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	11
Minimum Detect	1.2	Minimum Non-Detect	0.091
Maximum Detect	1.2	Maximum Non-Detect	0.31
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	1.2	SD Detected	N/A
Mean of Detected Logged Data	0.182	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,4,6,7,8-HpCDD was not processed!

Draft

Total HpCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	15	Number of Non-Detects	1
Number of Distinct Detects	13	Number of Distinct Non-Detects	1
Minimum Detect	0.11	Minimum Non-Detect	0.039
Maximum Detect	1.2	Maximum Non-Detect	0.039
Variance Detected	0.075	Percent Non-Detects	6.25%
Mean Detected	0.301	SD Detected	0.274
Mean of Detected Logged Data	-1.434	SD of Detected Logged Data	0.645

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.648	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.881	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.264	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.229	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.285	SD	0.264
95% UTL95% Coverage	0.951	95% KM UPL (t)	0.762
90% KM Percentile (z)	0.623	95% KM Percentile (z)	0.719
99% KM Percentile (z)	0.899	95% KM USL	0.93

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.284	SD	0.274
95% UTL95% Coverage	0.975	95% UPL (t)	0.779
90% Percentile (z)	0.635	95% Percentile (z)	0.734
99% Percentile (z)	0.921	95% USL	0.953

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.81	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.746	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.209	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.224	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	2.286	k star (bias corrected MLE)	1.874
Theta hat (MLE)	0.132	Theta star (bias corrected MLE)	0.161
nu hat (MLE)	68.59	nu star (bias corrected)	56.21
MLE Mean (bias corrected)	0.301		
MLE Sd (bias corrected)	0.22	95% Percentile of Chisquare (2k)	9.075

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.283
Maximum	1.2	Median	0.21
SD	0.274	CV	0.969
k hat (MLE)	1.495	k star (bias corrected MLE)	1.257
Theta hat (MLE)	0.189	Theta star (bias corrected MLE)	0.225
nu hat (MLE)	47.85	nu star (bias corrected)	40.21
MLE Mean (bias corrected)	0.283	MLE Sd (bias corrected)	0.253
95% Percentile of Chisquare (2k)	6.952	90% Percentile	0.616
95% Percentile	0.783	99% Percentile	1.165

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	1.204	1.325	95% Approx. Gamma UPL	0.816	0.857
95% Gamma USL	1.155	1.265			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	1.165		nu hat (KM)	37.29
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	1.054	1.102	95% Approx. Gamma UPL	0.738	0.748
95% Gamma USL	1.015	1.057			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.908	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.881	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.162	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.229	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.286	Mean in Log Scale	-1.53
SD in Original Scale	0.272	SD in Log Scale	0.733
95% UTL95% Coverage	1.376	95% BCA UTL95% Coverage	1.2
95% Bootstrap (%) UTL95% Coverage	1.2	95% UPL (t)	0.814
90% Percentile (z)	0.554	95% Percentile (z)	0.722
99% Percentile (z)	1.19	95% USL	1.297

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-1.547	95% KM UTL (Lognormal)95% Coverage	1.398
KM SD of Logged Data	0.746	95% KM UPL (Lognormal)	0.819
95% KM Percentile Lognormal (z)	0.726	95% KM USL (Lognormal)	1.316

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.284	Mean in Log Scale	-1.59
SD in Original Scale	0.274	SD in Log Scale	0.883
95% UTL95% Coverage	1.894	95% UPL (t)	1.005
90% Percentile (z)	0.632	95% Percentile (z)	0.871
99% Percentile (z)	1.59	95% USL	1.763

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	1.2
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	1.2	95% USL	1.2
95% KM Chebyshev UPL	1.471		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

OCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	13
Minimum Detect	N/A	Minimum Non-Detect	0.12
Maximum Detect	N/A	Maximum Non-Detect	1.4
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable OCDF was not processed!

OCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	12		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	12
Minimum Detect	N/A	Minimum Non-Detect	0.78
Maximum Detect	N/A	Maximum Non-Detect	4.1
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable OCDD was not processed!

Draft

Perchlorate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	3		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	3
Minimum Detect	N/A	Minimum Non-Detect	0.28
Maximum Detect	N/A	Maximum Non-Detect	0.3
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Perchlorate was not processed!

2,4-Dinitrotoluene2

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	500
Maximum Detect	N/A	Maximum Non-Detect	500
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,4-Dinitrotoluene2 was not processed!

Draft

Hexahydro-trinitro-triazine (RDX)

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	500
Maximum Detect	N/A	Maximum Non-Detect	500
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Hexahydro-trinitro-triazine (RDX) was not processed!

Nitroglycerine

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	500
Maximum Detect	N/A	Maximum Non-Detect	500
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Nitroglycerine was not processed!

Draft

Inorganic Arsenic

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	0.004
Maximum Detect	N/A	Maximum Non-Detect	0.004
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Inorganic Arsenic was not processed!

Arsenic(III)

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	0.004
Maximum Detect	N/A	Maximum Non-Detect	0.004
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Arsenic(III) was not processed!

Arsenic(V)

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	0.004
Maximum Detect	N/A	Maximum Non-Detect	0.004
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Arsenic(V) was not processed!

Draft

Dimethyl Arsenic

General Statistics

Total Number of Observations	16	Number of Distinct Observations	13
		Number of Missing Observations	4
Minimum	0.007	First Quartile	0.0128
Second Largest	0.026	Median	0.018
Maximum	0.031	Third Quartile	0.0215
Mean	0.0175	SD	0.0066
Coefficient of Variation	0.377	Skewness	0.228
Mean of logged Data	-4.121	SD of logged Data	0.418

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.978	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.0976	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	0.0342	90% Percentile (z)	0.026
95% UPL (t)	0.0294	95% Percentile (z)	0.0284
95% USL	0.0336	99% Percentile (z)	0.0329

Gamma GOF Test

A-D Test Statistic	0.246	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.741	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.147	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.216	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	6.793	k star (bias corrected MLE)	5.561
Theta hat (MLE)	0.00258	Theta star (bias corrected MLE)	0.00315
nu hat (MLE)	217.4	nu star (bias corrected)	177.9
MLE Mean (bias corrected)	0.0175	MLE Sd (bias corrected)	0.00742

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.032	90% Percentile	0.0274
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.0325	95% Percentile	0.0312
95% WH Approx. Gamma UTL with 95% Coverage	0.04	99% Percentile	0.0392
95% HW Approx. Gamma UTL with 95% Coverage	0.0413		
95% WH USL	0.039	95% HW USL	0.0402

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.953	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.174	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	0.0466	90% Percentile (z)	0.0277
95% UPL (t)	0.0345	95% Percentile (z)	0.0323
95% USL	0.0451	99% Percentile (z)	0.0429

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	0.031
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	0.031	95% BCA Bootstrap UTL with 95% Coverage	0.031
95% UPL	0.031	90% Percentile	0.025
90% Chebyshev UPL	0.0379	95% Percentile	0.0273
95% Chebyshev UPL	0.0472	99% Percentile	0.0303
95% USL	0.031		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Monomethyl Arsenic

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	2		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	1
Minimum Detect	0.007	Minimum Non-Detect	0.004
Maximum Detect	0.007	Maximum Non-Detect	0.004
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	0.007	SD Detected	N/A
Mean of Detected Logged Data	-4.962	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Monomethyl Arsenic was not processed!

Draft

Aluminum

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	15	Number of Non-Detects	1
Number of Distinct Detects	14	Number of Distinct Non-Detects	1
Minimum Detect	0.16	Minimum Non-Detect	0.13
Maximum Detect	4.27	Maximum Non-Detect	0.13
Variance Detected	1.014	Percent Non-Detects	6.25%
Mean Detected	0.737	SD Detected	1.007
Mean of Detected Logged Data	-0.716	SD of Detected Logged Data	0.822

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.505	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.881	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.357	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.229	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.699	SD	0.953
95% UTL95% Coverage	3.105	95% KM UPL (t)	2.421
90% KM Percentile (z)	1.921	95% KM Percentile (z)	2.267
99% KM Percentile (z)	2.917	95% KM USL	3.028

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.695	SD	0.987
95% UTL95% Coverage	3.187	95% UPL (t)	2.479
90% Percentile (z)	1.96	95% Percentile (z)	2.319
99% Percentile (z)	2.991	95% USL	3.107

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.089	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.756	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.239	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.226	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.362	k star (bias corrected MLE)	1.134
Theta hat (MLE)	0.541	Theta star (bias corrected MLE)	0.65
nu hat (MLE)	40.86	nu star (bias corrected)	34.02
MLE Mean (bias corrected)	0.737		
MLE Sd (bias corrected)	0.692	95% Percentile of Chisquare (2k)	6.501

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.691
Maximum	4.27	Median	0.54
SD	0.99	CV	1.432
k hat (MLE)	0.981	k star (bias corrected MLE)	0.839
Theta hat (MLE)	0.704	Theta star (bias corrected MLE)	0.824
nu hat (MLE)	31.4	nu star (bias corrected)	26.85
MLE Mean (bias corrected)	0.691	MLE Sd (bias corrected)	0.755
95% Percentile of Chisquare (2k)	5.351	90% Percentile	1.662
95% Percentile	2.204	99% Percentile	3.482

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	3.541	3.92	95% Approx. Gamma UPL	2.264	2.367
95% Gamma USL	3.378	3.715			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	0.537		nu hat (KM)	17.19
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	3.023	3.099	95% Approx. Gamma UPL	2.011	1.992
95% Gamma USL	2.895	2.955			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.899	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.881	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.162	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.229	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.695	Mean in Log Scale	-0.836
SD in Original Scale	0.987	SD in Log Scale	0.93
95% UTL95% Coverage	4.527	95% BCA UTL95% Coverage	4.27
95% Bootstrap (%) UTL95% Coverage	4.27	95% UPL (t)	2.324
90% Percentile (z)	1.426	95% Percentile (z)	1.999
99% Percentile (z)	3.767	95% USL	4.2

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-0.798	95% KM UTL (Lognormal)95% Coverage	3.686
KM SD of Logged Data	0.833	95% KM UPL (Lognormal)	2.028
95% KM Percentile Lognormal (z)	1.772	95% KM USL (Lognormal)	3.446

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.695	Mean in Log Scale	-0.842
SD in Original Scale	0.987	SD in Log Scale	0.941
95% UTL95% Coverage	4.632	95% UPL (t)	2.359
90% Percentile (z)	1.439	95% Percentile (z)	2.025
99% Percentile (z)	3.846	95% USL	4.293

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	4.27
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	4.27	95% USL	4.27
95% KM Chebyshev UPL	4.982		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Antimony

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	3		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	2
Minimum Detect	0.01	Minimum Non-Detect	0.006
Maximum Detect	0.01	Maximum Non-Detect	0.007
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	0.01	SD Detected	N/A
Mean of Detected Logged Data	-4.605	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Antimony was not processed!

Draft

Arsenic

General Statistics

Total Number of Observations	16	Number of Distinct Observations	15
		Number of Missing Observations	4
Minimum	18.2	First Quartile	23.48
Second Largest	37.5	Median	26.55
Maximum	40.3	Third Quartile	31.13
Mean	27.88	SD	6.412
Coefficient of Variation	0.23	Skewness	0.607
Mean of logged Data	3.304	SD of logged Data	0.225

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.937	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.132	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	44.06	90% Percentile (z)	36.09
95% UPL (t)	39.46	95% Percentile (z)	38.42
95% USL	43.54	99% Percentile (z)	42.79

Gamma GOF Test

A-D Test Statistic	0.349	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.736	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.129	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	20.98	k star (bias corrected MLE)	17.09
Theta hat (MLE)	1.328	Theta star (bias corrected MLE)	1.631
nu hat (MLE)	671.5	nu star (bias corrected)	546.9
MLE Mean (bias corrected)	27.88	MLE Sd (bias corrected)	6.743

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	40.27	90% Percentile	36.79
95% Hawkins Wixley (HW) Approx. Gamma UPL	40.41	95% Percentile	39.81
95% WH Approx. Gamma UTL with 95% Coverage	46.31	99% Percentile	45.91
95% HW Approx. Gamma UTL with 95% Coverage	46.69		
95% WH USL	45.61	95% HW USL	45.95

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.963	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.121	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	48.02	90% Percentile (z)	36.31
95% UPL (t)	40.87	95% Percentile (z)	39.4
95% USL	47.16	99% Percentile (z)	45.93

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	40.3
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	40.3	95% BCA Bootstrap UTL with 95% Coverage	40.3
95% UPL	40.3	90% Percentile	36.85
90% Chebyshev UPL	47.7	95% Percentile	38.2
95% Chebyshev UPL	56.68	99% Percentile	39.88
95% USL	40.3		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Barium

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	0.03
Maximum Detect	N/A	Maximum Non-Detect	0.03
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Barium was not processed!

Beryllium

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	6		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	6
Minimum Detect	N/A	Minimum Non-Detect	0.025
Maximum Detect	N/A	Maximum Non-Detect	0.03
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Beryllium was not processed!

Draft

Cadmium

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	6		
Number of Detects	5	Number of Non-Detects	11
Number of Distinct Detects	5	Number of Distinct Non-Detects	2
Minimum Detect	0.007	Minimum Non-Detect	0.006
Maximum Detect	0.05	Maximum Non-Detect	0.007
Variance Detected	3.2730E-4	Percent Non-Detects	68.75%
Mean Detected	0.0184	SD Detected	0.0181
Mean of Detected Logged Data	-4.293	SD of Detected Logged Data	0.8

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.722	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.331	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.396	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.00988	SD	0.0107
95% UTL95% Coverage	0.0369	95% KM UPL (t)	0.0292
90% KM Percentile (z)	0.0236	95% KM Percentile (z)	0.0275
99% KM Percentile (z)	0.0348	95% KM USL	0.0361

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.00791	SD	0.0119
95% UTL95% Coverage	0.0378	95% UPL (t)	0.0293
90% Percentile (z)	0.0231	95% Percentile (z)	0.0274
99% Percentile (z)	0.0355	95% USL	0.0369

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.552	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.685	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.288	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.361	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.828	k star (bias corrected MLE)	0.865
Theta hat (MLE)	0.0101	Theta star (bias corrected MLE)	0.0213
nu hat (MLE)	18.28	nu star (bias corrected)	8.647
MLE Mean (bias corrected)	0.0184		
MLE Sd (bias corrected)	0.0198	95% Percentile of Chisquare (2k)	5.456

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.007	Mean	0.0126
Maximum	0.05	Median	0.01
SD	0.0102	CV	0.806
k hat (MLE)	3.847	k star (bias corrected MLE)	3.167
Theta hat (MLE)	0.00328	Theta star (bias corrected MLE)	0.00399
nu hat (MLE)	123.1	nu star (bias corrected)	101.3
MLE Mean (bias corrected)	0.0126	MLE Sd (bias corrected)	0.00709
95% Percentile of Chisquare (2k)	13.09	90% Percentile	0.0221
95% Percentile	0.0261	99% Percentile	0.0346

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.035	0.0346	95% Approx. Gamma UPL	0.0265	0.0259
95% Gamma USL	0.0339	0.0335			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	0.849		nu hat (KM)	27.17
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0331	0.0326	95% Approx. Gamma UPL	0.0237	0.023
95% Gamma USL	0.0319	0.0314			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.865	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.252	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.396	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.00642	Mean in Log Scale	-6.414
SD in Original Scale	0.0125	SD in Log Scale	1.767
95% UTL95% Coverage	0.142	95% BCA UTL95% Coverage	0.05
95% Bootstrap (%) UTL95% Coverage	0.05	95% UPL (t)	0.0399
90% Percentile (z)	0.0158	95% Percentile (z)	0.0299
99% Percentile (z)	0.0998	95% USL	0.123

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-4.859	95% KM UTL (Lognormal)95% Coverage	0.0313
KM SD of Logged Data	0.553	95% KM UPL (Lognormal)	0.0211
95% KM Percentile Lognormal (z)	0.0193	95% KM USL (Lognormal)	0.03

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.00791	Mean in Log Scale	-5.306
SD in Original Scale	0.0119	SD in Log Scale	0.82
95% UTL95% Coverage	0.0393	95% UPL (t)	0.0218
90% Percentile (z)	0.0142	95% Percentile (z)	0.0191
99% Percentile (z)	0.0334	95% USL	0.0368

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.05
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.05	95% USL	0.05
95% KM Chebyshev UPL	0.058		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Chromium

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	2	Number of Non-Detects	14
Number of Distinct Detects	2	Number of Distinct Non-Detects	13
Minimum Detect	0.192	Minimum Non-Detect	0.015
Maximum Detect	0.388	Maximum Non-Detect	0.142
Variance Detected	0.0192	Percent Non-Detects	87.5%
Mean Detected	0.29	SD Detected	0.139
Mean of Detected Logged Data	-1.299	SD of Detected Logged Data	0.497

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only
Not Enough Data to Perform GOF Test

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0494	SD	0.0973
95% UTL95% Coverage	0.295	95% KM UPL (t)	0.225
90% KM Percentile (z)	0.174	95% KM Percentile (z)	0.209
99% KM Percentile (z)	0.276	95% KM USL	0.287

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0581	SD	0.0995
95% UTL95% Coverage	0.309	95% UPL (t)	0.238
90% Percentile (z)	0.186	95% Percentile (z)	0.222
99% Percentile (z)	0.29	95% USL	0.301

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only
Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	8.41	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0345	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	33.64	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A		
MLE Sd (bias corrected)	N/A	95% Percentile of Chisquare (2k)	N/A

The following statistics are computed using gamma distribution and KM estimates
Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

k hat (KM)	0.257		nu hat (KM)	8.236	
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.266	0.262	95% Approx. Gamma UPL	0.162	0.153
95% Gamma USL	0.253	0.248			

Lognormal GOF Test on Detected Observations Only
Not Enough Data to Perform GOF Test

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0441	Mean in Log Scale	-4.329
SD in Original Scale	0.102	SD in Log Scale	1.222
95% UTL95% Coverage	0.288	95% BCA UTL95% Coverage	0.388
95% Bootstrap (%) UTL95% Coverage	0.388	95% UPL (t)	0.12
90% Percentile (z)	0.0631	95% Percentile (z)	0.0984
99% Percentile (z)	0.226	95% USL	0.261

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0581	Mean in Log Scale	-3.677
SD in Original Scale	0.0995	SD in Log Scale	1.2
95% UTL95% Coverage	0.523	95% UPL (t)	0.221
90% Percentile (z)	0.118	95% Percentile (z)	0.182
99% Percentile (z)	0.413	95% USL	0.475

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics
Data do not follow a Discernible Distribution (0.05)

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.388
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.388	95% USL	0.388
95% KM Chebyshev UPL	0.487		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Cobalt

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	4		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	4
Minimum Detect	N/A	Minimum Non-Detect	0.017
Maximum Detect	N/A	Maximum Non-Detect	0.02
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Cobalt was not processed!

Draft

Copper

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	3.63	First Quartile	5.288
Second Largest	10.7	Median	6.17
Maximum	12.2	Third Quartile	7.618
Mean	6.708	SD	2.361
Coefficient of Variation	0.352	Skewness	0.98
Mean of logged Data	1.849	SD of logged Data	0.337

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.929	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.123	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	12.67	90% Percentile (z)	9.734
95% UPL (t)	10.97	95% Percentile (z)	10.59
95% USL	12.48	99% Percentile (z)	12.2

Gamma GOF Test

A-D Test Statistic	0.198	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.739	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0909	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	9.363	k star (bias corrected MLE)	7.649
Theta hat (MLE)	0.716	Theta star (bias corrected MLE)	0.877
nu hat (MLE)	299.6	nu star (bias corrected)	244.8
MLE Mean (bias corrected)	6.708	MLE Sd (bias corrected)	2.426

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	11.34	90% Percentile	9.943
95% Hawkins Wixley (HW) Approx. Gamma UPL	11.41	95% Percentile	11.13
95% WH Approx. Gamma UTL with 95% Coverage	13.81	99% Percentile	13.59
95% HW Approx. Gamma UTL with 95% Coverage	14.03		
95% WH USL	13.51	95% HW USL	13.71

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.981	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0826	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	14.89	90% Percentile (z)	9.79
95% UPL (t)	11.69	95% Percentile (z)	11.07
95% USL	14.49	99% Percentile (z)	13.93

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	12.2
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	12.2	95% BCA Bootstrap UTL with 95% Coverage	12.2
95% UPL	12.2	90% Percentile	9.755
90% Chebyshev UPL	14.01	95% Percentile	11.08
95% Chebyshev UPL	17.32	99% Percentile	11.98
95% USL	12.2		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Iron

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	15
Minimum Detect	N/A	Minimum Non-Detect	0.813
Maximum Detect	N/A	Maximum Non-Detect	2.46
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Iron was not processed!

Draft

Lead

General Statistics

Total Number of Observations	16	Number of Distinct Observations	9
		Number of Missing Observations	4
Minimum	0.004	First Quartile	0.01
Second Largest	0.11	Median	0.015
Maximum	0.16	Third Quartile	0.03
Mean	0.0338	SD	0.0436
Coefficient of Variation	1.292	Skewness	2.178
Mean of logged Data	-3.954	SD of logged Data	1.033

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.665	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.347	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	0.144	90% Percentile (z)	0.0896
95% UPL (t)	0.113	95% Percentile (z)	0.105
95% USL	0.14	99% Percentile (z)	0.135

Gamma GOF Test

A-D Test Statistic	1.107	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.763	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.248	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.221	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.019	k star (bias corrected MLE)	0.87
Theta hat (MLE)	0.0331	Theta star (bias corrected MLE)	0.0388
nu hat (MLE)	32.61	nu star (bias corrected)	27.83
MLE Mean (bias corrected)	0.0338	MLE Sd (bias corrected)	0.0362

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.111	90% Percentile	0.0804
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.113	95% Percentile	0.106
95% WH Approx. Gamma UTL with 95% Coverage	0.174	99% Percentile	0.167
95% HW Approx. Gamma UTL with 95% Coverage	0.186		
95% WH USL	0.166	95% HW USL	0.176

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.915	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.236	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Lognormal at 5% Significance Level

Data appear Approximate Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	0.26	90% Percentile (z)	0.072
95% UPL (t)	0.124	95% Percentile (z)	0.105
95% USL	0.239	99% Percentile (z)	0.212

Nonparametric Distribution Free Background Statistics

Data appear Approximate Lognormal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	0.16
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	0.16	95% BCA Bootstrap UTL with 95% Coverage	0.16
95% UPL	0.16	90% Percentile	0.09
90% Chebyshev UPL	0.169	95% Percentile	0.123
95% Chebyshev UPL	0.23	99% Percentile	0.153
95% USL	0.16		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Manganese

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	0.186	First Quartile	0.237
Second Largest	0.293	Median	0.257
Maximum	0.339	Third Quartile	0.275
Mean	0.257	SD	0.0361
Coefficient of Variation	0.141	Skewness	0.193
Mean of logged Data	-1.37	SD of logged Data	0.143

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.976	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.106	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	0.348	90% Percentile (z)	0.303
95% UPL (t)	0.322	95% Percentile (z)	0.316
95% USL	0.345	99% Percentile (z)	0.341

Gamma GOF Test

A-D Test Statistic	0.232	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.735	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.105	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.214	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	53.13	k star (bias corrected MLE)	43.21
Theta hat (MLE)	0.00483	Theta star (bias corrected MLE)	0.00594
nu hat (MLE)	1700	nu star (bias corrected)	1383
MLE Mean (bias corrected)	0.257	MLE Sd (bias corrected)	0.039

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.326	90% Percentile	0.308
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.327	95% Percentile	0.324
95% WH Approx. Gamma UTL with 95% Coverage	0.358	99% Percentile	0.356
95% HW Approx. Gamma UTL with 95% Coverage	0.359		
95% WH USL	0.354	95% HW USL	0.356

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.973	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.117	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	0.365	90% Percentile (z)	0.305
95% UPL (t)	0.329	95% Percentile (z)	0.322
95% USL	0.36	99% Percentile (z)	0.354

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	0.339
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	0.339	95% BCA Bootstrap UTL with 95% Coverage	0.339
95% UPL	0.339	90% Percentile	0.29
90% Chebyshev UPL	0.368	95% Percentile	0.305
95% Chebyshev UPL	0.419	99% Percentile	0.332
95% USL	0.339		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Mercury

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	5.58	First Quartile	8.155
Second Largest	14.2	Median	9.04
Maximum	16.4	Third Quartile	11.85
Mean	9.897	SD	2.959
Coefficient of Variation	0.299	Skewness	0.755
Mean of logged Data	2.252	SD of logged Data	0.292

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.942	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.18	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	17.36	90% Percentile (z)	13.69
95% UPL (t)	15.24	95% Percentile (z)	14.76
95% USL	17.13	99% Percentile (z)	16.78

Gamma GOF Test

A-D Test Statistic	0.29	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.738	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.147	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	12.55	k star (bias corrected MLE)	10.24
Theta hat (MLE)	0.789	Theta star (bias corrected MLE)	0.967
nu hat (MLE)	401.6	nu star (bias corrected)	327.6
MLE Mean (bias corrected)	9.897	MLE Sd (bias corrected)	3.093

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	15.72	90% Percentile	14.01
95% Hawkins Wixley (HW) Approx. Gamma UPL	15.81	95% Percentile	15.47
95% WH Approx. Gamma UTL with 95% Coverage	18.71	99% Percentile	18.47
95% HW Approx. Gamma UTL with 95% Coverage	18.96		
95% WH USL	18.35	95% HW USL	18.58

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.977	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.128	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	19.88	90% Percentile (z)	13.83
95% UPL (t)	16.12	95% Percentile (z)	15.37
95% USL	19.42	99% Percentile (z)	18.76

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	16.4
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	16.4	95% BCA Bootstrap UTL with 95% Coverage	16.4
95% UPL	16.4	90% Percentile	13.8
90% Chebyshev UPL	19.05	95% Percentile	14.75
95% Chebyshev UPL	23.19	99% Percentile	16.07
95% USL	16.4		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Methyl Mercury

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	4.25	First Quartile	6.125
Second Largest	11.6	Median	8.075
Maximum	15.3	Third Quartile	8.76
Mean	7.913	SD	2.931
Coefficient of Variation	0.37	Skewness	0.953
Mean of logged Data	2.006	SD of logged Data	0.364

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.922	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.16	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	15.31	90% Percentile (z)	11.67
95% UPL (t)	13.21	95% Percentile (z)	12.73
95% USL	15.07	99% Percentile (z)	14.73

Gamma GOF Test

A-D Test Statistic	0.313	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.74	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.124	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	8.232	k star (bias corrected MLE)	6.73
Theta hat (MLE)	0.961	Theta star (bias corrected MLE)	1.176
nu hat (MLE)	263.4	nu star (bias corrected)	215.4
MLE Mean (bias corrected)	7.913	MLE Sd (bias corrected)	3.05

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	13.78	90% Percentile	11.99
95% Hawkins Wixley (HW) Approx. Gamma UPL	13.9	95% Percentile	13.5
95% WH Approx. Gamma UTL with 95% Coverage	16.96	99% Percentile	16.67
95% HW Approx. Gamma UTL with 95% Coverage	17.3		
95% WH USL	16.58	95% HW USL	16.89

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.955	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.123	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	18.64	90% Percentile (z)	11.86
95% UPL (t)	14.36	95% Percentile (z)	13.53
95% USL	18.1	99% Percentile (z)	17.34

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	15.3
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	15.3	95% BCA Bootstrap UTL with 95% Coverage	15.3
95% UPL	15.3	90% Percentile	11.1
90% Chebyshev UPL	16.98	95% Percentile	12.53
95% Chebyshev UPL	21.08	99% Percentile	14.75
95% USL	15.3		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Selenium

General Statistics

Total Number of Observations	16	Number of Distinct Observations	14
		Number of Missing Observations	4
Minimum	0.163	First Quartile	0.249
Second Largest	0.313	Median	0.277
Maximum	0.353	Third Quartile	0.291
Mean	0.271	SD	0.0435
Coefficient of Variation	0.16	Skewness	-0.67
Mean of logged Data	-1.319	SD of logged Data	0.176

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.948	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.169	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	0.381	90% Percentile (z)	0.327
95% UPL (t)	0.35	95% Percentile (z)	0.343
95% USL	0.377	99% Percentile (z)	0.372

Gamma GOF Test

A-D Test Statistic	0.536	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.736	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.191	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	37.08	k star (bias corrected MLE)	30.17
Theta hat (MLE)	0.00731	Theta star (bias corrected MLE)	0.00899
nu hat (MLE)	1187	nu star (bias corrected)	965.4
MLE Mean (bias corrected)	0.271	MLE Sd (bias corrected)	0.0494

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.36	90% Percentile	0.336
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.362	95% Percentile	0.357
95% WH Approx. Gamma UTL with 95% Coverage	0.401	99% Percentile	0.399
95% HW Approx. Gamma UTL with 95% Coverage	0.405		
95% WH USL	0.396	95% HW USL	0.4

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.891	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.201	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	0.417	90% Percentile (z)	0.335
95% UPL (t)	0.367	95% Percentile (z)	0.357
95% USL	0.411	99% Percentile (z)	0.403

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	0.353
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	0.353	95% BCA Bootstrap UTL with 95% Coverage	0.353
95% UPL	0.353	90% Percentile	0.311
90% Chebyshev UPL	0.405	95% Percentile	0.323
95% Chebyshev UPL	0.466	99% Percentile	0.347
95% USL	0.353		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Silver

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	4		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	4
Minimum Detect	N/A	Minimum Non-Detect	0.017
Maximum Detect	N/A	Maximum Non-Detect	0.02
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Silver was not processed!

Thallium

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	0.002
Maximum Detect	N/A	Maximum Non-Detect	0.002
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Thallium was not processed!

Vanadium

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	3		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	3
Minimum Detect	N/A	Minimum Non-Detect	0.012
Maximum Detect	N/A	Maximum Non-Detect	0.014
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Vanadium was not processed!

Draft

Zinc

General Statistics

Total Number of Observations	16	Number of Distinct Observations	12
		Number of Missing Observations	4
Minimum	11.3	First Quartile	13.4
Second Largest	15.8	Median	14.05
Maximum	16.1	Third Quartile	14.9
Mean	14.11	SD	1.21
Coefficient of Variation	0.0858	Skewness	-0.408
Mean of logged Data	2.643	SD of logged Data	0.0879

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.956	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.155	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	17.16	90% Percentile (z)	15.66
95% UPL (t)	16.29	95% Percentile (z)	16.1
95% USL	17.06	99% Percentile (z)	16.92

Gamma GOF Test

A-D Test Statistic	0.351	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.736	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.157	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.214	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	140.6	k star (bias corrected MLE)	114.3
Theta hat (MLE)	0.1	Theta star (bias corrected MLE)	0.123
nu hat (MLE)	4499	nu star (bias corrected)	3656
MLE Mean (bias corrected)	14.11	MLE Sd (bias corrected)	1.32

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	16.41	90% Percentile	15.82
95% Hawkins Wixley (HW) Approx. Gamma UPL	16.42	95% Percentile	16.34
95% WH Approx. Gamma UTL with 95% Coverage	17.4	99% Percentile	17.36
95% HW Approx. Gamma UTL with 95% Coverage	17.44		
95% WH USL	17.29	95% HW USL	17.32

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.94	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.168	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	17.55	90% Percentile (z)	15.73
95% UPL (t)	16.48	95% Percentile (z)	16.24
95% USL	17.42	99% Percentile (z)	17.25

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	16.1
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	16.1	95% BCA Bootstrap UTL with 95% Coverage	16.1
95% UPL	16.1	90% Percentile	15.5
90% Chebyshev UPL	17.85	95% Percentile	15.88
95% Chebyshev UPL	19.54	99% Percentile	16.06
95% USL	16.1		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Sea Cucumber (loli)

Draft

Aldrin

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	4
Maximum Detect	N/A	Maximum Non-Detect	4
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Aldrin was not processed!

Alpha-BHC

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	4
Maximum Detect	N/A	Maximum Non-Detect	4
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Alpha-BHC was not processed!

Draft

Beta-BHC

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	4
Maximum Detect	N/A	Maximum Non-Detect	4
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Beta-BHC was not processed!

Draft

Delta-BHC

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	4
Maximum Detect	N/A	Maximum Non-Detect	4
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Delta-BHC was not processed!

Gamma-BHC (Lindane)

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	4
Maximum Detect	N/A	Maximum Non-Detect	4
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gamma-BHC (Lindane) was not processed!

Heptachlor

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	4
Maximum Detect	N/A	Maximum Non-Detect	4
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Heptachlor was not processed!

Draft

Heptachlor Epoxide

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	4
Maximum Detect	N/A	Maximum Non-Detect	4
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Heptachlor Epoxide was not processed!

p,p'-DDT

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	4
Maximum Detect	N/A	Maximum Non-Detect	4
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable p,p'-DDT was not processed!

Draft

1,2,4-Trimethylbenzene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	12.5
Maximum Detect	N/A	Maximum Non-Detect	12.5
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,4-Trimethylbenzene was not processed!

Draft

Ethyl Benzene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	12.5
Maximum Detect	N/A	Maximum Non-Detect	12.5
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Ethyl Benzene was not processed!

M,P-XYLENES

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	25
Maximum Detect	N/A	Maximum Non-Detect	25
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable M,P-XYLENES was not processed!

Draft

o-Xylene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	12.5
Maximum Detect	N/A	Maximum Non-Detect	12.5
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable o-Xylene was not processed!

Styrene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	12.5
Maximum Detect	N/A	Maximum Non-Detect	12.5
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Styrene was not processed!

Draft

Toluene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	12.5
Maximum Detect	N/A	Maximum Non-Detect	12.5
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Toluene was not processed!

bis(2-Ethylhexyl) phthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable bis(2-Ethylhexyl) phthalate was not processed!

Draft

Diethyl phthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Diethyl phthalate was not processed!

Dimethyl phthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Dimethyl phthalate was not processed!

Draft

Di-n-butyl phthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Di-n-butyl phthalate was not processed!

Di-n-octyl phthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Di-n-octyl phthalate was not processed!

Draft

Pyrene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Pyrene was not processed!

2,3,7,8-TCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	11	Number of Non-Detects	5
Number of Distinct Detects	11	Number of Distinct Non-Detects	4
Minimum Detect	0.058	Minimum Non-Detect	0.12
Maximum Detect	0.12	Maximum Non-Detect	0.19
Variance Detected	3.1287E-4	Percent Non-Detects	31.25%
Mean Detected	0.0805	SD Detected	0.0177
Mean of Detected Logged Data	-2.541	SD of Detected Logged Data	0.211

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.938	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.131	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.267	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0801	SD	0.0165
95% UTL95% Coverage	0.122	95% KM UPL (t)	0.11
90% KM Percentile (z)	0.101	95% KM Percentile (z)	0.107
99% KM Percentile (z)	0.119	95% KM USL	0.121

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0791	SD	0.0163
95% UTL95% Coverage	0.12	95% UPL (t)	0.108
90% Percentile (z)	0.0999	95% Percentile (z)	0.106
99% Percentile (z)	0.117	95% USL	0.119

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.186	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.729	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.106	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.255	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	24.29	k star (bias corrected MLE)	17.73
Theta hat (MLE)	0.00331	Theta star (bias corrected MLE)	0.00454
nu hat (MLE)	534.5	nu star (bias corrected)	390
MLE Mean (bias corrected)	0.0805		
MLE Sd (bias corrected)	0.0191	95% Percentile of Chisquare (2k)	50.35

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.058	Mean	0.0799
Maximum	0.12	Median	0.0779
SD	0.0148	CV	0.185
k hat (MLE)	33.51	k star (bias corrected MLE)	27.27
Theta hat (MLE)	0.00238	Theta star (bias corrected MLE)	0.00293
nu hat (MLE)	1072	nu star (bias corrected)	872.6
MLE Mean (bias corrected)	0.0799	MLE Sd (bias corrected)	0.0153
95% Percentile of Chisquare (2k)	72.78	90% Percentile	0.1
95% Percentile	0.107	99% Percentile	0.12

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.12	0.121	95% Approx. Gamma UPL	0.108	0.108
95% Gamma USL	0.119	0.119			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	23.46		nu hat (KM)	750.7
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.126	0.127	95% Approx. Gamma UPL	0.111	0.112
95% Gamma USL	0.125	0.125			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.974	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.111	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.267	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0797	Mean in Log Scale	-2.545
SD in Original Scale	0.0148	SD in Log Scale	0.176
95% UTL95% Coverage	0.123	95% BCA UTL95% Coverage	0.12
95% Bootstrap (%) UTL95% Coverage	0.12	95% UPL (t)	0.108
90% Percentile (z)	0.0984	95% Percentile (z)	0.105
99% Percentile (z)	0.118	95% USL	0.121

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.544	95% KM UTL (Lognormal)95% Coverage	0.13
KM SD of Logged Data	0.198	95% KM UPL (Lognormal)	0.112
95% KM Percentile Lognormal (z)	0.109	95% KM USL (Lognormal)	0.128

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0791	Mean in Log Scale	-2.556
SD in Original Scale	0.0163	SD in Log Scale	0.198
95% UTL95% Coverage	0.128	95% UPL (t)	0.111
90% Percentile (z)	0.1	95% Percentile (z)	0.107
99% Percentile (z)	0.123	95% USL	0.126

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.19
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.19	95% USL	0.19
95% KM Chebyshev UPL	0.154		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Total TCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	10	Number of Non-Detects	6
Number of Distinct Detects	9	Number of Distinct Non-Detects	5
Minimum Detect	0.042	Minimum Non-Detect	0.054
Maximum Detect	0.33	Maximum Non-Detect	0.19
Variance Detected	0.011	Percent Non-Detects	37.5%
Mean Detected	0.14	SD Detected	0.105
Mean of Detected Logged Data	-2.2	SD of Detected Logged Data	0.706

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.805	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.842	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.26	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.28	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.113	SD	0.0884
95% UTL95% Coverage	0.336	95% KM UPL (t)	0.272
90% KM Percentile (z)	0.226	95% KM Percentile (z)	0.258
99% KM Percentile (z)	0.318	95% KM USL	0.329

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.111	SD	0.0912
95% UTL95% Coverage	0.341	95% UPL (t)	0.276
90% Percentile (z)	0.228	95% Percentile (z)	0.261
99% Percentile (z)	0.323	95% USL	0.334

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.441	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.734	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.171	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.269	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	2.318	k star (bias corrected MLE)	1.689
Theta hat (MLE)	0.0602	Theta star (bias corrected MLE)	0.0826
nu hat (MLE)	46.36	nu star (bias corrected)	33.78
MLE Mean (bias corrected)	0.14		
MLE Sd (bias corrected)	0.107	95% Percentile of Chisquare (2k)	8.461

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.108
Maximum	0.33	Median	0.0748
SD	0.0939	CV	0.873
k hat (MLE)	1.672	k star (bias corrected MLE)	1.4
Theta hat (MLE)	0.0643	Theta star (bias corrected MLE)	0.0768
nu hat (MLE)	53.5	nu star (bias corrected)	44.8
MLE Mean (bias corrected)	0.108	MLE Sd (bias corrected)	0.0909
95% Percentile of Chisquare (2k)	7.465	90% Percentile	0.228
95% Percentile	0.287	99% Percentile	0.42

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.44	0.473	95% Approx. Gamma UPL	0.301	0.311
95% Gamma USL	0.422	0.453			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

k hat (KM)	1.621		nu hat (KM)	51.88	
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.387	0.4	95% Approx. Gamma UPL	0.276	0.279
95% Gamma USL	0.373	0.385			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.936	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.842	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.134	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.28	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.111	Mean in Log Scale	-2.432
SD in Original Scale	0.0907	SD in Log Scale	0.666
95% UTL95% Coverage	0.472	95% BCA UTL95% Coverage	0.33
95% Bootstrap (%) UTL95% Coverage	0.33	95% UPL (t)	0.293
90% Percentile (z)	0.206	95% Percentile (z)	0.263
99% Percentile (z)	0.413	95% USL	0.447

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.424	95% KM UTL (Lognormal)95% Coverage	0.466
KM SD of Logged Data	0.658	95% KM UPL (Lognormal)	0.291
95% KM Percentile Lognormal (z)	0.261	95% KM USL (Lognormal)	0.442

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.111	Mean in Log Scale	-2.455
SD in Original Scale	0.0912	SD in Log Scale	0.717
95% UTL95% Coverage	0.525	95% UPL (t)	0.314
90% Percentile (z)	0.215	95% Percentile (z)	0.279
99% Percentile (z)	0.456	95% USL	0.495

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.33
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.33	95% USL	0.33
95% KM Chebyshev UPL	0.51		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

2,3,7,8-TCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	13
Minimum Detect	N/A	Minimum Non-Detect	0.041
Maximum Detect	N/A	Maximum Non-Detect	0.23
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,3,7,8-TCDD was not processed!

Draft

Total TCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	14	Number of Non-Detects	2
Number of Distinct Detects	12	Number of Distinct Non-Detects	1
Minimum Detect	0.49	Minimum Non-Detect	0.16
Maximum Detect	1.4	Maximum Non-Detect	0.16
Variance Detected	0.0842	Percent Non-Detects	12.5%
Mean Detected	1	SD Detected	0.29
Mean of Detected Logged Data	-0.0452	SD of Detected Logged Data	0.325

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.952	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.112	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.237	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.895	SD	0.382
95% UTL95% Coverage	1.858	95% KM UPL (t)	1.585
90% KM Percentile (z)	1.384	95% KM Percentile (z)	1.523
99% KM Percentile (z)	1.783	95% KM USL	1.827

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.885	SD	0.414
95% UTL95% Coverage	1.931	95% UPL (t)	1.634
90% Percentile (z)	1.416	95% Percentile (z)	1.567
99% Percentile (z)	1.849	95% USL	1.898

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.373	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.734	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.131	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.229	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	11.22	k star (bias corrected MLE)	8.861
Theta hat (MLE)	0.0892	Theta star (bias corrected MLE)	0.113
nu hat (MLE)	314.1	nu star (bias corrected)	248.1
MLE Mean (bias corrected)	1		
MLE Sd (bias corrected)	0.336	95% Percentile of Chisquare (2k)	28.51

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.39	Mean	0.929
Maximum	1.4	Median	0.97
SD	0.333	CV	0.358
k hat (MLE)	7.18	k star (bias corrected MLE)	5.875
Theta hat (MLE)	0.129	Theta star (bias corrected MLE)	0.158
nu hat (MLE)	229.8	nu star (bias corrected)	188
MLE Mean (bias corrected)	0.929	MLE Sd (bias corrected)	0.383
95% Percentile of Chisquare (2k)	20.69	90% Percentile	1.442
95% Percentile	1.636	99% Percentile	2.044

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	2.086	2.152	95% Approx. Gamma UPL	1.675	1.703
95% Gamma USL	2.036	2.098			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	5.502		nu hat (KM)	176
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	2.603	2.818	95% Approx. Gamma UPL	1.954	2.05
95% Gamma USL	2.524	2.723			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.917	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.154	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.237	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.932	Mean in Log Scale	-0.138
SD in Original Scale	0.328	SD in Log Scale	0.395
95% UTL95% Coverage	2.361	95% BCA UTL95% Coverage	1.4
95% Bootstrap (%) UTL95% Coverage	1.4	95% UPL (t)	1.779
90% Percentile (z)	1.446	95% Percentile (z)	1.669
99% Percentile (z)	2.184	95% USL	2.287

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-0.269	95% KM UTL (Lognormal)95% Coverage	4.042
KM SD of Logged Data	0.66	95% KM UPL (Lognormal)	2.518
95% KM Percentile Lognormal (z)	2.263	95% KM USL (Lognormal)	3.832

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.885	Mean in Log Scale	-0.355
SD in Original Scale	0.414	SD in Log Scale	0.9
95% UTL95% Coverage	6.791	95% UPL (t)	3.563
90% Percentile (z)	2.22	95% Percentile (z)	3.079
99% Percentile (z)	5.685	95% USL	6.315

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	1.4
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	1.4	95% USL	1.4
95% KM Chebyshev UPL	2.609		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,7,8-PECDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	14
Minimum Detect	N/A	Minimum Non-Detect	0.042
Maximum Detect	N/A	Maximum Non-Detect	0.2
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,7,8-PECDF was not processed!

2,3,4,7,8-PeCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	14
Minimum Detect	N/A	Minimum Non-Detect	0.032
Maximum Detect	N/A	Maximum Non-Detect	0.14
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,3,4,7,8-PeCDF was not processed!

Draft

Total PeCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	2	Number of Non-Detects	14
Number of Distinct Detects	2	Number of Distinct Non-Detects	13
Minimum Detect	0.057	Minimum Non-Detect	0.038
Maximum Detect	0.23	Maximum Non-Detect	0.17
Variance Detected	0.015	Percent Non-Detects	87.5%
Mean Detected	0.144	SD Detected	0.122
Mean of Detected Logged Data	-2.167	SD of Detected Logged Data	0.986

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only
Not Enough Data to Perform GOF Test

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.052	SD	0.0463
95% UTL95% Coverage	0.169	95% KM UPL (t)	0.136
90% KM Percentile (z)	0.111	95% KM Percentile (z)	0.128
99% KM Percentile (z)	0.16	95% KM USL	0.165

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0554	SD	0.0527
95% UTL95% Coverage	0.188	95% UPL (t)	0.151
90% Percentile (z)	0.123	95% Percentile (z)	0.142
99% Percentile (z)	0.178	95% USL	0.184

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only
Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	2.368	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0606	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	9.472	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A		
MLE Sd (bias corrected)	N/A	95% Percentile of Chisquare (2k)	N/A

The following statistics are computed using gamma distribution and KM estimates
Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

k hat (KM)	1.259		nu hat (KM)	40.28	
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.147	0.145	95% Approx. Gamma UPL	0.111	0.108
95% Gamma USL	0.143	0.14			

Lognormal GOF Test on Detected Observations Only
Not Enough Data to Perform GOF Test

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.021	Mean in Log Scale	-5.287
SD in Original Scale	0.0573	SD in Log Scale	1.289
95% UTL95% Coverage	0.131	95% BCA UTL95% Coverage	0.23
95% Bootstrap (%) UTL95% Coverage	0.23	95% UPL (t)	0.052
90% Percentile (z)	0.0264	95% Percentile (z)	0.0422
99% Percentile (z)	0.102	95% USL	0.118

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0554	Mean in Log Scale	-3.173
SD in Original Scale	0.0527	SD in Log Scale	0.72
95% UTL95% Coverage	0.258	95% UPL (t)	0.154
90% Percentile (z)	0.105	95% Percentile (z)	0.137
99% Percentile (z)	0.223	95% USL	0.243

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics
Data do not follow a Discernible Distribution (0.05)

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.23
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.23	95% USL	0.23
95% KM Chebyshev UPL	0.26		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,7,8-PeCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	14
Minimum Detect	N/A	Minimum Non-Detect	0.032
Maximum Detect	N/A	Maximum Non-Detect	0.19
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,7,8-PeCDD was not processed!

Draft

Total PeCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	10	Number of Non-Detects	6
Number of Distinct Detects	10	Number of Distinct Non-Detects	5
Minimum Detect	0.035	Minimum Non-Detect	0.078
Maximum Detect	0.18	Maximum Non-Detect	0.19
Variance Detected	0.00162	Percent Non-Detects	37.5%
Mean Detected	0.0994	SD Detected	0.0402
Mean of Detected Logged Data	-2.394	SD of Detected Logged Data	0.459

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.972	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.842	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.142	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.28	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0905	SD	0.0379
95% UTL95% Coverage	0.186	95% KM UPL (t)	0.159
90% KM Percentile (z)	0.139	95% KM Percentile (z)	0.153
99% KM Percentile (z)	0.179	95% KM USL	0.183

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0896	SD	0.0364
95% UTL95% Coverage	0.182	95% UPL (t)	0.155
90% Percentile (z)	0.136	95% Percentile (z)	0.149
99% Percentile (z)	0.174	95% USL	0.179

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.256	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.729	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.185	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.267	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	6.049	k star (bias corrected MLE)	4.301
Theta hat (MLE)	0.0164	Theta star (bias corrected MLE)	0.0231
nu hat (MLE)	121	nu star (bias corrected)	86.01
MLE Mean (bias corrected)	0.0994		
MLE Sd (bias corrected)	0.0479	95% Percentile of Chisquare (2k)	16.36

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.035	Mean	0.0904
Maximum	0.18	Median	0.0855
SD	0.0348	CV	0.385
k hat (MLE)	7.274	k star (bias corrected MLE)	5.952
Theta hat (MLE)	0.0124	Theta star (bias corrected MLE)	0.0152
nu hat (MLE)	232.8	nu star (bias corrected)	190.4
MLE Mean (bias corrected)	0.0904	MLE Sd (bias corrected)	0.037
95% Percentile of Chisquare (2k)	20.9	90% Percentile	0.14
95% Percentile	0.159	99% Percentile	0.198

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.202	0.207	95% Approx. Gamma UPL	0.162	0.164
95% Gamma USL	0.197	0.202			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	5.706		nu hat (KM)	182.6
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.221	0.229	95% Approx. Gamma UPL	0.174	0.177
95% Gamma USL	0.216	0.223			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.94	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.842	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.218	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.28	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0893	Mean in Log Scale	-2.488
SD in Original Scale	0.0352	SD in Log Scale	0.4
95% UTL95% Coverage	0.228	95% BCA UTL95% Coverage	0.18
95% Bootstrap (%) UTL95% Coverage	0.18	95% UPL (t)	0.171
90% Percentile (z)	0.139	95% Percentile (z)	0.16
99% Percentile (z)	0.21	95% USL	0.221

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.501	95% KM UTL (Lognormal)95% Coverage	0.265
KM SD of Logged Data	0.465	95% KM UPL (Lognormal)	0.19
95% KM Percentile Lognormal (z)	0.176	95% KM USL (Lognormal)	0.255

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0896	Mean in Log Scale	-2.496
SD in Original Scale	0.0364	SD in Log Scale	0.436
95% UTL95% Coverage	0.248	95% UPL (t)	0.181
90% Percentile (z)	0.144	95% Percentile (z)	0.169
99% Percentile (z)	0.227	95% USL	0.239

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.19
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.19	95% USL	0.19
95% KM Chebyshev UPL	0.261		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,4,7,8-HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	15
Minimum Detect	0.037	Minimum Non-Detect	0.027
Maximum Detect	0.037	Maximum Non-Detect	0.18
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	0.037	SD Detected	N/A
Mean of Detected Logged Data	-3.297	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,4,7,8-HxCDF was not processed!

1,2,3,6,7,8-HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	16		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	15
Minimum Detect	0.041	Minimum Non-Detect	0.024
Maximum Detect	0.041	Maximum Non-Detect	0.15
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	0.041	SD Detected	N/A
Mean of Detected Logged Data	-3.194	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,6,7,8-HxCDF was not processed!

Draft

2,3,4,6,7,8-HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	3	Number of Non-Detects	13
Number of Distinct Detects	3	Number of Distinct Non-Detects	12
Minimum Detect	0.033	Minimum Non-Detect	0.033
Maximum Detect	0.073	Maximum Non-Detect	0.14
Variance Detected	4.8533E-4	Percent Non-Detects	81.25%
Mean Detected	0.0477	SD Detected	0.022
Mean of Detected Logged Data	-3.108	SD of Detected Logged Data	0.429

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.824	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.353	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0374	SD	0.0114
95% UTL95% Coverage	0.0661	95% KM UPL (t)	0.0579
90% KM Percentile (z)	0.0519	95% KM Percentile (z)	0.0561
99% KM Percentile (z)	0.0638	95% KM USL	0.0651

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0362	SD	0.0197
95% UTL95% Coverage	0.0858	95% UPL (t)	0.0717
90% Percentile (z)	0.0614	95% Percentile (z)	0.0685
99% Percentile (z)	0.0819	95% USL	0.0842

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	7.863	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00606	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	47.18	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A		
MLE Sd (bias corrected)	N/A	95% Percentile of Chisquare (2k)	N/A

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.027
Maximum	0.073	Median	0.0254
SD	0.0139	CV	0.515
k hat (MLE)	5.587	k star (bias corrected MLE)	4.581
Theta hat (MLE)	0.00483	Theta star (bias corrected MLE)	0.0059
nu hat (MLE)	178.8	nu star (bias corrected)	146.6
MLE Mean (bias corrected)	0.027	MLE Sd (bias corrected)	0.0126
95% Percentile of Chisquare (2k)	17.15	90% Percentile	0.0439
95% Percentile	0.0505	99% Percentile	0.0646

The following statistics are computed using Gamma ROS Statistics on Imputed Data
Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0658	0.0669	95% Approx. Gamma UPL	0.0517	0.0519
95% Gamma USL	0.0641	0.0651			

The following statistics are computed using gamma distribution and KM estimates
Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	10.8		nu hat (KM)	345.4
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0648	0.0646	95% Approx. Gamma UPL	0.0557	0.0554
95% Gamma USL	0.0637	0.0635			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.856	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.336	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.512	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0303	Mean in Log Scale	-3.547
SD in Original Scale	0.0122	SD in Log Scale	0.3
95% UTL95% Coverage	0.0614	95% BCA UTL95% Coverage	0.073
95% Bootstrap (%) UTL95% Coverage	0.073	95% UPL (t)	0.0495
90% Percentile (z)	0.0423	95% Percentile (z)	0.0472
99% Percentile (z)	0.0579	95% USL	0.06

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-3.318	95% KM UTL (Lognormal)95% Coverage	0.0641
KM SD of Logged Data	0.226	95% KM UPL (Lognormal)	0.0545
95% KM Percentile Lognormal (z)	0.0525	95% KM USL (Lognormal)	0.0629

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0362	Mean in Log Scale	-3.453
SD in Original Scale	0.0197	SD in Log Scale	0.528
95% UTL95% Coverage	0.12	95% UPL (t)	0.0822
90% Percentile (z)	0.0623	95% Percentile (z)	0.0754
99% Percentile (z)	0.108	95% USL	0.115

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.14
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.14	95% USL	0.14
95% KM Chebyshev UPL	0.0885		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,7,8,9-HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	14
Minimum Detect	0.054	Minimum Non-Detect	0.034
Maximum Detect	0.054	Maximum Non-Detect	0.19
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	0.054	SD Detected	N/A
Mean of Detected Logged Data	-2.919	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,7,8,9-HxCDF was not processed!

Draft

Total HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	4	Number of Non-Detects	12
Number of Distinct Detects	4	Number of Distinct Non-Detects	12
Minimum Detect	0.033	Minimum Non-Detect	0.036
Maximum Detect	0.11	Maximum Non-Detect	0.16
Variance Detected	0.0013	Percent Non-Detects	75%
Mean Detected	0.0635	SD Detected	0.0361
Mean of Detected Logged Data	-2.88	SD of Detected Logged Data	0.573

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.895	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.269	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.443	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0435	SD	0.0224
95% UTL95% Coverage	0.1	95% KM UPL (t)	0.0841
90% KM Percentile (z)	0.0723	95% KM Percentile (z)	0.0804
99% KM Percentile (z)	0.0957	95% KM USL	0.0984

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0454	SD	0.0282
95% UTL95% Coverage	0.117	95% UPL (t)	0.0963
90% Percentile (z)	0.0815	95% Percentile (z)	0.0918
99% Percentile (z)	0.111	95% USL	0.114

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.364	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.659	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.302	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.396	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	4.223	k star (bias corrected MLE)	1.222
Theta hat (MLE)	0.015	Theta star (bias corrected MLE)	0.0519
nu hat (MLE)	33.78	nu star (bias corrected)	9.779
MLE Mean (bias corrected)	0.0635		
MLE Sd (bias corrected)	0.0574	95% Percentile of Chisquare (2k)	6.827

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0222	Mean	0.0384
Maximum	0.11	Median	0.0324
SD	0.0223	CV	0.581
k hat (MLE)	5.307	k star (bias corrected MLE)	4.354
Theta hat (MLE)	0.00724	Theta star (bias corrected MLE)	0.00883
nu hat (MLE)	169.8	nu star (bias corrected)	139.3
MLE Mean (bias corrected)	0.0384	MLE Sd (bias corrected)	0.0184
95% Percentile of Chisquare (2k)	16.51	90% Percentile	0.0631
95% Percentile	0.0729	99% Percentile	0.0936

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0952	0.0955	95% Approx. Gamma UPL	0.0744	0.0739
95% Gamma USL	0.0927	0.0928			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

k hat (KM)	3.765		nu hat (KM)	120.5	
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.101	0.101	95% Approx. Gamma UPL	0.0802	0.0797
95% Gamma USL	0.0985	0.0985			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.904	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.267	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.443	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.041	Mean in Log Scale	-3.27
SD in Original Scale	0.0211	SD in Log Scale	0.355
95% UTL95% Coverage	0.0931	95% BCA UTL95% Coverage	0.11
95% Bootstrap (%) UTL95% Coverage	0.11	95% UPL (t)	0.0722
90% Percentile (z)	0.0599	95% Percentile (z)	0.0682
99% Percentile (z)	0.0868	95% USL	0.0905

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-3.22	95% KM UTL (Lognormal)95% Coverage	0.102
KM SD of Logged Data	0.371	95% KM UPL (Lognormal)	0.0781
95% KM Percentile Lognormal (z)	0.0736	95% KM USL (Lognormal)	0.099

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0454	Mean in Log Scale	-3.269
SD in Original Scale	0.0282	SD in Log Scale	0.616
95% UTL95% Coverage	0.18	95% UPL (t)	0.116
90% Percentile (z)	0.0837	95% Percentile (z)	0.105
99% Percentile (z)	0.159	95% USL	0.171

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.16
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.16	95% USL	0.16
95% KM Chebyshev UPL	0.144		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,4,7,8-HxCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	12		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	11
Minimum Detect	0.036	Minimum Non-Detect	0.04
Maximum Detect	0.036	Maximum Non-Detect	0.24
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	0.036	SD Detected	N/A
Mean of Detected Logged Data	-3.324	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,4,7,8-HxCDD was not processed!

1,2,3,6,7,8-HxCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	14
Minimum Detect	0.087	Minimum Non-Detect	0.041
Maximum Detect	0.087	Maximum Non-Detect	0.25
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	0.087	SD Detected	N/A
Mean of Detected Logged Data	-2.442	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,6,7,8-HxCDD was not processed!

Draft

1,2,3,7,8,9-HxCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	2	Number of Non-Detects	14
Number of Distinct Detects	2	Number of Distinct Non-Detects	12
Minimum Detect	0.066	Minimum Non-Detect	0.043
Maximum Detect	0.096	Maximum Non-Detect	0.26
Variance Detected	4.5000E-4	Percent Non-Detects	87.5%
Mean Detected	0.081	SD Detected	0.0212
Mean of Detected Logged Data	-2.531	SD of Detected Logged Data	0.265

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0509	SD	0.0167
95% UTL95% Coverage	0.093	95% KM UPL (t)	0.081
90% KM Percentile (z)	0.0723	95% KM Percentile (z)	0.0783
99% KM Percentile (z)	0.0897	95% KM USL	0.0916

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0575	SD	0.0378
95% UTL95% Coverage	0.153	95% UPL (t)	0.126
90% Percentile (z)	0.106	95% Percentile (z)	0.12
99% Percentile (z)	0.145	95% USL	0.15

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	28.82	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00281	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	115.3	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A		
MLE Sd (bias corrected)	N/A	95% Percentile of Chisquare (2k)	N/A

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

k hat (KM)	9.308		nu hat (KM)	297.9	
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0939	0.0941	95% Approx. Gamma UPL	0.0794	0.0791
95% Gamma USL	0.0922	0.0923			

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0396	Mean in Log Scale	-3.292
SD in Original Scale	0.0177	SD in Log Scale	0.336
95% UTL95% Coverage	0.0868	95% BCA UTL95% Coverage	0.096
95% Bootstrap (%) UTL95% Coverage	0.096	95% UPL (t)	0.0682
90% Percentile (z)	0.0572	95% Percentile (z)	0.0646
99% Percentile (z)	0.0813	95% USL	0.0845

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0575	Mean in Log Scale	-3.069
SD in Original Scale	0.0378	SD in Log Scale	0.682
95% UTL95% Coverage	0.26	95% UPL (t)	0.159
90% Percentile (z)	0.111	95% Percentile (z)	0.143
99% Percentile (z)	0.227	95% USL	0.246

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.26
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.26	95% USL	0.26
95% KM Chebyshev UPL	0.126		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Total HxCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	5	Number of Non-Detects	11
Number of Distinct Detects	5	Number of Distinct Non-Detects	11
Minimum Detect	0.087	Minimum Non-Detect	0.042
Maximum Detect	0.55	Maximum Non-Detect	0.25
Variance Detected	0.0357	Percent Non-Detects	68.75%
Mean Detected	0.217	SD Detected	0.189
Mean of Detected Logged Data	-1.752	SD of Detected Logged Data	0.696

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.717	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.378	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.396	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.107	SD	0.124
95% UTL95% Coverage	0.418	95% KM UPL (t)	0.33
90% KM Percentile (z)	0.265	95% KM Percentile (z)	0.31
99% KM Percentile (z)	0.394	95% KM USL	0.408

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.111	SD	0.126
95% UTL95% Coverage	0.43	95% UPL (t)	0.339
90% Percentile (z)	0.273	95% Percentile (z)	0.319
99% Percentile (z)	0.405	95% USL	0.42

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.578	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.684	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.324	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.36	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	2.364	k star (bias corrected MLE)	1.079
Theta hat (MLE)	0.092	Theta star (bias corrected MLE)	0.201
nu hat (MLE)	23.64	nu star (bias corrected)	10.79
MLE Mean (bias corrected)	0.217		
MLE Sd (bias corrected)	0.209	95% Percentile of Chisquare (2k)	6.294

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.0748
Maximum	0.55	Median	0.01
SD	0.139	CV	1.86
k hat (MLE)	0.557	k star (bias corrected MLE)	0.495
Theta hat (MLE)	0.134	Theta star (bias corrected MLE)	0.151
nu hat (MLE)	17.84	nu star (bias corrected)	15.82
MLE Mean (bias corrected)	0.0748	MLE Sd (bias corrected)	0.106
95% Percentile of Chisquare (2k)	3.814	90% Percentile	0.203
95% Percentile	0.289	99% Percentile	0.499

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.504	0.545	95% Approx. Gamma UPL	0.291	0.292
95% Gamma USL	0.476	0.511			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	0.744		nu hat (KM)	23.81
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.428	0.438	95% Approx. Gamma UPL	0.292	0.289
95% Gamma USL	0.411	0.419			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.877	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.279	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.396	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0956	Mean in Log Scale	-2.777
SD in Original Scale	0.13	SD in Log Scale	0.825
95% UTL95% Coverage	0.499	95% BCA UTL95% Coverage	0.55
95% Bootstrap (%) UTL95% Coverage	0.55	95% UPL (t)	0.276
90% Percentile (z)	0.179	95% Percentile (z)	0.242
99% Percentile (z)	0.424	95% USL	0.467

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.601	95% KM UTL (Lognormal)95% Coverage	0.493
KM SD of Logged Data	0.75	95% KM UPL (Lognormal)	0.288
95% KM Percentile Lognormal (z)	0.255	95% KM USL (Lognormal)	0.464

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.111	Mean in Log Scale	-2.577
SD in Original Scale	0.126	SD in Log Scale	0.87
95% UTL95% Coverage	0.683	95% UPL (t)	0.366
90% Percentile (z)	0.232	95% Percentile (z)	0.318
99% Percentile (z)	0.575	95% USL	0.637

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.55
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.55	95% USL	0.55
95% KM Chebyshev UPL	0.661		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,4,6,7,8-HpCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	6	Number of Non-Detects	10
Number of Distinct Detects	6	Number of Distinct Non-Detects	10
Minimum Detect	0.029	Minimum Non-Detect	0.035
Maximum Detect	0.068	Maximum Non-Detect	0.18
Variance Detected	2.4227E-4	Percent Non-Detects	62.5%
Mean Detected	0.0477	SD Detected	0.0156
Mean of Detected Logged Data	-3.089	SD of Detected Logged Data	0.333

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.93	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.186	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0402	SD	0.0136
95% UTL95% Coverage	0.0745	95% KM UPL (t)	0.0647
90% KM Percentile (z)	0.0576	95% KM Percentile (z)	0.0625
99% KM Percentile (z)	0.0718	95% KM USL	0.0734

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0455	SD	0.0242
95% UTL95% Coverage	0.107	95% UPL (t)	0.0892
90% Percentile (z)	0.0765	95% Percentile (z)	0.0853
99% Percentile (z)	0.102	95% USL	0.105

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.259	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.698	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.205	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.332	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	11.15	k star (bias corrected MLE)	5.687
Theta hat (MLE)	0.00427	Theta star (bias corrected MLE)	0.00838
nu hat (MLE)	133.8	nu star (bias corrected)	68.25
MLE Mean (bias corrected)	0.0477		
MLE Sd (bias corrected)	0.02	95% Percentile of Chisquare (2k)	20.18

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0251	Mean	0.0389
Maximum	0.068	Median	0.0377
SD	0.012	CV	0.308
k hat (MLE)	13.46	k star (bias corrected MLE)	10.98
Theta hat (MLE)	0.00289	Theta star (bias corrected MLE)	0.00354
nu hat (MLE)	430.9	nu star (bias corrected)	351.4
MLE Mean (bias corrected)	0.0389	MLE Sd (bias corrected)	0.0117
95% Percentile of Chisquare (2k)	33.88	90% Percentile	0.0545
95% Percentile	0.06	99% Percentile	0.0713

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0721	0.0726	95% Approx. Gamma UPL	0.0609	0.061
95% Gamma USL	0.0708	0.0712			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	8.789		nu hat (KM)	281.2
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.079	0.0797	95% Approx. Gamma UPL	0.0656	0.0658
95% Gamma USL	0.0774	0.0781			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.95	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.18	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0391	Mean in Log Scale	-3.275
SD in Original Scale	0.0117	SD in Log Scale	0.26
95% UTL95% Coverage	0.0728	95% BCA UTL95% Coverage	0.068
95% Bootstrap (%) UTL95% Coverage	0.068	95% UPL (t)	0.0605
90% Percentile (z)	0.0527	95% Percentile (z)	0.058
99% Percentile (z)	0.0692	95% USL	0.0713

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-3.263	95% KM UTL (Lognormal)95% Coverage	0.0826
KM SD of Logged Data	0.305	95% KM UPL (Lognormal)	0.0664
95% KM Percentile Lognormal (z)	0.0632	95% KM USL (Lognormal)	0.0806

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0455	Mean in Log Scale	-3.23
SD in Original Scale	0.0242	SD in Log Scale	0.558
95% UTL95% Coverage	0.162	95% UPL (t)	0.108
90% Percentile (z)	0.0808	95% Percentile (z)	0.099
99% Percentile (z)	0.145	95% USL	0.154

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.18
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.18	95% USL	0.18
95% KM Chebyshev UPL	0.101		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,4,7,8,9-HpCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	14
Minimum Detect	0.057	Minimum Non-Detect	0.034
Maximum Detect	0.057	Maximum Non-Detect	0.24
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	0.057	SD Detected	N/A
Mean of Detected Logged Data	-2.865	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,4,7,8,9-HpCDF was not processed!

Draft

Total HpCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	16		
Number of Detects	5	Number of Non-Detects	11
Number of Distinct Detects	5	Number of Distinct Non-Detects	11
Minimum Detect	0.035	Minimum Non-Detect	0.038
Maximum Detect	0.22	Maximum Non-Detect	0.21
Variance Detected	0.00575	Percent Non-Detects	68.75%
Mean Detected	0.0862	SD Detected	0.0758
Mean of Detected Logged Data	-2.681	SD of Detected Logged Data	0.7

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.704	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.41	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.396	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0545	SD	0.0443
95% UTL95% Coverage	0.166	95% KM UPL (t)	0.135
90% KM Percentile (z)	0.111	95% KM Percentile (z)	0.127
99% KM Percentile (z)	0.158	95% KM USL	0.163

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0609	SD	0.0505
95% UTL95% Coverage	0.188	95% UPL (t)	0.152
90% Percentile (z)	0.126	95% Percentile (z)	0.144
99% Percentile (z)	0.178	95% USL	0.184

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.615	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.684	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.374	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.36	Data Not Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	2.325	k star (bias corrected MLE)	1.063
Theta hat (MLE)	0.0371	Theta star (bias corrected MLE)	0.0811
nu hat (MLE)	23.25	nu star (bias corrected)	10.63
MLE Mean (bias corrected)	0.0862		
MLE Sd (bias corrected)	0.0836	95% Percentile of Chisquare (2k)	6.235

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.0392
Maximum	0.22	Median	0.0241
SD	0.0514	CV	1.313
k hat (MLE)	1.31	k star (bias corrected MLE)	1.106
Theta hat (MLE)	0.0299	Theta star (bias corrected MLE)	0.0354
nu hat (MLE)	41.92	nu star (bias corrected)	35.39
MLE Mean (bias corrected)	0.0392	MLE Sd (bias corrected)	0.0372
95% Percentile of Chisquare (2k)	6.396	90% Percentile	0.0879
95% Percentile	0.113	99% Percentile	0.171

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.176	0.182	95% Approx. Gamma UPL	0.117	0.116
95% Gamma USL	0.169	0.174			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	1.511		nu hat (KM)	48.35
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.155	0.154	95% Approx. Gamma UPL	0.116	0.114
95% Gamma USL	0.15	0.149			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.862	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.33	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.396	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0504	Mean in Log Scale	-3.167
SD in Original Scale	0.0466	SD in Log Scale	0.511
95% UTL95% Coverage	0.153	95% BCA UTL95% Coverage	0.22
95% Bootstrap (%) UTL95% Coverage	0.22	95% UPL (t)	0.106
90% Percentile (z)	0.0811	95% Percentile (z)	0.0976
99% Percentile (z)	0.138	95% USL	0.147

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-3.067	95% KM UTL (Lognormal)95% Coverage	0.152
KM SD of Logged Data	0.469	95% KM UPL (Lognormal)	0.109
95% KM Percentile Lognormal (z)	0.101	95% KM USL (Lognormal)	0.147

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0609	Mean in Log Scale	-3.04
SD in Original Scale	0.0505	SD in Log Scale	0.692
95% UTL95% Coverage	0.274	95% UPL (t)	0.167
90% Percentile (z)	0.116	95% Percentile (z)	0.149
99% Percentile (z)	0.239	95% USL	0.26

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.22
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.22	95% USL	0.22
95% KM Chebyshev UPL	0.254		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,4,6,7,8-HpCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	11	Number of Non-Detects	5
Number of Distinct Detects	9	Number of Distinct Non-Detects	5
Minimum Detect	0.1	Minimum Non-Detect	0.089
Maximum Detect	0.89	Maximum Non-Detect	0.28
Variance Detected	0.077	Percent Non-Detects	31.25%
Mean Detected	0.285	SD Detected	0.278
Mean of Detected Logged Data	-1.572	SD of Detected Logged Data	0.764

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.676	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.85	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.339	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.267	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.233	SD	0.233
95% UTL95% Coverage	0.822	95% KM UPL (t)	0.655
90% KM Percentile (z)	0.532	95% KM Percentile (z)	0.617
99% KM Percentile (z)	0.776	95% KM USL	0.803

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.227	SD	0.244
95% UTL95% Coverage	0.843	95% UPL (t)	0.668
90% Percentile (z)	0.54	95% Percentile (z)	0.628
99% Percentile (z)	0.795	95% USL	0.823

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.103	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.741	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.244	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.259	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.734	k star (bias corrected MLE)	1.322
Theta hat (MLE)	0.164	Theta star (bias corrected MLE)	0.215
nu hat (MLE)	38.14	nu star (bias corrected)	29.07
MLE Mean (bias corrected)	0.285		
MLE Sd (bias corrected)	0.248	95% Percentile of Chisquare (2k)	7.186

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.217
Maximum	0.89	Median	0.121
SD	0.25	CV	1.15
k hat (MLE)	1.19	k star (bias corrected MLE)	1.008
Theta hat (MLE)	0.183	Theta star (bias corrected MLE)	0.216
nu hat (MLE)	38.06	nu star (bias corrected)	32.26
MLE Mean (bias corrected)	0.217	MLE Sd (bias corrected)	0.216
95% Percentile of Chisquare (2k)	6.023	90% Percentile	0.499
95% Percentile	0.649	99% Percentile	0.997

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	1.037	1.124	95% Approx. Gamma UPL	0.678	0.7
95% Gamma USL	0.992	1.069			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	0.998		nu hat (KM)	31.93
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.87	0.885	95% Approx. Gamma UPL	0.606	0.601
95% Gamma USL	0.837	0.849			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.828	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.85	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.21	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.267	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Approximate Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.228	Mean in Log Scale	-1.816
SD in Original Scale	0.243	SD in Log Scale	0.774
95% UTL95% Coverage	1.147	95% BCA UTL95% Coverage	0.89
95% Bootstrap (%) UTL95% Coverage	0.89	95% UPL (t)	0.659
90% Percentile (z)	0.439	95% Percentile (z)	0.581
99% Percentile (z)	0.984	95% USL	1.078

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-1.756	95% KM UTL (Lognormal)95% Coverage	0.959
KM SD of Logged Data	0.679	95% KM UPL (Lognormal)	0.589
95% KM Percentile Lognormal (z)	0.528	95% KM USL (Lognormal)	0.908

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.227	Mean in Log Scale	-1.825
SD in Original Scale	0.244	SD in Log Scale	0.774
95% UTL95% Coverage	1.137	95% UPL (t)	0.653
90% Percentile (z)	0.435	95% Percentile (z)	0.576
99% Percentile (z)	0.975	95% USL	1.068

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.89
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.89	95% USL	0.89
95% KM Chebyshev UPL	1.282		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Total HpCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	11	Number of Non-Detects	5
Number of Distinct Detects	9	Number of Distinct Non-Detects	5
Minimum Detect	0.1	Minimum Non-Detect	0.04
Maximum Detect	1.7	Maximum Non-Detect	0.25
Variance Detected	0.304	Percent Non-Detects	31.25%
Mean Detected	0.466	SD Detected	0.552
Mean of Detected Logged Data	-1.242	SD of Detected Logged Data	0.953

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.669	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.366	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.267	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.345	SD	0.473
95% UTL95% Coverage	1.538	95% KM UPL (t)	1.199
90% KM Percentile (z)	0.951	95% KM Percentile (z)	1.122
99% KM Percentile (z)	1.445	95% KM USL	1.5

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.344	SD	0.488
95% UTL95% Coverage	1.576	95% UPL (t)	1.226
90% Percentile (z)	0.97	95% Percentile (z)	1.147
99% Percentile (z)	1.48	95% USL	1.537

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.973	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.748	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.316	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.261	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.183	k star (bias corrected MLE)	0.921
Theta hat (MLE)	0.394	Theta star (bias corrected MLE)	0.507
nu hat (MLE)	26.02	nu star (bias corrected)	20.25
MLE Mean (bias corrected)	0.466		
MLE Sd (bias corrected)	0.486	95% Percentile of Chisquare (2k)	5.68

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.324
Maximum	1.7	Median	0.16
SD	0.501	CV	1.546
k hat (MLE)	0.539	k star (bias corrected MLE)	0.48
Theta hat (MLE)	0.601	Theta star (bias corrected MLE)	0.675
nu hat (MLE)	17.25	nu star (bias corrected)	15.35
MLE Mean (bias corrected)	0.324	MLE Sd (bias corrected)	0.468
95% Percentile of Chisquare (2k)	3.739	90% Percentile	0.883
95% Percentile	1.262	99% Percentile	2.198

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	2.281	2.701	95% Approx. Gamma UPL	1.321	1.427
95% Gamma USL	2.155	2.527			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	0.531		nu hat (KM)	17.01
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	1.79	1.905	95% Approx. Gamma UPL	1.128	1.14
95% Gamma USL	1.705	1.804			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.876	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.255	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.267	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.34	Mean in Log Scale	-1.748
SD in Original Scale	0.49	SD in Log Scale	1.132
95% UTL95% Coverage	3.033	95% BCA UTL95% Coverage	1.7
95% Bootstrap (%) UTL95% Coverage	1.7	95% UPL (t)	1.347
90% Percentile (z)	0.743	95% Percentile (z)	1.121
99% Percentile (z)	2.425	95% USL	2.769

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-1.715	95% KM UTL (Lognormal)95% Coverage	2.759
KM SD of Logged Data	1.081	95% KM UPL (Lognormal)	1.271
95% KM Percentile Lognormal (z)	1.066	95% KM USL (Lognormal)	2.528

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.344	Mean in Log Scale	-1.72
SD in Original Scale	0.488	SD in Log Scale	1.138
95% UTL95% Coverage	3.166	95% UPL (t)	1.4
90% Percentile (z)	0.77	95% Percentile (z)	1.164
99% Percentile (z)	2.528	95% USL	2.888

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	1.7
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	1.7	95% USL	1.7
95% KM Chebyshev UPL	2.469		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

OCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	6	Number of Non-Detects	10
Number of Distinct Detects	6	Number of Distinct Non-Detects	10
Minimum Detect	0.084	Minimum Non-Detect	0.088
Maximum Detect	0.36	Maximum Non-Detect	0.53
Variance Detected	0.0117	Percent Non-Detects	62.5%
Mean Detected	0.167	SD Detected	0.108
Mean of Detected Logged Data	-1.937	SD of Detected Logged Data	0.575

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.814	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.302	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.127	SD	0.079
95% UTL95% Coverage	0.327	95% KM UPL (t)	0.27
90% KM Percentile (z)	0.229	95% KM Percentile (z)	0.257
99% KM Percentile (z)	0.311	95% KM USL	0.32

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.144	SD	0.0944
95% UTL95% Coverage	0.382	95% UPL (t)	0.314
90% Percentile (z)	0.265	95% Percentile (z)	0.299
99% Percentile (z)	0.363	95% USL	0.374

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.468	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.701	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.273	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.334	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	3.502	k star (bias corrected MLE)	1.862
Theta hat (MLE)	0.0478	Theta star (bias corrected MLE)	0.0899
nu hat (MLE)	42.02	nu star (bias corrected)	22.35
MLE Mean (bias corrected)	0.167		
MLE Sd (bias corrected)	0.123	95% Percentile of Chisquare (2k)	9.037

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0312	Mean	0.109
Maximum	0.36	Median	0.0888
SD	0.0802	CV	0.737
k hat (MLE)	3.039	k star (bias corrected MLE)	2.511
Theta hat (MLE)	0.0358	Theta star (bias corrected MLE)	0.0433
nu hat (MLE)	97.26	nu star (bias corrected)	80.35
MLE Mean (bias corrected)	0.109	MLE Sd (bias corrected)	0.0686
95% Percentile of Chisquare (2k)	11.1	90% Percentile	0.201
95% Percentile	0.24	99% Percentile	0.328

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.336	0.345	95% Approx. Gamma UPL	0.248	0.249
95% Gamma USL	0.325	0.333			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	2.603		nu hat (KM)	83.29
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.336	0.338	95% Approx. Gamma UPL	0.258	0.256
95% Gamma USL	0.326	0.328			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.891	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.238	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.118	Mean in Log Scale	-2.246
SD in Original Scale	0.0746	SD in Log Scale	0.434
95% UTL95% Coverage	0.316	95% BCA UTL95% Coverage	0.36
95% Bootstrap (%) UTL95% Coverage	0.36	95% UPL (t)	0.232
90% Percentile (z)	0.185	95% Percentile (z)	0.216
99% Percentile (z)	0.29	95% USL	0.305

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.184	95% KM UTL (Lognormal)95% Coverage	0.347
KM SD of Logged Data	0.446	95% KM UPL (Lognormal)	0.252
95% KM Percentile Lognormal (z)	0.235	95% KM USL (Lognormal)	0.335

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.144	Mean in Log Scale	-2.153
SD in Original Scale	0.0944	SD in Log Scale	0.687
95% UTL95% Coverage	0.657	95% UPL (t)	0.402
90% Percentile (z)	0.28	95% Percentile (z)	0.359
99% Percentile (z)	0.574	95% USL	0.622

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.53
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.53	95% USL	0.53
95% KM Chebyshev UPL	0.482		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

OCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	12	Number of Non-Detects	4
Number of Distinct Detects	10	Number of Distinct Non-Detects	4
Minimum Detect	0.44	Minimum Non-Detect	0.31
Maximum Detect	3.5	Maximum Non-Detect	0.76
Variance Detected	1.277	Percent Non-Detects	25%
Mean Detected	1.236	SD Detected	1.13
Mean of Detected Logged Data	-0.0835	SD of Detected Logged Data	0.748

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.695	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.333	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.256	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	1.039	SD	0.999
95% UTL95% Coverage	3.56	95% KM UPL (t)	2.844
90% KM Percentile (z)	2.319	95% KM Percentile (z)	2.682
99% KM Percentile (z)	3.363	95% KM USL	3.479

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	1.003	SD	1.055
95% UTL95% Coverage	3.665	95% UPL (t)	2.909
90% Percentile (z)	2.354	95% Percentile (z)	2.738
99% Percentile (z)	3.457	95% USL	3.58

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.078	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.743	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.26	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.249	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.843	k star (bias corrected MLE)	1.438
Theta hat (MLE)	0.671	Theta star (bias corrected MLE)	0.86
nu hat (MLE)	44.23	nu star (bias corrected)	34.51
MLE Mean (bias corrected)	1.236		
MLE Sd (bias corrected)	1.031	95% Percentile of Chisquare (2k)	7.598

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.982
Maximum	3.5	Median	0.575
SD	1.071	CV	1.09
k hat (MLE)	1.022	k star (bias corrected MLE)	0.872
Theta hat (MLE)	0.961	Theta star (bias corrected MLE)	1.126
nu hat (MLE)	32.71	nu star (bias corrected)	27.91
MLE Mean (bias corrected)	0.982	MLE Sd (bias corrected)	1.052
95% Percentile of Chisquare (2k)	5.487	90% Percentile	2.339
95% Percentile	3.089	99% Percentile	4.849

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	5.019	5.74	95% Approx. Gamma UPL	3.232	3.473
95% Gamma USL	4.792	5.441			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	1.082		nu hat (KM)	34.62
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	3.954	4.066	95% Approx. Gamma UPL	2.742	2.74
95% Gamma USL	3.803	3.896			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.84	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.209	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.256	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Approximate Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	1.026	Mean in Log Scale	-0.315
SD in Original Scale	1.04	SD in Log Scale	0.798
95% UTL95% Coverage	5.466	95% BCA UTL95% Coverage	3.5
95% Bootstrap (%) UTL95% Coverage	3.5	95% UPL (t)	3.085
90% Percentile (z)	2.029	95% Percentile (z)	2.711
99% Percentile (z)	4.669	95% USL	5.125

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-0.272	95% KM UTL (Lognormal)95% Coverage	4.613
KM SD of Logged Data	0.714	95% KM UPL (Lognormal)	2.766
95% KM Percentile Lognormal (z)	2.463	95% KM USL (Lognormal)	4.355

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	1.003	Mean in Log Scale	-0.376
SD in Original Scale	1.055	SD in Log Scale	0.847
95% UTL95% Coverage	5.827	95% UPL (t)	3.175
90% Percentile (z)	2.034	95% Percentile (z)	2.767
99% Percentile (z)	4.929	95% USL	5.442

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	3.5
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	3.5	95% USL	3.5
95% KM Chebyshev UPL	5.527		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Perchlorate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	3		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	2
Minimum Detect	0.58	Minimum Non-Detect	0.29
Maximum Detect	0.58	Maximum Non-Detect	0.3
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	0.58	SD Detected	N/A
Mean of Detected Logged Data	-0.545	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Perchlorate was not processed!

2,4-Dinitrotoluene2

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	500
Maximum Detect	N/A	Maximum Non-Detect	500
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,4-Dinitrotoluene2 was not processed!

Draft

Hexahydro-trinitro-triazine (RDX)

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	500
Maximum Detect	N/A	Maximum Non-Detect	500
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Hexahydro-trinitro-triazine (RDX) was not processed!

Nitroglycerine

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	500
Maximum Detect	N/A	Maximum Non-Detect	500
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Nitroglycerine was not processed!

Draft

Inorganic Arsenic

General Statistics

Total Number of Observations	16	Number of Distinct Observations	12
		Number of Missing Observations	4
Minimum	0.008	First Quartile	0.00975
Second Largest	0.023	Median	0.0145
Maximum	0.024	Third Quartile	0.0175
Mean	0.0145	SD	0.00543
Coefficient of Variation	0.374	Skewness	0.442
Mean of logged Data	-4.3	SD of logged Data	0.38

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.915	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.171	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	0.0282	90% Percentile (z)	0.0215
95% UPL (t)	0.0243	95% Percentile (z)	0.0234
95% USL	0.0278	99% Percentile (z)	0.0271

Gamma GOF Test

A-D Test Statistic	0.431	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.74	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.176	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	7.65	k star (bias corrected MLE)	6.258
Theta hat (MLE)	0.0019	Theta star (bias corrected MLE)	0.00232
nu hat (MLE)	244.8	nu star (bias corrected)	200.2
MLE Mean (bias corrected)	0.0145	MLE Sd (bias corrected)	0.0058

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.0257	90% Percentile	0.0222
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.026	95% Percentile	0.0252
95% WH Approx. Gamma UTL with 95% Coverage	0.0319	99% Percentile	0.0313
95% HW Approx. Gamma UTL with 95% Coverage	0.0326		
95% WH USL	0.0311	95% HW USL	0.0318

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.926	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.164	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	0.0354	90% Percentile (z)	0.0221
95% UPL (t)	0.0269	95% Percentile (z)	0.0253
95% USL	0.0343	99% Percentile (z)	0.0328

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	0.024
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	0.024	95% BCA Bootstrap UTL with 95% Coverage	0.024
95% UPL	0.024	90% Percentile	0.0225
90% Chebyshev UPL	0.0313	95% Percentile	0.0238
95% Chebyshev UPL	0.0389	99% Percentile	0.0239
95% USL	0.024		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Arsenic(III)

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	7		
Number of Detects	8	Number of Non-Detects	8
Number of Distinct Detects	7	Number of Distinct Non-Detects	1
Minimum Detect	0.004	Minimum Non-Detect	0.004
Maximum Detect	0.019	Maximum Non-Detect	0.004
Variance Detected	2.3268E-5	Percent Non-Detects	50%
Mean Detected	0.0121	SD Detected	0.00482
Mean of Detected Logged Data	-4.506	SD of Detected Logged Data	0.506

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.969	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.158	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.00806	SD	0.00517
95% UTL95% Coverage	0.0211	95% KM UPL (t)	0.0174
90% KM Percentile (z)	0.0147	95% KM Percentile (z)	0.0166
99% KM Percentile (z)	0.0201	95% KM USL	0.0207

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.00706	SD	0.00618
95% UTL95% Coverage	0.0227	95% UPL (t)	0.0182
90% Percentile (z)	0.015	95% Percentile (z)	0.0172
99% Percentile (z)	0.0214	95% USL	0.0222

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.394	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.719	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.218	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.295	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	5.48	k star (bias corrected MLE)	3.509
Theta hat (MLE)	0.00221	Theta star (bias corrected MLE)	0.00346
nu hat (MLE)	87.69	nu star (bias corrected)	56.14
MLE Mean (bias corrected)	0.0121		
MLE Sd (bias corrected)	0.00647	95% Percentile of Chisquare (2k)	14.09

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.004	Mean	0.0111
Maximum	0.019	Median	0.01
SD	0.00347	CV	0.314
k hat (MLE)	9.847	k star (bias corrected MLE)	8.043
Theta hat (MLE)	0.00112	Theta star (bias corrected MLE)	0.00138
nu hat (MLE)	315.1	nu star (bias corrected)	257.4
MLE Mean (bias corrected)	0.0111	MLE Sd (bias corrected)	0.0039
95% Percentile of Chisquare (2k)	26.41	90% Percentile	0.0163
95% Percentile	0.0182	99% Percentile	0.0221

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0224	0.023	95% Approx. Gamma UPL	0.0185	0.0187
95% Gamma USL	0.0219	0.0225			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	2.436		nu hat (KM)	77.96
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0255	0.0265	95% Approx. Gamma UPL	0.0187	0.0189
95% Gamma USL	0.0246	0.0255			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.88	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.247	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.00764	Mean in Log Scale	-5.171
SD in Original Scale	0.00575	SD in Log Scale	0.824
95% UTL95% Coverage	0.0455	95% BCA UTL95% Coverage	0.019
95% Bootstrap (%) UTL95% Coverage	0.019	95% UPL (t)	0.0252
90% Percentile (z)	0.0163	95% Percentile (z)	0.022
99% Percentile (z)	0.0386	95% USL	0.0426

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-5.014	95% KM UTL (Lognormal)95% Coverage	0.0308
KM SD of Logged Data	0.608	95% KM UPL (Lognormal)	0.0199
95% KM Percentile Lognormal (z)	0.0181	95% KM USL (Lognormal)	0.0293

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.00706	Mean in Log Scale	-5.361
SD in Original Scale	0.00618	SD in Log Scale	0.947
95% UTL95% Coverage	0.0513	95% UPL (t)	0.026
90% Percentile (z)	0.0158	95% Percentile (z)	0.0223
99% Percentile (z)	0.0426	95% USL	0.0475

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.019
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.019	95% USL	0.019
95% KM Chebyshev UPL	0.0313		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Arsenic(V)

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	9		
Number of Detects	12	Number of Non-Detects	4
Number of Distinct Detects	8	Number of Distinct Non-Detects	1
Minimum Detect	0.005	Minimum Non-Detect	0.004
Maximum Detect	0.013	Maximum Non-Detect	0.004
Variance Detected	5.8788E-6	Percent Non-Detects	25%
Mean Detected	0.00933	SD Detected	0.00242
Mean of Detected Logged Data	-4.709	SD of Detected Logged Data	0.284

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.961	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.859	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.138	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.256	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.008	SD	0.00306
95% UTL95% Coverage	0.0157	95% KM UPL (t)	0.0135
90% KM Percentile (z)	0.0119	95% KM Percentile (z)	0.013
99% KM Percentile (z)	0.0151	95% KM USL	0.0155

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0075	SD	0.00388
95% UTL95% Coverage	0.0173	95% UPL (t)	0.0145
90% Percentile (z)	0.0125	95% Percentile (z)	0.0139
99% Percentile (z)	0.0165	95% USL	0.017

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.324	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.731	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.147	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.245	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	14.58	k star (bias corrected MLE)	10.99
Theta hat (MLE)	6.3997E-4	Theta star (bias corrected MLE)	8.4898E-4
nu hat (MLE)	350	nu star (bias corrected)	263.8
MLE Mean (bias corrected)	0.00933		
MLE Sd (bias corrected)	0.00281	95% Percentile of Chisquare (2k)	33.91

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.005	Mean	0.0095
Maximum	0.013	Median	0.01
SD	0.0021	CV	0.221
k hat (MLE)	19.06	k star (bias corrected MLE)	15.53
Theta hat (MLE)	4.9835E-4	Theta star (bias corrected MLE)	6.1171E-4
nu hat (MLE)	610	nu star (bias corrected)	497
MLE Mean (bias corrected)	0.0095	MLE Sd (bias corrected)	0.00241
95% Percentile of Chisquare (2k)	45.06	90% Percentile	0.0127
95% Percentile	0.0138	99% Percentile	0.016

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0161	0.0164	95% Approx. Gamma UPL	0.014	0.0141
95% Gamma USL	0.0159	0.0161			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	6.827		nu hat (KM)	218.5
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0185	0.0191	95% Approx. Gamma UPL	0.0147	0.015
95% Gamma USL	0.018	0.0186			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.929	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.171	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.256	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.00818	Mean in Log Scale	-4.873
SD in Original Scale	0.00295	SD in Log Scale	0.387
95% UTL95% Coverage	0.0203	95% BCA UTL95% Coverage	0.013
95% Bootstrap (%) UTL95% Coverage	0.013	95% UPL (t)	0.0154
90% Percentile (z)	0.0126	95% Percentile (z)	0.0145
99% Percentile (z)	0.0188	95% USL	0.0197

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-4.912	95% KM UTL (Lognormal)95% Coverage	0.0214
KM SD of Logged Data	0.424	95% KM UPL (Lognormal)	0.0158
95% KM Percentile Lognormal (z)	0.0148	95% KM USL (Lognormal)	0.0207

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0075	Mean in Log Scale	-5.085
SD in Original Scale	0.00388	SD in Log Scale	0.716
95% UTL95% Coverage	0.0377	95% UPL (t)	0.0226
90% Percentile (z)	0.0155	95% Percentile (z)	0.0201
99% Percentile (z)	0.0327	95% USL	0.0356

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.013
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.013	95% USL	0.013
95% KM Chebyshev UPL	0.0218		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Dimethyl Arsenic

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	7		
Number of Detects	9	Number of Non-Detects	7
Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	0.005	Minimum Non-Detect	0.004
Maximum Detect	0.016	Maximum Non-Detect	0.004
Variance Detected	1.0500E-5	Percent Non-Detects	43.75%
Mean Detected	0.008	SD Detected	0.00324
Mean of Detected Logged Data	-4.884	SD of Detected Logged Data	0.333

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.751	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.829	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.278	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.295	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.00625	SD	0.00303
95% UTL95% Coverage	0.0139	95% KM UPL (t)	0.0117
90% KM Percentile (z)	0.0101	95% KM Percentile (z)	0.0112
99% KM Percentile (z)	0.0133	95% KM USL	0.0137

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.00538	SD	0.00388
95% UTL95% Coverage	0.0152	95% UPL (t)	0.0124
90% Percentile (z)	0.0103	95% Percentile (z)	0.0118
99% Percentile (z)	0.0144	95% USL	0.0149

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.624	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.722	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.234	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.279	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	9.137	k star (bias corrected MLE)	6.165
Theta hat (MLE)	8.7560E-4	Theta star (bias corrected MLE)	0.0013
nu hat (MLE)	164.5	nu star (bias corrected)	111
MLE Mean (bias corrected)	0.008		
MLE Sd (bias corrected)	0.00322	95% Percentile of Chisquare (2k)	21.47

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.005	Mean	0.00888
Maximum	0.016	Median	0.0095
SD	0.00258	CV	0.291
k hat (MLE)	13.49	k star (bias corrected MLE)	11
Theta hat (MLE)	6.5778E-4	Theta star (bias corrected MLE)	8.0650E-4
nu hat (MLE)	431.8	nu star (bias corrected)	352.1
MLE Mean (bias corrected)	0.00888	MLE Sd (bias corrected)	0.00268
95% Percentile of Chisquare (2k)	33.94	90% Percentile	0.0124
95% Percentile	0.0137	99% Percentile	0.0163

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0164	0.0166	95% Approx. Gamma UPL	0.0139	0.014
95% Gamma USL	0.0161	0.0163			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	4.252		nu hat (KM)	136.1
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0146	0.0148	95% Approx. Gamma UPL	0.0116	0.0116
95% Gamma USL	0.0142	0.0144			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.883	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.829	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.211	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.295	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.00589	Mean in Log Scale	-5.278
SD in Original Scale	0.00346	SD in Log Scale	0.549
95% UTL95% Coverage	0.0204	95% BCA UTL95% Coverage	0.016
95% Bootstrap (%) UTL95% Coverage	0.016	95% UPL (t)	0.0138
90% Percentile (z)	0.0103	95% Percentile (z)	0.0126
99% Percentile (z)	0.0183	95% USL	0.0195

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-5.163	95% KM UTL (Lognormal)95% Coverage	0.0155
KM SD of Logged Data	0.394	95% KM UPL (Lognormal)	0.0117
95% KM Percentile Lognormal (z)	0.011	95% KM USL (Lognormal)	0.015

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.00538	Mean in Log Scale	-5.466
SD in Original Scale	0.00388	SD in Log Scale	0.724
95% UTL95% Coverage	0.0263	95% UPL (t)	0.0156
90% Percentile (z)	0.0107	95% Percentile (z)	0.0139
99% Percentile (z)	0.0228	95% USL	0.0248

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.016
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.016	95% USL	0.016
95% KM Chebyshev UPL	0.0199		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Monomethyl Arsenic

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	2		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	2
Minimum Detect	N/A	Minimum Non-Detect	0.003
Maximum Detect	N/A	Maximum Non-Detect	0.004
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Monomethyl Arsenic was not processed!

Draft

Aluminum

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	0.22	First Quartile	0.395
Second Largest	2.75	Median	0.605
Maximum	2.84	Third Quartile	1.558
Mean	1.018	SD	0.842
Coefficient of Variation	0.828	Skewness	1.272
Mean of logged Data	-0.281	SD of logged Data	0.793

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.815	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.248	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	3.143	90% Percentile (z)	2.097
95% UPL (t)	2.539	95% Percentile (z)	2.403
95% USL	3.075	99% Percentile (z)	2.976

Gamma GOF Test

A-D Test Statistic	0.561	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.752	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.21	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.218	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.823	k star (bias corrected MLE)	1.523
Theta hat (MLE)	0.558	Theta star (bias corrected MLE)	0.668
nu hat (MLE)	58.34	nu star (bias corrected)	48.74
MLE Mean (bias corrected)	1.018	MLE Sd (bias corrected)	0.824

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	2.772	90% Percentile	2.112
95% Hawkins Wixley (HW) Approx. Gamma UPL	2.839	95% Percentile	2.637
95% WH Approx. Gamma UTL with 95% Coverage	4.009	99% Percentile	3.821
95% HW Approx. Gamma UTL with 95% Coverage	4.256		
95% WH USL	3.854	95% HW USL	4.075

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.947	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.168	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	5.588	90% Percentile (z)	2.086
95% UPL (t)	3.164	95% Percentile (z)	2.782
95% USL	5.241	99% Percentile (z)	4.777

Nonparametric Distribution Free Background Statistics

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	2.84
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	2.84	95% BCA Bootstrap UTL with 95% Coverage	2.84
95% UPL	2.84	90% Percentile	2.235
90% Chebyshev UPL	3.621	95% Percentile	2.773
95% Chebyshev UPL	4.801	99% Percentile	2.827
95% USL	2.84		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Antimony

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	3		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	3
Minimum Detect	N/A	Minimum Non-Detect	0.006
Maximum Detect	N/A	Maximum Non-Detect	0.008
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Antimony was not processed!

Draft

Arsenic

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	0.38	First Quartile	0.514
Second Largest	18.4	Median	0.694
Maximum	18.5	Third Quartile	9.433
Mean	5.623	SD	6.965
Coefficient of Variation	1.239	Skewness	1.038
Mean of logged Data	0.689	SD of logged Data	1.588

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.745	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.323	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	23.2	90% Percentile (z)	14.55
95% UPL (t)	18.21	95% Percentile (z)	17.08
95% USL	22.64	99% Percentile (z)	21.83

Gamma GOF Test

A-D Test Statistic	1.548	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.788	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.331	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.226	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.596	k star (bias corrected MLE)	0.526
Theta hat (MLE)	9.433	Theta star (bias corrected MLE)	10.69
nu hat (MLE)	19.07	nu star (bias corrected)	16.83
MLE Mean (bias corrected)	5.623	MLE Sd (bias corrected)	7.753

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	22.86	90% Percentile	15.05
95% Hawkins Wixley (HW) Approx. Gamma UPL	24.51	95% Percentile	21.21
95% WH Approx. Gamma UTL with 95% Coverage	39.07	99% Percentile	36.29
95% HW Approx. Gamma UTL with 95% Coverage	45.66		
95% WH USL	36.95	95% HW USL	42.77

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.785	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.307	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Lognormal at 5% Significance Level

Data Not Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	109.8	90% Percentile (z)	15.25
95% UPL (t)	35.14	95% Percentile (z)	27.16
95% USL	96.55	99% Percentile (z)	80.19

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	18.5
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	18.5	95% BCA Bootstrap UTL with 95% Coverage	18.5
95% UPL	18.5	90% Percentile	17.5
90% Chebyshev UPL	27.16	95% Percentile	18.43
95% Chebyshev UPL	36.92	99% Percentile	18.49
95% USL	18.5		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Barium

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	6		
Number of Detects	10	Number of Non-Detects	6
Number of Distinct Detects	5	Number of Distinct Non-Detects	1
Minimum Detect	0.04	Minimum Non-Detect	0.03
Maximum Detect	0.08	Maximum Non-Detect	0.03
Variance Detected	1.5556E-4	Percent Non-Detects	37.5%
Mean Detected	0.06	SD Detected	0.0125
Mean of Detected Logged Data	-2.834	SD of Detected Logged Data	0.214

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.94	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.842	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.189	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.28	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0488	SD	0.0173
95% UTL95% Coverage	0.0924	95% KM UPL (t)	0.08
90% KM Percentile (z)	0.0709	95% KM Percentile (z)	0.0772
99% KM Percentile (z)	0.0889	95% KM USL	0.091

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0431	SD	0.0245
95% UTL95% Coverage	0.105	95% UPL (t)	0.0874
90% Percentile (z)	0.0745	95% Percentile (z)	0.0834
99% Percentile (z)	0.1	95% USL	0.103

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.411	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.725	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.204	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.266	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	24.88	k star (bias corrected MLE)	17.48
Theta hat (MLE)	0.00241	Theta star (bias corrected MLE)	0.00343
nu hat (MLE)	497.6	nu star (bias corrected)	349.7
MLE Mean (bias corrected)	0.06		
MLE Sd (bias corrected)	0.0143	95% Percentile of Chisquare (2k)	49.76

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0203	Mean	0.0492
Maximum	0.08	Median	0.05
SD	0.0178	CV	0.363
k hat (MLE)	7.442	k star (bias corrected MLE)	6.088
Theta hat (MLE)	0.00661	Theta star (bias corrected MLE)	0.00808
nu hat (MLE)	238.2	nu star (bias corrected)	194.8
MLE Mean (bias corrected)	0.0492	MLE Sd (bias corrected)	0.0199
95% Percentile of Chisquare (2k)	21.26	90% Percentile	0.0758
95% Percentile	0.0859	99% Percentile	0.107

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.109	0.112	95% Approx. Gamma UPL	0.0878	0.0891
95% Gamma USL	0.106	0.109			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	7.963		nu hat (KM)	254.8
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.104	0.106	95% Approx. Gamma UPL	0.0844	0.0852
95% Gamma USL	0.101	0.103			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.934	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.842	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.192	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.28	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0504	Mean in Log Scale	-3.038
SD in Original Scale	0.0163	SD in Log Scale	0.331
95% UTL95% Coverage	0.111	95% BCA UTL95% Coverage	0.08
95% Bootstrap (%) UTL95% Coverage	0.08	95% UPL (t)	0.0872
90% Percentile (z)	0.0733	95% Percentile (z)	0.0826
99% Percentile (z)	0.104	95% USL	0.108

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-3.086	95% KM UTL (Lognormal)95% Coverage	0.114
KM SD of Logged Data	0.363	95% KM UPL (Lognormal)	0.0881
95% KM Percentile Lognormal (z)	0.083	95% KM USL (Lognormal)	0.111

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0431	Mean in Log Scale	-3.346
SD in Original Scale	0.0245	SD in Log Scale	0.703
95% UTL95% Coverage	0.208	95% UPL (t)	0.125
90% Percentile (z)	0.0867	95% Percentile (z)	0.112
99% Percentile (z)	0.181	95% USL	0.196

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.08
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.08	95% USL	0.08
95% KM Chebyshev UPL	0.126		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Beryllium

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	6		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	6
Minimum Detect	N/A	Minimum Non-Detect	0.026
Maximum Detect	N/A	Maximum Non-Detect	0.032
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Beryllium was not processed!

Cadmium

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	3		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	3
Minimum Detect	N/A	Minimum Non-Detect	0.006
Maximum Detect	N/A	Maximum Non-Detect	0.008
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Cadmium was not processed!

Chromium

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	13
Minimum Detect	N/A	Minimum Non-Detect	0.034
Maximum Detect	N/A	Maximum Non-Detect	0.121
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Chromium was not processed!

Cobalt

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	2		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	1
Minimum Detect	0.037	Minimum Non-Detect	0.02
Maximum Detect	0.037	Maximum Non-Detect	0.02
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	0.037	SD Detected	N/A
Mean of Detected Logged Data	-3.297	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Cobalt was not processed!

Draft

Copper

General Statistics

Total Number of Observations	16	Number of Distinct Observations	14
		Number of Missing Observations	4
Minimum	0.35	First Quartile	0.44
Second Largest	12.4	Median	0.505
Maximum	52.7	Third Quartile	3.43
Mean	5.569	SD	13.14
Coefficient of Variation	2.36	Skewness	3.483
Mean of logged Data	0.215	SD of logged Data	1.573

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.455	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.357	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	38.74	90% Percentile (z)	22.41
95% UPL (t)	29.32	95% Percentile (z)	27.18
95% USL	37.68	99% Percentile (z)	36.14

Gamma GOF Test

A-D Test Statistic	2.206	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.81	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.33	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.229	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.433	k star (bias corrected MLE)	0.393
Theta hat (MLE)	12.88	Theta star (bias corrected MLE)	14.17
nu hat (MLE)	13.84	nu star (bias corrected)	12.58
MLE Mean (bias corrected)	5.569	MLE Sd (bias corrected)	8.883

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	21.85	90% Percentile	15.78
95% Hawkins Wixley (HW) Approx. Gamma UPL	21.31	95% Percentile	23.28
95% WH Approx. Gamma UTL with 95% Coverage	39.58	99% Percentile	42.17
95% HW Approx. Gamma UTL with 95% Coverage	42.03		
95% WH USL	37.23	95% HW USL	39.15

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.771	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.303	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Lognormal at 5% Significance Level

Data Not Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	65.78	90% Percentile (z)	9.313
95% UPL (t)	21.29	95% Percentile (z)	16.49
95% USL	57.93	99% Percentile (z)	48.2

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	52.7
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	52.7	95% BCA Bootstrap UTL with 95% Coverage	52.7
95% UPL	52.7	90% Percentile	11.8
90% Chebyshev UPL	46.21	95% Percentile	22.48
95% Chebyshev UPL	64.61	99% Percentile	46.66
95% USL	52.7		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Iron

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	16		
Number of Detects	5	Number of Non-Detects	11
Number of Distinct Detects	5	Number of Distinct Non-Detects	11
Minimum Detect	3.34	Minimum Non-Detect	1.27
Maximum Detect	14.7	Maximum Non-Detect	3.24
Variance Detected	23.43	Percent Non-Detects	68.75%
Mean Detected	6.324	SD Detected	4.84
Mean of Detected Logged Data	1.663	SD of Detected Logged Data	0.628

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.724	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.303	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.396	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	2.849	SD	3.368
95% UTL95% Coverage	11.35	95% KM UPL (t)	8.936
90% KM Percentile (z)	7.166	95% KM Percentile (z)	8.39
99% KM Percentile (z)	10.69	95% KM USL	11.08

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	2.74	SD	3.54
95% UTL95% Coverage	11.68	95% UPL (t)	9.137
90% Percentile (z)	7.277	95% Percentile (z)	8.563
99% Percentile (z)	10.98	95% USL	11.39

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.649	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.683	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.332	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.36	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	2.906	k star (bias corrected MLE)	1.296
Theta hat (MLE)	2.177	Theta star (bias corrected MLE)	4.881
nu hat (MLE)	29.06	nu star (bias corrected)	12.96
MLE Mean (bias corrected)	6.324		
MLE Sd (bias corrected)	5.556	95% Percentile of Chisquare (2k)	7.093

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	1.983
Maximum	14.7	Median	0.01
SD	3.922	CV	1.978
k hat (MLE)	0.218	k star (bias corrected MLE)	0.219
Theta hat (MLE)	9.099	Theta star (bias corrected MLE)	9.066
nu hat (MLE)	6.974	nu star (bias corrected)	7
MLE Mean (bias corrected)	1.983	MLE Sd (bias corrected)	4.24
95% Percentile of Chisquare (2k)	2.201	90% Percentile	5.992
95% Percentile	9.975	99% Percentile	20.79

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	18.75	23.48	95% Approx. Gamma UPL	9.282	9.897
95% Gamma USL	17.46	21.5			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	0.716		nu hat (KM)	22.9
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	11.45	11.61	95% Approx. Gamma UPL	7.793	7.683
95% Gamma USL	10.99	11.11			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.806	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.308	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.396	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	2.346	Mean in Log Scale	0.0931
SD in Original Scale	3.731	SD in Log Scale	1.14
95% UTL95% Coverage	19.5	95% BCA UTL95% Coverage	14.7
95% Bootstrap (%) UTL95% Coverage	14.7	95% UPL (t)	8.611
90% Percentile (z)	4.73	95% Percentile (z)	7.158
99% Percentile (z)	15.56	95% USL	17.78

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.684	95% KM UTL (Lognormal)95% Coverage	12.53
KM SD of Logged Data	0.731	95% KM UPL (Lognormal)	7.422
95% KM Percentile Lognormal (z)	6.592	95% KM USL (Lognormal)	11.82

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	2.74	Mean in Log Scale	0.568
SD in Original Scale	3.54	SD in Log Scale	0.86
95% UTL95% Coverage	15.47	95% UPL (t)	8.349
90% Percentile (z)	5.313	95% Percentile (z)	7.262
99% Percentile (z)	13.05	95% USL	14.43

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	14.7
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	14.7	95% USL	14.7
95% KM Chebyshev UPL	17.98		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Lead

General Statistics

Total Number of Observations	16	Number of Distinct Observations	11
		Number of Missing Observations	4
Minimum	0.01	First Quartile	0.02
Second Largest	0.47	Median	0.035
Maximum	2.14	Third Quartile	0.183
Mean	0.238	SD	0.527
Coefficient of Variation	2.221	Skewness	3.536
Mean of logged Data	-2.719	SD of logged Data	1.507

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.468	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.333	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	1.569	90% Percentile (z)	0.913
95% UPL (t)	1.19	95% Percentile (z)	1.105
95% USL	1.526	99% Percentile (z)	1.464

Gamma GOF Test

A-D Test Statistic	1.411	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.797	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.242	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.227	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.496	k star (bias corrected MLE)	0.445
Theta hat (MLE)	0.479	Theta star (bias corrected MLE)	0.534
nu hat (MLE)	15.88	nu star (bias corrected)	14.23
MLE Mean (bias corrected)	0.238	MLE Sd (bias corrected)	0.356

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.919	90% Percentile	0.658
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.912	95% Percentile	0.951
95% WH Approx. Gamma UTL with 95% Coverage	1.623	99% Percentile	1.68
95% HW Approx. Gamma UTL with 95% Coverage	1.74		
95% WH USL	1.53	95% HW USL	1.626

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.891	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.199	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	2.961	90% Percentile (z)	0.455
95% UPL (t)	1.005	95% Percentile (z)	0.787
95% USL	2.622	99% Percentile (z)	2.198

Nonparametric Distribution Free Background Statistics

Data appear Lognormal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	2.14
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	2.14	95% BCA Bootstrap UTL with 95% Coverage	2.14
95% UPL	2.14	90% Percentile	0.445
90% Chebyshev UPL	1.868	95% Percentile	0.888
95% Chebyshev UPL	2.607	99% Percentile	1.89
95% USL	2.14		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Manganese

General Statistics

Total Number of Observations	16	Number of Distinct Observations	15
		Number of Missing Observations	4
Minimum	0.074	First Quartile	0.215
Second Largest	0.493	Median	0.253
Maximum	0.68	Third Quartile	0.303
Mean	0.283	SD	0.154
Coefficient of Variation	0.545	Skewness	1.271
Mean of logged Data	-1.397	SD of logged Data	0.553

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.883	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.237	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	0.672	90% Percentile (z)	0.481
95% UPL (t)	0.562	95% Percentile (z)	0.537
95% USL	0.66	99% Percentile (z)	0.642

Gamma GOF Test

A-D Test Statistic	0.439	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.742	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.173	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.216	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.842	k star (bias corrected MLE)	3.163
Theta hat (MLE)	0.0737	Theta star (bias corrected MLE)	0.0895
nu hat (MLE)	122.9	nu star (bias corrected)	101.2
MLE Mean (bias corrected)	0.283	MLE Sd (bias corrected)	0.159

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.605	90% Percentile	0.497
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.617	95% Percentile	0.585
95% WH Approx. Gamma UTL with 95% Coverage	0.8	99% Percentile	0.777
95% HW Approx. Gamma UTL with 95% Coverage	0.834		
95% WH USL	0.776	95% HW USL	0.807

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.954	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.179	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	0.998	90% Percentile (z)	0.502
95% UPL (t)	0.672	95% Percentile (z)	0.614
95% USL	0.955	99% Percentile (z)	0.895

Nonparametric Distribution Free Background Statistics

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	0.68
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	0.68	95% BCA Bootstrap UTL with 95% Coverage	0.68
95% UPL	0.68	90% Percentile	0.487
90% Chebyshev UPL	0.76	95% Percentile	0.54
95% Chebyshev UPL	0.976	99% Percentile	0.652
95% USL	0.68		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Mercury

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	0.19	First Quartile	0.255
Second Largest	2.7	Median	0.49
Maximum	2.88	Third Quartile	1.695
Mean	1.076	SD	0.983
Coefficient of Variation	0.913	Skewness	0.75
Mean of logged Data	-0.397	SD of logged Data	1.04

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.818	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.28	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	3.558	90% Percentile (z)	2.336
95% UPL (t)	2.853	95% Percentile (z)	2.693
95% USL	3.478	99% Percentile (z)	3.363

Gamma GOF Test

A-D Test Statistic	0.998	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.76	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.22	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.22	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.202	k star (bias corrected MLE)	1.018
Theta hat (MLE)	0.895	Theta star (bias corrected MLE)	1.057
nu hat (MLE)	38.46	nu star (bias corrected)	32.58
MLE Mean (bias corrected)	1.076	MLE Sd (bias corrected)	1.067

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	3.431	90% Percentile	2.467
95% Hawkins Wixley (HW) Approx. Gamma UPL	3.591	95% Percentile	3.204
95% WH Approx. Gamma UTL with 95% Coverage	5.258	99% Percentile	4.911
95% HW Approx. Gamma UTL with 95% Coverage	5.8		
95% WH USL	5.026	95% HW USL	5.51

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.86	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.201	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Approximate Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	9.28	90% Percentile (z)	2.549
95% UPL (t)	4.403	95% Percentile (z)	3.719
95% USL	8.533	99% Percentile (z)	7.556

Nonparametric Distribution Free Background Statistics

Data appear Approximate Lognormal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	2.88
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	2.88	95% BCA Bootstrap UTL with 95% Coverage	2.88
95% UPL	2.88	90% Percentile	2.555
90% Chebyshev UPL	4.116	95% Percentile	2.745
95% Chebyshev UPL	5.493	99% Percentile	2.853
95% USL	2.88		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Methyl Mercury

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	12		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	12
Minimum Detect	0.95	Minimum Non-Detect	0.86
Maximum Detect	0.95	Maximum Non-Detect	1.45
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	0.95	SD Detected	N/A
Mean of Detected Logged Data	-0.0513	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Methyl Mercury was not processed!

Draft

Selenium

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	0.216	First Quartile	0.33
Second Largest	2.29	Median	0.391
Maximum	2.37	Third Quartile	1.825
Mean	1.017	SD	0.835
Coefficient of Variation	0.821	Skewness	0.507
Mean of logged Data	-0.354	SD of logged Data	0.909

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.78	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.334	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	3.123	90% Percentile (z)	2.086
95% UPL (t)	2.525	95% Percentile (z)	2.39
95% USL	3.056	99% Percentile (z)	2.958

Gamma GOF Test

A-D Test Statistic	1.618	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.755	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.322	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.219	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.494	k star (bias corrected MLE)	1.255
Theta hat (MLE)	0.681	Theta star (bias corrected MLE)	0.81
nu hat (MLE)	47.8	nu star (bias corrected)	40.17
MLE Mean (bias corrected)	1.017	MLE Sd (bias corrected)	0.908

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	2.996	90% Percentile	2.213
95% Hawkins Wixley (HW) Approx. Gamma UPL	3.109	95% Percentile	2.814
95% WH Approx. Gamma UTL with 95% Coverage	4.453	99% Percentile	4.185
95% HW Approx. Gamma UTL with 95% Coverage	4.831		
95% WH USL	4.27	95% HW USL	4.608

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.803	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.297	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Lognormal at 5% Significance Level

Data Not Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	6.957	90% Percentile (z)	2.249
95% UPL (t)	3.626	95% Percentile (z)	3.129
95% USL	6.465	99% Percentile (z)	5.813

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	2.37
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	2.37	95% BCA Bootstrap UTL with 95% Coverage	2.37
95% UPL	2.37	90% Percentile	2.1
90% Chebyshev UPL	3.598	95% Percentile	2.31
95% Chebyshev UPL	4.767	99% Percentile	2.358
95% USL	2.37		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Silver

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	5		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	5
Minimum Detect	N/A	Minimum Non-Detect	0.017
Maximum Detect	N/A	Maximum Non-Detect	0.022
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Silver was not processed!

Thallium

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	0.002
Maximum Detect	N/A	Maximum Non-Detect	0.002
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Thallium was not processed!

Draft

Vanadium

General Statistics

Total Number of Observations	16	Number of Distinct Observations	14
		Number of Missing Observations	4
Minimum	0.017	First Quartile	0.0288
Second Largest	0.053	Median	0.0315
Maximum	0.075	Third Quartile	0.045
Mean	0.0367	SD	0.0144
Coefficient of Variation	0.392	Skewness	1.27
Mean of logged Data	-3.371	SD of logged Data	0.37

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.903	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.179	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	0.073	90% Percentile (z)	0.0551
95% UPL (t)	0.0627	95% Percentile (z)	0.0603
95% USL	0.0718	99% Percentile (z)	0.0701

Gamma GOF Test

A-D Test Statistic	0.32	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.74	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.164	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	7.801	k star (bias corrected MLE)	6.38
Theta hat (MLE)	0.0047	Theta star (bias corrected MLE)	0.00575
nu hat (MLE)	249.6	nu star (bias corrected)	204.1
MLE Mean (bias corrected)	0.0367	MLE Sd (bias corrected)	0.0145

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.0647	90% Percentile	0.0561
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.0652	95% Percentile	0.0634
95% WH Approx. Gamma UTL with 95% Coverage	0.08	99% Percentile	0.0786
95% HW Approx. Gamma UTL with 95% Coverage	0.0814		
95% WH USL	0.0781	95% HW USL	0.0795

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.978	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.143	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	0.0874	90% Percentile (z)	0.0552
95% UPL (t)	0.067	95% Percentile (z)	0.0631
95% USL	0.0848	99% Percentile (z)	0.0812

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	0.075
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	0.075	95% BCA Bootstrap UTL with 95% Coverage	0.075
95% UPL	0.075	90% Percentile	0.051
90% Chebyshev UPL	0.0811	95% Percentile	0.0585
95% Chebyshev UPL	0.101	99% Percentile	0.0717
95% USL	0.075		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Zinc

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	11	Number of Non-Detects	5
Number of Distinct Detects	11	Number of Distinct Non-Detects	4
Minimum Detect	1.01	Minimum Non-Detect	0.63
Maximum Detect	27.8	Maximum Non-Detect	0.9
Variance Detected	59.92	Percent Non-Detects	31.25%
Mean Detected	5.292	SD Detected	7.741
Mean of Detected Logged Data	1.125	SD of Detected Logged Data	0.969

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.567	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.85	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.333	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.267	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	3.835	SD	6.49
95% UTL95% Coverage	20.22	95% KM UPL (t)	15.56
90% KM Percentile (z)	12.15	95% KM Percentile (z)	14.51
99% KM Percentile (z)	18.93	95% KM USL	19.69

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	3.76	SD	6.742
95% UTL95% Coverage	20.78	95% UPL (t)	15.94
90% Percentile (z)	12.4	95% Percentile (z)	14.85
99% Percentile (z)	19.44	95% USL	20.23

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.858	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.75	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.282	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.262	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.06	k star (bias corrected MLE)	0.832
Theta hat (MLE)	4.992	Theta star (bias corrected MLE)	6.364
nu hat (MLE)	23.32	nu star (bias corrected)	18.29
MLE Mean (bias corrected)	5.292		
MLE Sd (bias corrected)	5.803	95% Percentile of Chisquare (2k)	5.321

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	3.641
Maximum	27.8	Median	1.765
SD	6.807	CV	1.87
k hat (MLE)	0.344	k star (bias corrected MLE)	0.321
Theta hat (MLE)	10.57	Theta star (bias corrected MLE)	11.33
nu hat (MLE)	11.02	nu star (bias corrected)	10.29
MLE Mean (bias corrected)	3.641	MLE Sd (bias corrected)	6.422
95% Percentile of Chisquare (2k)	2.876	90% Percentile	10.64
95% Percentile	16.28	99% Percentile	30.83

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	30.17	40.04	95% Approx. Gamma UPL	16.53	19.27
95% Gamma USL	28.35	37.11			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	0.349		nu hat (KM)	11.17
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	20.22	21.02	95% Approx. Gamma UPL	12.59	12.45
95% Gamma USL	19.24	19.88			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.91	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.21	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.267	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	3.732	Mean in Log Scale	0.39
SD in Original Scale	6.757	SD in Log Scale	1.382
95% UTL95% Coverage	48.4	95% BCA UTL95% Coverage	27.8
95% Bootstrap (%) UTL95% Coverage	27.8	95% UPL (t)	17.96
90% Percentile (z)	8.687	95% Percentile (z)	14.35
99% Percentile (z)	36.82	95% USL	43.29

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.629	95% KM UTL (Lognormal)95% Coverage	27.4
KM SD of Logged Data	1.062	95% KM UPL (Lognormal)	12.79
95% KM Percentile Lognormal (z)	10.77	95% KM USL (Lognormal)	25.15

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	3.76	Mean in Log Scale	0.477
SD in Original Scale	6.742	SD in Log Scale	1.272
95% UTL95% Coverage	39.92	95% UPL (t)	16.04
90% Percentile (z)	8.223	95% Percentile (z)	13.05
99% Percentile (z)	31.05	95% USL	36.03

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	27.8
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	27.8	95% USL	27.8
95% KM Chebyshev UPL	32.99		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Limu Kohu

Draft

Aldrin

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	4
Maximum Detect	N/A	Maximum Non-Detect	4
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Aldrin was not processed!

Draft

Alpha-BHC

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	5		
Number of Detects	4	Number of Non-Detects	12
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	9.8	Minimum Non-Detect	4
Maximum Detect	22.7	Maximum Non-Detect	4
Variance Detected	33.26	Percent Non-Detects	75%
Mean Detected	14.23	SD Detected	5.767
Mean of Detected Logged Data	2.602	SD of Detected Logged Data	0.363

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.806	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.368	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.443	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	6.556	SD	5.083
95% UTL95% Coverage	19.39	95% KM UPL (t)	15.74
90% KM Percentile (z)	13.07	95% KM Percentile (z)	14.92
99% KM Percentile (z)	18.38	95% KM USL	18.98

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	5.056	SD	6.045
95% UTL95% Coverage	20.31	95% UPL (t)	15.98
90% Percentile (z)	12.8	95% Percentile (z)	15
99% Percentile (z)	19.12	95% USL	19.83

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.493	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.657	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.361	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.395	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	9.554	k star (bias corrected MLE)	2.555
Theta hat (MLE)	1.489	Theta star (bias corrected MLE)	5.567
nu hat (MLE)	76.43	nu star (bias corrected)	20.44
MLE Mean (bias corrected)	14.23		
MLE Sd (bias corrected)	8.899	95% Percentile of Chisquare (2k)	11.24

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	3.925
Maximum	22.7	Median	0.01
SD	6.742	CV	1.717
k hat (MLE)	0.21	k star (bias corrected MLE)	0.213
Theta hat (MLE)	18.66	Theta star (bias corrected MLE)	18.47
nu hat (MLE)	6.731	nu star (bias corrected)	6.803
MLE Mean (bias corrected)	3.925	MLE Sd (bias corrected)	8.514
95% Percentile of Chisquare (2k)	2.155	90% Percentile	11.87
95% Percentile	19.9	99% Percentile	41.8

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	38.84	51.42	95% Approx. Gamma UPL	19.31	21.59
95% Gamma USL	36.18	47.05			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

k hat (KM)	1.663		nu hat (KM)	53.23	
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	20.35	20.6	95% Approx. Gamma UPL	14.94	14.85
95% Gamma USL	19.68	19.88			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.869	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.333	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.443	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	5.996	Mean in Log Scale	1.408
SD in Original Scale	5.765	SD in Log Scale	0.913
95% UTL95% Coverage	40.92	95% BCA UTL95% Coverage	22.7
95% Bootstrap (%) UTL95% Coverage	22.7	95% UPL (t)	21.27
90% Percentile (z)	13.17	95% Percentile (z)	18.34
99% Percentile (z)	34.17	95% USL	38.01

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	1.69	95% KM UTL (Lognormal)95% Coverage	21.68
KM SD of Logged Data	0.549	95% KM UPL (Lognormal)	14.62
95% KM Percentile Lognormal (z)	13.38	95% KM USL (Lognormal)	20.74

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	5.056	Mean in Log Scale	1.17
SD in Original Scale	6.045	SD in Log Scale	0.869
95% UTL95% Coverage	28.88	95% UPL (t)	15.49
90% Percentile (z)	9.813	95% Percentile (z)	13.46
99% Percentile (z)	24.32	95% USL	26.93

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	22.7
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	22.7	95% USL	22.7
95% KM Chebyshev UPL	29.4		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Beta-BHC

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	4
Maximum Detect	N/A	Maximum Non-Detect	4
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Beta-BHC was not processed!

Delta-BHC

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	4
Maximum Detect	N/A	Maximum Non-Detect	4
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Delta-BHC was not processed!

Gamma-BHC (Lindane)

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	4
Maximum Detect	N/A	Maximum Non-Detect	4
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gamma-BHC (Lindane) was not processed!

Heptachlor

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	4
Maximum Detect	N/A	Maximum Non-Detect	4
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Heptachlor was not processed!

Heptachlor Epoxide

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	4
Maximum Detect	N/A	Maximum Non-Detect	4
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Heptachlor Epoxide was not processed!

p,p'-DDT

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	4
Maximum Detect	N/A	Maximum Non-Detect	4
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable p,p'-DDT was not processed!

Draft

1,2,4-Trimethylbenzene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	2		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	2
Minimum Detect	N/A	Minimum Non-Detect	12.5
Maximum Detect	N/A	Maximum Non-Detect	25
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,4-Trimethylbenzene was not processed!

Ethyl Benzene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	2		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	2
Minimum Detect	N/A	Minimum Non-Detect	12.5
Maximum Detect	N/A	Maximum Non-Detect	25
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Ethyl Benzene was not processed!

M,P-XYLENES

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	2		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	2
Minimum Detect	N/A	Minimum Non-Detect	25
Maximum Detect	N/A	Maximum Non-Detect	50
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable M,P-XYLENES was not processed!

Draft

o-Xylene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	2		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	2
Minimum Detect	N/A	Minimum Non-Detect	12.5
Maximum Detect	N/A	Maximum Non-Detect	25
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable o-Xylene was not processed!

Styrene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	2		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	2
Minimum Detect	N/A	Minimum Non-Detect	12.5
Maximum Detect	N/A	Maximum Non-Detect	25
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Styrene was not processed!

Toluene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	2		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	2
Minimum Detect	N/A	Minimum Non-Detect	12.5
Maximum Detect	N/A	Maximum Non-Detect	25
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Toluene was not processed!

Draft

bis(2-Ethylhexyl) phthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable bis(2-Ethylhexyl) phthalate was not processed!

Diethyl phthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Diethyl phthalate was not processed!

Dimethyl phthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Dimethyl phthalate was not processed!

Draft

Di-n-butyl phthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Di-n-butyl phthalate was not processed!

Di-n-octyl phthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Di-n-octyl phthalate was not processed!

Pyrene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Pyrene was not processed!

Draft

2,3,7,8-TCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	8		
Number of Detects	7	Number of Non-Detects	9
Number of Distinct Detects	6	Number of Distinct Non-Detects	5
Minimum Detect	0.074	Minimum Non-Detect	0.081
Maximum Detect	0.13	Maximum Non-Detect	0.12
Variance Detected	4.5562E-4	Percent Non-Detects	56.25%
Mean Detected	0.107	SD Detected	0.0213
Mean of Detected Logged Data	-2.249	SD of Detected Logged Data	0.211

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.931	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.151	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.335	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0923	SD	0.0206
95% UTL95% Coverage	0.144	95% KM UPL (t)	0.13
90% KM Percentile (z)	0.119	95% KM Percentile (z)	0.126
99% KM Percentile (z)	0.14	95% KM USL	0.143

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0771	SD	0.0314
95% UTL95% Coverage	0.156	95% UPL (t)	0.134
90% Percentile (z)	0.117	95% Percentile (z)	0.129
99% Percentile (z)	0.15	95% USL	0.154

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.299	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.707	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.172	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.311	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	27.47	k star (bias corrected MLE)	15.79
Theta hat (MLE)	0.00391	Theta star (bias corrected MLE)	0.0068
nu hat (MLE)	384.6	nu star (bias corrected)	221.1
MLE Mean (bias corrected)	0.107		
MLE Sd (bias corrected)	0.027	95% Percentile of Chisquare (2k)	45.7

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0651	Mean	0.0921
Maximum	0.13	Median	0.0862
SD	0.0211	CV	0.229
k hat (MLE)	21.5	k star (bias corrected MLE)	17.51
Theta hat (MLE)	0.00428	Theta star (bias corrected MLE)	0.00526
nu hat (MLE)	688	nu star (bias corrected)	560.3
MLE Mean (bias corrected)	0.0921	MLE Sd (bias corrected)	0.022
95% Percentile of Chisquare (2k)	49.83	90% Percentile	0.121
95% Percentile	0.131	99% Percentile	0.151

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.152	0.153	95% Approx. Gamma UPL	0.132	0.133
95% Gamma USL	0.15	0.151			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	20.02		nu hat (KM)	640.5
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.15	0.151	95% Approx. Gamma UPL	0.131	0.132
95% Gamma USL	0.148	0.149			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.918	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.161	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.335	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0922	Mean in Log Scale	-2.406
SD in Original Scale	0.0207	SD in Log Scale	0.215
95% UTL95% Coverage	0.155	95% BCA UTL95% Coverage	0.13
95% Bootstrap (%) UTL95% Coverage	0.13	95% UPL (t)	0.133
90% Percentile (z)	0.119	95% Percentile (z)	0.128
99% Percentile (z)	0.149	95% USL	0.153

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.407	95% KM UTL (Lognormal)95% Coverage	0.155
KM SD of Logged Data	0.214	95% KM UPL (Lognormal)	0.133
95% KM Percentile Lognormal (z)	0.128	95% KM USL (Lognormal)	0.152

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0771	Mean in Log Scale	-2.638
SD in Original Scale	0.0314	SD in Log Scale	0.399
95% UTL95% Coverage	0.196	95% UPL (t)	0.147
90% Percentile (z)	0.119	95% Percentile (z)	0.138
99% Percentile (z)	0.181	95% USL	0.19

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.13
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.13	95% USL	0.13
95% KM Chebyshev UPL	0.185		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Total TCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	11		
Number of Detects	6	Number of Non-Detects	10
Number of Distinct Detects	6	Number of Distinct Non-Detects	7
Minimum Detect	0.11	Minimum Non-Detect	0.073
Maximum Detect	1.4	Maximum Non-Detect	0.12
Variance Detected	0.258	Percent Non-Detects	62.5%
Mean Detected	0.37	SD Detected	0.508
Mean of Detected Logged Data	-1.5	SD of Detected Logged Data	0.959

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.595	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.404	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.186	SD	0.318
95% UTL95% Coverage	0.989	95% KM UPL (t)	0.76
90% KM Percentile (z)	0.593	95% KM Percentile (z)	0.709
99% KM Percentile (z)	0.926	95% KM USL	0.963

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.17	SD	0.334
95% UTL95% Coverage	1.014	95% UPL (t)	0.774
90% Percentile (z)	0.599	95% Percentile (z)	0.72
99% Percentile (z)	0.948	95% USL	0.987

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.93	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.713	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.321	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.34	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.125	k star (bias corrected MLE)	0.674
Theta hat (MLE)	0.329	Theta star (bias corrected MLE)	0.549
nu hat (MLE)	13.5	nu star (bias corrected)	8.085
MLE Mean (bias corrected)	0.37		
MLE Sd (bias corrected)	0.451	95% Percentile of Chisquare (2k)	4.65

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.145
Maximum	1.4	Median	0.01
SD	0.344	CV	2.374
k hat (MLE)	0.431	k star (bias corrected MLE)	0.392
Theta hat (MLE)	0.337	Theta star (bias corrected MLE)	0.37
nu hat (MLE)	13.78	nu star (bias corrected)	12.53
MLE Mean (bias corrected)	0.145	MLE Sd (bias corrected)	0.232
95% Percentile of Chisquare (2k)	3.278	90% Percentile	0.411
95% Percentile	0.607	99% Percentile	1.1

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	1.039	1.124	95% Approx. Gamma UPL	0.574	0.569
95% Gamma USL	0.978	1.047			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	0.341		nu hat (KM)	10.91
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.821	0.803	95% Approx. Gamma UPL	0.538	0.511
95% Gamma USL	0.785	0.765			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.777	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.278	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Approximate Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.149	Mean in Log Scale	-3.249
SD in Original Scale	0.343	SD in Log Scale	1.572
95% UTL95% Coverage	2.051	95% BCA UTL95% Coverage	1.4
95% Bootstrap (%) UTL95% Coverage	1.4	95% UPL (t)	0.665
90% Percentile (z)	0.291	95% Percentile (z)	0.515
99% Percentile (z)	1.503	95% USL	1.806

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.184	95% KM UTL (Lognormal)95% Coverage	0.761
KM SD of Logged Data	0.757	95% KM UPL (Lognormal)	0.442
95% KM Percentile Lognormal (z)	0.391	95% KM USL (Lognormal)	0.716

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.17	Mean in Log Scale	-2.437
SD in Original Scale	0.334	SD in Log Scale	0.944
95% UTL95% Coverage	0.946	95% UPL (t)	0.481
90% Percentile (z)	0.293	95% Percentile (z)	0.413
99% Percentile (z)	0.785	95% USL	0.877

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	1.4
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	1.4	95% USL	1.4
95% KM Chebyshev UPL	1.615		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

2,3,7,8-TCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	12		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	12
Minimum Detect	N/A	Minimum Non-Detect	0.056
Maximum Detect	N/A	Maximum Non-Detect	0.1
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,3,7,8-TCDD was not processed!

Draft

Total TCDD

General Statistics

Total Number of Observations	16	Number of Distinct Observations	15
		Number of Missing Observations	4
Minimum	0.38	First Quartile	0.49
Second Largest	0.79	Median	0.585
Maximum	0.96	Third Quartile	0.673
Mean	0.598	SD	0.163
Coefficient of Variation	0.272	Skewness	0.564
Mean of logged Data	-0.549	SD of logged Data	0.272

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.954	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.124	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	1.008	90% Percentile (z)	0.806
95% UPL (t)	0.892	95% Percentile (z)	0.865
95% USL	0.995	99% Percentile (z)	0.976

Gamma GOF Test

A-D Test Statistic	0.214	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.738	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.116	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	14.68	k star (bias corrected MLE)	11.97
Theta hat (MLE)	0.0407	Theta star (bias corrected MLE)	0.0499
nu hat (MLE)	469.6	nu star (bias corrected)	382.9
MLE Mean (bias corrected)	0.598	MLE Sd (bias corrected)	0.173

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.92	90% Percentile	0.827
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.925	95% Percentile	0.907
95% WH Approx. Gamma UTL with 95% Coverage	1.083	99% Percentile	1.071
95% HW Approx. Gamma UTL with 95% Coverage	1.097		
95% WH USL	1.064	95% HW USL	1.076

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.966	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.111	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	1.146	90% Percentile (z)	0.818
95% UPL (t)	0.943	95% Percentile (z)	0.902
95% USL	1.121	99% Percentile (z)	1.086

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	0.96
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	0.96	95% BCA Bootstrap UTL with 95% Coverage	0.96
95% UPL	0.96	90% Percentile	0.785
90% Chebyshev UPL	1.101	95% Percentile	0.833
95% Chebyshev UPL	1.329	99% Percentile	0.935
95% USL	0.96		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,7,8-PECDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	14
Minimum Detect	N/A	Minimum Non-Detect	0.047
Maximum Detect	N/A	Maximum Non-Detect	0.098
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,7,8-PECDF was not processed!

2,3,4,7,8-PeCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	12		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	12
Minimum Detect	N/A	Minimum Non-Detect	0.036
Maximum Detect	N/A	Maximum Non-Detect	0.072
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,3,4,7,8-PeCDF was not processed!

Draft

Total PeCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	16		
Number of Detects	3	Number of Non-Detects	13
Number of Distinct Detects	3	Number of Distinct Non-Detects	13
Minimum Detect	0.081	Minimum Non-Detect	0.046
Maximum Detect	0.37	Maximum Non-Detect	0.085
Variance Detected	0.0261	Percent Non-Detects	81.25%
Mean Detected	0.184	SD Detected	0.162
Mean of Detected Logged Data	-1.937	SD of Detected Logged Data	0.823

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.799	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.364	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.072	SD	0.0784
95% UTL95% Coverage	0.27	95% KM UPL (t)	0.214
90% KM Percentile (z)	0.172	95% KM Percentile (z)	0.201
99% KM Percentile (z)	0.254	95% KM USL	0.264

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0585	SD	0.0858
95% UTL95% Coverage	0.275	95% UPL (t)	0.214
90% Percentile (z)	0.168	95% Percentile (z)	0.2
99% Percentile (z)	0.258	95% USL	0.268

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	2.218	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0828	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	13.31	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A		
MLE Sd (bias corrected)	N/A	95% Percentile of Chisquare (2k)	N/A

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.0426
Maximum	0.37	Median	0.01
SD	0.0916	CV	2.151
k hat (MLE)	0.645	k star (bias corrected MLE)	0.566
Theta hat (MLE)	0.066	Theta star (bias corrected MLE)	0.0752
nu hat (MLE)	20.64	nu star (bias corrected)	18.1
MLE Mean (bias corrected)	0.0426	MLE Sd (bias corrected)	0.0566
95% Percentile of Chisquare (2k)	4.158	90% Percentile	0.112
95% Percentile	0.156	99% Percentile	0.264

The following statistics are computed using Gamma ROS Statistics on Imputed Data
Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.256	0.257	95% Approx. Gamma UPL	0.151	0.144
95% Gamma USL	0.242	0.242			

The following statistics are computed using gamma distribution and KM estimates
Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

k hat (KM)	0.842		nu hat (KM)	26.96	
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.236	0.232	95% Approx. Gamma UPL	0.17	0.165
95% Gamma USL	0.228	0.223			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.852	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.338	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0388	Mean in Log Scale	-4.617
SD in Original Scale	0.093	SD in Log Scale	1.364
95% UTL95% Coverage	0.309	95% BCA UTL95% Coverage	0.37
95% Bootstrap (%) UTL95% Coverage	0.37	95% UPL (t)	0.116
90% Percentile (z)	0.0568	95% Percentile (z)	0.0932
99% Percentile (z)	0.236	95% USL	0.277

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.862	95% KM UTL (Lognormal)95% Coverage	0.219
KM SD of Logged Data	0.533	95% KM UPL (Lognormal)	0.15
95% KM Percentile Lognormal (z)	0.137	95% KM USL (Lognormal)	0.21

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0585	Mean in Log Scale	-3.235
SD in Original Scale	0.0858	SD in Log Scale	0.729
95% UTL95% Coverage	0.248	95% UPL (t)	0.147
90% Percentile (z)	0.1	95% Percentile (z)	0.13
99% Percentile (z)	0.214	95% USL	0.233

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.37
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.37	95% USL	0.37
95% KM Chebyshev UPL	0.424		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,7,8-PeCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	14
Minimum Detect	N/A	Minimum Non-Detect	0.04
Maximum Detect	N/A	Maximum Non-Detect	0.071
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,7,8-PeCDD was not processed!

Draft

Total PeCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	11	Number of Non-Detects	5
Number of Distinct Detects	9	Number of Distinct Non-Detects	5
Minimum Detect	0.045	Minimum Non-Detect	0.044
Maximum Detect	0.22	Maximum Non-Detect	0.071
Variance Detected	0.00332	Percent Non-Detects	31.25%
Mean Detected	0.117	SD Detected	0.0576
Mean of Detected Logged Data	-2.255	SD of Detected Logged Data	0.481

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.868	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.249	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.267	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0945	SD	0.0562
95% UTL95% Coverage	0.236	95% KM UPL (t)	0.196
90% KM Percentile (z)	0.166	95% KM Percentile (z)	0.187
99% KM Percentile (z)	0.225	95% KM USL	0.232

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0896	SD	0.0627
95% UTL95% Coverage	0.248	95% UPL (t)	0.203
90% Percentile (z)	0.17	95% Percentile (z)	0.193
99% Percentile (z)	0.235	95% USL	0.243

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.36	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.732	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.207	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.256	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	4.907	k star (bias corrected MLE)	3.629
Theta hat (MLE)	0.0237	Theta star (bias corrected MLE)	0.0321
nu hat (MLE)	108	nu star (bias corrected)	79.85
MLE Mean (bias corrected)	0.117		
MLE Sd (bias corrected)	0.0612	95% Percentile of Chisquare (2k)	14.44

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.0864
Maximum	0.22	Median	0.083
SD	0.066	CV	0.764
k hat (MLE)	1.611	k star (bias corrected MLE)	1.351
Theta hat (MLE)	0.0536	Theta star (bias corrected MLE)	0.064
nu hat (MLE)	51.56	nu star (bias corrected)	43.23
MLE Mean (bias corrected)	0.0864	MLE Sd (bias corrected)	0.0743
95% Percentile of Chisquare (2k)	7.291	90% Percentile	0.185
95% Percentile	0.233	99% Percentile	0.343

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.363	0.4	95% Approx. Gamma UPL	0.247	0.26
95% Gamma USL	0.349	0.382			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

k hat (KM)	2.829		nu hat (KM)	90.52	
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.273	0.281	95% Approx. Gamma UPL	0.205	0.207
95% Gamma USL	0.264	0.272			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.956	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.176	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.267	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0921	Mean in Log Scale	-2.572
SD in Original Scale	0.0602	SD in Log Scale	0.631
95% UTL95% Coverage	0.376	95% BCA UTL95% Coverage	0.22
95% Bootstrap (%) UTL95% Coverage	0.22	95% UPL (t)	0.239
90% Percentile (z)	0.171	95% Percentile (z)	0.216
99% Percentile (z)	0.332	95% USL	0.357

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.514	95% KM UTL (Lognormal)95% Coverage	0.319
KM SD of Logged Data	0.544	95% KM UPL (Lognormal)	0.216
95% KM Percentile Lognormal (z)	0.198	95% KM USL (Lognormal)	0.306

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0896	Mean in Log Scale	-2.648
SD in Original Scale	0.0627	SD in Log Scale	0.726
95% UTL95% Coverage	0.442	95% UPL (t)	0.263
90% Percentile (z)	0.179	95% Percentile (z)	0.234
99% Percentile (z)	0.383	95% USL	0.417

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.22
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.22	95% USL	0.22
95% KM Chebyshev UPL	0.347		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,4,7,8-HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	14
Minimum Detect	N/A	Minimum Non-Detect	0.035
Maximum Detect	N/A	Maximum Non-Detect	0.066
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,4,7,8-HxCDF was not processed!

1,2,3,6,7,8-HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	13
Minimum Detect	0.058	Minimum Non-Detect	0.034
Maximum Detect	0.058	Maximum Non-Detect	0.062
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	0.058	SD Detected	N/A
Mean of Detected Logged Data	-2.847	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
s suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,6,7,8-HxCDF was not processed!

2,3,4,6,7,8-HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	14
Minimum Detect	N/A	Minimum Non-Detect	0.033
Maximum Detect	N/A	Maximum Non-Detect	0.06
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,3,4,6,7,8-HxCDF was not processed!

1,2,3,7,8,9-HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	15
Minimum Detect	N/A	Minimum Non-Detect	0.035
Maximum Detect	N/A	Maximum Non-Detect	0.074
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,7,8,9-HxCDF was not processed!

Draft

Total HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	12		
Number of Detects	3	Number of Non-Detects	13
Number of Distinct Detects	3	Number of Distinct Non-Detects	11
Minimum Detect	0.05	Minimum Non-Detect	0.037
Maximum Detect	0.058	Maximum Non-Detect	0.061
Variance Detected	1.6000E-5	Percent Non-Detects	81.25%
Mean Detected	0.054	SD Detected	0.004
Mean of Detected Logged Data	-2.921	SD of Detected Logged Data	0.0742

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	1	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.175	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.042	SD	0.00769
95% UTL95% Coverage	0.0614	95% KM UPL (t)	0.0559
90% KM Percentile (z)	0.0518	95% KM Percentile (z)	0.0546
99% KM Percentile (z)	0.0599	95% KM USL	0.0608

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0308	SD	0.0122
95% UTL95% Coverage	0.0616	95% UPL (t)	0.0528
90% Percentile (z)	0.0464	95% Percentile (z)	0.0508
99% Percentile (z)	0.0591	95% USL	0.0606

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	272.8	k star (bias corrected MLE)	N/A
Theta hat (MLE)	1.9795E-4	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	1637	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A		
MLE Sd (bias corrected)	N/A	95% Percentile of Chisquare (2k)	N/A

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0415	Mean	0.0455
Maximum	0.058	Median	0.0436
SD	0.00482	CV	0.106
k hat (MLE)	103.6	k star (bias corrected MLE)	84.23
Theta hat (MLE)	4.3931E-4	Theta star (bias corrected MLE)	5.4042E-4
nu hat (MLE)	3316	nu star (bias corrected)	2695
MLE Mean (bias corrected)	0.0455	MLE Sd (bias corrected)	0.00496
95% Percentile of Chisquare (2k)	199.7	90% Percentile	0.052
95% Percentile	0.054	99% Percentile	0.0578

The following statistics are computed using Gamma ROS Statistics on Imputed Data
Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.058	0.0581	95% Approx. Gamma UPL	0.0542	0.0542
95% Gamma USL	0.0576	0.0576			

The following statistics are computed using gamma distribution and KM estimates
Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

k hat (KM)	29.8		nu hat (KM)	953.6	
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0627	0.0629	95% Approx. Gamma UPL	0.0561	0.0561
95% Gamma USL	0.0619	0.0621			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	1	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.178	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.046	Mean in Log Scale	-3.082
SD in Original Scale	0.00451	SD in Log Scale	0.092
95% UTL95% Coverage	0.0578	95% BCA UTL95% Coverage	0.058
95% Bootstrap (%) UTL95% Coverage	0.058	95% UPL (t)	0.0542
90% Percentile (z)	0.0516	95% Percentile (z)	0.0534
99% Percentile (z)	0.0568	95% USL	0.0574

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-3.186	95% KM UTL (Lognormal)95% Coverage	0.0635
KM SD of Logged Data	0.17	95% KM UPL (Lognormal)	0.0562
95% KM Percentile Lognormal (z)	0.0547	95% KM USL (Lognormal)	0.0627

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0308	Mean in Log Scale	-3.542
SD in Original Scale	0.0122	SD in Log Scale	0.345
95% UTL95% Coverage	0.0692	95% UPL (t)	0.054
90% Percentile (z)	0.0451	95% Percentile (z)	0.0511
99% Percentile (z)	0.0646	95% USL	0.0673

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.061
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.061	95% USL	0.061
95% KM Chebyshev UPL	0.0765		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,4,7,8-HxCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	13
Minimum Detect	N/A	Minimum Non-Detect	0.062
Maximum Detect	N/A	Maximum Non-Detect	0.15
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,4,7,8-HxCDD was not processed!

1,2,3,6,7,8-HxCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	14
Minimum Detect	0.064	Minimum Non-Detect	0.071
Maximum Detect	0.064	Maximum Non-Detect	0.2
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	0.064	SD Detected	N/A
Mean of Detected Logged Data	-2.749	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
s suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,6,7,8-HxCDD was not processed!

Draft

1,2,3,7,8,9-HxCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	3	Number of Non-Detects	13
Number of Distinct Detects	3	Number of Distinct Non-Detects	11
Minimum Detect	0.32	Minimum Non-Detect	0.066
Maximum Detect	0.79	Maximum Non-Detect	0.24
Variance Detected	0.0552	Percent Non-Detects	81.25%
Mean Detected	0.553	SD Detected	0.235
Mean of Detected Logged Data	-0.658	SD of Detected Logged Data	0.455

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	1	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.176	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.157	SD	0.208
95% UTL95% Coverage	0.681	95% KM UPL (t)	0.532
90% KM Percentile (z)	0.423	95% KM Percentile (z)	0.499
99% KM Percentile (z)	0.64	95% KM USL	0.665

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.147	SD	0.22
95% UTL95% Coverage	0.703	95% UPL (t)	0.545
90% Percentile (z)	0.429	95% Percentile (z)	0.509
99% Percentile (z)	0.659	95% USL	0.685

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	7.754	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0714	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	46.52	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A		
MLE Sd (bias corrected)	N/A	95% Percentile of Chisquare (2k)	N/A

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.112
Maximum	0.79	Median	0.01
SD	0.235	CV	2.103
k hat (MLE)	0.394	k star (bias corrected MLE)	0.362
Theta hat (MLE)	0.284	Theta star (bias corrected MLE)	0.309
nu hat (MLE)	12.61	nu star (bias corrected)	11.58
MLE Mean (bias corrected)	0.112	MLE Sd (bias corrected)	0.186
95% Percentile of Chisquare (2k)	3.111	90% Percentile	0.321
95% Percentile	0.481	99% Percentile	0.887

The following statistics are computed using Gamma ROS Statistics on Imputed Data
Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.833	0.881	95% Approx. Gamma UPL	0.45	0.435
95% Gamma USL	0.782	0.819			

The following statistics are computed using gamma distribution and KM estimates
Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

k hat (KM)	0.575		nu hat (KM)	18.39	
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.713	0.723	95% Approx. Gamma UPL	0.467	0.458
95% Gamma USL	0.682	0.689			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.987	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.219	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.145	Mean in Log Scale	-2.57
SD in Original Scale	0.22	SD in Log Scale	1.001
95% UTL95% Coverage	0.957	95% BCA UTL95% Coverage	0.79
95% Bootstrap (%) UTL95% Coverage	0.79	95% UPL (t)	0.467
90% Percentile (z)	0.276	95% Percentile (z)	0.397
99% Percentile (z)	0.785	95% USL	0.883

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.332	95% KM UTL (Lognormal)95% Coverage	0.77
KM SD of Logged Data	0.82	95% KM UPL (Lognormal)	0.428
95% KM Percentile Lognormal (z)	0.374	95% KM USL (Lognormal)	0.72

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.147	Mean in Log Scale	-2.566
SD in Original Scale	0.22	SD in Log Scale	1.014
95% UTL95% Coverage	0.994	95% UPL (t)	0.48
90% Percentile (z)	0.282	95% Percentile (z)	0.408
99% Percentile (z)	0.814	95% USL	0.916

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.79
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.79	95% USL	0.79
95% KM Chebyshev UPL	1.09		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Total HxCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	11		
Number of Detects	4	Number of Non-Detects	12
Number of Distinct Detects	3	Number of Distinct Non-Detects	9
Minimum Detect	0.15	Minimum Non-Detect	0.086
Maximum Detect	0.21	Maximum Non-Detect	0.16
Variance Detected	8.2500E-4	Percent Non-Detects	75%
Mean Detected	0.188	SD Detected	0.0287
Mean of Detected Logged Data	-1.683	SD of Detected Logged Data	0.16

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.865	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.283	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.443	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.112	SD	0.0457
95% UTL95% Coverage	0.227	95% KM UPL (t)	0.194
90% KM Percentile (z)	0.17	95% KM Percentile (z)	0.187
99% KM Percentile (z)	0.218	95% KM USL	0.223

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0912	SD	0.06
95% UTL95% Coverage	0.243	95% UPL (t)	0.2
90% Percentile (z)	0.168	95% Percentile (z)	0.19
99% Percentile (z)	0.231	95% USL	0.238

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.43	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.656	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.314	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.394	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	53.77	k star (bias corrected MLE)	13.61
Theta hat (MLE)	0.00349	Theta star (bias corrected MLE)	0.0138
nu hat (MLE)	430.2	nu star (bias corrected)	108.9
MLE Mean (bias corrected)	0.188		
MLE Sd (bias corrected)	0.0508	95% Percentile of Chisquare (2k)	40.38

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0678	Mean	0.113
Maximum	0.21	Median	0.0913
SD	0.0477	CV	0.421
k hat (MLE)	7.206	k star (bias corrected MLE)	5.897
Theta hat (MLE)	0.0157	Theta star (bias corrected MLE)	0.0192
nu hat (MLE)	230.6	nu star (bias corrected)	188.7
MLE Mean (bias corrected)	0.113	MLE Sd (bias corrected)	0.0467
95% Percentile of Chisquare (2k)	20.75	90% Percentile	0.176
95% Percentile	0.2	99% Percentile	0.249

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.254	0.258	95% Approx. Gamma UPL	0.204	0.205
95% Gamma USL	0.248	0.251			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

k hat (KM)	5.969		nu hat (KM)	191	
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.239	0.24	95% Approx. Gamma UPL	0.194	0.194
95% Gamma USL	0.233	0.235			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.861	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.278	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.443	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.125	Mean in Log Scale	-2.125
SD in Original Scale	0.0405	SD in Log Scale	0.285
95% UTL95% Coverage	0.245	95% BCA UTL95% Coverage	0.21
95% Bootstrap (%) UTL95% Coverage	0.21	95% UPL (t)	0.2
90% Percentile (z)	0.172	95% Percentile (z)	0.191
99% Percentile (z)	0.232	95% USL	0.24

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.258	95% KM UTL (Lognormal)95% Coverage	0.247
KM SD of Logged Data	0.341	95% KM UPL (Lognormal)	0.194
95% KM Percentile Lognormal (z)	0.183	95% KM USL (Lognormal)	0.241

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0912	Mean in Log Scale	-2.561
SD in Original Scale	0.06	SD in Log Scale	0.565
95% UTL95% Coverage	0.322	95% UPL (t)	0.215
90% Percentile (z)	0.159	95% Percentile (z)	0.196
99% Percentile (z)	0.288	95% USL	0.307

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.21
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.21	95% USL	0.21
95% KM Chebyshev UPL	0.317		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,4,6,7,8-HpCDF

General Statistics

Total Number of Observations	16	Number of Distinct Observations	11
		Number of Missing Observations	4
Minimum	0.064	First Quartile	0.086
Second Largest	0.12	Median	0.102
Maximum	0.13	Third Quartile	0.11
Mean	0.0984	SD	0.0192
Coefficient of Variation	0.195	Skewness	-0.181
Mean of logged Data	-2.337	SD of logged Data	0.204

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.947	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.227	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.222	Data Not Normal at 5% Significance Level	

Data appear Approximate Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	0.147	90% Percentile (z)	0.123
95% UPL (t)	0.133	95% Percentile (z)	0.13
95% USL	0.145	99% Percentile (z)	0.143

Gamma GOF Test

A-D Test Statistic	0.5	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.736	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.242	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Data Not Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	26.72	k star (bias corrected MLE)	21.75
Theta hat (MLE)	0.00368	Theta star (bias corrected MLE)	0.00452
nu hat (MLE)	855.2	nu star (bias corrected)	696.2
MLE Mean (bias corrected)	0.0984	MLE Sd (bias corrected)	0.0211

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.137	90% Percentile	0.126
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.138	95% Percentile	0.136
95% WH Approx. Gamma UTL with 95% Coverage	0.155	99% Percentile	0.154
95% HW Approx. Gamma UTL with 95% Coverage	0.157		
95% WH USL	0.153	95% HW USL	0.154

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.937	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.238	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.222	Data Not Lognormal at 5% Significance Level	

Data appear Approximate Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	0.162	90% Percentile (z)	0.125
95% UPL (t)	0.14	95% Percentile (z)	0.135
95% USL	0.159	99% Percentile (z)	0.155

Nonparametric Distribution Free Background Statistics

Data appear Approximate Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	0.13
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	0.13	95% BCA Bootstrap UTL with 95% Coverage	0.13
95% UPL	0.13	90% Percentile	0.12
90% Chebyshev UPL	0.158	95% Percentile	0.123
95% Chebyshev UPL	0.185	99% Percentile	0.129
95% USL	0.13		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,4,7,8,9-HpCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	15
Minimum Detect	N/A	Minimum Non-Detect	0.042
Maximum Detect	N/A	Maximum Non-Detect	0.084
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,4,7,8,9-HpCDF was not processed!

Draft

Total HpCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	13	Number of Non-Detects	3
Number of Distinct Detects	11	Number of Distinct Non-Detects	3
Minimum Detect	0.063	Minimum Non-Detect	0.042
Maximum Detect	0.24	Maximum Non-Detect	0.063
Variance Detected	0.00391	Percent Non-Detects	18.75%
Mean Detected	0.124	SD Detected	0.0625
Mean of Detected Logged Data	-2.183	SD of Detected Logged Data	0.445

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.775	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.298	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.246	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.109	SD	0.063
95% UTL95% Coverage	0.268	95% KM UPL (t)	0.223
90% KM Percentile (z)	0.19	95% KM Percentile (z)	0.213
99% KM Percentile (z)	0.256	95% KM USL	0.263

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.106	SD	0.0685
95% UTL95% Coverage	0.279	95% UPL (t)	0.23
90% Percentile (z)	0.194	95% Percentile (z)	0.219
99% Percentile (z)	0.265	95% USL	0.273

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.995	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.736	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.244	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.237	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	5.199	k star (bias corrected MLE)	4.051
Theta hat (MLE)	0.0239	Theta star (bias corrected MLE)	0.0307
nu hat (MLE)	135.2	nu star (bias corrected)	105.3
MLE Mean (bias corrected)	0.124		
MLE Sd (bias corrected)	0.0618	95% Percentile of Chisquare (2k)	15.65

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0148	Mean	0.104
Maximum	0.24	Median	0.091
SD	0.0713	CV	0.686
k hat (MLE)	1.819	k star (bias corrected MLE)	1.519
Theta hat (MLE)	0.0571	Theta star (bias corrected MLE)	0.0684
nu hat (MLE)	58.2	nu star (bias corrected)	48.62
MLE Mean (bias corrected)	0.104	MLE Sd (bias corrected)	0.0843
95% Percentile of Chisquare (2k)	7.882	90% Percentile	0.216
95% Percentile	0.269	99% Percentile	0.391

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.411	0.455	95% Approx. Gamma UPL	0.285	0.302
95% Gamma USL	0.395	0.436			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	2.994		nu hat (KM)	95.8
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.312	0.322	95% Approx. Gamma UPL	0.235	0.238
95% Gamma USL	0.302	0.312			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.869	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.214	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.246	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.109	Mean in Log Scale	-2.372
SD in Original Scale	0.0653	SD in Log Scale	0.57
95% UTL95% Coverage	0.393	95% BCA UTL95% Coverage	0.24
95% Bootstrap (%) UTL95% Coverage	0.24	95% UPL (t)	0.261
90% Percentile (z)	0.194	95% Percentile (z)	0.238
99% Percentile (z)	0.351	95% USL	0.375

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.368	95% KM UTL (Lognormal)95% Coverage	0.371
KM SD of Logged Data	0.545	95% KM UPL (Lognormal)	0.251
95% KM Percentile Lognormal (z)	0.23	95% KM USL (Lognormal)	0.355

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.106	Mean in Log Scale	-2.456
SD in Original Scale	0.0685	SD in Log Scale	0.713
95% UTL95% Coverage	0.519	95% UPL (t)	0.311
90% Percentile (z)	0.214	95% Percentile (z)	0.277
99% Percentile (z)	0.451	95% USL	0.49

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.24
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.24	95% USL	0.24
95% KM Chebyshev UPL	0.392		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,4,6,7,8-HpCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	11		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	11
Minimum Detect	N/A	Minimum Non-Detect	0.093
Maximum Detect	N/A	Maximum Non-Detect	0.34
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,4,6,7,8-HpCDD was not processed!

Draft

Total HpCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	15	Number of Non-Detects	1
Number of Distinct Detects	12	Number of Distinct Non-Detects	1
Minimum Detect	0.093	Minimum Non-Detect	0.052
Maximum Detect	0.73	Maximum Non-Detect	0.052
Variance Detected	0.0319	Percent Non-Detects	6.25%
Mean Detected	0.324	SD Detected	0.178
Mean of Detected Logged Data	-1.261	SD of Detected Logged Data	0.536

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.877	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.881	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.176	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.229	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.307	SD	0.179
95% UTL95% Coverage	0.759	95% KM UPL (t)	0.631
90% KM Percentile (z)	0.536	95% KM Percentile (z)	0.602
99% KM Percentile (z)	0.724	95% KM USL	0.745

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.305	SD	0.188
95% UTL95% Coverage	0.779	95% UPL (t)	0.644
90% Percentile (z)	0.546	95% Percentile (z)	0.614
99% Percentile (z)	0.742	95% USL	0.764

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.344	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.74	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.146	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.223	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	3.93	k star (bias corrected MLE)	3.189
Theta hat (MLE)	0.0823	Theta star (bias corrected MLE)	0.101
nu hat (MLE)	117.9	nu star (bias corrected)	95.66
MLE Mean (bias corrected)	0.324		
MLE Sd (bias corrected)	0.181	95% Percentile of Chisquare (2k)	13.15

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.013	Mean	0.304
Maximum	0.73	Median	0.265
SD	0.189	CV	0.622
k hat (MLE)	2.05	k star (bias corrected MLE)	1.708
Theta hat (MLE)	0.148	Theta star (bias corrected MLE)	0.178
nu hat (MLE)	65.61	nu star (bias corrected)	54.64
MLE Mean (bias corrected)	0.304	MLE Sd (bias corrected)	0.233
95% Percentile of Chisquare (2k)	8.523	90% Percentile	0.614
95% Percentile	0.759	99% Percentile	1.083

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	1.119	1.256	95% Approx. Gamma UPL	0.792	0.849
95% Gamma USL	1.079	1.204			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

k hat (KM)	2.919		nu hat (KM)	93.42	
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.948	1.004	95% Approx. Gamma UPL	0.699	0.72
95% Gamma USL	0.918	0.968			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.957	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.881	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.132	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.229	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.308	Mean in Log Scale	-1.342
SD in Original Scale	0.183	SD in Log Scale	0.612
95% UTL95% Coverage	1.223	95% BCA UTL95% Coverage	0.73
95% Bootstrap (%) UTL95% Coverage	0.73	95% UPL (t)	0.789
90% Percentile (z)	0.572	95% Percentile (z)	0.714
99% Percentile (z)	1.083	95% USL	1.164

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-1.367	95% KM UTL (Lognormal)95% Coverage	1.307
KM SD of Logged Data	0.648	95% KM UPL (Lognormal)	0.822
95% KM Percentile Lognormal (z)	0.74	95% KM USL (Lognormal)	1.24

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.305	Mean in Log Scale	-1.41
SD in Original Scale	0.188	SD in Log Scale	0.79
95% UTL95% Coverage	1.793	95% UPL (t)	1.018
90% Percentile (z)	0.672	95% Percentile (z)	0.895
99% Percentile (z)	1.534	95% USL	1.683

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.73
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.73	95% USL	0.73
95% KM Chebyshev UPL	1.113		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

OCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	11		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	11
Minimum Detect	N/A	Minimum Non-Detect	0.15
Maximum Detect	N/A	Maximum Non-Detect	0.37
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable OCDF was not processed!

OCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	13
Minimum Detect	2.6	Minimum Non-Detect	0.53
Maximum Detect	2.6	Maximum Non-Detect	2.2
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	2.6	SD Detected	N/A
Mean of Detected Logged Data	0.956	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
s suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable OCDD was not processed!

Draft

Perchlorate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	12		
Number of Detects	12	Number of Non-Detects	4
Number of Distinct Detects	11	Number of Distinct Non-Detects	2
Minimum Detect	0.3	Minimum Non-Detect	0.29
Maximum Detect	3.9	Maximum Non-Detect	0.3
Variance Detected	1.155	Percent Non-Detects	25%
Mean Detected	1.051	SD Detected	1.075
Mean of Detected Logged Data	-0.314	SD of Detected Logged Data	0.837

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.728	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.859	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.295	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.256	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.861	SD	0.95
95% UTL95% Coverage	3.259	95% KM UPL (t)	2.577
90% KM Percentile (z)	2.078	95% KM Percentile (z)	2.423
99% KM Percentile (z)	3.071	95% KM USL	3.182

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.825	SD	1.005
95% UTL95% Coverage	3.362	95% UPL (t)	2.641
90% Percentile (z)	2.113	95% Percentile (z)	2.478
99% Percentile (z)	3.163	95% USL	3.281

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.809	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.745	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.252	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.249	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.52	k star (bias corrected MLE)	1.195
Theta hat (MLE)	0.692	Theta star (bias corrected MLE)	0.879
nu hat (MLE)	36.47	nu star (bias corrected)	28.69
MLE Mean (bias corrected)	1.051		
MLE Sd (bias corrected)	0.961	95% Percentile of Chisquare (2k)	6.728

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.791
Maximum	3.9	Median	0.415
SD	1.031	CV	1.305
k hat (MLE)	0.544	k star (bias corrected MLE)	0.484
Theta hat (MLE)	1.453	Theta star (bias corrected MLE)	1.634
nu hat (MLE)	17.42	nu star (bias corrected)	15.48
MLE Mean (bias corrected)	0.791	MLE Sd (bias corrected)	1.137
95% Percentile of Chisquare (2k)	3.761	90% Percentile	2.154
95% Percentile	3.073	99% Percentile	5.341

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	5.609	7.082	95% Approx. Gamma UPL	3.285	3.749
95% Gamma USL	5.305	6.625			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	0.821		nu hat (KM)	26.26
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	3.627	3.749	95% Approx. Gamma UPL	2.44	2.437
95% Gamma USL	3.478	3.58			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.889	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.216	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.256	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.814	Mean in Log Scale	-0.815
SD in Original Scale	1.014	SD in Log Scale	1.156
95% UTL95% Coverage	8.191	95% BCA UTL95% Coverage	3.9
95% Bootstrap (%) UTL95% Coverage	3.9	95% UPL (t)	3.575
90% Percentile (z)	1.947	95% Percentile (z)	2.964
99% Percentile (z)	6.518	95% USL	7.461

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-0.545	95% KM UTL (Lognormal)95% Coverage	4.381
KM SD of Logged Data	0.801	95% KM UPL (Lognormal)	2.467
95% KM Percentile Lognormal (z)	2.166	95% KM USL (Lognormal)	4.107

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.825	Mean in Log Scale	-0.714
SD in Original Scale	1.005	SD in Log Scale	1.013
95% UTL95% Coverage	6.314	95% UPL (t)	3.054
90% Percentile (z)	1.793	95% Percentile (z)	2.591
99% Percentile (z)	5.168	95% USL	5.818

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	3.9
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	3.9	95% USL	3.9
95% KM Chebyshev UPL	5.129		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

2,4-Dinitrotoluene3

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,4-Dinitrotoluene3 was not processed!

2,4-Dinitrotoluene4

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	100
Maximum Detect	N/A	Maximum Non-Detect	100
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,4-Dinitrotoluene4 was not processed!

Hexahydro-trinitro-triazine (RDX)

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	500
Maximum Detect	N/A	Maximum Non-Detect	500
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Hexahydro-trinitro-triazine (RDX) was not processed!

Nitroglycerine

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	500
Maximum Detect	N/A	Maximum Non-Detect	500
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Nitroglycerine was not processed!

Draft

Inorganic Arsenic

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	0.512	First Quartile	0.754
Second Largest	1.61	Median	0.988
Maximum	1.66	Third Quartile	1.385
Mean	1.057	SD	0.382
Coefficient of Variation	0.361	Skewness	0.303
Mean of logged Data	-0.0085	SD of logged Data	0.372

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.913	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.214	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	2.02	90% Percentile (z)	1.546
95% UPL (t)	1.747	95% Percentile (z)	1.685
95% USL	1.99	99% Percentile (z)	1.945

Gamma GOF Test

A-D Test Statistic	0.527	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.74	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.209	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	8.034	k star (bias corrected MLE)	6.57
Theta hat (MLE)	0.132	Theta star (bias corrected MLE)	0.161
nu hat (MLE)	257.1	nu star (bias corrected)	210.2
MLE Mean (bias corrected)	1.057	MLE Sd (bias corrected)	0.412

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	1.853	90% Percentile	1.607
95% Hawkins Wixley (HW) Approx. Gamma UPL	1.872	95% Percentile	1.813
95% WH Approx. Gamma UTL with 95% Coverage	2.284	99% Percentile	2.243
95% HW Approx. Gamma UTL with 95% Coverage	2.336		
95% WH USL	2.233	95% HW USL	2.28

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.931	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.193	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	2.537	90% Percentile (z)	1.598
95% UPL (t)	1.943	95% Percentile (z)	1.829
95% USL	2.462	99% Percentile (z)	2.357

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	1.66
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	1.66	95% BCA Bootstrap UTL with 95% Coverage	1.66
95% UPL	1.66	90% Percentile	1.575
90% Chebyshev UPL	2.238	95% Percentile	1.623
95% Chebyshev UPL	2.772	99% Percentile	1.653
95% USL	1.66		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Arsenic(III)

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	0.42	First Quartile	0.675
Second Largest	1.32	Median	0.796
Maximum	1.45	Third Quartile	1.138
Mean	0.899	SD	0.309
Coefficient of Variation	0.344	Skewness	0.331
Mean of logged Data	-0.165	SD of logged Data	0.356

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.943	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.187	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	1.678	90% Percentile (z)	1.294
95% UPL (t)	1.457	95% Percentile (z)	1.407
95% USL	1.653	99% Percentile (z)	1.617

Gamma GOF Test

A-D Test Statistic	0.365	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.74	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.161	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	8.838	k star (bias corrected MLE)	7.222
Theta hat (MLE)	0.102	Theta star (bias corrected MLE)	0.124
nu hat (MLE)	282.8	nu star (bias corrected)	231.1
MLE Mean (bias corrected)	0.899	MLE Sd (bias corrected)	0.334

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	1.54	90% Percentile	1.345
95% Hawkins Wixley (HW) Approx. Gamma UPL	1.556	95% Percentile	1.51
95% WH Approx. Gamma UTL with 95% Coverage	1.884	99% Percentile	1.853
95% HW Approx. Gamma UTL with 95% Coverage	1.924		
95% WH USL	1.843	95% HW USL	1.88

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.957	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.15	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	2.083	90% Percentile (z)	1.338
95% UPL (t)	1.614	95% Percentile (z)	1.523
95% USL	2.024	99% Percentile (z)	1.941

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	1.45
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	1.45	95% BCA Bootstrap UTL with 95% Coverage	1.45
95% UPL	1.45	90% Percentile	1.3
90% Chebyshev UPL	1.854	95% Percentile	1.353
95% Chebyshev UPL	2.287	99% Percentile	1.431
95% USL	1.45		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Arsenic(V)

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	13	Number of Non-Detects	3
Number of Distinct Detects	13	Number of Distinct Non-Detects	2
Minimum Detect	0.087	Minimum Non-Detect	0.078
Maximum Detect	0.535	Maximum Non-Detect	0.08
Variance Detected	0.0132	Percent Non-Detects	18.75%
Mean Detected	0.184	SD Detected	0.115
Mean of Detected Logged Data	-1.822	SD of Detected Logged Data	0.493

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.666	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.309	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.246	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.164	SD	0.108
95% UTL95% Coverage	0.436	95% KM UPL (t)	0.359
90% KM Percentile (z)	0.302	95% KM Percentile (z)	0.341
99% KM Percentile (z)	0.415	95% KM USL	0.427

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.157	SD	0.118
95% UTL95% Coverage	0.455	95% UPL (t)	0.37
90% Percentile (z)	0.308	95% Percentile (z)	0.351
99% Percentile (z)	0.431	95% USL	0.445

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.976	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.737	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.229	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.238	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	4.115	k star (bias corrected MLE)	3.216
Theta hat (MLE)	0.0446	Theta star (bias corrected MLE)	0.0571
nu hat (MLE)	107	nu star (bias corrected)	83.63
MLE Mean (bias corrected)	0.184		
MLE Sd (bias corrected)	0.102	95% Percentile of Chisquare (2k)	13.24

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.152
Maximum	0.535	Median	0.17
SD	0.124	CV	0.817
k hat (MLE)	1.337	k star (bias corrected MLE)	1.128
Theta hat (MLE)	0.113	Theta star (bias corrected MLE)	0.134
nu hat (MLE)	42.78	nu star (bias corrected)	36.09
MLE Mean (bias corrected)	0.152	MLE Sd (bias corrected)	0.143
95% Percentile of Chisquare (2k)	6.478	90% Percentile	0.339
95% Percentile	0.435	99% Percentile	0.657

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.694	0.797	95% Approx. Gamma UPL	0.463	0.502
95% Gamma USL	0.665	0.758			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

k hat (KM)	2.306		nu hat (KM)	73.78	
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.463	0.472	95% Approx. Gamma UPL	0.349	0.35
95% Gamma USL	0.449	0.457			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.851	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.208	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.246	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Approximate Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.159	Mean in Log Scale	-2.025
SD in Original Scale	0.115	SD in Log Scale	0.622
95% UTL95% Coverage	0.634	95% BCA UTL95% Coverage	0.535
95% Bootstrap (%) UTL95% Coverage	0.535	95% UPL (t)	0.406
90% Percentile (z)	0.293	95% Percentile (z)	0.367
99% Percentile (z)	0.561	95% USL	0.603

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-1.958	95% KM UTL (Lognormal)95% Coverage	0.515
KM SD of Logged Data	0.513	95% KM UPL (Lognormal)	0.356
95% KM Percentile Lognormal (z)	0.328	95% KM USL (Lognormal)	0.494

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.157	Mean in Log Scale	-2.085
SD in Original Scale	0.118	SD in Log Scale	0.718
95% UTL95% Coverage	0.761	95% UPL (t)	0.455
90% Percentile (z)	0.312	95% Percentile (z)	0.405
99% Percentile (z)	0.66	95% USL	0.718

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.535
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.535	95% USL	0.535
95% KM Chebyshev UPL	0.648		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Dimethyl Arsenic

General Statistics

Total Number of Observations	16	Number of Distinct Observations	15
		Number of Missing Observations	4
Minimum	0.103	First Quartile	0.142
Second Largest	0.287	Median	0.195
Maximum	0.3	Third Quartile	0.269
Mean	0.205	SD	0.0664
Coefficient of Variation	0.324	Skewness	0.0484
Mean of logged Data	-1.637	SD of logged Data	0.343

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.918	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.162	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	0.373	90% Percentile (z)	0.29
95% UPL (t)	0.325	95% Percentile (z)	0.314
95% USL	0.367	99% Percentile (z)	0.36

Gamma GOF Test

A-D Test Statistic	0.501	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.739	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.176	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	9.588	k star (bias corrected MLE)	7.832
Theta hat (MLE)	0.0214	Theta star (bias corrected MLE)	0.0262
nu hat (MLE)	306.8	nu star (bias corrected)	250.6
MLE Mean (bias corrected)	0.205	MLE Sd (bias corrected)	0.0733

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.345	90% Percentile	0.303
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.349	95% Percentile	0.339
95% WH Approx. Gamma UTL with 95% Coverage	0.42	99% Percentile	0.413
95% HW Approx. Gamma UTL with 95% Coverage	0.428		
95% WH USL	0.411	95% HW USL	0.419

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.924	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.17	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	0.463	90% Percentile (z)	0.302
95% UPL (t)	0.362	95% Percentile (z)	0.342
95% USL	0.45	99% Percentile (z)	0.433

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	0.3
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	0.3	95% BCA Bootstrap UTL with 95% Coverage	0.3
95% UPL	0.3	90% Percentile	0.287
90% Chebyshev UPL	0.411	95% Percentile	0.29
95% Chebyshev UPL	0.504	99% Percentile	0.298
95% USL	0.3		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Monomethyl Arsenic

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	2		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	1
Minimum Detect	0.011	Minimum Non-Detect	0.008
Maximum Detect	0.011	Maximum Non-Detect	0.008
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	0.011	SD Detected	N/A
Mean of Detected Logged Data	-4.51	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
s suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Monomethyl Arsenic was not processed!

Draft

Aluminum

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	31.6	First Quartile	200.5
Second Largest	448	Median	257
Maximum	630	Third Quartile	349.8
Mean	278.5	SD	144.1
Coefficient of Variation	0.518	Skewness	0.781
Mean of logged Data	5.465	SD of logged Data	0.681

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.955	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.194	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	642.3	90% Percentile (z)	463.2
95% UPL (t)	538.9	95% Percentile (z)	515.6
95% USL	630.6	99% Percentile (z)	613.8

Gamma GOF Test

A-D Test Statistic	0.364	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.744	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.139	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.217	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.191	k star (bias corrected MLE)	2.634
Theta hat (MLE)	87.27	Theta star (bias corrected MLE)	105.7
nu hat (MLE)	102.1	nu star (bias corrected)	84.3
MLE Mean (bias corrected)	278.5	MLE Sd (bias corrected)	171.6

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	628.9	90% Percentile	508.4
95% Hawkins Wixley (HW) Approx. Gamma UPL	656.9	95% Percentile	607
95% WH Approx. Gamma UTL with 95% Coverage	846.9	99% Percentile	822.3
95% HW Approx. Gamma UTL with 95% Coverage	912.7		
95% WH USL	820.1	95% HW USL	880.7

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.865	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.187	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Approximate Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	1316	90% Percentile (z)	565
95% UPL (t)	807.9	95% Percentile (z)	723.5
95% USL	1246	99% Percentile (z)	1151

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	630
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	630	95% BCA Bootstrap UTL with 95% Coverage	630
95% UPL	630	90% Percentile	435.5
90% Chebyshev UPL	724.2	95% Percentile	493.5
95% Chebyshev UPL	926.1	99% Percentile	602.7
95% USL	630		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Antimony

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	6		
Number of Detects	10	Number of Non-Detects	6
Number of Distinct Detects	5	Number of Distinct Non-Detects	1
Minimum Detect	0.008	Minimum Non-Detect	0.007
Maximum Detect	0.03	Maximum Non-Detect	0.007
Variance Detected	5.7878E-5	Percent Non-Detects	37.5%
Mean Detected	0.0131	SD Detected	0.00761
Mean of Detected Logged Data	-4.456	SD of Detected Logged Data	0.49

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.725	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.358	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.28	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0108	SD	0.00642
95% UTL95% Coverage	0.027	95% KM UPL (t)	0.0224
90% KM Percentile (z)	0.019	95% KM Percentile (z)	0.0214
99% KM Percentile (z)	0.0258	95% KM USL	0.0265

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0095	SD	0.0076
95% UTL95% Coverage	0.0287	95% UPL (t)	0.0232
90% Percentile (z)	0.0192	95% Percentile (z)	0.022
99% Percentile (z)	0.0272	95% USL	0.0281

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.198	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.729	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.344	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.268	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	4.281	k star (bias corrected MLE)	3.063
Theta hat (MLE)	0.00306	Theta star (bias corrected MLE)	0.00428
nu hat (MLE)	85.61	nu star (bias corrected)	61.26
MLE Mean (bias corrected)	0.0131		
MLE Sd (bias corrected)	0.00749	95% Percentile of Chisquare (2k)	12.78

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.008	Mean	0.0119
Maximum	0.03	Median	0.01
SD	0.00609	CV	0.51
k hat (MLE)	6.103	k star (bias corrected MLE)	5
Theta hat (MLE)	0.00196	Theta star (bias corrected MLE)	0.00239
nu hat (MLE)	195.3	nu star (bias corrected)	160
MLE Mean (bias corrected)	0.0119	MLE Sd (bias corrected)	0.00534
95% Percentile of Chisquare (2k)	18.31	90% Percentile	0.0191
95% Percentile	0.0219	99% Percentile	0.0277

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0282	0.0284	95% Approx. Gamma UPL	0.0223	0.0222
95% Gamma USL	0.0275	0.0276			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

k hat (KM)	2.832		nu hat (KM)	90.63	
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0281	0.0283	95% Approx. Gamma UPL	0.0216	0.0216
95% Gamma USL	0.0273	0.0275			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.769	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.319	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.28	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.00952	Mean in Log Scale	-4.919
SD in Original Scale	0.00762	SD in Log Scale	0.751
95% UTL95% Coverage	0.0486	95% BCA UTL95% Coverage	0.03
95% Bootstrap (%) UTL95% Coverage	0.03	95% UPL (t)	0.0284
90% Percentile (z)	0.0191	95% Percentile (z)	0.0251
99% Percentile (z)	0.0419	95% USL	0.0457

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0095	Mean in Log Scale	-4.906
SD in Original Scale	0.0076	SD in Log Scale	0.709
95% UTL95% Coverage	0.0443	95% UPL (t)	0.0267
90% Percentile (z)	0.0184	95% Percentile (z)	0.0238
99% Percentile (z)	0.0385	95% USL	0.0419

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.03
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.03	95% USL	0.03
95% KM Chebyshev UPL	0.0397		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Arsenic

General Statistics

Total Number of Observations	16	Number of Distinct Observations	15
		Number of Missing Observations	4
Minimum	1.8	First Quartile	2.12
Second Largest	3.2	Median	2.23
Maximum	3.76	Third Quartile	2.635
Mean	2.406	SD	0.51
Coefficient of Variation	0.212	Skewness	1.446
Mean of logged Data	0.859	SD of logged Data	0.194

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.872	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.215	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level

Data appear Approximate Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	3.692	90% Percentile (z)	3.059
95% UPL (t)	3.327	95% Percentile (z)	3.244
95% USL	3.651	99% Percentile (z)	3.592

Gamma GOF Test

A-D Test Statistic	0.545	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.736	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.2	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	26.93	k star (bias corrected MLE)	21.92
Theta hat (MLE)	0.0893	Theta star (bias corrected MLE)	0.11
nu hat (MLE)	861.7	nu star (bias corrected)	701.5
MLE Mean (bias corrected)	2.406	MLE Sd (bias corrected)	0.514

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	3.341	90% Percentile	3.083
95% Hawkins Wixley (HW) Approx. Gamma UPL	3.343	95% Percentile	3.308
95% WH Approx. Gamma UTL with 95% Coverage	3.786	99% Percentile	3.759
95% HW Approx. Gamma UTL with 95% Coverage	3.802		
95% WH USL	3.734	95% HW USL	3.748

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.929	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.188	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	3.856	90% Percentile (z)	3.029
95% UPL (t)	3.354	95% Percentile (z)	3.25
95% USL	3.796	99% Percentile (z)	3.71

Nonparametric Distribution Free Background Statistics

Data appear Approximate Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	3.76
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	3.76	95% BCA Bootstrap UTL with 95% Coverage	3.76
95% UPL	3.76	90% Percentile	2.96
90% Chebyshev UPL	3.982	95% Percentile	3.34
95% Chebyshev UPL	4.696	99% Percentile	3.676
95% USL	3.76		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Barium

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	0.44	First Quartile	1.105
Second Largest	2.09	Median	1.46
Maximum	3.11	Third Quartile	1.815
Mean	1.503	SD	0.628
Coefficient of Variation	0.418	Skewness	0.839
Mean of logged Data	0.319	SD of logged Data	0.456

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.956	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.112	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	3.088	90% Percentile (z)	2.308
95% UPL (t)	2.638	95% Percentile (z)	2.536
95% USL	3.037	99% Percentile (z)	2.964

Gamma GOF Test

A-D Test Statistic	0.174	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.741	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.102	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.216	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	5.812	k star (bias corrected MLE)	4.764
Theta hat (MLE)	0.258	Theta star (bias corrected MLE)	0.315
nu hat (MLE)	186	nu star (bias corrected)	152.5
MLE Mean (bias corrected)	1.503	MLE Sd (bias corrected)	0.688

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	2.856	90% Percentile	2.424
95% Hawkins Wixley (HW) Approx. Gamma UPL	2.908	95% Percentile	2.784
95% WH Approx. Gamma UTL with 95% Coverage	3.622	99% Percentile	3.546
95% HW Approx. Gamma UTL with 95% Coverage	3.753		
95% WH USL	3.53	95% HW USL	3.65

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.959	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.117	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	4.344	90% Percentile (z)	2.466
95% UPL (t)	3.133	95% Percentile (z)	2.91
95% USL	4.187	99% Percentile (z)	3.97

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	3.11
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	3.11	95% BCA Bootstrap UTL with 95% Coverage	3.11
95% UPL	3.11	90% Percentile	2.07
90% Chebyshev UPL	3.445	95% Percentile	2.345
95% Chebyshev UPL	4.325	99% Percentile	2.957
95% USL	3.11		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Beryllium

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	0.03
Maximum Detect	N/A	Maximum Non-Detect	0.03
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Beryllium was not processed!

Draft

Cadmium

General Statistics

Total Number of Observations	16	Number of Distinct Observations	7
		Number of Missing Observations	4
Minimum	0.03	First Quartile	0.05
Second Largest	0.08	Median	0.065
Maximum	0.09	Third Quartile	0.08
Mean	0.0631	SD	0.0174
Coefficient of Variation	0.276	Skewness	-0.377
Mean of logged Data	-2.804	SD of logged Data	0.31

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.945	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.154	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	0.107	90% Percentile (z)	0.0854
95% UPL (t)	0.0946	95% Percentile (z)	0.0918
95% USL	0.106	99% Percentile (z)	0.104

Gamma GOF Test

A-D Test Statistic	0.527	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.738	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.178	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	12.24	k star (bias corrected MLE)	9.988
Theta hat (MLE)	0.00516	Theta star (bias corrected MLE)	0.00632
nu hat (MLE)	391.7	nu star (bias corrected)	319.6
MLE Mean (bias corrected)	0.0631	MLE Sd (bias corrected)	0.02

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.101	90% Percentile	0.0897
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.102	95% Percentile	0.0992
95% WH Approx. Gamma UTL with 95% Coverage	0.12	99% Percentile	0.119
95% HW Approx. Gamma UTL with 95% Coverage	0.123		
95% WH USL	0.118	95% HW USL	0.12

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.91	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.18	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	0.132	90% Percentile (z)	0.0901
95% UPL (t)	0.106	95% Percentile (z)	0.101
95% USL	0.129	99% Percentile (z)	0.125

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	0.09
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	0.09	95% BCA Bootstrap UTL with 95% Coverage	0.09
95% UPL	0.09	90% Percentile	0.08
90% Chebyshev UPL	0.117	95% Percentile	0.0825
95% Chebyshev UPL	0.141	99% Percentile	0.0885
95% USL	0.09		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Chromium

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	0.164	First Quartile	1.423
Second Largest	3.08	Median	1.82
Maximum	4.19	Third Quartile	2.135
Mean	1.872	SD	0.906
Coefficient of Variation	0.484	Skewness	0.786
Mean of logged Data	0.464	SD of logged Data	0.713

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.93	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.178	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	4.158	90% Percentile (z)	3.033
95% UPL (t)	3.509	95% Percentile (z)	3.362
95% USL	4.085	99% Percentile (z)	3.979

Gamma GOF Test

A-D Test Statistic	0.793	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.744	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.228	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.217	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.219	k star (bias corrected MLE)	2.657
Theta hat (MLE)	0.581	Theta star (bias corrected MLE)	0.704
nu hat (MLE)	103	nu star (bias corrected)	85.04
MLE Mean (bias corrected)	1.872	MLE Sd (bias corrected)	1.148

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	4.205	90% Percentile	3.411
95% Hawkins Wixley (HW) Approx. Gamma UPL	4.437	95% Percentile	4.07
95% WH Approx. Gamma UTL with 95% Coverage	5.647	99% Percentile	5.507
95% HW Approx. Gamma UTL with 95% Coverage	6.164		
95% WH USL	5.47	95% HW USL	5.948

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.77	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.28	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.222	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	9.623	90% Percentile (z)	3.966
95% UPL (t)	5.77	95% Percentile (z)	5.14
95% USL	9.085	99% Percentile (z)	8.358

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	4.19
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	4.19	95% BCA Bootstrap UTL with 95% Coverage	4.19
95% UPL	4.19	90% Percentile	2.71
90% Chebyshev UPL	4.673	95% Percentile	3.358
95% Chebyshev UPL	5.941	99% Percentile	4.024
95% USL	4.19		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Cobalt

General Statistics

Total Number of Observations	16	Number of Distinct Observations	12
		Number of Missing Observations	4
Minimum	0.05	First Quartile	0.155
Second Largest	0.32	Median	0.165
Maximum	0.35	Third Quartile	0.213
Mean	0.184	SD	0.0753
Coefficient of Variation	0.408	Skewness	0.65
Mean of logged Data	-1.779	SD of logged Data	0.462

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.938	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.147	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	0.374	90% Percentile (z)	0.281
95% UPL (t)	0.32	95% Percentile (z)	0.308
95% USL	0.368	99% Percentile (z)	0.359

Gamma GOF Test

A-D Test Statistic	0.435	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.741	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.173	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.216	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	5.816	k star (bias corrected MLE)	4.767
Theta hat (MLE)	0.0317	Theta star (bias corrected MLE)	0.0387
nu hat (MLE)	186.1	nu star (bias corrected)	152.5
MLE Mean (bias corrected)	0.184	MLE Sd (bias corrected)	0.0844

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.35	90% Percentile	0.297
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.358	95% Percentile	0.342
95% WH Approx. Gamma UTL with 95% Coverage	0.444	99% Percentile	0.435
95% HW Approx. Gamma UTL with 95% Coverage	0.462		
95% WH USL	0.433	95% HW USL	0.449

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.913	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.204	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	0.542	90% Percentile (z)	0.305
95% UPL (t)	0.389	95% Percentile (z)	0.361
95% USL	0.522	99% Percentile (z)	0.495

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	0.35
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	0.35	95% BCA Bootstrap UTL with 95% Coverage	0.35
95% UPL	0.35	90% Percentile	0.275
90% Chebyshev UPL	0.417	95% Percentile	0.328
95% Chebyshev UPL	0.523	99% Percentile	0.346
95% USL	0.35		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Copper

General Statistics

Total Number of Observations	16	Number of Distinct Observations	14
		Number of Missing Observations	4
Minimum	0.4	First Quartile	0.475
Second Largest	0.83	Median	0.565
Maximum	0.87	Third Quartile	0.68
Mean	0.593	SD	0.148
Coefficient of Variation	0.249	Skewness	0.342
Mean of logged Data	-0.552	SD of logged Data	0.251

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.941	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.125	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	0.966	90% Percentile (z)	0.783
95% UPL (t)	0.86	95% Percentile (z)	0.836
95% USL	0.954	99% Percentile (z)	0.937

Gamma GOF Test

A-D Test Statistic	0.334	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.737	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.14	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	17.21	k star (bias corrected MLE)	14.02
Theta hat (MLE)	0.0345	Theta star (bias corrected MLE)	0.0423
nu hat (MLE)	550.6	nu star (bias corrected)	448.7
MLE Mean (bias corrected)	0.593	MLE Sd (bias corrected)	0.158

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.887	90% Percentile	0.803
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.891	95% Percentile	0.875
95% WH Approx. Gamma UTL with 95% Coverage	1.033	99% Percentile	1.022
95% HW Approx. Gamma UTL with 95% Coverage	1.044		
95% WH USL	1.016	95% HW USL	1.026

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.942	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.144	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	1.086	90% Percentile (z)	0.795
95% UPL (t)	0.907	95% Percentile (z)	0.871
95% USL	1.064	99% Percentile (z)	1.033

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	0.87
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	0.87	95% BCA Bootstrap UTL with 95% Coverage	0.87
95% UPL	0.87	90% Percentile	0.78
90% Chebyshev UPL	1.05	95% Percentile	0.84
95% Chebyshev UPL	1.257	99% Percentile	0.864
95% USL	0.87		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Iron

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	46.6	First Quartile	394.5
Second Largest	761	Median	463
Maximum	932	Third Quartile	642
Mean	489.7	SD	219.2
Coefficient of Variation	0.448	Skewness	-0.0223
Mean of logged Data	6.037	SD of logged Data	0.702

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.985	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.126	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	1043	90% Percentile (z)	770.7
95% UPL (t)	885.9	95% Percentile (z)	850.4
95% USL	1025	99% Percentile (z)	999.8

Gamma GOF Test

A-D Test Statistic	0.656	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.743	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.2	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.216	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.34	k star (bias corrected MLE)	2.756
Theta hat (MLE)	146.6	Theta star (bias corrected MLE)	177.7
nu hat (MLE)	106.9	nu star (bias corrected)	88.18
MLE Mean (bias corrected)	489.7	MLE Sd (bias corrected)	295

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	1090	90% Percentile	885.2
95% Hawkins Wixley (HW) Approx. Gamma UPL	1151	95% Percentile	1053
95% WH Approx. Gamma UTL with 95% Coverage	1458	99% Percentile	1420
95% HW Approx. Gamma UTL with 95% Coverage	1593		
95% WH USL	1413	95% HW USL	1537

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.782	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.24	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.222	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	2463	90% Percentile (z)	1029
95% UPL (t)	1489	95% Percentile (z)	1328
95% USL	2327	99% Percentile (z)	2144

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	932
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	932	95% BCA Bootstrap UTL with 95% Coverage	932
95% UPL	932	90% Percentile	722.5
90% Chebyshev UPL	1168	95% Percentile	803.8
95% Chebyshev UPL	1475	99% Percentile	906.4
95% USL	932		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Lead

General Statistics

Total Number of Observations	16	Number of Distinct Observations	14
		Number of Missing Observations	4
Minimum	0.3	First Quartile	0.41
Second Largest	0.7	Median	0.55
Maximum	0.81	Third Quartile	0.663
Mean	0.524	SD	0.155
Coefficient of Variation	0.295	Skewness	0.0705
Mean of logged Data	-0.689	SD of logged Data	0.311

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.952	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.122	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	0.915	90% Percentile (z)	0.722
95% UPL (t)	0.804	95% Percentile (z)	0.779
95% USL	0.902	99% Percentile (z)	0.884

Gamma GOF Test

A-D Test Statistic	0.385	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.739	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.141	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	11.62	k star (bias corrected MLE)	9.482
Theta hat (MLE)	0.0451	Theta star (bias corrected MLE)	0.0553
nu hat (MLE)	371.8	nu star (bias corrected)	303.4
MLE Mean (bias corrected)	0.524	MLE Sd (bias corrected)	0.17

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.847	90% Percentile	0.751
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.854	95% Percentile	0.832
95% WH Approx. Gamma UTL with 95% Coverage	1.013	99% Percentile	0.999
95% HW Approx. Gamma UTL with 95% Coverage	1.032		
95% WH USL	0.994	95% HW USL	1.011

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.937	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.155	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	1.101	90% Percentile (z)	0.748
95% UPL (t)	0.881	95% Percentile (z)	0.838
95% USL	1.074	99% Percentile (z)	1.036

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	0.81
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	0.81	95% BCA Bootstrap UTL with 95% Coverage	0.81
95% UPL	0.81	90% Percentile	0.685
90% Chebyshev UPL	1.002	95% Percentile	0.728
95% Chebyshev UPL	1.219	99% Percentile	0.794
95% USL	0.81		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Manganese

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	1.56	First Quartile	5.68
Second Largest	11.9	Median	7.35
Maximum	17.8	Third Quartile	9.93
Mean	8.051	SD	3.876
Coefficient of Variation	0.481	Skewness	0.819
Mean of logged Data	1.959	SD of logged Data	0.565

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.949	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.151	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	17.83	90% Percentile (z)	13.02
95% UPL (t)	15.06	95% Percentile (z)	14.43
95% USL	17.52	99% Percentile (z)	17.07

Gamma GOF Test

A-D Test Statistic	0.294	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.742	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.142	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.216	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	4.101	k star (bias corrected MLE)	3.374
Theta hat (MLE)	1.963	Theta star (bias corrected MLE)	2.386
nu hat (MLE)	131.2	nu star (bias corrected)	108
MLE Mean (bias corrected)	8.051	MLE Sd (bias corrected)	4.383

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	16.87	90% Percentile	13.93
95% Hawkins Wixley (HW) Approx. Gamma UPL	17.36	95% Percentile	16.35
95% WH Approx. Gamma UTL with 95% Coverage	22.14	99% Percentile	21.55
95% HW Approx. Gamma UTL with 95% Coverage	23.34		
95% WH USL	21.5	95% HW USL	22.6

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.92	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.178	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	29.52	90% Percentile (z)	14.63
95% UPL (t)	19.68	95% Percentile (z)	17.96
95% USL	28.2	99% Percentile (z)	26.4

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	17.8
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	17.8	95% BCA Bootstrap UTL with 95% Coverage	17.8
95% UPL	17.8	90% Percentile	11.85
90% Chebyshev UPL	20.04	95% Percentile	13.38
95% Chebyshev UPL	25.47	99% Percentile	16.92
95% USL	17.8		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Mercury

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	1.02	First Quartile	1.9
Second Largest	3.24	Median	2.175
Maximum	3.33	Third Quartile	2.568
Mean	2.278	SD	0.616
Coefficient of Variation	0.27	Skewness	0.131
Mean of logged Data	0.786	SD of logged Data	0.293

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.954	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.121	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	3.832	90% Percentile (z)	3.067
95% UPL (t)	3.39	95% Percentile (z)	3.29
95% USL	3.782	99% Percentile (z)	3.71

Gamma GOF Test

A-D Test Statistic	0.33	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.738	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.122	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	13.48	k star (bias corrected MLE)	11
Theta hat (MLE)	0.169	Theta star (bias corrected MLE)	0.207
nu hat (MLE)	431.5	nu star (bias corrected)	351.9
MLE Mean (bias corrected)	2.278	MLE Sd (bias corrected)	0.687

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	3.566	90% Percentile	3.19
95% Hawkins Wixley (HW) Approx. Gamma UPL	3.599	95% Percentile	3.512
95% WH Approx. Gamma UTL with 95% Coverage	4.221	99% Percentile	4.171
95% HW Approx. Gamma UTL with 95% Coverage	4.298		
95% WH USL	4.144	95% HW USL	4.214

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.925	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.143	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	4.595	90% Percentile (z)	3.193
95% UPL (t)	3.724	95% Percentile (z)	3.552
95% USL	4.488	99% Percentile (z)	4.336

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	3.33
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	3.33	95% BCA Bootstrap UTL with 95% Coverage	3.33
95% UPL	3.33	90% Percentile	3.18
90% Chebyshev UPL	4.182	95% Percentile	3.263
95% Chebyshev UPL	5.044	99% Percentile	3.317
95% USL	3.33		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Methyl Mercury

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	7		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	7
Minimum Detect	N/A	Minimum Non-Detect	0.9
Maximum Detect	N/A	Maximum Non-Detect	0.99
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Methyl Mercury was not processed!

Draft

Selenium

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	8		
Number of Detects	7	Number of Non-Detects	9
Number of Distinct Detects	5	Number of Distinct Non-Detects	4
Minimum Detect	0.059	Minimum Non-Detect	0.056
Maximum Detect	0.093	Maximum Non-Detect	0.06
Variance Detected	1.1829E-4	Percent Non-Detects	56.25%
Mean Detected	0.0694	SD Detected	0.0109
Mean of Detected Logged Data	-2.677	SD of Detected Logged Data	0.142

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.716	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.409	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.335	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0619	SD	0.00941
95% UTL95% Coverage	0.0856	95% KM UPL (t)	0.0789
90% KM Percentile (z)	0.074	95% KM Percentile (z)	0.0774
99% KM Percentile (z)	0.0838	95% KM USL	0.0849

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0468	SD	0.0217
95% UTL95% Coverage	0.102	95% UPL (t)	0.0861
90% Percentile (z)	0.0747	95% Percentile (z)	0.0826
99% Percentile (z)	0.0974	95% USL	0.0999

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.96	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.708	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.4	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.311	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	54.29	k star (bias corrected MLE)	31.12
Theta hat (MLE)	0.00128	Theta star (bias corrected MLE)	0.00223
nu hat (MLE)	760	nu star (bias corrected)	435.6
MLE Mean (bias corrected)	0.0694		
MLE Sd (bias corrected)	0.0124	95% Percentile of Chisquare (2k)	81.65

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0321	Mean	0.0542
Maximum	0.093	Median	0.05
SD	0.0161	CV	0.298
k hat (MLE)	12.64	k star (bias corrected MLE)	10.31
Theta hat (MLE)	0.00429	Theta star (bias corrected MLE)	0.00526
nu hat (MLE)	404.4	nu star (bias corrected)	329.9
MLE Mean (bias corrected)	0.0542	MLE Sd (bias corrected)	0.0169
95% Percentile of Chisquare (2k)	32.19	90% Percentile	0.0766
95% Percentile	0.0846	99% Percentile	0.101

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.102	0.104	95% Approx. Gamma UPL	0.086	0.0864
95% Gamma USL	0.1	0.102			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	43.26		nu hat (KM)	1384
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0858	0.0858	95% Approx. Gamma UPL	0.0783	0.0783
95% Gamma USL	0.0849	0.0849			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.762	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.39	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.335	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0568	Mean in Log Scale	-2.893
SD in Original Scale	0.0138	SD in Log Scale	0.228
95% UTL95% Coverage	0.0984	95% BCA UTL95% Coverage	0.093
95% Bootstrap (%) UTL95% Coverage	0.093	95% UPL (t)	0.0836
90% Percentile (z)	0.0742	95% Percentile (z)	0.0806
99% Percentile (z)	0.0941	95% USL	0.0966

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0468	Mean in Log Scale	-3.159
SD in Original Scale	0.0217	SD in Log Scale	0.449
95% UTL95% Coverage	0.132	95% UPL (t)	0.0956
90% Percentile (z)	0.0755	95% Percentile (z)	0.0888
99% Percentile (z)	0.121	95% USL	0.127

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.093
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.093	95% USL	0.093
95% KM Chebyshev UPL	0.104		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Silver

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	0.02
Maximum Detect	N/A	Maximum Non-Detect	0.02
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Silver was not processed!

Draft

Thallium

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	6		
Number of Detects	14	Number of Non-Detects	2
Number of Distinct Detects	6	Number of Distinct Non-Detects	2
Minimum Detect	0.004	Minimum Non-Detect	0.004
Maximum Detect	0.009	Maximum Non-Detect	0.005
Variance Detected	2.9945E-6	Percent Non-Detects	12.5%
Mean Detected	0.00593	SD Detected	0.00173
Mean of Detected Logged Data	-5.168	SD of Detected Logged Data	0.294

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.893	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.874	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.204	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.237	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.00569	SD	0.00169
95% UTL95% Coverage	0.00994	95% KM UPL (t)	0.00873
90% KM Percentile (z)	0.00785	95% KM Percentile (z)	0.00846
99% KM Percentile (z)	0.00961	95% KM USL	0.0098

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.00547	SD	0.00205
95% UTL95% Coverage	0.0106	95% UPL (t)	0.00916
90% Percentile (z)	0.00809	95% Percentile (z)	0.00883
99% Percentile (z)	0.0102	95% USL	0.0105

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.648	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.734	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.19	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.229	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	12.71	k star (bias corrected MLE)	10.04
Theta hat (MLE)	4.6638E-4	Theta star (bias corrected MLE)	5.9075E-4
nu hat (MLE)	355.9	nu star (bias corrected)	281
MLE Mean (bias corrected)	0.00593		
MLE Sd (bias corrected)	0.00187	95% Percentile of Chisquare (2k)	31.5

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.004	Mean	0.00644
Maximum	0.01	Median	0.0065
SD	0.00213	CV	0.331
k hat (MLE)	9.802	k star (bias corrected MLE)	8.006
Theta hat (MLE)	6.5672E-4	Theta star (bias corrected MLE)	8.0407E-4
nu hat (MLE)	313.7	nu star (bias corrected)	256.2
MLE Mean (bias corrected)	0.00644	MLE Sd (bias corrected)	0.00228
95% Percentile of Chisquare (2k)	26.31	90% Percentile	0.00947
95% Percentile	0.0106	99% Percentile	0.0129

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0131	0.0133	95% Approx. Gamma UPL	0.0108	0.0109
95% Gamma USL	0.0128	0.013			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

k hat (KM)	11.39		nu hat (KM)	364.5	
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0107	0.0108	95% Approx. Gamma UPL	0.009	0.00904
95% Gamma USL	0.0105	0.0106			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.888	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.874	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.187	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.237	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.00561	Mean in Log Scale	-5.236
SD in Original Scale	0.00185	SD in Log Scale	0.335
95% UTL95% Coverage	0.0124	95% BCA UTL95% Coverage	0.009
95% Bootstrap (%) UTL95% Coverage	0.009	95% UPL (t)	0.00976
90% Percentile (z)	0.00818	95% Percentile (z)	0.00924
99% Percentile (z)	0.0116	95% USL	0.0121

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-5.212	95% KM UTL (Lognormal)95% Coverage	0.0113
KM SD of Logged Data	0.289	95% KM UPL (Lognormal)	0.00919
95% KM Percentile Lognormal (z)	0.00877	95% KM USL (Lognormal)	0.0111

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.00547	Mean in Log Scale	-5.285
SD in Original Scale	0.00205	SD in Log Scale	0.422
95% UTL95% Coverage	0.0147	95% UPL (t)	0.0109
90% Percentile (z)	0.00871	95% Percentile (z)	0.0102
99% Percentile (z)	0.0135	95% USL	0.0142

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.009
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.009	95% USL	0.009
95% KM Chebyshev UPL	0.0133		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Vanadium

General Statistics

Total Number of Observations	16	Number of Distinct Observations	15
		Number of Missing Observations	4
Minimum	1.12	First Quartile	2.513
Second Largest	4.01	Median	2.67
Maximum	5.02	Third Quartile	3.433
Mean	2.926	SD	0.897
Coefficient of Variation	0.306	Skewness	0.509
Mean of logged Data	1.026	SD of logged Data	0.333

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.94	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.172	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	5.188	90% Percentile (z)	4.075
95% UPL (t)	4.546	95% Percentile (z)	4.4
95% USL	5.116	99% Percentile (z)	5.011

Gamma GOF Test

A-D Test Statistic	0.52	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.739	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.176	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	10.61	k star (bias corrected MLE)	8.663
Theta hat (MLE)	0.276	Theta star (bias corrected MLE)	0.338
nu hat (MLE)	339.6	nu star (bias corrected)	277.2
MLE Mean (bias corrected)	2.926	MLE Sd (bias corrected)	0.994

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	4.811	90% Percentile	4.25
95% Hawkins Wixley (HW) Approx. Gamma UPL	4.868	95% Percentile	4.729
95% WH Approx. Gamma UTL with 95% Coverage	5.797	99% Percentile	5.718
95% HW Approx. Gamma UTL with 95% Coverage	5.928		
95% WH USL	5.68	95% HW USL	5.801

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.903	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.201	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	6.467	90% Percentile (z)	4.275
95% UPL (t)	5.093	95% Percentile (z)	4.825
95% USL	6.295	99% Percentile (z)	6.055

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	5.02
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	5.02	95% BCA Bootstrap UTL with 95% Coverage	5.02
95% UPL	5.02	90% Percentile	3.94
90% Chebyshev UPL	5.698	95% Percentile	4.263
95% Chebyshev UPL	6.954	99% Percentile	4.869
95% USL	5.02		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Zinc

General Statistics

Total Number of Observations	16	Number of Distinct Observations	14
		Number of Missing Observations	4
Minimum	1.26	First Quartile	1.723
Second Largest	2.64	Median	1.87
Maximum	2.65	Third Quartile	2.043
Mean	1.908	SD	0.367
Coefficient of Variation	0.192	Skewness	0.643
Mean of logged Data	0.629	SD of logged Data	0.19

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.935	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.141	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	2.834	90% Percentile (z)	2.378
95% UPL (t)	2.571	95% Percentile (z)	2.511
95% USL	2.804	99% Percentile (z)	2.761

Gamma GOF Test

A-D Test Statistic	0.338	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.736	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.117	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	29.58	k star (bias corrected MLE)	24.07
Theta hat (MLE)	0.0645	Theta star (bias corrected MLE)	0.0792
nu hat (MLE)	946.5	nu star (bias corrected)	770.4
MLE Mean (bias corrected)	1.908	MLE Sd (bias corrected)	0.389

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	2.613	90% Percentile	2.42
95% Hawkins Wixley (HW) Approx. Gamma UPL	2.62	95% Percentile	2.589
95% WH Approx. Gamma UTL with 95% Coverage	2.947	99% Percentile	2.926
95% HW Approx. Gamma UTL with 95% Coverage	2.966		
95% WH USL	2.908	95% HW USL	2.925

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.96	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.119	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	3.032	90% Percentile (z)	2.393
95% UPL (t)	2.645	95% Percentile (z)	2.565
95% USL	2.985	99% Percentile (z)	2.92

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	2.65
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	2.65	95% BCA Bootstrap UTL with 95% Coverage	2.65
95% UPL	2.65	90% Percentile	2.39
90% Chebyshev UPL	3.042	95% Percentile	2.643
95% Chebyshev UPL	3.556	99% Percentile	2.649
95% USL	2.65		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Round 2 – January to March 2014

Draft

Octopus (he‘e)

Draft

Alpha-BHC

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	7		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	7
Minimum Detect	N/A	Minimum Non-Detect	3.96
Maximum Detect	N/A	Maximum Non-Detect	4.04
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Alpha-BHC was not processed!

Gamma-BHC (Lindane)

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	7		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	7
Minimum Detect	N/A	Minimum Non-Detect	3.96
Maximum Detect	N/A	Maximum Non-Detect	4.04
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gamma-BHC (Lindane) was not processed!

Delta-BHC

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	7		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	7
Minimum Detect	N/A	Minimum Non-Detect	3.96
Maximum Detect	N/A	Maximum Non-Detect	4.04
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Delta-BHC was not processed!

Draft

Heptachlor

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	7		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	7
Minimum Detect	N/A	Minimum Non-Detect	3.96
Maximum Detect	N/A	Maximum Non-Detect	4.04
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Heptachlor was not processed!

Aldrin

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	7		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	7
Minimum Detect	N/A	Minimum Non-Detect	3.96
Maximum Detect	N/A	Maximum Non-Detect	4.04
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Aldrin was not processed!

Heptachlor Epoxide

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	7		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	7
Minimum Detect	N/A	Minimum Non-Detect	3.96
Maximum Detect	N/A	Maximum Non-Detect	4.04
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Heptachlor Epoxide was not processed!

Draft

p,p'-DDT

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	7		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	7
Minimum Detect	N/A	Minimum Non-Detect	3.96
Maximum Detect	N/A	Maximum Non-Detect	4.04
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable p,p'-DDT was not processed!

Beta-BHC

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	7		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	7
Minimum Detect	N/A	Minimum Non-Detect	3.96
Maximum Detect	N/A	Maximum Non-Detect	4.04
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Beta-BHC was not processed!

Draft

Toluene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	12.5
Maximum Detect	N/A	Maximum Non-Detect	12.5
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Toluene was not processed!

Ethyl Benzene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	12.5
Maximum Detect	N/A	Maximum Non-Detect	12.5
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Ethyl Benzene was not processed!

M,P-Xylenes

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	25
Maximum Detect	N/A	Maximum Non-Detect	25
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable M,P-Xylenes was not processed!

Draft

Styrene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	12.5
Maximum Detect	N/A	Maximum Non-Detect	12.5
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Styrene was not processed!

o-Xylene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	12.5
Maximum Detect	N/A	Maximum Non-Detect	12.5
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable o-Xylene was not processed!

1,2,4-Trimethylbenzene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	12.5
Maximum Detect	N/A	Maximum Non-Detect	12.5
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,4-Trimethylbenzene was not processed!

Draft

Dimethylphthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Dimethylphthalate was not processed!

Diethylphthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Diethylphthalate was not processed!

Di-n-butylphthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Di-n-butylphthalate was not processed!

Draft

Pyrene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Pyrene was not processed!

bis(2-Ethylhexyl)phthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable bis(2-Ethylhexyl)phthalate was not processed!

Di-n-octylphthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Di-n-octylphthalate was not processed!

Draft

2,3,7,8-TCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	7		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	7
Minimum Detect	N/A	Minimum Non-Detect	0.097
Maximum Detect	N/A	Maximum Non-Detect	0.19
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,3,7,8-TCDF was not processed!

Draft

Total TCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	7		
Number of Detects	7	Number of Non-Detects	9
Number of Distinct Detects	6	Number of Distinct Non-Detects	4
Minimum Detect	0.074	Minimum Non-Detect	0.095
Maximum Detect	0.19	Maximum Non-Detect	0.12
Variance Detected	0.00136	Percent Non-Detects	56.25%
Mean Detected	0.125	SD Detected	0.0369
Mean of Detected Logged Data	-2.118	SD of Detected Logged Data	0.298

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.964	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.198	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.335	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0973	SD	0.0336
95% UTL95% Coverage	0.182	95% KM UPL (t)	0.158
90% KM Percentile (z)	0.14	95% KM Percentile (z)	0.153
99% KM Percentile (z)	0.175	95% KM USL	0.179

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0842	SD	0.0439
95% UTL95% Coverage	0.195	95% UPL (t)	0.164
90% Percentile (z)	0.14	95% Percentile (z)	0.156
99% Percentile (z)	0.186	95% USL	0.191

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.192	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.708	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.159	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.312	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	13.49	k star (bias corrected MLE)	7.803
Theta hat (MLE)	0.00926	Theta star (bias corrected MLE)	0.016
nu hat (MLE)	188.8	nu star (bias corrected)	109.2
MLE Mean (bias corrected)	0.125		
MLE Sd (bias corrected)	0.0447	95% Percentile of Chisquare (2k)	25.79

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.036	Mean	0.0918
Maximum	0.19	Median	0.0811
SD	0.0399	CV	0.435
k hat (MLE)	6.092	k star (bias corrected MLE)	4.991
Theta hat (MLE)	0.0151	Theta star (bias corrected MLE)	0.0184
nu hat (MLE)	194.9	nu star (bias corrected)	159.7
MLE Mean (bias corrected)	0.0918	MLE Sd (bias corrected)	0.0411
95% Percentile of Chisquare (2k)	18.28	90% Percentile	0.147
95% Percentile	0.168	99% Percentile	0.213

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.218	0.223	95% Approx. Gamma UPL	0.172	0.174
95% Gamma USL	0.212	0.217			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	8.369		nu hat (KM)	267.8
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.191	0.192	95% Approx. Gamma UPL	0.158	0.159
95% Gamma USL	0.187	0.188			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.982	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.162	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.335	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0955	Mean in Log Scale	-2.408
SD in Original Scale	0.0365	SD in Log Scale	0.347
95% UTL95% Coverage	0.216	95% BCA UTL95% Coverage	0.19
95% Bootstrap (%) UTL95% Coverage	0.19	95% UPL (t)	0.168
90% Percentile (z)	0.14	95% Percentile (z)	0.159
99% Percentile (z)	0.202	95% USL	0.21

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.38	95% KM UTL (Lognormal)95% Coverage	0.198
KM SD of Logged Data	0.3	95% KM UPL (Lognormal)	0.159
95% KM Percentile Lognormal (z)	0.152	95% KM USL (Lognormal)	0.193

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0842	Mean in Log Scale	-2.586
SD in Original Scale	0.0439	SD in Log Scale	0.47
95% UTL95% Coverage	0.247	95% UPL (t)	0.176
90% Percentile (z)	0.138	95% Percentile (z)	0.163
99% Percentile (z)	0.225	95% USL	0.238

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.19
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.19	95% USL	0.19
95% KM Chebyshev UPL	0.248		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

2,3,7,8-TCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	13
Minimum Detect	N/A	Minimum Non-Detect	0.048
Maximum Detect	N/A	Maximum Non-Detect	0.16
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,3,7,8-TCDD was not processed!

Draft

Total TCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	8	Number of Non-Detects	8
Number of Distinct Detects	6	Number of Distinct Non-Detects	7
Minimum Detect	0.16	Minimum Non-Detect	0.072
Maximum Detect	0.48	Maximum Non-Detect	0.14
Variance Detected	0.0105	Percent Non-Detects	50%
Mean Detected	0.243	SD Detected	0.102
Mean of Detected Logged Data	-1.476	SD of Detected Logged Data	0.344

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.737	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.299	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.157	SD	0.109
95% UTL95% Coverage	0.432	95% KM UPL (t)	0.354
90% KM Percentile (z)	0.297	95% KM Percentile (z)	0.336
99% KM Percentile (z)	0.41	95% KM USL	0.423

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.149	SD	0.12
95% UTL95% Coverage	0.451	95% UPL (t)	0.365
90% Percentile (z)	0.302	95% Percentile (z)	0.346
99% Percentile (z)	0.427	95% USL	0.441

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.656	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.716	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.266	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.295	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	8.637	k star (bias corrected MLE)	5.482
Theta hat (MLE)	0.0281	Theta star (bias corrected MLE)	0.0442
nu hat (MLE)	138.2	nu star (bias corrected)	87.7
MLE Mean (bias corrected)	0.243		
MLE Sd (bias corrected)	0.104	95% Percentile of Chisquare (2k)	19.62

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.13
Maximum	0.48	Median	0.103
SD	0.136	CV	1.046
k hat (MLE)	0.759	k star (bias corrected MLE)	0.659
Theta hat (MLE)	0.171	Theta star (bias corrected MLE)	0.197
nu hat (MLE)	24.3	nu star (bias corrected)	21.08
MLE Mean (bias corrected)	0.13	MLE Sd (bias corrected)	0.16
95% Percentile of Chisquare (2k)	4.584	90% Percentile	0.331
95% Percentile	0.452	99% Percentile	0.743

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.807	0.948	95% Approx. Gamma UPL	0.493	0.535
95% Gamma USL	0.767	0.892			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	2.089		nu hat (KM)	65.83
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.506	0.525	95% Approx. Gamma UPL	0.368	0.373
95% Gamma USL	0.489	0.506			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.858	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.243	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.166	Mean in Log Scale	-1.949
SD in Original Scale	0.106	SD in Log Scale	0.546
95% UTL95% Coverage	0.566	95% BCA UTL95% Coverage	0.48
95% Bootstrap (%) UTL95% Coverage	0.48	95% UPL (t)	0.382
90% Percentile (z)	0.287	95% Percentile (z)	0.35
99% Percentile (z)	0.508	95% USL	0.541

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.053	95% KM UTL (Lognormal)95% Coverage	0.615
KM SD of Logged Data	0.621	95% KM UPL (Lognormal)	0.394
95% KM Percentile Lognormal (z)	0.356	95% KM USL (Lognormal)	0.585

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.149	Mean in Log Scale	-2.2
SD in Original Scale	0.12	SD in Log Scale	0.8
95% UTL95% Coverage	0.835	95% UPL (t)	0.47
90% Percentile (z)	0.309	95% Percentile (z)	0.413
99% Percentile (z)	0.713	95% USL	0.783

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.48
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.48	95% USL	0.48
95% KM Chebyshev UPL	0.646		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,7,8-PeCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	12		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	12
Minimum Detect	N/A	Minimum Non-Detect	0.052
Maximum Detect	N/A	Maximum Non-Detect	0.17
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,7,8-PeCDF was not processed!

2,3,4,7,8-PeCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	12		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	12
Minimum Detect	N/A	Minimum Non-Detect	0.042
Maximum Detect	N/A	Maximum Non-Detect	0.19
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,3,4,7,8-PeCDF was not processed!

Total PeCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	13
Minimum Detect	N/A	Minimum Non-Detect	0.049
Maximum Detect	N/A	Maximum Non-Detect	0.17
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Total PeCDF was not processed!

1,2,3,7,8-PeCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	13
Minimum Detect	N/A	Minimum Non-Detect	0.078
Maximum Detect	N/A	Maximum Non-Detect	0.26
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,7,8-PeCDD was not processed!

Total PeCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	13
Minimum Detect	N/A	Minimum Non-Detect	0.078
Maximum Detect	N/A	Maximum Non-Detect	0.26
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Total PeCDD was not processed!

1,2,3,4,7,8-HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	13
Minimum Detect	N/A	Minimum Non-Detect	0.036
Maximum Detect	N/A	Maximum Non-Detect	0.13
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,4,7,8-HxCDF was not processed!

Draft

1,2,3,6,7,8-HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	13
Minimum Detect	N/A	Minimum Non-Detect	0.033
Maximum Detect	N/A	Maximum Non-Detect	0.11
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,6,7,8-HxCDF was not processed!

2,3,4,6,7,8-HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	14
Minimum Detect	N/A	Minimum Non-Detect	0.03
Maximum Detect	N/A	Maximum Non-Detect	0.1
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,3,4,6,7,8-HxCDF was not processed!

Draft

1,2,3,7,8,9-HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	11		
Number of Detects	3	Number of Non-Detects	13
Number of Distinct Detects	3	Number of Distinct Non-Detects	10
Minimum Detect	0.11	Minimum Non-Detect	0.048
Maximum Detect	0.16	Maximum Non-Detect	0.13
Variance Detected	6.3333E-4	Percent Non-Detects	81.25%
Mean Detected	0.133	SD Detected	0.0252
Mean of Detected Logged Data	-2.027	SD of Detected Logged Data	0.188

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.987	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.219	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0651	SD	0.0349
95% UTL95% Coverage	0.153	95% KM UPL (t)	0.128
90% KM Percentile (z)	0.11	95% KM Percentile (z)	0.122
99% KM Percentile (z)	0.146	95% KM USL	0.15

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0642	SD	0.0369
95% UTL95% Coverage	0.157	95% UPL (t)	0.131
90% Percentile (z)	0.111	95% Percentile (z)	0.125
99% Percentile (z)	0.15	95% USL	0.154

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	42.58	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00313	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	255.5	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A		
MLE Sd (bias corrected)	N/A	95% Percentile of Chisquare (2k)	N/A

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0141	Mean	0.0538
Maximum	0.16	Median	0.0343
SD	0.0426	CV	0.792
k hat (MLE)	2.18	k star (bias corrected MLE)	1.813
Theta hat (MLE)	0.0247	Theta star (bias corrected MLE)	0.0297
nu hat (MLE)	69.75	nu star (bias corrected)	58
MLE Mean (bias corrected)	0.0538	MLE Sd (bias corrected)	0.0399
95% Percentile of Chisquare (2k)	8.873	90% Percentile	0.107
95% Percentile	0.132	99% Percentile	0.186

The following statistics are computed using Gamma ROS Statistics on Imputed Data
Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.194	0.203	95% Approx. Gamma UPL	0.137	0.14
95% Gamma USL	0.187	0.195			

The following statistics are computed using gamma distribution and KM estimates
Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	3.472		nu hat (KM)	111.1
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.159	0.16	95% Approx. Gamma UPL	0.125	0.124
95% Gamma USL	0.155	0.156			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.996	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.195	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0739	Mean in Log Scale	-2.67
SD in Original Scale	0.0317	SD in Log Scale	0.346
95% UTL95% Coverage	0.166	95% BCA UTL95% Coverage	0.16
95% Bootstrap (%) UTL95% Coverage	0.16	95% UPL (t)	0.129
90% Percentile (z)	0.108	95% Percentile (z)	0.122
99% Percentile (z)	0.155	95% USL	0.161

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.833	95% KM UTL (Lognormal)95% Coverage	0.164
KM SD of Logged Data	0.407	95% KM UPL (Lognormal)	0.123
95% KM Percentile Lognormal (z)	0.115	95% KM USL (Lognormal)	0.159

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0642	Mean in Log Scale	-2.866
SD in Original Scale	0.0369	SD in Log Scale	0.481
95% UTL95% Coverage	0.192	95% UPL (t)	0.136
90% Percentile (z)	0.105	95% Percentile (z)	0.126
99% Percentile (z)	0.174	95% USL	0.184

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.16
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.16	95% USL	0.16
95% KM Chebyshev UPL	0.222		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Total HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	13
Minimum Detect	0.16	Minimum Non-Detect	0.037
Maximum Detect	0.16	Maximum Non-Detect	0.12
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	0.16	SD Detected	N/A
Mean of Detected Logged Data	-1.833	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Total HxCDF was not processed!

1,2,3,4,7,8-HxCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	14
Minimum Detect	N/A	Minimum Non-Detect	0.031
Maximum Detect	N/A	Maximum Non-Detect	0.16
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,4,7,8-HxCDD was not processed!

Draft

1,2,3,6,7,8-HxCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	2	Number of Non-Detects	14
Number of Distinct Detects	2	Number of Distinct Non-Detects	13
Minimum Detect	0.069	Minimum Non-Detect	0.043
Maximum Detect	0.14	Maximum Non-Detect	0.18
Variance Detected	0.00252	Percent Non-Detects	87.5%
Mean Detected	0.105	SD Detected	0.0502
Mean of Detected Logged Data	-2.32	SD of Detected Logged Data	0.5

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only
Not Enough Data to Perform GOF Test

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0539	SD	0.0263
95% UTL95% Coverage	0.12	95% KM UPL (t)	0.102
90% KM Percentile (z)	0.0877	95% KM Percentile (z)	0.0972
99% KM Percentile (z)	0.115	95% KM USL	0.118

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0543	SD	0.0307
95% UTL95% Coverage	0.132	95% UPL (t)	0.11
90% Percentile (z)	0.0936	95% Percentile (z)	0.105
99% Percentile (z)	0.126	95% USL	0.129

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only
Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	8.318	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0126	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	33.27	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A		
MLE Sd (bias corrected)	N/A	95% Percentile of Chisquare (2k)	N/A

The following statistics are computed using gamma distribution and KM estimates
Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

k hat (KM)	4.183		nu hat (KM)	133.8	
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.118	0.118	95% Approx. Gamma UPL	0.0952	0.0944
95% Gamma USL	0.115	0.115			

Lognormal GOF Test on Detected Observations Only
Not Enough Data to Perform GOF Test

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0311	Mean in Log Scale	-3.704
SD in Original Scale	0.0317	SD in Log Scale	0.584
95% UTL95% Coverage	0.108	95% BCA UTL95% Coverage	0.14
95% Bootstrap (%) UTL95% Coverage	0.14	95% UPL (t)	0.0707
90% Percentile (z)	0.0521	95% Percentile (z)	0.0643
99% Percentile (z)	0.0958	95% USL	0.103

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0543	Mean in Log Scale	-3.041
SD in Original Scale	0.0307	SD in Log Scale	0.505
95% UTL95% Coverage	0.171	95% UPL (t)	0.119
90% Percentile (z)	0.0913	95% Percentile (z)	0.11
99% Percentile (z)	0.155	95% USL	0.164

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics
Data do not follow a Discernible Distribution (0.05)

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.18
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.18	95% USL	0.18
95% KM Chebyshev UPL	0.172		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,7,8,9-HxCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	15
Minimum Detect	N/A	Minimum Non-Detect	0.041
Maximum Detect	N/A	Maximum Non-Detect	0.15
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,7,8,9-HxCDD was not processed!

Total HxCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	13
Minimum Detect	N/A	Minimum Non-Detect	0.038
Maximum Detect	N/A	Maximum Non-Detect	0.16
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Total HxCDD was not processed!

Draft

1,2,3,4,6,7,8-HpCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	3	Number of Non-Detects	13
Number of Distinct Detects	3	Number of Distinct Non-Detects	12
Minimum Detect	0.064	Minimum Non-Detect	0.034
Maximum Detect	0.13	Maximum Non-Detect	0.094
Variance Detected	0.00115	Percent Non-Detects	81.25%
Mean Detected	0.101	SD Detected	0.0338
Mean of Detected Logged Data	-2.332	SD of Detected Logged Data	0.37

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.951	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.268	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0491	SD	0.029
95% UTL95% Coverage	0.122	95% KM UPL (t)	0.101
90% KM Percentile (z)	0.0863	95% KM Percentile (z)	0.0968
99% KM Percentile (z)	0.117	95% KM USL	0.12

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.047	SD	0.0307
95% UTL95% Coverage	0.124	95% UPL (t)	0.102
90% Percentile (z)	0.0863	95% Percentile (z)	0.0975
99% Percentile (z)	0.118	95% USL	0.122

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	11.85	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00855	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	71.11	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A		
MLE Sd (bias corrected)	N/A	95% Percentile of Chisquare (2k)	N/A

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.028
Maximum	0.13	Median	0.01
SD	0.0386	CV	1.379
k hat (MLE)	1.046	k star (bias corrected MLE)	0.892
Theta hat (MLE)	0.0267	Theta star (bias corrected MLE)	0.0314
nu hat (MLE)	33.48	nu star (bias corrected)	28.54
MLE Mean (bias corrected)	0.028	MLE Sd (bias corrected)	0.0296
95% Percentile of Chisquare (2k)	5.565	90% Percentile	0.0663
95% Percentile	0.0873	99% Percentile	0.137

The following statistics are computed using Gamma ROS Statistics on Imputed Data
Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.141	0.145	95% Approx. Gamma UPL	0.0901	0.089
95% Gamma USL	0.135	0.138			

The following statistics are computed using gamma distribution and KM estimates
Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	2.875		nu hat (KM)	91.99
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.127	0.129	95% Approx. Gamma UPL	0.0983	0.0979
95% Gamma USL	0.124	0.125			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.915	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.299	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0413	Mean in Log Scale	-3.368
SD in Original Scale	0.0325	SD in Log Scale	0.548
95% UTL95% Coverage	0.137	95% BCA UTL95% Coverage	0.13
95% Bootstrap (%) UTL95% Coverage	0.13	95% UPL (t)	0.0927
90% Percentile (z)	0.0695	95% Percentile (z)	0.0849
99% Percentile (z)	0.123	95% USL	0.131

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-3.132	95% KM UTL (Lognormal)95% Coverage	0.133
KM SD of Logged Data	0.441	95% KM UPL (Lognormal)	0.0968
95% KM Percentile Lognormal (z)	0.0902	95% KM USL (Lognormal)	0.128

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.047	Mean in Log Scale	-3.202
SD in Original Scale	0.0307	SD in Log Scale	0.521
95% UTL95% Coverage	0.151	95% UPL (t)	0.104
90% Percentile (z)	0.0793	95% Percentile (z)	0.0958
99% Percentile (z)	0.137	95% USL	0.145

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.13
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.13	95% USL	0.13
95% KM Chebyshev UPL	0.179		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,4,7,8,9-HpCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	12		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	12
Minimum Detect	N/A	Minimum Non-Detect	0.049
Maximum Detect	N/A	Maximum Non-Detect	0.14
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,4,7,8,9-HpCDF was not processed!

Total HpCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	12
Minimum Detect	0.13	Minimum Non-Detect	0.042
Maximum Detect	0.13	Maximum Non-Detect	0.12
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	0.13	SD Detected	N/A
Mean of Detected Logged Data	-2.04	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Total HpCDF was not processed!

Draft

1,2,3,4,6,7,8-HpCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	12		
Number of Detects	6	Number of Non-Detects	10
Number of Distinct Detects	6	Number of Distinct Non-Detects	9
Minimum Detect	0.052	Minimum Non-Detect	0.067
Maximum Detect	0.21	Maximum Non-Detect	0.15
Variance Detected	0.00325	Percent Non-Detects	62.5%
Mean Detected	0.127	SD Detected	0.057
Mean of Detected Logged Data	-2.163	SD of Detected Logged Data	0.498

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.987	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.142	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0848	SD	0.0477
95% UTL95% Coverage	0.205	95% KM UPL (t)	0.171
90% KM Percentile (z)	0.146	95% KM Percentile (z)	0.163
99% KM Percentile (z)	0.196	95% KM USL	0.201

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0808	SD	0.0506
95% UTL95% Coverage	0.209	95% UPL (t)	0.172
90% Percentile (z)	0.146	95% Percentile (z)	0.164
99% Percentile (z)	0.199	95% USL	0.204

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.153	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.698	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.139	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.333	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	5.393	k star (bias corrected MLE)	2.808
Theta hat (MLE)	0.0235	Theta star (bias corrected MLE)	0.0451
nu hat (MLE)	64.72	nu star (bias corrected)	33.69
MLE Mean (bias corrected)	0.127		
MLE Sd (bias corrected)	0.0755	95% Percentile of Chisquare (2k)	12.01

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0378	Mean	0.0794
Maximum	0.21	Median	0.0594
SD	0.051	CV	0.643
k hat (MLE)	3.431	k star (bias corrected MLE)	2.83
Theta hat (MLE)	0.0231	Theta star (bias corrected MLE)	0.028
nu hat (MLE)	109.8	nu star (bias corrected)	90.55
MLE Mean (bias corrected)	0.0794	MLE Sd (bias corrected)	0.0472
95% Percentile of Chisquare (2k)	12.08	90% Percentile	0.143
95% Percentile	0.169	99% Percentile	0.228

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.234	0.24	95% Approx. Gamma UPL	0.175	0.176
95% Gamma USL	0.227	0.232			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	3.163		nu hat (KM)	101.2
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.226	0.23	95% Approx. Gamma UPL	0.173	0.174
95% Gamma USL	0.22	0.223			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.976	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.131	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0835	Mean in Log Scale	-2.601
SD in Original Scale	0.0481	SD in Log Scale	0.467
95% UTL95% Coverage	0.241	95% BCA UTL95% Coverage	0.21
95% Bootstrap (%) UTL95% Coverage	0.21	95% UPL (t)	0.173
90% Percentile (z)	0.135	95% Percentile (z)	0.16
99% Percentile (z)	0.22	95% USL	0.232

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.593	95% KM UTL (Lognormal)95% Coverage	0.248
KM SD of Logged Data	0.475	95% KM UPL (Lognormal)	0.177
95% KM Percentile Lognormal (z)	0.163	95% KM USL (Lognormal)	0.239

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0808	Mean in Log Scale	-2.669
SD in Original Scale	0.0506	SD in Log Scale	0.549
95% UTL95% Coverage	0.277	95% UPL (t)	0.187
90% Percentile (z)	0.14	95% Percentile (z)	0.171
99% Percentile (z)	0.249	95% USL	0.265

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.21
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.21	95% USL	0.21
95% KM Chebyshev UPL	0.299		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Total HpCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	12		
Number of Detects	6	Number of Non-Detects	10
Number of Distinct Detects	4	Number of Distinct Non-Detects	9
Minimum Detect	0.078	Minimum Non-Detect	0.066
Maximum Detect	0.17	Maximum Non-Detect	0.15
Variance Detected	0.00159	Percent Non-Detects	62.5%
Mean Detected	0.131	SD Detected	0.0399
Mean of Detected Logged Data	-2.078	SD of Detected Logged Data	0.337

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.855	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.258	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0927	SD	0.038
95% UTL95% Coverage	0.189	95% KM UPL (t)	0.161
90% KM Percentile (z)	0.141	95% KM Percentile (z)	0.155
99% KM Percentile (z)	0.181	95% KM USL	0.185

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0801	SD	0.0482
95% UTL95% Coverage	0.202	95% UPL (t)	0.167
90% Percentile (z)	0.142	95% Percentile (z)	0.159
99% Percentile (z)	0.192	95% USL	0.198

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.554	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.698	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.296	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.332	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	11.44	k star (bias corrected MLE)	5.831
Theta hat (MLE)	0.0114	Theta star (bias corrected MLE)	0.0224
nu hat (MLE)	137.3	nu star (bias corrected)	69.98
MLE Mean (bias corrected)	0.131		
MLE Sd (bias corrected)	0.0542	95% Percentile of Chisquare (2k)	20.57

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.04	Mean	0.0809
Maximum	0.17	Median	0.0617
SD	0.0471	CV	0.582
k hat (MLE)	3.705	k star (bias corrected MLE)	3.052
Theta hat (MLE)	0.0218	Theta star (bias corrected MLE)	0.0265
nu hat (MLE)	118.6	nu star (bias corrected)	97.67
MLE Mean (bias corrected)	0.0809	MLE Sd (bias corrected)	0.0463
95% Percentile of Chisquare (2k)	12.75	90% Percentile	0.143
95% Percentile	0.169	99% Percentile	0.225

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.232	0.239	95% Approx. Gamma UPL	0.175	0.176
95% Gamma USL	0.225	0.231			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	5.965		nu hat (KM)	199.9
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.202	0.204	95% Approx. Gamma UPL	0.163	0.163
95% Gamma USL	0.197	0.199			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.835	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.297	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0861	Mean in Log Scale	-2.551
SD in Original Scale	0.043	SD in Log Scale	0.437
95% UTL95% Coverage	0.235	95% BCA UTL95% Coverage	0.17
95% Bootstrap (%) UTL95% Coverage	0.17	95% UPL (t)	0.172
90% Percentile (z)	0.137	95% Percentile (z)	0.16
99% Percentile (z)	0.216	95% USL	0.227

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.448	95% KM UTL (Lognormal)95% Coverage	0.212
KM SD of Logged Data	0.356	95% KM UPL (Lognormal)	0.165
95% KM Percentile Lognormal (z)	0.155	95% KM USL (Lognormal)	0.206

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0801	Mean in Log Scale	-2.684
SD in Original Scale	0.0482	SD in Log Scale	0.575
95% UTL95% Coverage	0.292	95% UPL (t)	0.193
90% Percentile (z)	0.143	95% Percentile (z)	0.176
99% Percentile (z)	0.26	95% USL	0.278

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.17
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.17	95% USL	0.17
95% KM Chebyshev UPL	0.263		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

OCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	11		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	10
Minimum Detect	0.38	Minimum Non-Detect	0.14
Maximum Detect	0.38	Maximum Non-Detect	0.27
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	0.38	SD Detected	N/A
Mean of Detected Logged Data	-0.968	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable OCDF was not processed!

Draft

OCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	5	Number of Non-Detects	11
Number of Distinct Detects	5	Number of Distinct Non-Detects	10
Minimum Detect	0.31	Minimum Non-Detect	0.34
Maximum Detect	0.82	Maximum Non-Detect	0.78
Variance Detected	0.038	Percent Non-Detects	68.75%
Mean Detected	0.502	SD Detected	0.195
Mean of Detected Logged Data	-0.744	SD of Detected Logged Data	0.363

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.903	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.263	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.396	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.38	SD	0.133
95% UTL95% Coverage	0.714	95% KM UPL (t)	0.619
90% KM Percentile (z)	0.55	95% KM Percentile (z)	0.598
99% KM Percentile (z)	0.688	95% KM USL	0.703

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.316	SD	0.175
95% UTL95% Coverage	0.757	95% UPL (t)	0.632
90% Percentile (z)	0.54	95% Percentile (z)	0.603
99% Percentile (z)	0.722	95% USL	0.743

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.259	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.679	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.214	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.358	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	9.274	k star (bias corrected MLE)	3.843
Theta hat (MLE)	0.0541	Theta star (bias corrected MLE)	0.131
nu hat (MLE)	92.74	nu star (bias corrected)	38.43
MLE Mean (bias corrected)	0.502		
MLE Sd (bias corrected)	0.256	95% Percentile of Chisquare (2k)	15.06

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.188	Mean	0.34
Maximum	0.82	Median	0.298
SD	0.154	CV	0.454
k hat (MLE)	7.329	k star (bias corrected MLE)	5.997
Theta hat (MLE)	0.0463	Theta star (bias corrected MLE)	0.0566
nu hat (MLE)	234.5	nu star (bias corrected)	191.9
MLE Mean (bias corrected)	0.34	MLE Sd (bias corrected)	0.139
95% Percentile of Chisquare (2k)	21.02	90% Percentile	0.525
95% Percentile	0.595	99% Percentile	0.742

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.753	0.759	95% Approx. Gamma UPL	0.606	0.606
95% Gamma USL	0.736	0.741			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	8.212		nu hat (KM)	262.8
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.717	0.718	95% Approx. Gamma UPL	0.602	0.6
95% Gamma USL	0.703	0.704			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.972	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.202	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.396	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.362	Mean in Log Scale	-1.066
SD in Original Scale	0.142	SD in Log Scale	0.301
95% UTL95% Coverage	0.736	95% BCA UTL95% Coverage	0.82
95% Bootstrap (%) UTL95% Coverage	0.82	95% UPL (t)	0.593
90% Percentile (z)	0.506	95% Percentile (z)	0.565
99% Percentile (z)	0.693	95% USL	0.718

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-1.012	95% KM UTL (Lognormal)95% Coverage	0.723
KM SD of Logged Data	0.272	95% KM UPL (Lognormal)	0.594
95% KM Percentile Lognormal (z)	0.569	95% KM USL (Lognormal)	0.707

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.316	Mean in Log Scale	-1.264
SD in Original Scale	0.175	SD in Log Scale	0.466
95% UTL95% Coverage	0.917	95% UPL (t)	0.656
90% Percentile (z)	0.514	95% Percentile (z)	0.609
99% Percentile (z)	0.836	95% USL	0.883

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.82
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.82	95% USL	0.82
95% KM Chebyshev UPL	0.975		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Perchlorate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	4		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	3
Minimum Detect	0.45	Minimum Non-Detect	0.28
Maximum Detect	0.45	Maximum Non-Detect	0.3
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	0.45	SD Detected	N/A
Mean of Detected Logged Data	-0.799	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Perchlorate was not processed!

2,4-Dinitrotoluene3

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	500
Maximum Detect	N/A	Maximum Non-Detect	500
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,4-Dinitrotoluene3 was not processed!

Draft

Hexahydro-trinitro-triazine (RDX)

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	500
Maximum Detect	N/A	Maximum Non-Detect	500
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Hexahydro-trinitro-triazine (RDX) was not processed!

Draft

Nitroglycerine

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	500
Maximum Detect	N/A	Maximum Non-Detect	500
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Nitroglycerine was not processed!

Inorganic Arsenic

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	2		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	2
Minimum Detect	N/A	Minimum Non-Detect	0.003
Maximum Detect	N/A	Maximum Non-Detect	0.004
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Inorganic Arsenic was not processed!

Arsenic(III)

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	2		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	2
Minimum Detect	N/A	Minimum Non-Detect	0.003
Maximum Detect	N/A	Maximum Non-Detect	0.004
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Arsenic(III) was not processed!

Arsenic(V)

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	2		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	2
Minimum Detect	0.004	Minimum Non-Detect	0.003
Maximum Detect	0.004	Maximum Non-Detect	0.004
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	0.004	SD Detected	N/A
Mean of Detected Logged Data	-5.521	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Arsenic(V) was not processed!

Draft

Dimethyl Arsenic

General Statistics

Total Number of Observations	16	Number of Distinct Observations	10
		Number of Missing Observations	4
Minimum	0.006	First Quartile	0.0123
Second Largest	0.018	Median	0.015
Maximum	0.019	Third Quartile	0.0163
Mean	0.014	SD	0.00371
Coefficient of Variation	0.265	Skewness	-0.88
Mean of logged Data	-4.311	SD of logged Data	0.319

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.916	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.187	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	0.0234	90% Percentile (z)	0.0187
95% UPL (t)	0.0207	95% Percentile (z)	0.0201
95% USL	0.0231	99% Percentile (z)	0.0226

Gamma GOF Test

A-D Test Statistic	0.879	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.738	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.226	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	12.1	k star (bias corrected MLE)	9.871
Theta hat (MLE)	0.00116	Theta star (bias corrected MLE)	0.00142
nu hat (MLE)	387.1	nu star (bias corrected)	315.9
MLE Mean (bias corrected)	0.014	MLE Sd (bias corrected)	0.00446

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.0224	90% Percentile	0.0199
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.0227	95% Percentile	0.022
95% WH Approx. Gamma UTL with 95% Coverage	0.0267	99% Percentile	0.0264
95% HW Approx. Gamma UTL with 95% Coverage	0.0274		
95% WH USL	0.0262	95% HW USL	0.0269

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.846	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.24	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Lognormal at 5% Significance Level

Data Not Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	0.0301	90% Percentile (z)	0.0202
95% UPL (t)	0.0239	95% Percentile (z)	0.0227
95% USL	0.0293	99% Percentile (z)	0.0282

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	0.019
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	0.019	95% BCA Bootstrap UTL with 95% Coverage	0.019
95% UPL	0.019	90% Percentile	0.0175
90% Chebyshev UPL	0.0255	95% Percentile	0.0183
95% Chebyshev UPL	0.0307	99% Percentile	0.0189
95% USL	0.019		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Aluminum

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	15
Minimum Detect	N/A	Minimum Non-Detect	0.13
Maximum Detect	N/A	Maximum Non-Detect	1.16
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Aluminum was not processed!

Antimony

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	2		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	2
Minimum Detect	N/A	Minimum Non-Detect	0.006
Maximum Detect	N/A	Maximum Non-Detect	0.007
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Antimony was not processed!

Draft

Arsenic

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	25.1	First Quartile	29.38
Second Largest	39.8	Median	32.05
Maximum	46.2	Third Quartile	37.08
Mean	33.55	SD	5.473
Coefficient of Variation	0.163	Skewness	0.682
Mean of logged Data	3.501	SD of logged Data	0.159

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.946	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.16	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	47.36	90% Percentile (z)	40.56
95% UPL (t)	43.44	95% Percentile (z)	42.55
95% USL	46.92	99% Percentile (z)	46.28

Gamma GOF Test

A-D Test Statistic	0.36	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.736	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.146	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.214	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	41.68	k star (bias corrected MLE)	33.9
Theta hat (MLE)	0.805	Theta star (bias corrected MLE)	0.99
nu hat (MLE)	1334	nu star (bias corrected)	1085
MLE Mean (bias corrected)	33.55	MLE Sd (bias corrected)	5.762

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	43.89	90% Percentile	41.11
95% Hawkins Wixley (HW) Approx. Gamma UPL	43.96	95% Percentile	43.56
95% WH Approx. Gamma UTL with 95% Coverage	48.66	99% Percentile	48.39
95% HW Approx. Gamma UTL with 95% Coverage	48.86		
95% WH USL	48.1	95% HW USL	48.29

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.965	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.135	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	49.54	90% Percentile (z)	40.65
95% UPL (t)	44.2	95% Percentile (z)	43.07
95% USL	48.91	99% Percentile (z)	48

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	46.2
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	46.2	95% BCA Bootstrap UTL with 95% Coverage	46.2
95% UPL	46.2	90% Percentile	39.4
90% Chebyshev UPL	50.47	95% Percentile	41.4
95% Chebyshev UPL	58.14	99% Percentile	45.24
95% USL	46.2		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Barium

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	0.03
Maximum Detect	N/A	Maximum Non-Detect	0.03
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Barium was not processed!

Beryllium

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	4		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	4
Minimum Detect	N/A	Minimum Non-Detect	0.027
Maximum Detect	N/A	Maximum Non-Detect	0.03
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Beryllium was not processed!

Draft

Cadmium

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	15	Number of Non-Detects	1
Number of Distinct Detects	14	Number of Distinct Non-Detects	1
Minimum Detect	0.008	Minimum Non-Detect	0.006
Maximum Detect	0.07	Maximum Non-Detect	0.006
Variance Detected	2.6095E-4	Percent Non-Detects	6.25%
Mean Detected	0.0203	SD Detected	0.0162
Mean of Detected Logged Data	-4.101	SD of Detected Logged Data	0.62

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.733	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.881	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.223	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.229	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0194	SD	0.0155
95% UTL95% Coverage	0.0586	95% KM UPL (t)	0.0475
90% KM Percentile (z)	0.0393	95% KM Percentile (z)	0.0449
99% KM Percentile (z)	0.0555	95% KM USL	0.0573

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0193	SD	0.0162
95% UTL95% Coverage	0.0601	95% UPL (t)	0.0485
90% Percentile (z)	0.04	95% Percentile (z)	0.0459
99% Percentile (z)	0.0569	95% USL	0.0588

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.577	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.745	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.171	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.224	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	2.589	k star (bias corrected MLE)	2.116
Theta hat (MLE)	0.00785	Theta star (bias corrected MLE)	0.00961
nu hat (MLE)	77.68	nu star (bias corrected)	63.48
MLE Mean (bias corrected)	0.0203		
MLE Sd (bias corrected)	0.014	95% Percentile of Chisquare (2k)	9.862

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.008	Mean	0.0197
Maximum	0.07	Median	0.0135
SD	0.0158	CV	0.803
k hat (MLE)	2.599	k star (bias corrected MLE)	2.153
Theta hat (MLE)	0.00758	Theta star (bias corrected MLE)	0.00914
nu hat (MLE)	83.15	nu star (bias corrected)	68.9
MLE Mean (bias corrected)	0.0197	MLE Sd (bias corrected)	0.0134
95% Percentile of Chisquare (2k)	9.98	90% Percentile	0.0376
95% Percentile	0.0456	99% Percentile	0.0633

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0652	0.067	95% Approx. Gamma UPL	0.0472	0.0473
95% Gamma USL	0.063	0.0645			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	1.572		nu hat (KM)	59.3
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0646	0.0666	95% Approx. Gamma UPL	0.0465	0.0468
95% Gamma USL	0.0624	0.0641			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.932	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.881	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.14	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.229	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0193	Mean in Log Scale	-4.195
SD in Original Scale	0.0162	SD in Log Scale	0.708
95% UTL95% Coverage	0.09	95% BCA UTL95% Coverage	0.07
95% Bootstrap (%) UTL95% Coverage	0.07	95% UPL (t)	0.0542
90% Percentile (z)	0.0373	95% Percentile (z)	0.0483
99% Percentile (z)	0.0782	95% USL	0.085

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-4.164	95% KM UTL (Lognormal)95% Coverage	0.0761
KM SD of Logged Data	0.63	95% KM UPL (Lognormal)	0.0485
95% KM Percentile Lognormal (z)	0.0438	95% KM USL (Lognormal)	0.0724

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0193	Mean in Log Scale	-4.208
SD in Original Scale	0.0162	SD in Log Scale	0.735
95% UTL95% Coverage	0.0952	95% UPL (t)	0.0562
90% Percentile (z)	0.0382	95% Percentile (z)	0.0499
99% Percentile (z)	0.0824	95% USL	0.0898

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.07
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.07	95% USL	0.07
95% KM Chebyshev UPL	0.0891		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Chromium

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	8		
Number of Detects	7	Number of Non-Detects	9
Number of Distinct Detects	7	Number of Distinct Non-Detects	2
Minimum Detect	0.017	Minimum Non-Detect	0.017
Maximum Detect	0.249	Maximum Non-Detect	0.018
Variance Detected	0.00897	Percent Non-Detects	56.25%
Mean Detected	0.0959	SD Detected	0.0947
Mean of Detected Logged Data	-2.83	SD of Detected Logged Data	1.094

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.824	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.268	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.335	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0515	SD	0.0699
95% UTL95% Coverage	0.228	95% KM UPL (t)	0.178
90% KM Percentile (z)	0.141	95% KM Percentile (z)	0.167
99% KM Percentile (z)	0.214	95% KM USL	0.222

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0468	SD	0.0747
95% UTL95% Coverage	0.235	95% UPL (t)	0.182
90% Percentile (z)	0.143	95% Percentile (z)	0.17
99% Percentile (z)	0.221	95% USL	0.229

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.459	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.725	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.233	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.319	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.17	k star (bias corrected MLE)	0.764
Theta hat (MLE)	0.082	Theta star (bias corrected MLE)	0.126
nu hat (MLE)	16.37	nu star (bias corrected)	10.69
MLE Mean (bias corrected)	0.0959		
MLE Sd (bias corrected)	0.11	95% Percentile of Chisquare (2k)	5.038

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.0476
Maximum	0.249	Median	0.01
SD	0.0743	CV	1.562
k hat (MLE)	0.763	k star (bias corrected MLE)	0.662
Theta hat (MLE)	0.0623	Theta star (bias corrected MLE)	0.0719
nu hat (MLE)	24.42	nu star (bias corrected)	21.17
MLE Mean (bias corrected)	0.0476	MLE Sd (bias corrected)	0.0585
95% Percentile of Chisquare (2k)	4.597	90% Percentile	0.121
95% Percentile	0.165	99% Percentile	0.271

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.279	0.295	95% Approx. Gamma UPL	0.17	0.169
95% Gamma USL	0.265	0.278			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	0.542		nu hat (KM)	17.35
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.25	0.257	95% Approx. Gamma UPL	0.161	0.158
95% Gamma USL	0.239	0.244			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.896	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.212	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.335	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0438	Mean in Log Scale	-4.666
SD in Original Scale	0.0764	SD in Log Scale	1.955
95% UTL95% Coverage	1.307	95% BCA UTL95% Coverage	0.249
95% Bootstrap (%) UTL95% Coverage	0.249	95% UPL (t)	0.322
90% Percentile (z)	0.115	95% Percentile (z)	0.234
99% Percentile (z)	0.888	95% USL	1.116

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-3.53	95% KM UTL (Lognormal)95% Coverage	0.292
KM SD of Logged Data	0.911	95% KM UPL (Lognormal)	0.152
95% KM Percentile Lognormal (z)	0.131	95% KM USL (Lognormal)	0.271

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0468	Mean in Log Scale	-3.909
SD in Original Scale	0.0747	SD in Log Scale	1.202
95% UTL95% Coverage	0.417	95% UPL (t)	0.176
90% Percentile (z)	0.0936	95% Percentile (z)	0.145
99% Percentile (z)	0.329	95% USL	0.378

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.249
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.249	95% USL	0.249
95% KM Chebyshev UPL	0.366		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Cobalt

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	3		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	3
Minimum Detect	N/A	Minimum Non-Detect	0.018
Maximum Detect	N/A	Maximum Non-Detect	0.02
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Cobalt was not processed!

Draft

Copper

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	4.39	First Quartile	5.74
Second Largest	15.3	Median	6.45
Maximum	40	Third Quartile	6.798
Mean	8.763	SD	8.682
Coefficient of Variation	0.991	Skewness	3.539
Mean of logged Data	1.969	SD of logged Data	0.535

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.451	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.439	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	30.68	90% Percentile (z)	19.89
95% UPL (t)	24.45	95% Percentile (z)	23.04
95% USL	29.97	99% Percentile (z)	28.96

Gamma GOF Test

A-D Test Statistic	2.777	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.746	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.401	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.217	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.633	k star (bias corrected MLE)	2.181
Theta hat (MLE)	3.327	Theta star (bias corrected MLE)	4.017
nu hat (MLE)	84.27	nu star (bias corrected)	69.8
MLE Mean (bias corrected)	8.763	MLE Sd (bias corrected)	5.933

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	20.58	90% Percentile	16.7
95% Hawkins Wixley (HW) Approx. Gamma UPL	20.12	95% Percentile	20.23
95% WH Approx. Gamma UTL with 95% Coverage	28.37	99% Percentile	28.01
95% HW Approx. Gamma UTL with 95% Coverage	28.13		
95% WH USL	27.41	95% HW USL	27.13

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.661	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.355	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Lognormal at 5% Significance Level

Data Not Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	27.61	90% Percentile (z)	14.21
95% UPL (t)	18.82	95% Percentile (z)	17.26
95% USL	26.45	99% Percentile (z)	24.84

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	40
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	40	95% BCA Bootstrap UTL with 95% Coverage	40
95% UPL	40	90% Percentile	11.33
90% Chebyshev UPL	35.61	95% Percentile	21.48
95% Chebyshev UPL	47.77	99% Percentile	36.3
95% USL	40		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Iron

General Statistics

Total Number of Observations	16	Number of Distinct Observations	14
		Number of Missing Observations	4
Minimum	1.16	First Quartile	1.468
Second Largest	14	Median	1.64
Maximum	221	Third Quartile	2.58
Mean	16.29	SD	54.68
Coefficient of Variation	3.356	Skewness	3.979
Mean of logged Data	0.986	SD of logged Data	1.322

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.302	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.467	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with	95% Coverage	154.3	90% Percentile (z)	86.36
	95% UPL (t)	115.1	95% Percentile (z)	106.2
	95% USL	149.9	99% Percentile (z)	143.5

Gamma GOF Test

A-D Test Statistic	4.104	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.823	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.439	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.231	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.369	k star (bias corrected MLE)	0.342
Theta hat (MLE)	44.11	Theta star (bias corrected MLE)	47.67
nu hat (MLE)	11.82	nu star (bias corrected)	10.94
MLE Mean (bias corrected)	16.29	MLE Sd (bias corrected)	27.87

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	55.49	90% Percentile	47.21
95% Hawkins Wixley (HW) Approx. Gamma UPL	47.77	95% Percentile	71.41
95% WH Approx. Gamma UTL with 95% Coverage	103.7	99% Percentile	133.3
95% HW Approx. Gamma UTL with 95% Coverage	95.81		
95% WH USL	97.26	95% HW USL	89.1

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.595	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.31	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Lognormal at 5% Significance Level

Data Not Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with	95% Coverage	75.27	90% Percentile (z)	14.57
	95% UPL (t)	29.18	95% Percentile (z)	23.55
	95% USL	67.66	99% Percentile (z)	57.97

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r		16	95% UTL with 95% Coverage	221
Approximate f		0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with	95% Coverage	221	95% BCA Bootstrap UTL with 95% Coverage	221
	95% UPL	221	90% Percentile	8.8
	90% Chebyshev UPL	185.4	95% Percentile	65.75
	95% Chebyshev UPL	262	99% Percentile	190
	95% USL	221		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Lead

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	9	Number of Non-Detects	7
Number of Distinct Detects	9	Number of Distinct Non-Detects	6
Minimum Detect	0.045	Minimum Non-Detect	0.005
Maximum Detect	0.778	Maximum Non-Detect	0.034
Variance Detected	0.0588	Percent Non-Detects	43.75%
Mean Detected	0.184	SD Detected	0.242
Mean of Detected Logged Data	-2.232	SD of Detected Logged Data	1.002

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.649	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.829	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.349	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.295	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.106	SD	0.193
95% UTL95% Coverage	0.593	95% KM UPL (t)	0.454
90% KM Percentile (z)	0.353	95% KM Percentile (z)	0.423
99% KM Percentile (z)	0.555	95% KM USL	0.577

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.109	SD	0.198
95% UTL95% Coverage	0.608	95% UPL (t)	0.466
90% Percentile (z)	0.362	95% Percentile (z)	0.434
99% Percentile (z)	0.569	95% USL	0.592

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.89	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.742	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.283	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.287	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.065	k star (bias corrected MLE)	0.784
Theta hat (MLE)	0.172	Theta star (bias corrected MLE)	0.234
nu hat (MLE)	19.18	nu star (bias corrected)	14.12
MLE Mean (bias corrected)	0.184		
MLE Sd (bias corrected)	0.208	95% Percentile of Chisquare (2k)	5.125

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.108
Maximum	0.778	Median	0.0455
SD	0.198	CV	1.839
k hat (MLE)	0.594	k star (bias corrected MLE)	0.524
Theta hat (MLE)	0.181	Theta star (bias corrected MLE)	0.206
nu hat (MLE)	19	nu star (bias corrected)	16.77
MLE Mean (bias corrected)	0.108	MLE Sd (bias corrected)	0.149
95% Percentile of Chisquare (2k)	3.96	90% Percentile	0.289
95% Percentile	0.407	99% Percentile	0.697

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.704	0.768	95% Approx. Gamma UPL	0.411	0.417
95% Gamma USL	0.666	0.72			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	0.299		nu hat (KM)	9.573
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.718	0.81	95% Approx. Gamma UPL	0.409	0.423
95% Gamma USL	0.677	0.757			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.842	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.829	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.264	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.295	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.107	Mean in Log Scale	-3.389
SD in Original Scale	0.199	SD in Log Scale	1.55
95% UTL95% Coverage	1.686	95% BCA UTL95% Coverage	0.778
95% Bootstrap (%) UTL95% Coverage	0.778	95% UPL (t)	0.555
90% Percentile (z)	0.246	95% Percentile (z)	0.432
99% Percentile (z)	1.241	95% USL	1.487

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-3.573	95% KM UTL (Lognormal)95% Coverage	1.939
KM SD of Logged Data	1.678	95% KM UPL (Lognormal)	0.582
95% KM Percentile Lognormal (z)	0.443	95% KM USL (Lognormal)	1.693

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.109	Mean in Log Scale	-3.248
SD in Original Scale	0.198	SD in Log Scale	1.463
95% UTL95% Coverage	1.562	95% UPL (t)	0.547
90% Percentile (z)	0.254	95% Percentile (z)	0.431
99% Percentile (z)	1.17	95% USL	1.388

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.778
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.778	95% USL	0.778
95% KM Chebyshev UPL	0.973		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Manganese

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	0.217	First Quartile	0.23
Second Largest	0.359	Median	0.263
Maximum	0.389	Third Quartile	0.311
Mean	0.279	SD	0.054
Coefficient of Variation	0.194	Skewness	0.74
Mean of logged Data	-1.294	SD of logged Data	0.186

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.905	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.19	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	0.415	90% Percentile (z)	0.348
95% UPL (t)	0.376	95% Percentile (z)	0.368
95% USL	0.411	99% Percentile (z)	0.404

Gamma GOF Test

A-D Test Statistic	0.524	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.736	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.186	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	30.14	k star (bias corrected MLE)	24.53
Theta hat (MLE)	0.00925	Theta star (bias corrected MLE)	0.0114
nu hat (MLE)	964.5	nu star (bias corrected)	785
MLE Mean (bias corrected)	0.279	MLE Sd (bias corrected)	0.0563

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.381	90% Percentile	0.353
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.382	95% Percentile	0.377
95% WH Approx. Gamma UTL with 95% Coverage	0.429	99% Percentile	0.426
95% HW Approx. Gamma UTL with 95% Coverage	0.431		
95% WH USL	0.424	95% HW USL	0.426

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.923	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.175	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	0.439	90% Percentile (z)	0.348
95% UPL (t)	0.384	95% Percentile (z)	0.373
95% USL	0.432	99% Percentile (z)	0.423

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	0.389
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	0.389	95% BCA Bootstrap UTL with 95% Coverage	0.389
95% UPL	0.389	90% Percentile	0.356
90% Chebyshev UPL	0.446	95% Percentile	0.367
95% Chebyshev UPL	0.521	99% Percentile	0.385
95% USL	0.389		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Mercury

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	8.11	First Quartile	10.68
Second Largest	15.8	Median	11.85
Maximum	18.6	Third Quartile	13.28
Mean	12.17	SD	2.686
Coefficient of Variation	0.221	Skewness	0.793
Mean of logged Data	2.477	SD of logged Data	0.215

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.961	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.128	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	18.95	90% Percentile (z)	15.61
95% UPL (t)	17.02	95% Percentile (z)	16.59
95% USL	18.73	99% Percentile (z)	18.42

Gamma GOF Test

A-D Test Statistic	0.139	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.736	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0982	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	22.95	k star (bias corrected MLE)	18.69
Theta hat (MLE)	0.53	Theta star (bias corrected MLE)	0.651
nu hat (MLE)	734.5	nu star (bias corrected)	598.1
MLE Mean (bias corrected)	12.17	MLE Sd (bias corrected)	2.814

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	17.32	90% Percentile	15.88
95% Hawkins Wixley (HW) Approx. Gamma UPL	17.37	95% Percentile	17.14
95% WH Approx. Gamma UTL with 95% Coverage	19.81	99% Percentile	19.65
95% HW Approx. Gamma UTL with 95% Coverage	19.96		
95% WH USL	19.52	95% HW USL	19.66

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.991	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0909	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	20.48	90% Percentile (z)	15.68
95% UPL (t)	17.56	95% Percentile (z)	16.95
95% USL	20.13	99% Percentile (z)	19.63

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	18.6
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	18.6	95% BCA Bootstrap UTL with 95% Coverage	18.6
95% UPL	18.6	90% Percentile	15.2
90% Chebyshev UPL	20.47	95% Percentile	16.5
95% Chebyshev UPL	24.24	99% Percentile	18.18
95% USL	18.6		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Methyl Mercury

General Statistics

Total Number of Observations	16	Number of Distinct Observations	14
		Number of Missing Observations	4
Minimum	6.4	First Quartile	8.3
Second Largest	12.6	Median	9.25
Maximum	12.6	Third Quartile	11.2
Mean	9.6	SD	2.071
Coefficient of Variation	0.216	Skewness	0.0896
Mean of logged Data	2.239	SD of logged Data	0.221

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.94	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.136	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	14.83	90% Percentile (z)	12.25
95% UPL (t)	13.34	95% Percentile (z)	13.01
95% USL	14.66	99% Percentile (z)	14.42

Gamma GOF Test

A-D Test Statistic	0.304	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.736	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.137	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	22.43	k star (bias corrected MLE)	18.27
Theta hat (MLE)	0.428	Theta star (bias corrected MLE)	0.525
nu hat (MLE)	717.9	nu star (bias corrected)	584.6
MLE Mean (bias corrected)	9.6	MLE Sd (bias corrected)	2.246

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	13.72	90% Percentile	12.57
95% Hawkins Wixley (HW) Approx. Gamma UPL	13.78	95% Percentile	13.57
95% WH Approx. Gamma UTL with 95% Coverage	15.72	99% Percentile	15.58
95% HW Approx. Gamma UTL with 95% Coverage	15.87		
95% WH USL	15.48	95% HW USL	15.62

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.945	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.125	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	16.39	90% Percentile (z)	12.46
95% UPL (t)	13.99	95% Percentile (z)	13.5
95% USL	16.1	99% Percentile (z)	15.69

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	12.6
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	12.6	95% BCA Bootstrap UTL with 95% Coverage	12.6
95% UPL	12.6	90% Percentile	12.35
90% Chebyshev UPL	16	95% Percentile	12.6
95% Chebyshev UPL	18.9	99% Percentile	12.6
95% USL	12.6		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Selenium

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	9		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	9
Minimum Detect	N/A	Minimum Non-Detect	0.14
Maximum Detect	N/A	Maximum Non-Detect	0.29
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Selenium was not processed!

Silver

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	3		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	3
Minimum Detect	N/A	Minimum Non-Detect	0.018
Maximum Detect	N/A	Maximum Non-Detect	0.02
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Silver was not processed!

Thallium

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	0.002
Maximum Detect	N/A	Maximum Non-Detect	0.002
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Thallium was not processed!

Draft

Vanadium

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	6		
Number of Detects	2	Number of Non-Detects	14
Number of Distinct Detects	2	Number of Distinct Non-Detects	4
Minimum Detect	0.016	Minimum Non-Detect	0.012
Maximum Detect	0.021	Maximum Non-Detect	0.015
Variance Detected	1.2500E-5	Percent Non-Detects	87.5%
Mean Detected	0.0185	SD Detected	0.00354
Mean of Detected Logged Data	-3.999	SD of Detected Logged Data	0.192

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only
Not Enough Data to Perform GOF Test

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0128	SD	0.00232
95% UTL95% Coverage	0.0187	95% KM UPL (t)	0.017
90% KM Percentile (z)	0.0158	95% KM Percentile (z)	0.0166
99% KM Percentile (z)	0.0182	95% KM USL	0.0185

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.00819	SD	0.00415
95% UTL95% Coverage	0.0187	95% UPL (t)	0.0157
90% Percentile (z)	0.0135	95% Percentile (z)	0.015
99% Percentile (z)	0.0178	95% USL	0.0183

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only
Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	54.42	k star (bias corrected MLE)	N/A
Theta hat (MLE)	3.3992E-4	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	217.7	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A		
MLE Sd (bias corrected)	N/A	95% Percentile of Chisquare (2k)	N/A

The following statistics are computed using gamma distribution and KM estimates
Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

k hat (KM)		30.39	nu hat (KM)		972.4
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0185	0.0185	95% Approx. Gamma UPL	0.0167	0.0167
95% Gamma USL	0.0183	0.0183			

Lognormal GOF Test on Detected Observations Only
Not Enough Data to Perform GOF Test

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0068	Mean in Log Scale	-5.187
SD in Original Scale	0.00506	SD in Log Scale	0.615
95% UTL95% Coverage	0.0264	95% BCA UTL95% Coverage	0.021
95% Bootstrap (%) UTL95% Coverage	0.021	95% UPL (t)	0.017
90% Percentile (z)	0.0123	95% Percentile (z)	0.0154
99% Percentile (z)	0.0234	95% USL	0.0251

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.00819	Mean in Log Scale	-4.88
SD in Original Scale	0.00415	SD in Log Scale	0.353
95% UTL95% Coverage	0.0185	95% UPL (t)	0.0144
90% Percentile (z)	0.0119	95% Percentile (z)	0.0136
99% Percentile (z)	0.0173	95% USL	0.018

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics
Data do not follow a Discernible Distribution (0.05)

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.021
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.021	95% USL	0.021
95% KM Chebyshev UPL	0.0233		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Zinc

General Statistics

Total Number of Observations	16	Number of Distinct Observations	12
		Number of Missing Observations	4
Minimum	11.5	First Quartile	13.08
Second Largest	20.5	Median	13.25
Maximum	30	Third Quartile	13.53
Mean	14.63	SD	4.539
Coefficient of Variation	0.31	Skewness	3.058
Mean of logged Data	2.652	SD of logged Data	0.234

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.528	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.402	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	26.09	90% Percentile (z)	20.45
95% UPL (t)	22.83	95% Percentile (z)	22.1
95% USL	25.72	99% Percentile (z)	25.19

Gamma GOF Test

A-D Test Statistic	2.939	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.737	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.395	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	16.31	k star (bias corrected MLE)	13.29
Theta hat (MLE)	0.897	Theta star (bias corrected MLE)	1.101
nu hat (MLE)	521.9	nu star (bias corrected)	425.4
MLE Mean (bias corrected)	14.63	MLE Sd (bias corrected)	4.013

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	22.05	90% Percentile	19.95
95% Hawkins Wixley (HW) Approx. Gamma UPL	21.95	95% Percentile	21.8
95% WH Approx. Gamma UTL with 95% Coverage	25.75	99% Percentile	25.54
95% HW Approx. Gamma UTL with 95% Coverage	25.72		
95% WH USL	25.32	95% HW USL	25.27

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.607	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.384	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Lognormal at 5% Significance Level

Data Not Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	25.62	90% Percentile (z)	19.15
95% UPL (t)	21.66	95% Percentile (z)	20.85
95% USL	25.14	99% Percentile (z)	24.46

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	30
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	30	95% BCA Bootstrap UTL with 95% Coverage	30
95% UPL	30	90% Percentile	17.5
90% Chebyshev UPL	28.67	95% Percentile	22.88
95% Chebyshev UPL	35.03	99% Percentile	28.58
95% USL	30		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Monomethyl Arsenic

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	2		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	2
Minimum Detect	N/A	Minimum Non-Detect	0.003
Maximum Detect	N/A	Maximum Non-Detect	0.004
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Monomethyl Arsenic was not processed!

Draft

Sea Cucumber (loli)

Draft

Alpha-BHC

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	7		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	7
Minimum Detect	N/A	Minimum Non-Detect	3.97
Maximum Detect	N/A	Maximum Non-Detect	4.03
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Alpha-BHC was not processed!

Gamma-BHC (Lindane)

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	7		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	7
Minimum Detect	N/A	Minimum Non-Detect	3.97
Maximum Detect	N/A	Maximum Non-Detect	4.03
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gamma-BHC (Lindane) was not processed!

Delta-BHC

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	7		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	7
Minimum Detect	N/A	Minimum Non-Detect	3.97
Maximum Detect	N/A	Maximum Non-Detect	4.03
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Delta-BHC was not processed!

Draft

Heptachlor

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	7		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	7
Minimum Detect	N/A	Minimum Non-Detect	3.97
Maximum Detect	N/A	Maximum Non-Detect	4.03
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Heptachlor was not processed!

Aldrin

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	7		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	7
Minimum Detect	N/A	Minimum Non-Detect	3.97
Maximum Detect	N/A	Maximum Non-Detect	4.03
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Aldrin was not processed!

Heptachlor Epoxide

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	7		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	7
Minimum Detect	N/A	Minimum Non-Detect	3.97
Maximum Detect	N/A	Maximum Non-Detect	4.03
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Heptachlor Epoxide was not processed!

Draft

p,p'-DDT

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	7		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	7
Minimum Detect	N/A	Minimum Non-Detect	3.97
Maximum Detect	N/A	Maximum Non-Detect	4.03
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable p,p'-DDT was not processed!

Beta-BHC

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	7		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	7
Minimum Detect	N/A	Minimum Non-Detect	3.97
Maximum Detect	N/A	Maximum Non-Detect	4.03
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Beta-BHC was not processed!

Draft

Toluene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	12.5
Maximum Detect	N/A	Maximum Non-Detect	12.5
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Toluene was not processed!

Ethyl Benzene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	12.5
Maximum Detect	N/A	Maximum Non-Detect	12.5
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Ethyl Benzene was not processed!

M,P-Xylenes

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	25
Maximum Detect	N/A	Maximum Non-Detect	25
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable M,P-Xylenes was not processed!

Draft

Styrene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	12.5
Maximum Detect	N/A	Maximum Non-Detect	12.5
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Styrene was not processed!

o-Xylene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	12.5
Maximum Detect	N/A	Maximum Non-Detect	12.5
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable o-Xylene was not processed!

1,2,4-Trimethylbenzene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	12.5
Maximum Detect	N/A	Maximum Non-Detect	12.5
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,4-Trimethylbenzene was not processed!

Draft

Dimethylphthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Dimethylphthalate was not processed!

Diethylphthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Diethylphthalate was not processed!

Di-n-butylphthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Di-n-butylphthalate was not processed!

Draft

Pyrene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Pyrene was not processed!

bis(2-Ethylhexyl)phthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable bis(2-Ethylhexyl)phthalate was not processed!

Di-n-octylphthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Di-n-octylphthalate was not processed!

Draft

2,3,7,8-TCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	13
Minimum Detect	N/A	Minimum Non-Detect	0.052
Maximum Detect	N/A	Maximum Non-Detect	0.15
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,3,7,8-TCDF was not processed!

Draft

Total TCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	12		
Number of Detects	14	Number of Non-Detects	2
Number of Distinct Detects	11	Number of Distinct Non-Detects	2
Minimum Detect	0.059	Minimum Non-Detect	0.069
Maximum Detect	0.69	Maximum Non-Detect	0.11
Variance Detected	0.0545	Percent Non-Detects	12.5%
Mean Detected	0.326	SD Detected	0.234
Mean of Detected Logged Data	-1.41	SD of Detected Logged Data	0.822

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.823	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.874	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.261	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.237	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.292	SD	0.228
95% UTL95% Coverage	0.868	95% KM UPL (t)	0.705
90% KM Percentile (z)	0.585	95% KM Percentile (z)	0.668
99% KM Percentile (z)	0.823	95% KM USL	0.85

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.291	SD	0.238
95% UTL95% Coverage	0.89	95% UPL (t)	0.72
90% Percentile (z)	0.595	95% Percentile (z)	0.681
99% Percentile (z)	0.843	95% USL	0.871

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.955	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.747	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.219	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.232	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.888	k star (bias corrected MLE)	1.531
Theta hat (MLE)	0.172	Theta star (bias corrected MLE)	0.213
nu hat (MLE)	52.87	nu star (bias corrected)	42.88
MLE Mean (bias corrected)	0.326		
MLE Sd (bias corrected)	0.263	95% Percentile of Chisquare (2k)	7.923

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0225	Mean	0.288
Maximum	0.69	Median	0.16
SD	0.241	CV	0.837
k hat (MLE)	1.222	k star (bias corrected MLE)	1.035
Theta hat (MLE)	0.235	Theta star (bias corrected MLE)	0.278
nu hat (MLE)	39.11	nu star (bias corrected)	33.11
MLE Mean (bias corrected)	0.288	MLE Sd (bias corrected)	0.283
95% Percentile of Chisquare (2k)	6.125	90% Percentile	0.657
95% Percentile	0.852	99% Percentile	1.303

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	1.391	1.572	95% Approx. Gamma UPL	0.913	0.975
95% Gamma USL	1.33	1.494			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	1.641		nu hat (KM)	52.5
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	1.206	1.304	95% Approx. Gamma UPL	0.822	0.852
95% Gamma USL	1.158	1.246			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.88	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.874	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.223	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.237	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.292	Mean in Log Scale	-1.596
SD in Original Scale	0.236	SD in Log Scale	0.92
95% UTL95% Coverage	2.066	95% BCA UTL95% Coverage	0.69
95% Bootstrap (%) UTL95% Coverage	0.69	95% UPL (t)	1.068
90% Percentile (z)	0.659	95% Percentile (z)	0.92
99% Percentile (z)	1.722	95% USL	1.918

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-1.587	95% KM UTL (Lognormal)95% Coverage	1.873
KM SD of Logged Data	0.877	95% KM UPL (Lognormal)	0.998
95% KM Percentile Lognormal (z)	0.866	95% KM USL (Lognormal)	1.745

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.291	Mean in Log Scale	-1.625
SD in Original Scale	0.238	SD in Log Scale	0.969
95% UTL95% Coverage	2.275	95% UPL (t)	1.135
90% Percentile (z)	0.682	95% Percentile (z)	0.97
99% Percentile (z)	1.878	95% USL	2.103

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.69
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.69	95% USL	0.69
95% KM Chebyshev UPL	1.318		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

2,3,7,8-TCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	14
Minimum Detect	N/A	Minimum Non-Detect	0.034
Maximum Detect	N/A	Maximum Non-Detect	0.19
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,3,7,8-TCDD was not processed!

Draft

Total TCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	8	Number of Non-Detects	8
Number of Distinct Detects	6	Number of Distinct Non-Detects	8
Minimum Detect	0.087	Minimum Non-Detect	0.034
Maximum Detect	0.18	Maximum Non-Detect	0.19
Variance Detected	8.2613E-4	Percent Non-Detects	50%
Mean Detected	0.127	SD Detected	0.0287
Mean of Detected Logged Data	-2.085	SD of Detected Logged Data	0.225

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.957	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.21	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0837	SD	0.0504
95% UTL95% Coverage	0.211	95% KM UPL (t)	0.175
90% KM Percentile (z)	0.148	95% KM Percentile (z)	0.167
99% KM Percentile (z)	0.201	95% KM USL	0.207

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.082	SD	0.0533
95% UTL95% Coverage	0.217	95% UPL (t)	0.178
90% Percentile (z)	0.15	95% Percentile (z)	0.17
99% Percentile (z)	0.206	95% USL	0.212

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.232	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.716	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.18	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.294	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	22.81	k star (bias corrected MLE)	14.34
Theta hat (MLE)	0.00557	Theta star (bias corrected MLE)	0.00887
nu hat (MLE)	365	nu star (bias corrected)	229.4
MLE Mean (bias corrected)	0.127		
MLE Sd (bias corrected)	0.0336	95% Percentile of Chisquare (2k)	42.17

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0558	Mean	0.0936
Maximum	0.18	Median	0.0886
SD	0.0406	CV	0.434
k hat (MLE)	5.937	k star (bias corrected MLE)	4.866
Theta hat (MLE)	0.0158	Theta star (bias corrected MLE)	0.0192
nu hat (MLE)	190	nu star (bias corrected)	155.7
MLE Mean (bias corrected)	0.0936	MLE Sd (bias corrected)	0.0424
95% Percentile of Chisquare (2k)	17.94	90% Percentile	0.15
95% Percentile	0.173	99% Percentile	0.219

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.224	0.23	95% Approx. Gamma UPL	0.177	0.179
95% Gamma USL	0.219	0.224			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	2.752		nu hat (KM)	83.05
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.274	0.289	95% Approx. Gamma UPL	0.199	0.204
95% Gamma USL	0.265	0.279			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.974	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.187	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0989	Mean in Log Scale	-2.37
SD in Original Scale	0.0356	SD in Log Scale	0.341
95% UTL95% Coverage	0.221	95% BCA UTL95% Coverage	0.18
95% Bootstrap (%) UTL95% Coverage	0.18	95% UPL (t)	0.173
90% Percentile (z)	0.145	95% Percentile (z)	0.164
99% Percentile (z)	0.206	95% USL	0.215

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.69	95% KM UTL (Lognormal)95% Coverage	0.364
KM SD of Logged Data	0.665	95% KM UPL (Lognormal)	0.226
95% KM Percentile Lognormal (z)	0.203	95% KM USL (Lognormal)	0.345

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.082	Mean in Log Scale	-2.76
SD in Original Scale	0.0533	SD in Log Scale	0.797
95% UTL95% Coverage	0.473	95% UPL (t)	0.267
90% Percentile (z)	0.176	95% Percentile (z)	0.235
99% Percentile (z)	0.404	95% USL	0.444

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.19
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.19	95% USL	0.19
95% KM Chebyshev UPL	0.31		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,7,8-PeCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	14
Minimum Detect	N/A	Minimum Non-Detect	0.028
Maximum Detect	N/A	Maximum Non-Detect	0.11
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,7,8-PeCDF was not processed!

2,3,4,7,8-PeCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	12		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	12
Minimum Detect	N/A	Minimum Non-Detect	0.024
Maximum Detect	N/A	Maximum Non-Detect	0.085
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,3,4,7,8-PeCDF was not processed!

Total PeCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	15
Minimum Detect	N/A	Minimum Non-Detect	0.026
Maximum Detect	N/A	Maximum Non-Detect	0.097
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Total PeCDF was not processed!

1,2,3,7,8-PeCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	13
Minimum Detect	N/A	Minimum Non-Detect	0.029
Maximum Detect	N/A	Maximum Non-Detect	0.071
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,7,8-PeCDD was not processed!

Total PeCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	13
Minimum Detect	N/A	Minimum Non-Detect	0.029
Maximum Detect	N/A	Maximum Non-Detect	0.071
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Total PeCDD was not processed!

1,2,3,4,7,8-HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	14
Minimum Detect	N/A	Minimum Non-Detect	0.021
Maximum Detect	N/A	Maximum Non-Detect	0.058
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,4,7,8-HxCDF was not processed!

Draft

1,2,3,6,7,8-HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	15
Minimum Detect	N/A	Minimum Non-Detect	0.015
Maximum Detect	N/A	Maximum Non-Detect	0.068
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,6,7,8-HxCDF was not processed!

2,3,4,6,7,8-HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	11		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	11
Minimum Detect	N/A	Minimum Non-Detect	0.017
Maximum Detect	N/A	Maximum Non-Detect	0.059
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,3,4,6,7,8-HxCDF was not processed!

1,2,3,7,8,9-HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	16		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	16
Minimum Detect	N/A	Minimum Non-Detect	0.02
Maximum Detect	N/A	Maximum Non-Detect	0.074
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,7,8,9-HxCDF was not processed!

Total HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	14
Minimum Detect	N/A	Minimum Non-Detect	0.018
Maximum Detect	N/A	Maximum Non-Detect	0.065
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Total HxCDF was not processed!

Draft

1,2,3,4,7,8-HxCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	2	Number of Non-Detects	14
Number of Distinct Detects	2	Number of Distinct Non-Detects	12
Minimum Detect	0.055	Minimum Non-Detect	0.025
Maximum Detect	0.063	Maximum Non-Detect	0.087
Variance Detected	3.2000E-5	Percent Non-Detects	87.5%
Mean Detected	0.059	SD Detected	0.00566
Mean of Detected Logged Data	-2.833	SD of Detected Logged Data	0.096

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0315	SD	0.0134
95% UTL95% Coverage	0.0654	95% KM UPL (t)	0.0557
90% KM Percentile (z)	0.0487	95% KM Percentile (z)	0.0536
99% KM Percentile (z)	0.0627	95% KM USL	0.0643

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0318	SD	0.0139
95% UTL95% Coverage	0.0668	95% UPL (t)	0.0569
90% Percentile (z)	0.0496	95% Percentile (z)	0.0546
99% Percentile (z)	0.0641	95% USL	0.0657

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	217.2	k star (bias corrected MLE)	N/A
Theta hat (MLE)	2.7160E-4	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	868.9	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A		
MLE Sd (bias corrected)	N/A	95% Percentile of Chisquare (2k)	N/A

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

k hat (KM)	5.503		nu hat (KM)	176.1	
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0674	0.0678	95% Approx. Gamma UPL	0.0547	0.0546
95% Gamma USL	0.0659	0.0662			

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0442	Mean in Log Scale	-3.128
SD in Original Scale	0.00629	SD in Log Scale	0.127
95% UTL95% Coverage	0.0604	95% BCA UTL95% Coverage	0.063
95% Bootstrap (%) UTL95% Coverage	0.063	95% UPL (t)	0.0551
90% Percentile (z)	0.0516	95% Percentile (z)	0.054
99% Percentile (z)	0.0589	95% USL	0.0598

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0318	Mean in Log Scale	-3.542
SD in Original Scale	0.0139	SD in Log Scale	0.452
95% UTL95% Coverage	0.0907	95% UPL (t)	0.0656
90% Percentile (z)	0.0517	95% Percentile (z)	0.061
99% Percentile (z)	0.083	95% USL	0.0875

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.087
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.087	95% USL	0.087
95% KM Chebyshev UPL	0.0918		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,6,7,8-HxCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	16		
Number of Detects	5	Number of Non-Detects	11
Number of Distinct Detects	5	Number of Distinct Non-Detects	11
Minimum Detect	0.049	Minimum Non-Detect	0.026
Maximum Detect	0.1	Maximum Non-Detect	0.094
Variance Detected	4.3230E-4	Percent Non-Detects	68.75%
Mean Detected	0.0846	SD Detected	0.0208
Mean of Detected Logged Data	-2.501	SD of Detected Logged Data	0.295

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.783	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.346	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.396	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0491	SD	0.0279
95% UTL95% Coverage	0.12	95% KM UPL (t)	0.0996
90% KM Percentile (z)	0.0849	95% KM Percentile (z)	0.0951
99% KM Percentile (z)	0.114	95% KM USL	0.117

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0464	SD	0.0299
95% UTL95% Coverage	0.122	95% UPL (t)	0.1
90% Percentile (z)	0.0847	95% Percentile (z)	0.0956
99% Percentile (z)	0.116	95% USL	0.119

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.73	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.679	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.378	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.357	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	16.37	k star (bias corrected MLE)	6.68
Theta hat (MLE)	0.00517	Theta star (bias corrected MLE)	0.0127
nu hat (MLE)	163.7	nu star (bias corrected)	66.8
MLE Mean (bias corrected)	0.0846		
MLE Sd (bias corrected)	0.0327	95% Percentile of Chisquare (2k)	22.84

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0341	Mean	0.0553
Maximum	0.1	Median	0.0432
SD	0.0233	CV	0.422
k hat (MLE)	7.346	k star (bias corrected MLE)	6.01
Theta hat (MLE)	0.00753	Theta star (bias corrected MLE)	0.0092
nu hat (MLE)	235.1	nu star (bias corrected)	192.3
MLE Mean (bias corrected)	0.0553	MLE Sd (bias corrected)	0.0226
95% Percentile of Chisquare (2k)	21.05	90% Percentile	0.0854
95% Percentile	0.0968	99% Percentile	0.121

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.123	0.124	95% Approx. Gamma UPL	0.0989	0.0992
95% Gamma USL	0.12	0.121			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	3.098		nu hat (KM)	99.14
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.14	0.144	95% Approx. Gamma UPL	0.105	0.106
95% Gamma USL	0.136	0.14			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.733	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.379	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.396	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Approximate Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0558	Mean in Log Scale	-2.95
SD in Original Scale	0.0229	SD in Log Scale	0.353
95% UTL95% Coverage	0.128	95% BCA UTL95% Coverage	0.1
95% Bootstrap (%) UTL95% Coverage	0.1	95% UPL (t)	0.0991
90% Percentile (z)	0.0823	95% Percentile (z)	0.0936
99% Percentile (z)	0.119	95% USL	0.124

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-3.162	95% KM UTL (Lognormal)95% Coverage	0.163
KM SD of Logged Data	0.534	95% KM UPL (Lognormal)	0.111
95% KM Percentile Lognormal (z)	0.102	95% KM USL (Lognormal)	0.156

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0464	Mean in Log Scale	-3.259
SD in Original Scale	0.0299	SD in Log Scale	0.637
95% UTL95% Coverage	0.192	95% UPL (t)	0.121
90% Percentile (z)	0.0869	95% Percentile (z)	0.11
99% Percentile (z)	0.169	95% USL	0.182

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.1
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.1	95% USL	0.1
95% KM Chebyshev UPL	0.175		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,7,8,9-HxCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	11		
Number of Detects	4	Number of Non-Detects	12
Number of Distinct Detects	3	Number of Distinct Non-Detects	11
Minimum Detect	0.058	Minimum Non-Detect	0.024
Maximum Detect	0.084	Maximum Non-Detect	0.088
Variance Detected	1.5492E-4	Percent Non-Detects	75%
Mean Detected	0.0678	SD Detected	0.0124
Mean of Detected Logged Data	-2.704	SD of Detected Logged Data	0.179

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.865	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.283	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.443	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0387	SD	0.0208
95% UTL95% Coverage	0.0911	95% KM UPL (t)	0.0762
90% KM Percentile (z)	0.0653	95% KM Percentile (z)	0.0729
99% KM Percentile (z)	0.087	95% KM USL	0.0895

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0381	SD	0.0204
95% UTL95% Coverage	0.0896	95% UPL (t)	0.075
90% Percentile (z)	0.0643	95% Percentile (z)	0.0717
99% Percentile (z)	0.0856	95% USL	0.088

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.428	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.656	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.321	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.394	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	41.05	k star (bias corrected MLE)	10.43
Theta hat (MLE)	0.00165	Theta star (bias corrected MLE)	0.0065
nu hat (MLE)	328.4	nu star (bias corrected)	83.44
MLE Mean (bias corrected)	0.0678		
MLE Sd (bias corrected)	0.021	95% Percentile of Chisquare (2k)	32.49

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0336	Mean	0.0459
Maximum	0.084	Median	0.0409
SD	0.0147	CV	0.321
k hat (MLE)	12.67	k star (bias corrected MLE)	10.34
Theta hat (MLE)	0.00362	Theta star (bias corrected MLE)	0.00444
nu hat (MLE)	405.6	nu star (bias corrected)	330.9
MLE Mean (bias corrected)	0.0459	MLE Sd (bias corrected)	0.0143
95% Percentile of Chisquare (2k)	32.27	90% Percentile	0.0649
95% Percentile	0.0715	99% Percentile	0.0854

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0864	0.087	95% Approx. Gamma UPL	0.0727	0.0727
95% Gamma USL	0.0848	0.0853			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	3.47		nu hat (KM)	111
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.103	0.106	95% Approx. Gamma UPL	0.0791	0.0797
95% Gamma USL	0.1	0.103			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.866	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.288	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.443	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.049	Mean in Log Scale	-3.042
SD in Original Scale	0.0128	SD in Log Scale	0.226
95% UTL95% Coverage	0.0845	95% BCA UTL95% Coverage	0.084
95% Bootstrap (%) UTL95% Coverage	0.084	95% UPL (t)	0.0719
90% Percentile (z)	0.0638	95% Percentile (z)	0.0693
99% Percentile (z)	0.0808	95% USL	0.083

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-3.378	95% KM UTL (Lognormal)95% Coverage	0.115
KM SD of Logged Data	0.483	95% KM UPL (Lognormal)	0.0816
95% KM Percentile Lognormal (z)	0.0755	95% KM USL (Lognormal)	0.111

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0381	Mean in Log Scale	-3.403
SD in Original Scale	0.0204	SD in Log Scale	0.55
95% UTL95% Coverage	0.133	95% UPL (t)	0.0899
90% Percentile (z)	0.0674	95% Percentile (z)	0.0823
99% Percentile (z)	0.12	95% USL	0.128

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.088
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.088	95% USL	0.088
95% KM Chebyshev UPL	0.132		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Total HxCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	16		
Number of Detects	7	Number of Non-Detects	9
Number of Distinct Detects	7	Number of Distinct Non-Detects	9
Minimum Detect	0.039	Minimum Non-Detect	0.047
Maximum Detect	0.3	Maximum Non-Detect	0.088
Variance Detected	0.00847	Percent Non-Detects	56.25%
Mean Detected	0.116	SD Detected	0.0921
Mean of Detected Logged Data	-2.396	SD of Detected Logged Data	0.731

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.834	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.202	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.335	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0752	SD	0.0669
95% UTL95% Coverage	0.244	95% KM UPL (t)	0.196
90% KM Percentile (z)	0.161	95% KM Percentile (z)	0.185
99% KM Percentile (z)	0.231	95% KM USL	0.239

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0682	SD	0.0728
95% UTL95% Coverage	0.252	95% UPL (t)	0.2
90% Percentile (z)	0.161	95% Percentile (z)	0.188
99% Percentile (z)	0.237	95% USL	0.246

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.284	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.714	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.185	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.315	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	2.245	k star (bias corrected MLE)	1.378
Theta hat (MLE)	0.0515	Theta star (bias corrected MLE)	0.084
nu hat (MLE)	31.43	nu star (bias corrected)	19.29
MLE Mean (bias corrected)	0.116		
MLE Sd (bias corrected)	0.0986	95% Percentile of Chisquare (2k)	7.387

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0157	Mean	0.0618
Maximum	0.3	Median	0.0266
SD	0.0762	CV	1.233
k hat (MLE)	1.171	k star (bias corrected MLE)	0.993
Theta hat (MLE)	0.0528	Theta star (bias corrected MLE)	0.0623
nu hat (MLE)	37.46	nu star (bias corrected)	31.77
MLE Mean (bias corrected)	0.0618	MLE Sd (bias corrected)	0.062
95% Percentile of Chisquare (2k)	5.963	90% Percentile	0.143
95% Percentile	0.186	99% Percentile	0.286

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.298	0.314	95% Approx. Gamma UPL	0.194	0.195
95% Gamma USL	0.285	0.298			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	1.265		nu hat (KM)	49.48
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.249	0.252	95% Approx. Gamma UPL	0.18	0.178
95% Gamma USL	0.241	0.243			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.957	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.16	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.335	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0734	Mean in Log Scale	-2.853
SD in Original Scale	0.0699	SD in Log Scale	0.624
95% UTL95% Coverage	0.279	95% BCA UTL95% Coverage	0.3
95% Bootstrap (%) UTL95% Coverage	0.3	95% UPL (t)	0.178
90% Percentile (z)	0.128	95% Percentile (z)	0.161
99% Percentile (z)	0.246	95% USL	0.265

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.813	95% KM UTL (Lognormal)95% Coverage	0.264
KM SD of Logged Data	0.587	95% KM UPL (Lognormal)	0.173
95% KM Percentile Lognormal (z)	0.158	95% KM USL (Lognormal)	0.252

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0682	Mean in Log Scale	-3.011
SD in Original Scale	0.0728	SD in Log Scale	0.747
95% UTL95% Coverage	0.324	95% UPL (t)	0.19
90% Percentile (z)	0.128	95% Percentile (z)	0.168
99% Percentile (z)	0.28	95% USL	0.305

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.3
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.3	95% USL	0.3
95% KM Chebyshev UPL	0.376		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,4,6,7,8-HpCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	12		
Number of Detects	6	Number of Non-Detects	10
Number of Distinct Detects	6	Number of Distinct Non-Detects	8
Minimum Detect	0.032	Minimum Non-Detect	0.032
Maximum Detect	0.075	Maximum Non-Detect	0.06
Variance Detected	2.8347E-4	Percent Non-Detects	62.5%
Mean Detected	0.0507	SD Detected	0.0168
Mean of Detected Logged Data	-3.027	SD of Detected Logged Data	0.326

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.911	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.217	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0398	SD	0.0129
95% UTL95% Coverage	0.0725	95% KM UPL (t)	0.0632
90% KM Percentile (z)	0.0564	95% KM Percentile (z)	0.0611
99% KM Percentile (z)	0.0699	95% KM USL	0.0714

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0319	SD	0.0183
95% UTL95% Coverage	0.078	95% UPL (t)	0.0649
90% Percentile (z)	0.0553	95% Percentile (z)	0.062
99% Percentile (z)	0.0744	95% USL	0.0766

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.323	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.698	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.221	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.332	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	11.3	k star (bias corrected MLE)	5.761
Theta hat (MLE)	0.00448	Theta star (bias corrected MLE)	0.0088
nu hat (MLE)	135.6	nu star (bias corrected)	69.13
MLE Mean (bias corrected)	0.0507		
MLE Sd (bias corrected)	0.0211	95% Percentile of Chisquare (2k)	20.38

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.0317
Maximum	0.075	Median	0.0258
SD	0.0186	CV	0.586
k hat (MLE)	3.557	k star (bias corrected MLE)	2.931
Theta hat (MLE)	0.00891	Theta star (bias corrected MLE)	0.0108
nu hat (MLE)	113.8	nu star (bias corrected)	93.8
MLE Mean (bias corrected)	0.0317	MLE Sd (bias corrected)	0.0185
95% Percentile of Chisquare (2k)	12.39	90% Percentile	0.0565
95% Percentile	0.067	99% Percentile	0.0897

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0924	0.0959	95% Approx. Gamma UPL	0.0693	0.0703
95% Gamma USL	0.0896	0.0927			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	9.476		nu hat (KM)	303.2
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0742	0.0745	95% Approx. Gamma UPL	0.0625	0.0624
95% Gamma USL	0.0728	0.073			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.941	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.195	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0348	Mean in Log Scale	-3.443
SD in Original Scale	0.0163	SD in Log Scale	0.403
95% UTL95% Coverage	0.0884	95% BCA UTL95% Coverage	0.075
95% Bootstrap (%) UTL95% Coverage	0.075	95% UPL (t)	0.0662
90% Percentile (z)	0.0536	95% Percentile (z)	0.062
99% Percentile (z)	0.0816	95% USL	0.0856

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-3.264	95% KM UTL (Lognormal)95% Coverage	0.0755
KM SD of Logged Data	0.27	95% KM UPL (Lognormal)	0.0622
95% KM Percentile Lognormal (z)	0.0596	95% KM USL (Lognormal)	0.0739

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0319	Mean in Log Scale	-3.574
SD in Original Scale	0.0183	SD in Log Scale	0.508
95% UTL95% Coverage	0.101	95% UPL (t)	0.0702
90% Percentile (z)	0.0538	95% Percentile (z)	0.0647
99% Percentile (z)	0.0914	95% USL	0.097

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.075
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.075	95% USL	0.075
95% KM Chebyshev UPL	0.098		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,4,7,8,9-HpCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	14
Minimum Detect	N/A	Minimum Non-Detect	0.043
Maximum Detect	N/A	Maximum Non-Detect	0.077
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,4,7,8,9-HpCDF was not processed!

Draft

Total HpCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	3	Number of Non-Detects	13
Number of Distinct Detects	3	Number of Distinct Non-Detects	11
Minimum Detect	0.04	Minimum Non-Detect	0.034
Maximum Detect	0.075	Maximum Non-Detect	0.066
Variance Detected	3.3633E-4	Percent Non-Detects	81.25%
Mean Detected	0.0607	SD Detected	0.0183
Mean of Detected Logged Data	-2.837	SD of Detected Logged Data	0.335

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.911	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.302	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0404	SD	0.012
95% UTL95% Coverage	0.0706	95% KM UPL (t)	0.062
90% KM Percentile (z)	0.0557	95% KM Percentile (z)	0.06
99% KM Percentile (z)	0.0682	95% KM USL	0.0696

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0313	SD	0.0167
95% UTL95% Coverage	0.0733	95% UPL (t)	0.0614
90% Percentile (z)	0.0526	95% Percentile (z)	0.0587
99% Percentile (z)	0.07	95% USL	0.072

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	14.43	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0042	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	86.6	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A		
MLE Sd (bias corrected)	N/A	95% Percentile of Chisquare (2k)	N/A

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0102	Mean	0.0263
Maximum	0.075	Median	0.0198
SD	0.0193	CV	0.734
k hat (MLE)	2.705	k star (bias corrected MLE)	2.239
Theta hat (MLE)	0.00971	Theta star (bias corrected MLE)	0.0117
nu hat (MLE)	86.55	nu star (bias corrected)	71.66
MLE Mean (bias corrected)	0.0263	MLE Sd (bias corrected)	0.0175
95% Percentile of Chisquare (2k)	10.25	90% Percentile	0.0497
95% Percentile	0.0601	99% Percentile	0.083

The following statistics are computed using Gamma ROS Statistics on Imputed Data
Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0858	0.0887	95% Approx. Gamma UPL	0.0523	0.0629
95% Gamma USL	0.0829	0.0855			

The following statistics are computed using gamma distribution and KM estimates
Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	11.4		nu hat (KM)	364.8
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0708	0.0709	95% Approx. Gamma UPL	0.0607	0.0605
95% Gamma USL	0.0696	0.0696			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.879	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.322	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.032	Mean in Log Scale	-3.525
SD in Original Scale	0.0161	SD in Log Scale	0.387
95% UTL95% Coverage	0.0782	95% BCA UTL95% Coverage	0.075
95% Bootstrap (%) UTL95% Coverage	0.075	95% UPL (t)	0.0593
90% Percentile (z)	0.0484	95% Percentile (z)	0.0557
99% Percentile (z)	0.0725	95% USL	0.0758

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-3.242	95% KM UTL (Lognormal)95% Coverage	0.0711
KM SD of Logged Data	0.237	95% KM UPL (Lognormal)	0.06
95% KM Percentile Lognormal (z)	0.0577	95% KM USL (Lognormal)	0.0697

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0313	Mean in Log Scale	-3.562
SD in Original Scale	0.0167	SD in Log Scale	0.42
95% UTL95% Coverage	0.082	95% UPL (t)	0.0606
90% Percentile (z)	0.0486	95% Percentile (z)	0.0566
99% Percentile (z)	0.0754	95% USL	0.0792

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.075
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.075	95% USL	0.075
95% KM Chebyshev UPL	0.0941		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,4,6,7,8-HpCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	16		
Number of Detects	2	Number of Non-Detects	14
Number of Distinct Detects	2	Number of Distinct Non-Detects	14
Minimum Detect	0.67	Minimum Non-Detect	0.064
Maximum Detect	0.75	Maximum Non-Detect	0.55
Variance Detected	0.0032	Percent Non-Detects	87.5%
Mean Detected	0.71	SD Detected	0.0566
Mean of Detected Logged Data	-0.344	SD of Detected Logged Data	0.0798

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.145	SD	0.214
95% UTL95% Coverage	0.685	95% KM UPL (t)	0.532
90% KM Percentile (z)	0.419	95% KM Percentile (z)	0.497
99% KM Percentile (z)	0.643	95% KM USL	0.668

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.181	SD	0.222
95% UTL95% Coverage	0.741	95% UPL (t)	0.582
90% Percentile (z)	0.465	95% Percentile (z)	0.546
99% Percentile (z)	0.697	95% USL	0.723

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	314.7	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00226	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	1259	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A		
MLE Sd (bias corrected)	N/A	95% Percentile of Chisquare (2k)	N/A

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

k hat (KM)	0.457		nu hat (KM)	14.63	
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.664	0.659	95% Approx. Gamma UPL	0.431	0.415
95% Gamma USL	0.634	0.628			

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.445	Mean in Log Scale	-0.829
SD in Original Scale	0.104	SD in Log Scale	0.191
95% UTL95% Coverage	0.706	95% BCA UTL95% Coverage	N/A
95% Bootstrap (%) UTL95% Coverage	N/A	95% UPL (t)	0.616
90% Percentile (z)	0.587	95% Percentile (z)	0.597
99% Percentile (z)	0.68	95% USL	0.695

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.181	Mean in Log Scale	-2.265
SD in Original Scale	0.222	SD in Log Scale	1.041
95% UTL95% Coverage	1.435	95% UPL (t)	0.68
90% Percentile (z)	0.394	95% Percentile (z)	0.575
99% Percentile (z)	1.168	95% USL	1.32

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.75
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.75	95% USL	0.75
95% KM Chebyshev UPL	1.107		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Total HpCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	16		
Number of Detects	8	Number of Non-Detects	8
Number of Distinct Detects	8	Number of Distinct Non-Detects	8
Minimum Detect	0.1	Minimum Non-Detect	0.046
Maximum Detect	0.84	Maximum Non-Detect	0.11
Variance Detected	0.0657	Percent Non-Detects	50%
Mean Detected	0.366	SD Detected	0.256
Mean of Detected Logged Data	-1.247	SD of Detected Logged Data	0.775

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.909	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.186	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.207	SD	0.233
95% UTL95% Coverage	0.794	95% KM UPL (t)	0.627
90% KM Percentile (z)	0.505	95% KM Percentile (z)	0.59
99% KM Percentile (z)	0.748	95% KM USL	0.776

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.202	SD	0.244
95% UTL95% Coverage	0.818	95% UPL (t)	0.643
90% Percentile (z)	0.515	95% Percentile (z)	0.603
99% Percentile (z)	0.769	95% USL	0.798

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.324	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.723	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.215	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.297	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	2.217	k star (bias corrected MLE)	1.469
Theta hat (MLE)	0.165	Theta star (bias corrected MLE)	0.249
nu hat (MLE)	35.47	nu star (bias corrected)	23.51
MLE Mean (bias corrected)	0.366		
MLE Sd (bias corrected)	0.302	95% Percentile of Chisquare (2k)	7.707

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.188
Maximum	0.84	Median	0.055
SD	0.254	CV	1.35
k hat (MLE)	0.505	k star (bias corrected MLE)	0.452
Theta hat (MLE)	0.372	Theta star (bias corrected MLE)	0.416
nu hat (MLE)	16.17	nu star (bias corrected)	14.47
MLE Mean (bias corrected)	0.188	MLE Sd (bias corrected)	0.28
95% Percentile of Chisquare (2k)	3.6	90% Percentile	0.519
95% Percentile	0.749	99% Percentile	1.319

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	1.406	1.685	95% Approx. Gamma UPL	0.802	0.872
95% Gamma USL	1.326	1.573			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	0.786		nu hat (KM)	25.16
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	1.044	1.126	95% Approx. Gamma UPL	0.667	0.683
95% Gamma USL	0.996	1.067			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.927	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.198	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.201	Mean in Log Scale	-2.296
SD in Original Scale	0.245	SD in Log Scale	1.207
95% UTL95% Coverage	2.117	95% BCA UTL95% Coverage	0.84
95% Bootstrap (%) UTL95% Coverage	0.84	95% UPL (t)	0.891
90% Percentile (z)	0.473	95% Percentile (z)	0.733
99% Percentile (z)	1.668	95% USL	1.921

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.157	95% KM UTL (Lognormal)95% Coverage	1.625
KM SD of Logged Data	1.047	95% KM UPL (Lognormal)	0.767
95% KM Percentile Lognormal (z)	0.647	95% KM USL (Lognormal)	1.493

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.202	Mean in Log Scale	-2.286
SD in Original Scale	0.244	SD in Log Scale	1.215
95% UTL95% Coverage	2.182	95% UPL (t)	0.913
90% Percentile (z)	0.482	95% Percentile (z)	0.75
99% Percentile (z)	1.716	95% USL	1.978

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.84
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.84	95% USL	0.84
95% KM Chebyshev UPL	1.253		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

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General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	12		
Number of Detects	3	Number of Non-Detects	13
Number of Distinct Detects	3	Number of Distinct Non-Detects	11
Minimum Detect	0.096	Minimum Non-Detect	0.061
Maximum Detect	0.12	Maximum Non-Detect	0.24
Variance Detected	1.4533E-4	Percent Non-Detects	81.25%
Mean Detected	0.109	SD Detected	0.0121
Mean of Detected Logged Data	-2.224	SD of Detected Logged Data	0.112

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.991	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.211	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0788	SD	0.0227
95% UTL95% Coverage	0.136	95% KM UPL (t)	0.12
90% KM Percentile (z)	0.108	95% KM Percentile (z)	0.116
99% KM Percentile (z)	0.132	95% KM USL	0.134

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0738	SD	0.0291
95% UTL95% Coverage	0.147	95% UPL (t)	0.126
90% Percentile (z)	0.111	95% Percentile (z)	0.122
99% Percentile (z)	0.142	95% USL	0.145

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	119.8	k star (bias corrected MLE)	N/A
Theta hat (MLE)	9.0683E-4	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	719	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A		
MLE Sd (bias corrected)	N/A	95% Percentile of Chisquare (2k)	N/A

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0647	Mean	0.0845
Maximum	0.12	Median	0.0836
SD	0.0142	CV	0.169
k hat (MLE)	41.07	k star (bias corrected MLE)	33.41
Theta hat (MLE)	0.00206	Theta star (bias corrected MLE)	0.00253
nu hat (MLE)	1314	nu star (bias corrected)	1069
MLE Mean (bias corrected)	0.0845	MLE Sd (bias corrected)	0.0146
95% Percentile of Chisquare (2k)	86.91	90% Percentile	0.104
95% Percentile	0.11	99% Percentile	0.122

The following statistics are computed using Gamma ROS Statistics on Imputed Data
Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.123	0.123	95% Approx. Gamma UPL	0.111	0.111
95% Gamma USL	0.122	0.122			

The following statistics are computed using gamma distribution and KM estimates
Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	12.03		nu hat (KM)	384.8
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.145	0.146	95% Approx. Gamma UPL	0.122	0.123
95% Gamma USL	0.142	0.143			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.984	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.225	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0866	Mean in Log Scale	-2.456
SD in Original Scale	0.0129	SD in Log Scale	0.138
95% UTL95% Coverage	0.122	95% BCA UTL95% Coverage	0.12
95% Bootstrap (%) UTL95% Coverage	0.12	95% UPL (t)	0.11
90% Percentile (z)	0.102	95% Percentile (z)	0.108
99% Percentile (z)	0.118	95% USL	0.12

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.58	95% KM UTL (Lognormal)95% Coverage	0.151
KM SD of Logged Data	0.273	95% KM UPL (Lognormal)	0.124
95% KM Percentile Lognormal (z)	0.119	95% KM USL (Lognormal)	0.148

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0738	Mean in Log Scale	-2.685
SD in Original Scale	0.0291	SD in Log Scale	0.419
95% UTL95% Coverage	0.196	95% UPL (t)	0.145
90% Percentile (z)	0.117	95% Percentile (z)	0.136
99% Percentile (z)	0.181	95% USL	0.19

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.24
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.24	95% USL	0.24
95% KM Chebyshev UPL	0.181		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

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General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	5	Number of Non-Detects	11
Number of Distinct Detects	4	Number of Distinct Non-Detects	9
Minimum Detect	1.6	Minimum Non-Detect	0.21
Maximum Detect	2.3	Maximum Non-Detect	1.3
Variance Detected	0.105	Percent Non-Detects	68.75%
Mean Detected	1.9	SD Detected	0.324
Mean of Detected Logged Data	0.631	SD of Detected Logged Data	0.167

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.817	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.331	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.396	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.738	SD	0.8
95% UTL95% Coverage	2.757	95% KM UPL (t)	2.184
90% KM Percentile (z)	1.763	95% KM Percentile (z)	2.054
99% KM Percentile (z)	2.599	95% KM USL	2.693

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.759	SD	0.823
95% UTL95% Coverage	2.837	95% UPL (t)	2.247
90% Percentile (z)	1.814	95% Percentile (z)	2.113
99% Percentile (z)	2.674	95% USL	2.771

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.604	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.678	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.351	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.357	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	44.3	k star (bias corrected MLE)	17.85
Theta hat (MLE)	0.0429	Theta star (bias corrected MLE)	0.106
nu hat (MLE)	443	nu star (bias corrected)	178.5
MLE Mean (bias corrected)	1.9		
MLE Sd (bias corrected)	0.45	95% Percentile of Chisquare (2k)	50.65

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.463	Mean	1.155
Maximum	2.3	Median	0.822
SD	0.558	CV	0.483
k hat (MLE)	5.238	k star (bias corrected MLE)	4.297
Theta hat (MLE)	0.221	Theta star (bias corrected MLE)	0.269
nu hat (MLE)	167.6	nu star (bias corrected)	137.5
MLE Mean (bias corrected)	1.155	MLE Sd (bias corrected)	0.557
95% Percentile of Chisquare (2k)	16.35	90% Percentile	1.902
95% Percentile	2.198	99% Percentile	2.827

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	2.894	2.964	95% Approx. Gamma UPL	2.257	2.277
95% Gamma USL	2.817	2.88			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	0.851		nu hat (KM)	27.25
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	3.722	3.992	95% Approx. Gamma UPL	2.381	2.427
95% Gamma USL	3.551	3.786			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.825	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.325	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.396	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	1.304	Mean in Log Scale	0.217
SD in Original Scale	0.454	SD in Log Scale	0.31
95% UTL95% Coverage	2.713	95% BCA UTL95% Coverage	2.3
95% Bootstrap (%) UTL95% Coverage	2.3	95% UPL (t)	2.173
90% Percentile (z)	1.847	95% Percentile (z)	2.067
99% Percentile (z)	2.552	95% USL	2.647

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-0.876	95% KM UTL (Lognormal)95% Coverage	5.453
KM SD of Logged Data	1.019	95% KM UPL (Lognormal)	2.626
95% KM Percentile Lognormal (z)	2.226	95% KM USL (Lognormal)	5.023

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.759	Mean in Log Scale	-0.892
SD in Original Scale	0.823	SD in Log Scale	1.155
95% UTL95% Coverage	7.566	95% UPL (t)	3.305
90% Percentile (z)	1.801	95% Percentile (z)	2.74
99% Percentile (z)	6.022	95% USL	6.892

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	2.3
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	2.3	95% USL	2.3
95% KM Chebyshev UPL	4.332		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

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General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	6		
Number of Detects	6	Number of Non-Detects	10
Number of Distinct Detects	5	Number of Distinct Non-Detects	2
Minimum Detect	0.3	Minimum Non-Detect	0.29
Maximum Detect	0.79	Maximum Non-Detect	0.3
Variance Detected	0.0525	Percent Non-Detects	62.5%
Mean Detected	0.462	SD Detected	0.229
Mean of Detected Logged Data	-0.866	SD of Detected Logged Data	0.456

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.726	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.354	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.354	SD	0.153
95% UTL95% Coverage	0.74	95% KM UPL (t)	0.63
90% KM Percentile (z)	0.55	95% KM Percentile (z)	0.605
99% KM Percentile (z)	0.709	95% KM USL	0.727

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.266	SD	0.205
95% UTL95% Coverage	0.783	95% UPL (t)	0.636
90% Percentile (z)	0.529	95% Percentile (z)	0.603
99% Percentile (z)	0.743	95% USL	0.767

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.896	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.698	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.351	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.333	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	5.56	k star (bias corrected MLE)	2.891
Theta hat (MLE)	0.083	Theta star (bias corrected MLE)	0.16
nu hat (MLE)	66.72	nu star (bias corrected)	34.69
MLE Mean (bias corrected)	0.462		
MLE Sd (bias corrected)	0.272	95% Percentile of Chisquare (2k)	12.26

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.185
Maximum	0.79	Median	0.0252
SD	0.258	CV	1.393
k hat (MLE)	0.489	k star (bias corrected MLE)	0.439
Theta hat (MLE)	0.379	Theta star (bias corrected MLE)	0.422
nu hat (MLE)	15.64	nu star (bias corrected)	14.04
MLE Mean (bias corrected)	0.185	MLE Sd (bias corrected)	0.28
95% Percentile of Chisquare (2k)	3.531	90% Percentile	0.515
95% Percentile	0.746	99% Percentile	1.321

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	1.401	1.667	95% Approx. Gamma UPL	0.794	0.856
95% Gamma USL	1.321	1.555			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	5.39		nu hat (KM)	172.5
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.736	0.735	95% Approx. Gamma UPL	0.602	0.598
95% Gamma USL	0.72	0.719			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.742	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.323	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Approximate Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.239	Mean in Log Scale	-1.797
SD in Original Scale	0.225	SD in Log Scale	0.874
95% UTL95% Coverage	1.507	95% BCA UTL95% Coverage	0.79
95% Bootstrap (%) UTL95% Coverage	0.79	95% UPL (t)	0.805
90% Percentile (z)	0.509	95% Percentile (z)	0.699
99% Percentile (z)	1.268	95% USL	1.404

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-1.098	95% KM UTL (Lognormal)95% Coverage	0.734
KM SD of Logged Data	0.312	95% KM UPL (Lognormal)	0.586
95% KM Percentile Lognormal (z)	0.557	95% KM USL (Lognormal)	0.715

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.266	Mean in Log Scale	-1.519
SD in Original Scale	0.205	SD in Log Scale	0.585
95% UTL95% Coverage	0.96	95% UPL (t)	0.631
90% Percentile (z)	0.464	95% Percentile (z)	0.574
99% Percentile (z)	0.855	95% USL	0.915

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.79
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.79	95% USL	0.79
95% KM Chebyshev UPL	1.04		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

2,4-Dinitrotoluene3

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	500
Maximum Detect	N/A	Maximum Non-Detect	500
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,4-Dinitrotoluene3 was not processed!

Hexahydro-trinitro-triazine (RDX)

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	500
Maximum Detect	N/A	Maximum Non-Detect	500
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Hexahydro-trinitro-triazine (RDX) was not processed!

Nitroglycerine

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	500
Maximum Detect	N/A	Maximum Non-Detect	500
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Nitroglycerine was not processed!

Draft

Inorganic Arsenic

General Statistics

Total Number of Observations	16	Number of Distinct Observations	14
		Number of Missing Observations	4
Minimum	0.006	First Quartile	0.018
Second Largest	0.071	Median	0.0305
Maximum	0.072	Third Quartile	0.0568
Mean	0.0376	SD	0.0219
Coefficient of Variation	0.581	Skewness	0.362
Mean of logged Data	-3.475	SD of logged Data	0.697

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.918	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.164	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	0.0928	90% Percentile (z)	0.0656
95% UPL (t)	0.0771	95% Percentile (z)	0.0736
95% USL	0.091	99% Percentile (z)	0.0885

Gamma GOF Test

A-D Test Statistic	0.344	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.746	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.128	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.217	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.717	k star (bias corrected MLE)	2.249
Theta hat (MLE)	0.0138	Theta star (bias corrected MLE)	0.0167
nu hat (MLE)	86.94	nu star (bias corrected)	71.97
MLE Mean (bias corrected)	0.0376	MLE Sd (bias corrected)	0.0251

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.0899	90% Percentile	0.0712
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.0932	95% Percentile	0.086
95% WH Approx. Gamma UTL with 95% Coverage	0.124	99% Percentile	0.119
95% HW Approx. Gamma UTL with 95% Coverage	0.132		
95% WH USL	0.119	95% HW USL	0.127

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.929	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.12	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	0.18	90% Percentile (z)	0.0756
95% UPL (t)	0.109	95% Percentile (z)	0.0974
95% USL	0.17	99% Percentile (z)	0.157

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	0.072
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	0.072	95% BCA Bootstrap UTL with 95% Coverage	0.072
95% UPL	0.072	90% Percentile	0.069
90% Chebyshev UPL	0.105	95% Percentile	0.0713
95% Chebyshev UPL	0.136	99% Percentile	0.0719
95% USL	0.072		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Arsenic(III)

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	9		
Number of Detects	15	Number of Non-Detects	1
Number of Distinct Detects	8	Number of Distinct Non-Detects	1
Minimum Detect	0.006	Minimum Non-Detect	0.004
Maximum Detect	0.021	Maximum Non-Detect	0.004
Variance Detected	2.2457E-5	Percent Non-Detects	6.25%
Mean Detected	0.0102	SD Detected	0.00474
Mean of Detected Logged Data	-4.67	SD of Detected Logged Data	0.409

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.815	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.881	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.267	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.229	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.00981	SD	0.00468
95% UTL95% Coverage	0.0216	95% KM UPL (t)	0.0183
90% KM Percentile (z)	0.0158	95% KM Percentile (z)	0.0175
99% KM Percentile (z)	0.0207	95% KM USL	0.0212

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.00969	SD	0.00502
95% UTL95% Coverage	0.0223	95% UPL (t)	0.0188
90% Percentile (z)	0.0161	95% Percentile (z)	0.0179
99% Percentile (z)	0.0214	95% USL	0.0219

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.798	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.738	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.232	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.222	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	6.063	k star (bias corrected MLE)	4.895
Theta hat (MLE)	0.00168	Theta star (bias corrected MLE)	0.00208
nu hat (MLE)	181.9	nu star (bias corrected)	146.8
MLE Mean (bias corrected)	0.0102		
MLE Sd (bias corrected)	0.00461	95% Percentile of Chisquare (2k)	18.02

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.006	Mean	0.0102
Maximum	0.021	Median	0.0085
SD	0.00458	CV	0.449
k hat (MLE)	6.456	k star (bias corrected MLE)	5.287
Theta hat (MLE)	0.00158	Theta star (bias corrected MLE)	0.00193
nu hat (MLE)	206.6	nu star (bias corrected)	169.2
MLE Mean (bias corrected)	0.0102	MLE Sd (bias corrected)	0.00443
95% Percentile of Chisquare (2k)	19.09	90% Percentile	0.0161
95% Percentile	0.0184	99% Percentile	0.0232

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0237	0.024	95% Approx. Gamma UPL	0.0188	0.0189
95% Gamma USL	0.0231	0.0234			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	4.396		nu hat (KM)	140.7
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.024	0.0245	95% Approx. Gamma UPL	0.0188	0.0189
95% Gamma USL	0.0234	0.0238			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.89	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.881	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.206	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.229	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.00978	Mean in Log Scale	-4.732
SD in Original Scale	0.00488	SD in Log Scale	0.466
95% UTL95% Coverage	0.0285	95% BCA UTL95% Coverage	0.021
95% Bootstrap (%) UTL95% Coverage	0.021	95% UPL (t)	0.0204
90% Percentile (z)	0.016	95% Percentile (z)	0.019
99% Percentile (z)	0.026	95% USL	0.0275

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-4.723	95% KM UTL (Lognormal)95% Coverage	0.0266
KM SD of Logged Data	0.435	95% KM UPL (Lognormal)	0.0195
95% KM Percentile Lognormal (z)	0.0182	95% KM USL (Lognormal)	0.0257

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.00969	Mean in Log Scale	-4.767
SD in Original Scale	0.00502	SD in Log Scale	0.553
95% UTL95% Coverage	0.0343	95% UPL (t)	0.0231
90% Percentile (z)	0.0173	95% Percentile (z)	0.0211
99% Percentile (z)	0.0308	95% USL	0.0328

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.021
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.021	95% USL	0.021
95% KM Chebyshev UPL	0.0308		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Arsenic(V)

General Statistics

Total Number of Observations	16	Number of Distinct Observations	15
		Number of Missing Observations	4
Minimum	0.006	First Quartile	0.012
Second Largest	0.053	Median	0.0205
Maximum	0.057	Third Quartile	0.0458
Mean	0.028	SD	0.018
Coefficient of Variation	0.641	Skewness	0.408
Mean of logged Data	-3.802	SD of logged Data	0.728

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.884	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.214	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level

Data appear Approximate Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	0.0733	90% Percentile (z)	0.051
95% UPL (t)	0.0605	95% Percentile (z)	0.0575
95% USL	0.0719	99% Percentile (z)	0.0698

Gamma GOF Test

A-D Test Statistic	0.525	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.748	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.154	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.217	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.361	k star (bias corrected MLE)	1.96
Theta hat (MLE)	0.0119	Theta star (bias corrected MLE)	0.0143
nu hat (MLE)	75.54	nu star (bias corrected)	62.71
MLE Mean (bias corrected)	0.028	MLE Sd (bias corrected)	0.02

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.0702	90% Percentile	0.0547
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.0725	95% Percentile	0.0668
95% WH Approx. Gamma UTL with 95% Coverage	0.0982	99% Percentile	0.0938
95% HW Approx. Gamma UTL with 95% Coverage	0.105		
95% WH USL	0.0947	95% HW USL	0.101

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.928	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.145	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	0.14	90% Percentile (z)	0.0567
95% UPL (t)	0.0831	95% Percentile (z)	0.0739
95% USL	0.132	99% Percentile (z)	0.121

Nonparametric Distribution Free Background Statistics

Data appear Approximate Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	0.057
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	0.057	95% BCA Bootstrap UTL with 95% Coverage	0.057
95% UPL	0.057	90% Percentile	0.052
90% Chebyshev UPL	0.0835	95% Percentile	0.054
95% Chebyshev UPL	0.109	99% Percentile	0.0564
95% USL	0.057		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Dimethyl Arsenic

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	3		
Number of Detects	3	Number of Non-Detects	13
Number of Distinct Detects	2	Number of Distinct Non-Detects	2
Minimum Detect	0.005	Minimum Non-Detect	0.004
Maximum Detect	0.006	Maximum Non-Detect	0.005
Variance Detected	3.3333E-7	Percent Non-Detects	81.25%
Mean Detected	0.00567	SD Detected	5.7735E-4
Mean of Detected Logged Data	-5.177	SD of Detected Logged Data	0.105

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.75	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.385	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.00431	SD	6.8179E-4
95% UTL95% Coverage	0.00603	95% KM UPL (t)	0.00554
90% KM Percentile (z)	0.00519	95% KM Percentile (z)	0.00543
99% KM Percentile (z)	0.0059	95% KM USL	0.00598

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.00303	SD	0.00134
95% UTL95% Coverage	0.0064	95% UPL (t)	0.00544
90% Percentile (z)	0.00474	95% Percentile (z)	0.00523
99% Percentile (z)	0.00614	95% USL	0.00629

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	138.5	k star (bias corrected MLE)	N/A
Theta hat (MLE)	4.0926E-5	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	830.8	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A		
MLE Sd (bias corrected)	N/A	95% Percentile of Chisquare (2k)	N/A

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.005	Mean	0.00919
Maximum	0.01	Median	0.01
SD	0.00176	CV	0.192
k hat (MLE)	22.45	k star (bias corrected MLE)	18.28
Theta hat (MLE)	4.0918E-4	Theta star (bias corrected MLE)	5.0246E-4
nu hat (MLE)	718.5	nu star (bias corrected)	585.1
MLE Mean (bias corrected)	0.00919	MLE Sd (bias corrected)	0.00215
95% Percentile of Chisquare (2k)	51.68	90% Percentile	0.012
95% Percentile	0.013	99% Percentile	0.0149

The following statistics are computed using Gamma ROS Statistics on Imputed Data
Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.015	0.0153	95% Approx. Gamma UPL	0.0131	0.0133
95% Gamma USL	0.0148	0.015			

The following statistics are computed using gamma distribution and KM estimates
Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	40.01		nu hat (KM)	1280
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.00606	0.00606	95% Approx. Gamma UPL	0.00551	0.00551
95% Gamma USL	0.00599	0.00599			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.75	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.385	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Approximate Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.00399	Mean in Log Scale	-5.553
SD in Original Scale	0.00102	SD in Log Scale	0.248
95% UTL95% Coverage	0.00725	95% BCA UTL95% Coverage	0.006
95% Bootstrap (%) UTL95% Coverage	0.006	95% UPL (t)	0.00607
90% Percentile (z)	0.00533	95% Percentile (z)	0.00583
99% Percentile (z)	0.0069	95% USL	0.0071

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-5.457	95% KM UTL (Lognormal)95% Coverage	0.00607
KM SD of Logged Data	0.14	95% KM UPL (Lognormal)	0.00549
95% KM Percentile Lognormal (z)	0.00537	95% KM USL (Lognormal)	0.006

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.00303	Mean in Log Scale	-5.867
SD in Original Scale	0.00134	SD in Log Scale	0.352
95% UTL95% Coverage	0.00689	95% UPL (t)	0.00536
90% Percentile (z)	0.00445	95% Percentile (z)	0.00506
99% Percentile (z)	0.00643	95% USL	0.0067

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.006
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.006	95% USL	0.006
95% KM Chebyshev UPL	0.00738		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Monomethyl Arsenic

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	3		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	2
Minimum Detect	0.006	Minimum Non-Detect	0.003
Maximum Detect	0.006	Maximum Non-Detect	0.004
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	0.006	SD Detected	N/A
Mean of Detected Logged Data	-5.116	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Monomethyl Arsenic was not processed!

Draft

Aluminum

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	16		
Number of Detects	14	Number of Non-Detects	2
Number of Distinct Detects	14	Number of Distinct Non-Detects	2
Minimum Detect	1.84	Minimum Non-Detect	0.28
Maximum Detect	24.3	Maximum Non-Detect	1.53
Variance Detected	39.09	Percent Non-Detects	12.5%
Mean Detected	8.359	SD Detected	6.252
Mean of Detected Logged Data	1.852	SD of Detected Logged Data	0.79

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.878	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.874	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.165	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.237	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	7.349	SD	6.237
95% UTL95% Coverage	23.09	95% KM UPL (t)	18.62
90% KM Percentile (z)	15.34	95% KM Percentile (z)	17.61
99% KM Percentile (z)	21.86	95% KM USL	22.59

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	7.371	SD	6.417
95% UTL95% Coverage	23.57	95% UPL (t)	18.97
90% Percentile (z)	15.6	95% Percentile (z)	17.93
99% Percentile (z)	22.3	95% USL	23.05

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.352	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.746	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.147	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.232	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.996	k star (bias corrected MLE)	1.616
Theta hat (MLE)	4.188	Theta star (bias corrected MLE)	5.174
nu hat (MLE)	55.88	nu star (bias corrected)	45.24
MLE Mean (bias corrected)	8.359		
MLE Sd (bias corrected)	6.576	95% Percentile of Chisquare (2k)	8.212

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	7.316
Maximum	24.3	Median	5.625
SD	6.481	CV	0.886
k hat (MLE)	0.647	k star (bias corrected MLE)	0.567
Theta hat (MLE)	11.31	Theta star (bias corrected MLE)	12.9
nu hat (MLE)	20.7	nu star (bias corrected)	18.15
MLE Mean (bias corrected)	7.316	MLE Sd (bias corrected)	9.713
95% Percentile of Chisquare (2k)	4.166	90% Percentile	19.27
95% Percentile	26.86	99% Percentile	45.32

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	45.68	61.57	95% Approx. Gamma UPL	28.17	34.23
95% Gamma USL	43.42	57.87			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	1.389		nu hat (KM)	44.44
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	35.96	41.7	95% Approx. Gamma UPL	23.45	25.5
95% Gamma USL	34.37	39.57			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.945	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.874	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.157	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.237	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	7.441	Mean in Log Scale	1.622
SD in Original Scale	6.338	SD in Log Scale	0.968
95% UTL95% Coverage	58.26	95% BCA UTL95% Coverage	24.3
95% Bootstrap (%) UTL95% Coverage	24.3	95% UPL (t)	29.11
90% Percentile (z)	17.51	95% Percentile (z)	24.88
99% Percentile (z)	48.11	95% USL	53.88

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	1.462	95% KM UTL (Lognormal)95% Coverage	102.5
KM SD of Logged Data	1.255	95% KM UPL (Lognormal)	41.68
95% KM Percentile Lognormal (z)	34	95% KM USL (Lognormal)	92.64

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	7.371	Mean in Log Scale	1.481
SD in Original Scale	6.417	SD in Log Scale	1.291
95% UTL95% Coverage	114.3	95% UPL (t)	45.31
90% Percentile (z)	23	95% Percentile (z)	36.76
99% Percentile (z)	88.58	95% USL	103

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	24.3
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	24.3	95% USL	24.3
95% KM Chebyshev UPL	35.37		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Antimony

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	3		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	2
Minimum Detect	0.009	Minimum Non-Detect	0.006
Maximum Detect	0.009	Maximum Non-Detect	0.007
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	0.009	SD Detected	N/A
Mean of Detected Logged Data	-4.711	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Antimony was not processed!

Draft

Arsenic

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	0.374	First Quartile	0.539
Second Largest	1.32	Median	0.743
Maximum	1.38	Third Quartile	0.933
Mean	0.782	SD	0.305
Coefficient of Variation	0.39	Skewness	0.624
Mean of logged Data	-0.318	SD of logged Data	0.394

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.942	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.122	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	1.552	90% Percentile (z)	1.173
95% UPL (t)	1.334	95% Percentile (z)	1.284
95% USL	1.528	99% Percentile (z)	1.492

Gamma GOF Test

A-D Test Statistic	0.196	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.74	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.103	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.216	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	7.134	k star (bias corrected MLE)	5.838
Theta hat (MLE)	0.11	Theta star (bias corrected MLE)	0.134
nu hat (MLE)	228.3	nu star (bias corrected)	186.8
MLE Mean (bias corrected)	0.782	MLE Sd (bias corrected)	0.324

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	1.411	90% Percentile	1.215
95% Hawkins Wixley (HW) Approx. Gamma UPL	1.426	95% Percentile	1.379
95% WH Approx. Gamma UTL with 95% Coverage	1.758	99% Percentile	1.724
95% HW Approx. Gamma UTL with 95% Coverage	1.8		
95% WH USL	1.716	95% HW USL	1.754

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.97	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0922	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	1.969	90% Percentile (z)	1.206
95% UPL (t)	1.484	95% Percentile (z)	1.392
95% USL	1.907	99% Percentile (z)	1.821

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	1.38
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	1.38	95% BCA Bootstrap UTL with 95% Coverage	1.38
95% UPL	1.38	90% Percentile	1.215
90% Chebyshev UPL	1.726	95% Percentile	1.335
95% Chebyshev UPL	2.153	99% Percentile	1.371
95% USL	1.38		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Barium

General Statistics

Total Number of Observations	16	Number of Distinct Observations	12
		Number of Missing Observations	4
Minimum	0.04	First Quartile	0.1
Second Largest	0.24	Median	0.13
Maximum	0.28	Third Quartile	0.21
Mean	0.151	SD	0.0688
Coefficient of Variation	0.457	Skewness	0.242
Mean of logged Data	-2.008	SD of logged Data	0.524

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.953	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.172	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	0.324	90% Percentile (z)	0.239
95% UPL (t)	0.275	95% Percentile (z)	0.264
95% USL	0.319	99% Percentile (z)	0.311

Gamma GOF Test

A-D Test Statistic	0.345	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.742	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.159	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.216	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	4.504	k star (bias corrected MLE)	3.701
Theta hat (MLE)	0.0334	Theta star (bias corrected MLE)	0.0407
nu hat (MLE)	144.1	nu star (bias corrected)	118.4
MLE Mean (bias corrected)	0.151	MLE Sd (bias corrected)	0.0783

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.308	90% Percentile	0.256
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.315	95% Percentile	0.298
95% WH Approx. Gamma UTL with 95% Coverage	0.4	99% Percentile	0.389
95% HW Approx. Gamma UTL with 95% Coverage	0.419		
95% WH USL	0.389	95% HW USL	0.406

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.942	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.152	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	0.504	90% Percentile (z)	0.263
95% UPL (t)	0.346	95% Percentile (z)	0.318
95% USL	0.483	99% Percentile (z)	0.454

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	0.28
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	0.28	95% BCA Bootstrap UTL with 95% Coverage	0.28
95% UPL	0.28	90% Percentile	0.225
90% Chebyshev UPL	0.364	95% Percentile	0.25
95% Chebyshev UPL	0.46	99% Percentile	0.274
95% USL	0.28		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Beryllium

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	5		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	5
Minimum Detect	N/A	Minimum Non-Detect	0.026
Maximum Detect	N/A	Maximum Non-Detect	0.03
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Beryllium was not processed!

Cadmium

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	3		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	2
Minimum Detect	0.034	Minimum Non-Detect	0.006
Maximum Detect	0.034	Maximum Non-Detect	0.007
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	0.034	SD Detected	N/A
Mean of Detected Logged Data	-3.381	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Cadmium was not processed!

Draft

Chromium

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	0.046	First Quartile	0.156
Second Largest	0.566	Median	0.195
Maximum	0.596	Third Quartile	0.267
Mean	0.24	SD	0.148
Coefficient of Variation	0.619	Skewness	1.6
Mean of logged Data	-1.591	SD of logged Data	0.601

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.811	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.231	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	0.614	90% Percentile (z)	0.43
95% UPL (t)	0.508	95% Percentile (z)	0.484
95% USL	0.602	99% Percentile (z)	0.585

Gamma GOF Test

A-D Test Statistic	0.571	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.744	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.156	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.217	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.243	k star (bias corrected MLE)	2.676
Theta hat (MLE)	0.0739	Theta star (bias corrected MLE)	0.0895
nu hat (MLE)	103.8	nu star (bias corrected)	85.64
MLE Mean (bias corrected)	0.24	MLE Sd (bias corrected)	0.146

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.538	90% Percentile	0.436
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.549	95% Percentile	0.52
95% WH Approx. Gamma UTL with 95% Coverage	0.724	99% Percentile	0.703
95% HW Approx. Gamma UTL with 95% Coverage	0.757		
95% WH USL	0.701	95% HW USL	0.731

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.929	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.172	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	0.929	90% Percentile (z)	0.44
95% UPL (t)	0.604	95% Percentile (z)	0.548
95% USL	0.885	99% Percentile (z)	0.825

Nonparametric Distribution Free Background Statistics

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	0.596
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	0.596	95% BCA Bootstrap UTL with 95% Coverage	0.596
95% UPL	0.596	90% Percentile	0.442
90% Chebyshev UPL	0.698	95% Percentile	0.574
95% Chebyshev UPL	0.906	99% Percentile	0.592
95% USL	0.596		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Cobalt

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	13	Number of Non-Detects	3
Number of Distinct Detects	12	Number of Distinct Non-Detects	2
Minimum Detect	0.019	Minimum Non-Detect	0.018
Maximum Detect	0.068	Maximum Non-Detect	0.019
Variance Detected	1.6924E-4	Percent Non-Detects	18.75%
Mean Detected	0.0461	SD Detected	0.013
Mean of Detected Logged Data	-3.122	SD of Detected Logged Data	0.329

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.977	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.117	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.246	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0408	SD	0.0157
95% UTL95% Coverage	0.0805	95% KM UPL (t)	0.0692
90% KM Percentile (z)	0.061	95% KM Percentile (z)	0.0667
99% KM Percentile (z)	0.0774	95% KM USL	0.0792

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0392	SD	0.0188
95% UTL95% Coverage	0.0867	95% UPL (t)	0.0732
90% Percentile (z)	0.0633	95% Percentile (z)	0.0702
99% Percentile (z)	0.083	95% USL	0.0852

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.337	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.734	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.156	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.237	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	11.44	k star (bias corrected MLE)	8.851
Theta hat (MLE)	0.00403	Theta star (bias corrected MLE)	0.00521
nu hat (MLE)	297.4	nu star (bias corrected)	230.1
MLE Mean (bias corrected)	0.0461		
MLE Sd (bias corrected)	0.0155	95% Percentile of Chisquare (2k)	28.49

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0182	Mean	0.0413
Maximum	0.068	Median	0.043
SD	0.0155	CV	0.376
k hat (MLE)	6.566	k star (bias corrected MLE)	5.376
Theta hat (MLE)	0.00629	Theta star (bias corrected MLE)	0.00768
nu hat (MLE)	210.1	nu star (bias corrected)	172
MLE Mean (bias corrected)	0.0413	MLE Sd (bias corrected)	0.0178
95% Percentile of Chisquare (2k)	19.34	90% Percentile	0.0652
95% Percentile	0.0743	99% Percentile	0.0936

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0956	0.0988	95% Approx. Gamma UPL	0.0762	0.0775
95% Gamma USL	0.0933	0.0963			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	6.743		nu hat (KM)	215.8
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.097	0.101	95% Approx. Gamma UPL	0.0767	0.0782
95% Gamma USL	0.0946	0.0979			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.901	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.182	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.246	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0415	Mean in Log Scale	-3.254
SD in Original Scale	0.0152	SD in Log Scale	0.411
95% UTL95% Coverage	0.109	95% BCA UTL95% Coverage	0.068
95% Bootstrap (%) UTL95% Coverage	0.068	95% UPL (t)	0.0811
90% Percentile (z)	0.0654	95% Percentile (z)	0.0759
99% Percentile (z)	0.1	95% USL	0.105

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-3.29	95% KM UTL (Lognormal)95% Coverage	0.116
KM SD of Logged Data	0.451	95% KM UPL (Lognormal)	0.0842
95% KM Percentile Lognormal (z)	0.0782	95% KM USL (Lognormal)	0.112

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0392	Mean in Log Scale	-3.413
SD in Original Scale	0.0188	SD in Log Scale	0.692
95% UTL95% Coverage	0.189	95% UPL (t)	0.115
90% Percentile (z)	0.0799	95% Percentile (z)	0.103
99% Percentile (z)	0.165	95% USL	0.179

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.068
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.068	95% USL	0.068
95% KM Chebyshev UPL	0.111		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Copper

General Statistics

Total Number of Observations	16	Number of Distinct Observations	14
		Number of Missing Observations	4
Minimum	0.36	First Quartile	0.443
Second Largest	0.72	Median	0.485
Maximum	38.9	Third Quartile	0.583
Mean	2.9	SD	9.6
Coefficient of Variation	3.311	Skewness	3.999
Mean of logged Data	-0.438	SD of logged Data	1.109

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.281	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.527	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	27.13	90% Percentile (z)	15.2
95% UPL (t)	20.25	95% Percentile (z)	18.69
95% USL	26.36	99% Percentile (z)	25.23

Gamma GOF Test

A-D Test Statistic	5.094	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.81	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.521	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.229	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.433	k star (bias corrected MLE)	0.393
Theta hat (MLE)	6.705	Theta star (bias corrected MLE)	7.377
nu hat (MLE)	13.84	nu star (bias corrected)	12.58
MLE Mean (bias corrected)	2.9	MLE Sd (bias corrected)	4.625

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	9.662	90% Percentile	8.216
95% Hawkins Wixley (HW) Approx. Gamma UPL	8.25	95% Percentile	12.12
95% WH Approx. Gamma UTL with 95% Coverage	17.51	99% Percentile	21.96
95% HW Approx. Gamma UTL with 95% Coverage	15.79		
95% WH USL	16.47	95% HW USL	14.76

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.429	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.398	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Lognormal at 5% Significance Level

Data Not Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	10.6	90% Percentile (z)	2.674
95% UPL (t)	4.788	95% Percentile (z)	4
95% USL	9.696	99% Percentile (z)	8.517

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	38.9
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	38.9	95% BCA Bootstrap UTL with 95% Coverage	38.9
95% UPL	38.9	90% Percentile	0.675
90% Chebyshev UPL	32.59	95% Percentile	10.27
95% Chebyshev UPL	46.04	99% Percentile	33.17
95% USL	38.9		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Iron

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	4.63	First Quartile	7.78
Second Largest	46.3	Median	16.15
Maximum	62.8	Third Quartile	23.93
Mean	20.56	SD	17.01
Coefficient of Variation	0.827	Skewness	1.383
Mean of logged Data	2.735	SD of logged Data	0.774

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.818	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.256	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	63.49	90% Percentile (z)	42.36
95% UPL (t)	51.29	95% Percentile (z)	48.54
95% USL	62.11	99% Percentile (z)	60.13

Gamma GOF Test

A-D Test Statistic	0.591	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.751	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.172	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.218	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.882	k star (bias corrected MLE)	1.571
Theta hat (MLE)	10.93	Theta star (bias corrected MLE)	13.09
nu hat (MLE)	60.22	nu star (bias corrected)	50.26
MLE Mean (bias corrected)	20.56	MLE Sd (bias corrected)	16.41

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	55.36	90% Percentile	42.37
95% Hawkins Wixley (HW) Approx. Gamma UPL	56.58	95% Percentile	52.75
95% WH Approx. Gamma UTL with 95% Coverage	79.73	99% Percentile	76.12
95% HW Approx. Gamma UTL with 95% Coverage	84.35		
95% WH USL	76.69	95% HW USL	80.8

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.944	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.149	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	108.8	90% Percentile (z)	41.57
95% UPL (t)	62.45	95% Percentile (z)	55.08
95% USL	102.2	99% Percentile (z)	93.37

Nonparametric Distribution Free Background Statistics

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	62.8
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	62.8	95% BCA Bootstrap UTL with 95% Coverage	62.8
95% UPL	62.8	90% Percentile	44.15
90% Chebyshev UPL	73.15	95% Percentile	50.43
95% Chebyshev UPL	96.97	99% Percentile	60.33
95% USL	62.8		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Lead

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	13	Number of Non-Detects	3
Number of Distinct Detects	12	Number of Distinct Non-Detects	3
Minimum Detect	0.008	Minimum Non-Detect	0.016
Maximum Detect	2.25	Maximum Non-Detect	0.031
Variance Detected	0.369	Percent Non-Detects	18.75%
Mean Detected	0.242	SD Detected	0.607
Mean of Detected Logged Data	-2.844	SD of Detected Logged Data	1.587

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.406	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.431	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.246	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.198	SD	0.534
95% UTL95% Coverage	1.545	95% KM UPL (t)	1.162
90% KM Percentile (z)	0.882	95% KM Percentile (z)	1.076
99% KM Percentile (z)	1.44	95% KM USL	1.502

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.198	SD	0.551
95% UTL95% Coverage	1.589	95% UPL (t)	1.194
90% Percentile (z)	0.905	95% Percentile (z)	1.105
99% Percentile (z)	1.48	95% USL	1.545

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.173	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.799	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.244	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.251	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.453	k star (bias corrected MLE)	0.4
Theta hat (MLE)	0.533	Theta star (bias corrected MLE)	0.604
nu hat (MLE)	11.78	nu star (bias corrected)	10.4
MLE Mean (bias corrected)	0.242		
MLE Sd (bias corrected)	0.382	95% Percentile of Chisquare (2k)	3.323

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.008	Mean	0.198
Maximum	2.25	Median	0.035
SD	0.551	CV	2.782
k hat (MLE)	0.42	k star (bias corrected MLE)	0.383
Theta hat (MLE)	0.472	Theta star (bias corrected MLE)	0.518
nu hat (MLE)	13.43	nu star (bias corrected)	12.25
MLE Mean (bias corrected)	0.198	MLE Sd (bias corrected)	0.32
95% Percentile of Chisquare (2k)	3.229	90% Percentile	0.564
95% Percentile	0.836	99% Percentile	1.523

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	1.351	1.401	95% Approx. Gamma UPL	0.744	0.711
95% Gamma USL	1.271	1.305			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	0.138		nu hat (KM)	4.411
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	1.273	1.309	95% Approx. Gamma UPL	0.707	0.672
95% Gamma USL	1.198	1.221			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.927	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.134	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.246	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.198	Mean in Log Scale	-3.193
SD in Original Scale	0.551	SD in Log Scale	1.608
95% UTL95% Coverage	2.376	95% BCA UTL95% Coverage	2.25
95% Bootstrap (%) UTL95% Coverage	2.25	95% UPL (t)	0.75
90% Percentile (z)	0.322	95% Percentile (z)	0.578
99% Percentile (z)	1.729	95% USL	2.087

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-3.181	95% KM UTL (Lognormal)95% Coverage	2.058
KM SD of Logged Data	1.546	95% KM UPL (Lognormal)	0.679
95% KM Percentile Lognormal (z)	0.529	95% KM USL (Lognormal)	1.817

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.198	Mean in Log Scale	-3.161
SD in Original Scale	0.551	SD in Log Scale	1.579
95% UTL95% Coverage	2.28	95% UPL (t)	0.735
90% Percentile (z)	0.321	95% Percentile (z)	0.569
99% Percentile (z)	1.669	95% USL	2.007

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	2.25
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	2.25	95% USL	2.25
95% KM Chebyshev UPL	2.596		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Manganese

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	0.136	First Quartile	0.298
Second Largest	0.981	Median	0.551
Maximum	2.37	Third Quartile	0.758
Mean	0.642	SD	0.54
Coefficient of Variation	0.84	Skewness	2.323
Mean of logged Data	-0.705	SD of logged Data	0.741

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.75	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.203	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level	

Data appear Approximate Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	2.005	90% Percentile (z)	1.334
95% UPL (t)	1.618	95% Percentile (z)	1.53
95% USL	1.961	99% Percentile (z)	1.898

Gamma GOF Test

A-D Test Statistic	0.449	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.75	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.14	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.218	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.056	k star (bias corrected MLE)	1.712
Theta hat (MLE)	0.312	Theta star (bias corrected MLE)	0.375
nu hat (MLE)	65.79	nu star (bias corrected)	54.79
MLE Mean (bias corrected)	0.642	MLE Sd (bias corrected)	0.491

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	1.671	90% Percentile	1.297
95% Hawkins Wixley (HW) Approx. Gamma UPL	1.705	95% Percentile	1.602
95% WH Approx. Gamma UTL with 95% Coverage	2.378	99% Percentile	2.286
95% HW Approx. Gamma UTL with 95% Coverage	2.504		
95% WH USL	2.29	95% HW USL	2.403

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.962	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.175	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	3.207	90% Percentile (z)	1.277
95% UPL (t)	1.885	95% Percentile (z)	1.672
95% USL	3.02	99% Percentile (z)	2.77

Nonparametric Distribution Free Background Statistics

Data appear Approximate Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	2.37
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	2.37	95% BCA Bootstrap UTL with 95% Coverage	2.37
95% UPL	2.37	90% Percentile	0.977
90% Chebyshev UPL	2.311	95% Percentile	1.328
95% Chebyshev UPL	3.067	99% Percentile	2.162
95% USL	2.37		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Mercury

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	8	Number of Non-Detects	8
Number of Distinct Detects	8	Number of Distinct Non-Detects	6
Minimum Detect	0.37	Minimum Non-Detect	0.14
Maximum Detect	3.12	Maximum Non-Detect	0.49
Variance Detected	0.872	Percent Non-Detects	50%
Mean Detected	0.82	SD Detected	0.934
Mean of Detected Logged Data	-0.493	SD of Detected Logged Data	0.682

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.507	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.439	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.501	SD	0.698
95% UTL95% Coverage	2.264	95% KM UPL (t)	1.763
90% KM Percentile (z)	1.396	95% KM Percentile (z)	1.65
99% KM Percentile (z)	2.126	95% KM USL	2.208

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.501	SD	0.719
95% UTL95% Coverage	2.316	95% UPL (t)	1.8
90% Percentile (z)	1.422	95% Percentile (z)	1.684
99% Percentile (z)	2.173	95% USL	2.258

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.571	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.725	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.381	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.298	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.846	k star (bias corrected MLE)	1.237
Theta hat (MLE)	0.444	Theta star (bias corrected MLE)	0.663
nu hat (MLE)	29.53	nu star (bias corrected)	19.79
MLE Mean (bias corrected)	0.82		
MLE Sd (bias corrected)	0.737	95% Percentile of Chisquare (2k)	6.88

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.415
Maximum	3.12	Median	0.191
SD	0.763	CV	1.837
k hat (MLE)	0.398	k star (bias corrected MLE)	0.365
Theta hat (MLE)	1.044	Theta star (bias corrected MLE)	1.138
nu hat (MLE)	12.73	nu star (bias corrected)	11.67
MLE Mean (bias corrected)	0.415	MLE Sd (bias corrected)	0.687
95% Percentile of Chisquare (2k)	3.128	90% Percentile	1.191
95% Percentile	1.78	99% Percentile	3.277

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	3.329	4.084	95% Approx. Gamma UPL	1.832	2.008
95% Gamma USL	3.13	3.793			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	0.515		nu hat (KM)	15.49
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	2.198	2.25	95% Approx. Gamma UPL	1.455	1.439
95% Gamma USL	2.104	2.144			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.664	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.322	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Data Not Lognormal at 5% Significance Level

Data Not Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.495	Mean in Log Scale	-1.151
SD in Original Scale	0.722	SD in Log Scale	0.848
95% UTL95% Coverage	2.688	95% BCA UTL95% Coverage	3.12
95% Bootstrap (%) UTL95% Coverage	3.12	95% UPL (t)	1.464
90% Percentile (z)	0.938	95% Percentile (z)	1.276
99% Percentile (z)	2.274	95% USL	2.511

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.501	Mean in Log Scale	-1.129
SD in Original Scale	0.719	SD in Log Scale	0.851
95% UTL95% Coverage	2.771	95% UPL (t)	1.505
90% Percentile (z)	0.963	95% Percentile (z)	1.311
99% Percentile (z)	2.342	95% USL	2.587

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	3.12
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	3.12	95% USL	3.12
95% KM Chebyshev UPL	3.639		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Methyl Mercury

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	10		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	10
Minimum Detect	N/A	Minimum Non-Detect	0.9
Maximum Detect	N/A	Maximum Non-Detect	1.1
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Methyl Mercury was not processed!

Draft

Selenium

General Statistics

Total Number of Observations	16	Number of Distinct Observations	11
		Number of Missing Observations	4
Minimum	0.34	First Quartile	0.418
Second Largest	0.62	Median	0.465
Maximum	0.68	Third Quartile	0.56
Mean	0.486	SD	0.0998
Coefficient of Variation	0.205	Skewness	0.474
Mean of logged Data	-0.74	SD of logged Data	0.203

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.943	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.151	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	0.738	90% Percentile (z)	0.614
95% UPL (t)	0.667	95% Percentile (z)	0.65
95% USL	0.73	99% Percentile (z)	0.718

Gamma GOF Test

A-D Test Statistic	0.369	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.736	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.146	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	25.96	k star (bias corrected MLE)	21.14
Theta hat (MLE)	0.0187	Theta star (bias corrected MLE)	0.023
nu hat (MLE)	830.8	nu star (bias corrected)	676.4
MLE Mean (bias corrected)	0.486	MLE Sd (bias corrected)	0.106

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.679	90% Percentile	0.626
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.681	95% Percentile	0.672
95% WH Approx. Gamma UTL with 95% Coverage	0.771	99% Percentile	0.765
95% HW Approx. Gamma UTL with 95% Coverage	0.777		
95% WH USL	0.761	95% HW USL	0.766

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.959	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.133	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	0.795	90% Percentile (z)	0.618
95% UPL (t)	0.688	95% Percentile (z)	0.666
95% USL	0.783	99% Percentile (z)	0.764

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	0.68
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	0.68	95% BCA Bootstrap UTL with 95% Coverage	0.68
95% UPL	0.68	90% Percentile	0.62
90% Chebyshev UPL	0.795	95% Percentile	0.635
95% Chebyshev UPL	0.935	99% Percentile	0.671
95% USL	0.68		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Silver

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	3		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	3
Minimum Detect	N/A	Minimum Non-Detect	0.018
Maximum Detect	N/A	Maximum Non-Detect	0.02
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Silver was not processed!

Thallium

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	0.002
Maximum Detect	N/A	Maximum Non-Detect	0.002
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Thallium was not processed!

Draft

Vanadium

General Statistics

Total Number of Observations	16	Number of Distinct Observations	15
		Number of Missing Observations	4
Minimum	0.034	First Quartile	0.04
Second Largest	0.166	Median	0.0595
Maximum	0.19	Third Quartile	0.0985
Mean	0.0781	SD	0.0483
Coefficient of Variation	0.618	Skewness	1.236
Mean of logged Data	-2.707	SD of logged Data	0.564

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.84	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.184	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level

Data appear Approximate Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	0.2	90% Percentile (z)	0.14
95% UPL (t)	0.165	95% Percentile (z)	0.158
95% USL	0.196	99% Percentile (z)	0.191

Gamma GOF Test

A-D Test Statistic	0.604	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.744	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.162	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.216	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.335	k star (bias corrected MLE)	2.751
Theta hat (MLE)	0.0234	Theta star (bias corrected MLE)	0.0284
nu hat (MLE)	106.7	nu star (bias corrected)	88.04
MLE Mean (bias corrected)	0.0781	MLE Sd (bias corrected)	0.0471

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.174	90% Percentile	0.141
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.176	95% Percentile	0.168
95% WH Approx. Gamma UTL with 95% Coverage	0.234	99% Percentile	0.227
95% HW Approx. Gamma UTL with 95% Coverage	0.242		
95% WH USL	0.227	95% HW USL	0.234

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.919	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.145	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	0.277	90% Percentile (z)	0.137
95% UPL (t)	0.185	95% Percentile (z)	0.169
95% USL	0.264	99% Percentile (z)	0.248

Nonparametric Distribution Free Background Statistics

Data appear Approximate Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	0.19
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	0.19	95% BCA Bootstrap UTL with 95% Coverage	0.19
95% UPL	0.19	90% Percentile	0.145
90% Chebyshev UPL	0.228	95% Percentile	0.172
95% Chebyshev UPL	0.295	99% Percentile	0.186
95% USL	0.19		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Zinc

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	13	Number of Non-Detects	3
Number of Distinct Detects	13	Number of Distinct Non-Detects	3
Minimum Detect	0.61	Minimum Non-Detect	0.57
Maximum Detect	21.6	Maximum Non-Detect	0.94
Variance Detected	32.33	Percent Non-Detects	18.75%
Mean Detected	2.734	SD Detected	5.686
Mean of Detected Logged Data	0.305	SD of Detected Logged Data	0.919

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.381	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.486	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.246	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	2.339	SD	4.992
95% UTL95% Coverage	14.94	95% KM UPL (t)	11.36
90% KM Percentile (z)	8.737	95% KM Percentile (z)	10.55
99% KM Percentile (z)	13.95	95% KM USL	14.54

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	2.294	SD	5.173
95% UTL95% Coverage	15.35	95% UPL (t)	11.64
90% Percentile (z)	8.923	95% Percentile (z)	10.8
99% Percentile (z)	14.33	95% USL	14.93

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	2.354	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.766	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.409	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.245	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.842	k star (bias corrected MLE)	0.699
Theta hat (MLE)	3.247	Theta star (bias corrected MLE)	3.911
nu hat (MLE)	21.89	nu star (bias corrected)	18.17
MLE Mean (bias corrected)	2.734		
MLE Sd (bias corrected)	3.27	95% Percentile of Chisquare (2k)	4.761

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	2.223
Maximum	21.6	Median	0.935
SD	5.203	CV	2.34
k hat (MLE)	0.456	k star (bias corrected MLE)	0.412
Theta hat (MLE)	4.878	Theta star (bias corrected MLE)	5.397
nu hat (MLE)	14.58	nu star (bias corrected)	13.18
MLE Mean (bias corrected)	2.223	MLE Sd (bias corrected)	3.464
95% Percentile of Chisquare (2k)	3.388	90% Percentile	6.246
95% Percentile	9.143	99% Percentile	16.41

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	15.34	18.02	95% Approx. Gamma UPL	8.744	9.345
95% Gamma USL	14.47	16.83			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	0.22		nu hat (KM)	7.026
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	11.46	11.03	95% Approx. Gamma UPL	7.131	6.695
95% Gamma USL	10.91	10.46			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.717	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.293	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.246	Data Not Lognormal at 5% Significance Level

Data Not Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	2.295	Mean in Log Scale	0.059
SD in Original Scale	5.172	SD in Log Scale	0.996
95% UTL95% Coverage	13.11	95% BCA UTL95% Coverage	21.6
95% Bootstrap (%) UTL95% Coverage	21.6	95% UPL (t)	6.419
90% Percentile (z)	3.803	95% Percentile (z)	5.462
99% Percentile (z)	10.77	95% USL	12.1

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	2.294	Mean in Log Scale	0.0676
SD in Original Scale	5.173	SD in Log Scale	0.973
95% UTL95% Coverage	12.47	95% UPL (t)	6.206
90% Percentile (z)	3.722	95% Percentile (z)	5.3
99% Percentile (z)	10.29	95% USL	11.53

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	21.6
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	21.6	95% USL	21.6
95% KM Chebyshev UPL	24.77		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Limu Kohu

Draft

Alpha-BHC

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	9		
Number of Detects	2	Number of Non-Detects	14
Number of Distinct Detects	2	Number of Distinct Non-Detects	7
Minimum Detect	23.5	Minimum Non-Detect	3.97
Maximum Detect	42.2	Maximum Non-Detect	20
Variance Detected	174.8	Percent Non-Detects	87.5%
Mean Detected	32.85	SD Detected	13.22
Mean of Detected Logged Data	3.45	SD of Detected Logged Data	0.414

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	7.58	SD	10.11
95% UTL95% Coverage	33.09	95% KM UPL (t)	25.84
90% KM Percentile (z)	20.53	95% KM Percentile (z)	24.2
99% KM Percentile (z)	31.09	95% KM USL	32.27

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	7.472	SD	10.94
95% UTL95% Coverage	35.08	95% UPL (t)	27.24
90% Percentile (z)	21.49	95% Percentile (z)	25.46
99% Percentile (z)	32.92	95% USL	34.19

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	12	k star (bias corrected MLE)	N/A
Theta hat (MLE)	2.737	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	48	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A		
MLE Sd (bias corrected)	N/A	95% Percentile of Chisquare (2k)	N/A

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

k hat (KM)	0.562		nu hat (KM)	18	
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	30.88	30.56	95% Approx. Gamma UPL	20.85	20.14
95% Gamma USL	29.61	29.22			

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	6.009	Mean in Log Scale	0.909
SD in Original Scale	11.11	SD in Log Scale	1.206
95% UTL95% Coverage	52.03	95% BCA UTL95% Coverage	42.2
95% Bootstrap (%) UTL95% Coverage	42.2	95% UPL (t)	21.92
90% Percentile (z)	11.63	95% Percentile (z)	18.03
99% Percentile (z)	41	95% USL	47.21

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	7.472	Mean in Log Scale	1.38
SD in Original Scale	10.94	SD in Log Scale	1.034
95% UTL95% Coverage	54.08	95% UPL (t)	25.76
90% Percentile (z)	14.96	95% Percentile (z)	21.78
99% Percentile (z)	44.08	95% USL	49.75

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	42.2
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	42.2	95% USL	42.2
95% KM Chebyshev UPL	52.99		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Gamma-BHC (Lindane)

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	8		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	8
Minimum Detect	N/A	Minimum Non-Detect	3.97
Maximum Detect	N/A	Maximum Non-Detect	20
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Gamma-BHC (Lindane) was not processed!

Delta-BHC

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	8		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	8
Minimum Detect	N/A	Minimum Non-Detect	3.97
Maximum Detect	N/A	Maximum Non-Detect	20
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Delta-BHC was not processed!

Heptachlor

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	8		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	8
Minimum Detect	N/A	Minimum Non-Detect	3.97
Maximum Detect	N/A	Maximum Non-Detect	20
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Heptachlor was not processed!

Aldrin

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	8		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	8
Minimum Detect	N/A	Minimum Non-Detect	3.97
Maximum Detect	N/A	Maximum Non-Detect	20
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Aldrin was not processed!

Draft

Heptachlor Epoxide

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	8		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	8
Minimum Detect	N/A	Minimum Non-Detect	3.97
Maximum Detect	N/A	Maximum Non-Detect	20
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Heptachlor Epoxide was not processed!

p,p'-DDT

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	8		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	8
Minimum Detect	N/A	Minimum Non-Detect	3.97
Maximum Detect	N/A	Maximum Non-Detect	20
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable p,p'-DDT was not processed!

Beta-BHC

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	8		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	8
Minimum Detect	N/A	Minimum Non-Detect	3.97
Maximum Detect	N/A	Maximum Non-Detect	20
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Beta-BHC was not processed!

Draft

Toluene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	25
Maximum Detect	N/A	Maximum Non-Detect	25
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Toluene was not processed!

Ethyl Benzene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	25
Maximum Detect	N/A	Maximum Non-Detect	25
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Ethyl Benzene was not processed!

M,P-Xylenes

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	50
Maximum Detect	N/A	Maximum Non-Detect	50
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable M,P-Xylenes was not processed!

Draft

Styrene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	25
Maximum Detect	N/A	Maximum Non-Detect	25
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Styrene was not processed!

o-Xylene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	25
Maximum Detect	N/A	Maximum Non-Detect	25
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable o-Xylene was not processed!

1,2,4-Trimethylbenzene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	25
Maximum Detect	N/A	Maximum Non-Detect	25
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,4-Trimethylbenzene was not processed!

Draft

Dimethylphthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Dimethylphthalate was not processed!

Diethylphthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	2		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	1
Minimum Detect	1520	Minimum Non-Detect	1000
Maximum Detect	1520	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	1520	SD Detected	N/A
Mean of Detected Logged Data	7.326	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Diethylphthalate was not processed!

Di-n-butylphthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Di-n-butylphthalate was not processed!

Draft

Pyrene

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Pyrene was not processed!

bis(2-Ethylhexyl)phthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable bis(2-Ethylhexyl)phthalate was not processed!

Di-n-octylphthalate

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	1000
Maximum Detect	N/A	Maximum Non-Detect	1000
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Di-n-octylphthalate was not processed!

Draft

2,3,7,8-TCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	15
Minimum Detect	N/A	Minimum Non-Detect	0.056
Maximum Detect	N/A	Maximum Non-Detect	0.19
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,3,7,8-TCDF was not processed!

Draft

Total TCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	8	Number of Non-Detects	8
Number of Distinct Detects	8	Number of Distinct Non-Detects	7
Minimum Detect	0.097	Minimum Non-Detect	0.041
Maximum Detect	0.45	Maximum Non-Detect	0.14
Variance Detected	0.0128	Percent Non-Detects	50%
Mean Detected	0.26	SD Detected	0.113
Mean of Detected Logged Data	-1.445	SD of Detected Logged Data	0.491

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.982	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.134	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.151	SD	0.132
95% UTL95% Coverage	0.484	95% KM UPL (t)	0.39
90% KM Percentile (z)	0.32	95% KM Percentile (z)	0.368
99% KM Percentile (z)	0.458	95% KM USL	0.474

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.15	SD	0.137
95% UTL95% Coverage	0.497	95% UPL (t)	0.398
90% Percentile (z)	0.326	95% Percentile (z)	0.376
99% Percentile (z)	0.47	95% USL	0.486

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.19	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.719	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.184	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.295	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	5.368	k star (bias corrected MLE)	3.438
Theta hat (MLE)	0.0484	Theta star (bias corrected MLE)	0.0755
nu hat (MLE)	85.89	nu star (bias corrected)	55.01
MLE Mean (bias corrected)	0.26		
MLE Sd (bias corrected)	0.14	95% Percentile of Chisquare (2k)	13.89

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.137
Maximum	0.45	Median	0.0648
SD	0.149	CV	1.085
k hat (MLE)	0.669	k star (bias corrected MLE)	0.586
Theta hat (MLE)	0.204	Theta star (bias corrected MLE)	0.234
nu hat (MLE)	21.42	nu star (bias corrected)	18.74
MLE Mean (bias corrected)	0.137	MLE Sd (bias corrected)	0.179
95% Percentile of Chisquare (2k)	4.251	90% Percentile	0.358
95% Percentile	0.497	99% Percentile	0.834

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.907	1.076	95% Approx. Gamma UPL	0.542	0.591
95% Gamma USL	0.86	1.01			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	1.316		nu hat (KM)	42.12
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.667	0.721	95% Approx. Gamma UPL	0.446	0.461
95% Gamma USL	0.639	0.687			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.96	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.204	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.162	Mean in Log Scale	-2.102
SD in Original Scale	0.127	SD in Log Scale	0.763
95% UTL95% Coverage	0.839	95% BCA UTL95% Coverage	0.45
95% Bootstrap (%) UTL95% Coverage	0.45	95% UPL (t)	0.486
90% Percentile (z)	0.325	95% Percentile (z)	0.429
99% Percentile (z)	0.722	95% USL	0.789

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.304	95% KM UTL (Lognormal)95% Coverage	1.033
KM SD of Logged Data	0.926	95% KM UPL (Lognormal)	0.532
95% KM Percentile Lognormal (z)	0.458	95% KM USL (Lognormal)	0.959

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.15	Mean in Log Scale	-2.354
SD in Original Scale	0.137	SD in Log Scale	1.038
95% UTL95% Coverage	1.306	95% UPL (t)	0.62
90% Percentile (z)	0.36	95% Percentile (z)	0.524
99% Percentile (z)	1.064	95% USL	1.201

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.45
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.45	95% USL	0.45
95% KM Chebyshev UPL	0.744		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

2,3,7,8-TCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	15
Minimum Detect	N/A	Minimum Non-Detect	0.02
Maximum Detect	N/A	Maximum Non-Detect	0.16
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,3,7,8-TCDD was not processed!

Draft

Total TCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	11		
Number of Detects	10	Number of Non-Detects	6
Number of Distinct Detects	6	Number of Distinct Non-Detects	6
Minimum Detect	0.11	Minimum Non-Detect	0.03
Maximum Detect	0.21	Maximum Non-Detect	0.16
Variance Detected	9.1222E-4	Percent Non-Detects	37.5%
Mean Detected	0.143	SD Detected	0.0302
Mean of Detected Logged Data	-1.963	SD of Detected Logged Data	0.198

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.884	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.842	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.24	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.28	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.106	SD	0.0567
95% UTL95% Coverage	0.249	95% KM UPL (t)	0.208
90% KM Percentile (z)	0.179	95% KM Percentile (z)	0.199
99% KM Percentile (z)	0.238	95% KM USL	0.245

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.105	SD	0.0577
95% UTL95% Coverage	0.25	95% UPL (t)	0.209
90% Percentile (z)	0.179	95% Percentile (z)	0.2
99% Percentile (z)	0.239	95% USL	0.246

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.421	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.725	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.219	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.266	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	27.41	k star (bias corrected MLE)	19.25
Theta hat (MLE)	0.00522	Theta star (bias corrected MLE)	0.00743
nu hat (MLE)	548.2	nu star (bias corrected)	385.1
MLE Mean (bias corrected)	0.143		
MLE Sd (bias corrected)	0.0326	95% Percentile of Chisquare (2k)	53.99

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0803	Mean	0.122
Maximum	0.21	Median	0.12
SD	0.0372	CV	0.305
k hat (MLE)	12.14	k star (bias corrected MLE)	9.909
Theta hat (MLE)	0.01	Theta star (bias corrected MLE)	0.0123
nu hat (MLE)	388.6	nu star (bias corrected)	317.1
MLE Mean (bias corrected)	0.122	MLE Sd (bias corrected)	0.0387
95% Percentile of Chisquare (2k)	31.18	90% Percentile	0.173
95% Percentile	0.192	99% Percentile	0.23

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.233	0.236	95% Approx. Gamma UPL	0.195	0.196
95% Gamma USL	0.228	0.231			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	3.493		nu hat (KM)	111.8
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.352	0.381	95% Approx. Gamma UPL	0.255	0.266
95% Gamma USL	0.34	0.366			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.924	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.842	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.206	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.28	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.125	Mean in Log Scale	-2.115
SD in Original Scale	0.0343	SD in Log Scale	0.259
95% UTL95% Coverage	0.232	95% BCA UTL95% Coverage	0.21
95% Bootstrap (%) UTL95% Coverage	0.21	95% UPL (t)	0.193
90% Percentile (z)	0.168	95% Percentile (z)	0.185
99% Percentile (z)	0.221	95% USL	0.227

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.46	95% KM UTL (Lognormal)95% Coverage	0.536
KM SD of Logged Data	0.728	95% KM UPL (Lognormal)	0.318
95% KM Percentile Lognormal (z)	0.283	95% KM USL (Lognormal)	0.506

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.105	Mean in Log Scale	-2.477
SD in Original Scale	0.0577	SD in Log Scale	0.784
95% UTL95% Coverage	0.608	95% UPL (t)	0.347
90% Percentile (z)	0.23	95% Percentile (z)	0.305
99% Percentile (z)	0.521	95% USL	0.571

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.21
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.21	95% USL	0.21
95% KM Chebyshev UPL	0.361		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,7,8-PeCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	14
Minimum Detect	N/A	Minimum Non-Detect	0.015
Maximum Detect	N/A	Maximum Non-Detect	0.12
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,7,8-PeCDF was not processed!

2,3,4,7,8-PeCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	15
Minimum Detect	N/A	Minimum Non-Detect	0.011
Maximum Detect	N/A	Maximum Non-Detect	0.17
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,3,4,7,8-PeCDF was not processed!

Draft

Total PeCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	2	Number of Non-Detects	14
Number of Distinct Detects	2	Number of Distinct Non-Detects	13
Minimum Detect	0.019	Minimum Non-Detect	0.013
Maximum Detect	0.21	Maximum Non-Detect	0.14
Variance Detected	0.0182	Percent Non-Detects	87.5%
Mean Detected	0.115	SD Detected	0.135
Mean of Detected Logged Data	-2.762	SD of Detected Logged Data	1.699

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0272	SD	0.0473
95% UTL95% Coverage	0.147	95% KM UPL (t)	0.113
90% KM Percentile (z)	0.0878	95% KM Percentile (z)	0.105
99% KM Percentile (z)	0.137	95% KM USL	0.143

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.037	SD	0.0496
95% UTL95% Coverage	0.162	95% UPL (t)	0.127
90% Percentile (z)	0.101	95% Percentile (z)	0.119
99% Percentile (z)	0.152	95% USL	0.158

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	0.974	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.118	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	3.894	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A		
MLE Sd (bias corrected)	N/A	95% Percentile of Chisquare (2k)	N/A

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

k hat (KM)	0.331		nu hat (KM)	10.58	
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.113	0.108	95% Approx. Gamma UPL	0.0753	0.0706
95% Gamma USL	0.108	0.103			

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0168	Mean in Log Scale	-5.583
SD in Original Scale	0.0517	SD in Log Scale	1.267
95% UTL95% Coverage	0.0921	95% BCA UTL95% Coverage	0.21
95% Bootstrap (%) UTL95% Coverage	0.21	95% UPL (t)	0.0371
90% Percentile (z)	0.0191	95% Percentile (z)	0.0302
99% Percentile (z)	0.0717	95% USL	0.0831

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.037	Mean in Log Scale	-3.747
SD in Original Scale	0.0496	SD in Log Scale	0.88
95% UTL95% Coverage	0.217	95% UPL (t)	0.116
90% Percentile (z)	0.0728	95% Percentile (z)	0.1
99% Percentile (z)	0.183	95% USL	0.202

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.21
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.21	95% USL	0.21
95% KM Chebyshev UPL	0.24		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,7,8-PeCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	15
Minimum Detect	N/A	Minimum Non-Detect	0.014
Maximum Detect	N/A	Maximum Non-Detect	0.17
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,7,8-PeCDD was not processed!

Total PeCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	15
Minimum Detect	N/A	Minimum Non-Detect	0.014
Maximum Detect	N/A	Maximum Non-Detect	0.17
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Total PeCDD was not processed!

1,2,3,4,7,8-HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	16		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	15
Minimum Detect	0.027	Minimum Non-Detect	0.012
Maximum Detect	0.027	Maximum Non-Detect	0.11
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	0.027	SD Detected	N/A
Mean of Detected Logged Data	-3.612	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,4,7,8-HxCDF was not processed!

1,2,3,6,7,8-HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	15
Minimum Detect	N/A	Minimum Non-Detect	0.012
Maximum Detect	N/A	Maximum Non-Detect	0.091
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,6,7,8-HxCDF was not processed!

2,3,4,6,7,8-HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	13
Minimum Detect	0.018	Minimum Non-Detect	0.0097
Maximum Detect	0.018	Maximum Non-Detect	0.11
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	0.018	SD Detected	N/A
Mean of Detected Logged Data	-4.017	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,3,4,6,7,8-HxCDF was not processed!

1,2,3,7,8,9-HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	16		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	16
Minimum Detect	N/A	Minimum Non-Detect	0.011
Maximum Detect	N/A	Maximum Non-Detect	0.11
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,7,8,9-HxCDF was not processed!

Draft

Total HxCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	3	Number of Non-Detects	13
Number of Distinct Detects	2	Number of Distinct Non-Detects	12
Minimum Detect	0.1	Minimum Non-Detect	0.011
Maximum Detect	0.11	Maximum Non-Detect	0.11
Variance Detected	3.3333E-5	Percent Non-Detects	81.25%
Mean Detected	0.103	SD Detected	0.00577
Mean of Detected Logged Data	-2.271	SD of Detected Logged Data	0.055

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.75	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.385	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0291	SD	0.0367
95% UTL95% Coverage	0.122	95% KM UPL (t)	0.0954
90% KM Percentile (z)	0.0761	95% KM Percentile (z)	0.0894
99% KM Percentile (z)	0.114	95% KM USL	0.119

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0347	SD	0.0368
95% UTL95% Coverage	0.127	95% UPL (t)	0.101
90% Percentile (z)	0.0818	95% Percentile (z)	0.0951
99% Percentile (z)	0.12	95% USL	0.124

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	490.5	k star (bias corrected MLE)	N/A
Theta hat (MLE)	2.1068E-4	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	2943	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A		
MLE Sd (bias corrected)	N/A	95% Percentile of Chisquare (2k)	N/A

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0783	Mean	0.0868
Maximum	0.11	Median	0.0828
SD	0.00864	CV	0.0995
k hat (MLE)	118.7	k star (bias corrected MLE)	96.47
Theta hat (MLE)	7.3131E-4	Theta star (bias corrected MLE)	8.9969E-4
nu hat (MLE)	3798	nu star (bias corrected)	3087
MLE Mean (bias corrected)	0.0868	MLE Sd (bias corrected)	0.00884
95% Percentile of Chisquare (2k)	226.3	90% Percentile	0.0983
95% Percentile	0.102	99% Percentile	0.109

The following statistics are computed using Gamma ROS Statistics on Imputed Data
Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.109	0.109	95% Approx. Gamma UPL	0.102	0.102
95% Gamma USL	0.108	0.108			

The following statistics are computed using gamma distribution and KM estimates
Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	0.63		nu hat (KM)	20.15
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.139	0.143	95% Approx. Gamma UPL	0.0899	0.0888
95% Gamma USL	0.133	0.136			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.75	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.385	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Approximate Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0881	Mean in Log Scale	-2.432
SD in Original Scale	0.00796	SD in Log Scale	0.0844
95% UTL95% Coverage	0.109	95% BCA UTL95% Coverage	0.11
95% Bootstrap (%) UTL95% Coverage	0.11	95% UPL (t)	0.102
90% Percentile (z)	0.0978	95% Percentile (z)	0.101
99% Percentile (z)	0.107	95% USL	0.108

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-4.07	95% KM UTL (Lognormal)95% Coverage	0.161
KM SD of Logged Data	0.889	95% KM UPL (Lognormal)	0.0851
95% KM Percentile Lognormal (z)	0.0737	95% KM USL (Lognormal)	0.15

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0347	Mean in Log Scale	-3.868
SD in Original Scale	0.0368	SD in Log Scale	1.035
95% UTL95% Coverage	0.285	95% UPL (t)	0.136
90% Percentile (z)	0.0787	95% Percentile (z)	0.115
99% Percentile (z)	0.232	95% USL	0.262

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.11
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.11	95% USL	0.11
95% KM Chebyshev UPL	0.194		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,4,7,8-HxCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	13
Minimum Detect	N/A	Minimum Non-Detect	0.015
Maximum Detect	N/A	Maximum Non-Detect	0.17
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,4,7,8-HxCDD was not processed!

Draft

1,2,3,6,7,8-HxCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	2	Number of Non-Detects	14
Number of Distinct Detects	2	Number of Distinct Non-Detects	14
Minimum Detect	0.018	Minimum Non-Detect	0.02
Maximum Detect	0.024	Maximum Non-Detect	0.17
Variance Detected	1.8000E-5	Percent Non-Detects	87.5%
Mean Detected	0.021	SD Detected	0.00424
Mean of Detected Logged Data	-3.874	SD of Detected Logged Data	0.203

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0195	SD	0.0026
95% UTL95% Coverage	0.0261	95% KM UPL (t)	0.0242
90% KM Percentile (z)	0.0228	95% KM Percentile (z)	0.0238
99% KM Percentile (z)	0.0255	95% KM USL	0.0258

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0322	SD	0.0193
95% UTL95% Coverage	0.0809	95% UPL (t)	0.067
90% Percentile (z)	0.0569	95% Percentile (z)	0.0639
99% Percentile (z)	0.077	95% USL	0.0793

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	48.66	k star (bias corrected MLE)	N/A
Theta hat (MLE)	4.3153E-4	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	194.7	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A		
MLE Sd (bias corrected)	N/A	95% Percentile of Chisquare (2k)	N/A

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

k hat (KM)	56.33		nu hat (KM)	1803	
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0263	0.0264	95% Approx. Gamma UPL	0.0242	0.0242
95% Gamma USL	0.0261	0.0261			

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0192	Mean in Log Scale	-3.953
SD in Original Scale	0.00135	SD in Log Scale	0.0645
95% UTL95% Coverage	0.0226	95% BCA UTL95% Coverage	0.024
95% Bootstrap (%) UTL95% Coverage	0.024	95% UPL (t)	0.0216
90% Percentile (z)	0.0209	95% Percentile (z)	0.0214
99% Percentile (z)	0.0223	95% USL	0.0225

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0322	Mean in Log Scale	-3.595
SD in Original Scale	0.0193	SD in Log Scale	0.587
95% UTL95% Coverage	0.121	95% UPL (t)	0.0793
90% Percentile (z)	0.0583	95% Percentile (z)	0.0721
99% Percentile (z)	0.108	95% USL	0.115

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.17
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.17	95% USL	0.17
95% KM Chebyshev UPL	0.0312		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,7,8,9-HxCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	15
Minimum Detect	N/A	Minimum Non-Detect	0.016
Maximum Detect	N/A	Maximum Non-Detect	0.17
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,7,8,9-HxCDD was not processed!

Draft

Total HxCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	16		
Number of Detects	2	Number of Non-Detects	14
Number of Distinct Detects	2	Number of Distinct Non-Detects	14
Minimum Detect	0.023	Minimum Non-Detect	0.016
Maximum Detect	0.2	Maximum Non-Detect	0.17
Variance Detected	0.0157	Percent Non-Detects	87.5%
Mean Detected	0.112	SD Detected	0.125
Mean of Detected Logged Data	-2.691	SD of Detected Logged Data	1.529

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0297	SD	0.0441
95% UTL95% Coverage	0.141	95% KM UPL (t)	0.109
90% KM Percentile (z)	0.0862	95% KM Percentile (z)	0.102
99% KM Percentile (z)	0.132	95% KM USL	0.137

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0407	SD	0.0469
95% UTL95% Coverage	0.159	95% UPL (t)	0.125
90% Percentile (z)	0.101	95% Percentile (z)	0.118
99% Percentile (z)	0.15	95% USL	0.155

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	1.144	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0975	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	4.575	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A		
MLE Sd (bias corrected)	N/A	95% Percentile of Chisquare (2k)	N/A

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

k hat (KM)	0.453		nu hat (KM)	14.51	
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.113	0.109	95% Approx. Gamma UPL	0.0775	0.0735
95% Gamma USL	0.108	0.104			

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0173	Mean in Log Scale	-5.228
SD in Original Scale	0.049	SD in Log Scale	1.102
95% UTL95% Coverage	0.0865	95% BCA UTL95% Coverage	0.2
95% Bootstrap (%) UTL95% Coverage	0.2	95% UPL (t)	0.0392
90% Percentile (z)	0.022	95% Percentile (z)	0.0328
99% Percentile (z)	0.0695	95% USL	0.0791

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0407	Mean in Log Scale	-3.582
SD in Original Scale	0.0469	SD in Log Scale	0.842
95% UTL95% Coverage	0.233	95% UPL (t)	0.127
90% Percentile (z)	0.0818	95% Percentile (z)	0.111
99% Percentile (z)	0.197	95% USL	0.217

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.2
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.2	95% USL	0.2
95% KM Chebyshev UPL	0.228		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,4,6,7,8-HpCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	9	Number of Non-Detects	7
Number of Distinct Detects	8	Number of Distinct Non-Detects	7
Minimum Detect	0.034	Minimum Non-Detect	0.021
Maximum Detect	0.19	Maximum Non-Detect	0.082
Variance Detected	0.00311	Percent Non-Detects	43.75%
Mean Detected	0.0837	SD Detected	0.0557
Mean of Detected Logged Data	-2.656	SD of Detected Logged Data	0.611

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.821	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.829	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.298	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.295	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0597	SD	0.0485
95% UTL95% Coverage	0.182	95% KM UPL (t)	0.147
90% KM Percentile (z)	0.122	95% KM Percentile (z)	0.14
99% KM Percentile (z)	0.173	95% KM USL	0.178

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.058	SD	0.0512
95% UTL95% Coverage	0.187	95% UPL (t)	0.151
90% Percentile (z)	0.124	95% Percentile (z)	0.142
99% Percentile (z)	0.177	95% USL	0.183

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.49	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.727	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.255	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.281	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	3.013	k star (bias corrected MLE)	2.083
Theta hat (MLE)	0.0278	Theta star (bias corrected MLE)	0.0402
nu hat (MLE)	54.24	nu star (bias corrected)	37.49
MLE Mean (bias corrected)	0.0837		
MLE Sd (bias corrected)	0.058	95% Percentile of Chisquare (2k)	9.755

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.0532
Maximum	0.19	Median	0.0345
SD	0.0543	CV	1.02
k hat (MLE)	1.216	k star (bias corrected MLE)	1.029
Theta hat (MLE)	0.0438	Theta star (bias corrected MLE)	0.0517
nu hat (MLE)	38.9	nu star (bias corrected)	32.94
MLE Mean (bias corrected)	0.0532	MLE Sd (bias corrected)	0.0525
95% Percentile of Chisquare (2k)	6.104	90% Percentile	0.122
95% Percentile	0.158	99% Percentile	0.242

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.256	0.279	95% Approx. Gamma UPL	0.167	0.174
95% Gamma USL	0.245	0.265			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	1.515		nu hat (KM)	43.47
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.211	0.219	95% Approx. Gamma UPL	0.15	0.151
95% Gamma USL	0.203	0.21			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.917	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.829	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.217	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.295	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0577	Mean in Log Scale	-3.139
SD in Original Scale	0.051	SD in Log Scale	0.748
95% UTL95% Coverage	0.286	95% BCA UTL95% Coverage	0.19
95% Bootstrap (%) UTL95% Coverage	0.19	95% UPL (t)	0.167
90% Percentile (z)	0.113	95% Percentile (z)	0.148
99% Percentile (z)	0.247	95% USL	0.27

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-3.074	95% KM UTL (Lognormal)95% Coverage	0.259
KM SD of Logged Data	0.683	95% KM UPL (Lognormal)	0.159
95% KM Percentile Lognormal (z)	0.142	95% KM USL (Lognormal)	0.245

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.058	Mean in Log Scale	-3.162
SD in Original Scale	0.0512	SD in Log Scale	0.817
95% UTL95% Coverage	0.333	95% UPL (t)	0.185
90% Percentile (z)	0.121	95% Percentile (z)	0.162
99% Percentile (z)	0.284	95% USL	0.312

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.19
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.19	95% USL	0.19
95% KM Chebyshev UPL	0.278		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,4,7,8,9-HpCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	1	Number of Non-Detects	15
Number of Distinct Detects	1	Number of Distinct Non-Detects	14
Minimum Detect	0.048	Minimum Non-Detect	0.015
Maximum Detect	0.048	Maximum Non-Detect	0.11
Variance Detected	N/A	Percent Non-Detects	93.75%
Mean Detected	0.048	SD Detected	N/A
Mean of Detected Logged Data	-3.037	SD of Detected Logged Data	N/A

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,4,7,8,9-HpCDF was not processed!

Draft

Total HpCDF

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	6	Number of Non-Detects	10
Number of Distinct Detects	5	Number of Distinct Non-Detects	10
Minimum Detect	0.048	Minimum Non-Detect	0.013
Maximum Detect	0.46	Maximum Non-Detect	0.096
Variance Detected	0.0247	Percent Non-Detects	62.5%
Mean Detected	0.16	SD Detected	0.157
Mean of Detected Logged Data	-2.172	SD of Detected Logged Data	0.869

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.769	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.258	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.071	SD	0.112
95% UTL95% Coverage	0.354	95% KM UPL (t)	0.274
90% KM Percentile (z)	0.215	95% KM Percentile (z)	0.255
99% KM Percentile (z)	0.332	95% KM USL	0.345

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0749	SD	0.114
95% UTL95% Coverage	0.363	95% UPL (t)	0.281
90% Percentile (z)	0.221	95% Percentile (z)	0.262
99% Percentile (z)	0.34	95% USL	0.353

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.458	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.707	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.282	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.337	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.618	k star (bias corrected MLE)	0.92
Theta hat (MLE)	0.0989	Theta star (bias corrected MLE)	0.174
nu hat (MLE)	19.42	nu star (bias corrected)	11.04
MLE Mean (bias corrected)	0.16		
MLE Sd (bias corrected)	0.167	95% Percentile of Chisquare (2k)	5.679

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.0663
Maximum	0.46	Median	0.01
SD	0.118	CV	1.777
k hat (MLE)	0.627	k star (bias corrected MLE)	0.551
Theta hat (MLE)	0.106	Theta star (bias corrected MLE)	0.12
nu hat (MLE)	20.07	nu star (bias corrected)	17.64
MLE Mean (bias corrected)	0.0663	MLE Sd (bias corrected)	0.0892
95% Percentile of Chisquare (2k)	4.091	90% Percentile	0.176
95% Percentile	0.246	99% Percentile	0.417

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.423	0.455	95% Approx. Gamma UPL	0.249	0.25
95% Gamma USL	0.401	0.427			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	0.401		nu hat (KM)	12.82
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.396	0.419	95% Approx. Gamma UPL	0.243	0.243
95% Gamma USL	0.376	0.396			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.901	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.264	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0677	Mean in Log Scale	-3.586
SD in Original Scale	0.117	SD in Log Scale	1.254
95% UTL95% Coverage	0.657	95% BCA UTL95% Coverage	0.46
95% Bootstrap (%) UTL95% Coverage	0.46	95% UPL (t)	0.267
90% Percentile (z)	0.138	95% Percentile (z)	0.218
99% Percentile (z)	0.513	95% USL	0.594

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-3.431	95% KM UTL (Lognormal)95% Coverage	0.584
KM SD of Logged Data	1.146	95% KM UPL (Lognormal)	0.257
95% KM Percentile Lognormal (z)	0.213	95% KM USL (Lognormal)	0.532

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0749	Mean in Log Scale	-3.263
SD in Original Scale	0.114	SD in Log Scale	1.128
95% UTL95% Coverage	0.66	95% UPL (t)	0.294
90% Percentile (z)	0.162	95% Percentile (z)	0.245
99% Percentile (z)	0.528	95% USL	0.602

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.46
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.46	95% USL	0.46
95% KM Chebyshev UPL	0.575		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

1,2,3,4,6,7,8-HpCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	16		
Number of Detects	3	Number of Non-Detects	13
Number of Distinct Detects	3	Number of Distinct Non-Detects	13
Minimum Detect	0.17	Minimum Non-Detect	0.04
Maximum Detect	0.63	Maximum Non-Detect	0.58
Variance Detected	0.0562	Percent Non-Detects	81.25%
Mean Detected	0.367	SD Detected	0.237
Mean of Detected Logged Data	-1.146	SD of Detected Logged Data	0.657

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.941	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.277	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.104	SD	0.153
95% UTL95% Coverage	0.49	95% KM UPL (t)	0.38
90% KM Percentile (z)	0.3	95% KM Percentile (z)	0.356
99% KM Percentile (z)	0.46	95% KM USL	0.478

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.126	SD	0.161
95% UTL95% Coverage	0.532	95% UPL (t)	0.416
90% Percentile (z)	0.332	95% Percentile (z)	0.39
99% Percentile (z)	0.5	95% USL	0.519

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	3.663	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.1	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	21.98	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A		
MLE Sd (bias corrected)	N/A	95% Percentile of Chisquare (2k)	N/A

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.0769
Maximum	0.63	Median	0.01
SD	0.168	CV	2.183
k hat (MLE)	0.462	k star (bias corrected MLE)	0.417
Theta hat (MLE)	0.166	Theta star (bias corrected MLE)	0.184
nu hat (MLE)	14.79	nu star (bias corrected)	13.35
MLE Mean (bias corrected)	0.0769	MLE Sd (bias corrected)	0.119
95% Percentile of Chisquare (2k)	3.417	90% Percentile	0.215
95% Percentile	0.315	99% Percentile	0.563

The following statistics are computed using Gamma ROS Statistics on Imputed Data
Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.535	0.554	95% Approx. Gamma UPL	0.298	0.286
95% Gamma USL	0.503	0.517			

The following statistics are computed using gamma distribution and KM estimates
Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	0.459		nu hat (KM)	14.68
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.489	0.493	95% Approx. Gamma UPL	0.315	0.307
95% Gamma USL	0.466	0.469			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.994	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.202	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0935	Mean in Log Scale	-3.055
SD in Original Scale	0.161	SD in Log Scale	0.979
95% UTL95% Coverage	0.558	95% BCA UTL95% Coverage	0.63
95% Bootstrap (%) UTL95% Coverage	0.63	95% UPL (t)	0.277
90% Percentile (z)	0.165	95% Percentile (z)	0.236
99% Percentile (z)	0.46	95% USL	0.516

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.807	95% KM UTL (Lognormal)95% Coverage	0.521
KM SD of Logged Data	0.854	95% KM UPL (Lognormal)	0.283
95% KM Percentile Lognormal (z)	0.246	95% KM USL (Lognormal)	0.486

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.126	Mean in Log Scale	-2.612
SD in Original Scale	0.161	SD in Log Scale	1.003
95% UTL95% Coverage	0.922	95% UPL (t)	0.449
90% Percentile (z)	0.265	95% Percentile (z)	0.382
99% Percentile (z)	0.756	95% USL	0.85

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.63
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.63	95% USL	0.63
95% KM Chebyshev UPL	0.792		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Total HpCDD

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	13	Number of Non-Detects	3
Number of Distinct Detects	12	Number of Distinct Non-Detects	3
Minimum Detect	0.084	Minimum Non-Detect	0.038
Maximum Detect	1.2	Maximum Non-Detect	0.14
Variance Detected	0.171	Percent Non-Detects	18.75%
Mean Detected	0.415	SD Detected	0.413
Mean of Detected Logged Data	-1.325	SD of Detected Logged Data	0.978

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.771	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.261	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.246	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.349	SD	0.384
95% UTL95% Coverage	1.317	95% KM UPL (t)	1.042
90% KM Percentile (z)	0.841	95% KM Percentile (z)	0.98
99% KM Percentile (z)	1.241	95% KM USL	1.286

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.346	SD	0.399
95% UTL95% Coverage	1.352	95% UPL (t)	1.066
90% Percentile (z)	0.857	95% Percentile (z)	1.001
99% Percentile (z)	1.273	95% USL	1.32

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.637	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.754	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.186	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.242	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.263	k star (bias corrected MLE)	1.023
Theta hat (MLE)	0.329	Theta star (bias corrected MLE)	0.406
nu hat (MLE)	32.84	nu star (bias corrected)	26.59
MLE Mean (bias corrected)	0.415		
MLE Sd (bias corrected)	0.41	95% Percentile of Chisquare (2k)	6.08

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.339
Maximum	1.2	Median	0.17
SD	0.404	CV	1.192
k hat (MLE)	0.704	k star (bias corrected MLE)	0.613
Theta hat (MLE)	0.482	Theta star (bias corrected MLE)	0.553
nu hat (MLE)	22.51	nu star (bias corrected)	19.63
MLE Mean (bias corrected)	0.339	MLE Sd (bias corrected)	0.433
95% Percentile of Chisquare (2k)	4.379	90% Percentile	0.877
95% Percentile	1.21	99% Percentile	2.014

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	2.141	2.532	95% Approx. Gamma UPL	1.296	1.414
95% Gamma USL	2.031	2.381			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	0.827		nu hat (KM)	26.47
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	1.736	1.88	95% Approx. Gamma UPL	1.116	1.148
95% Gamma USL	1.657	1.784			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.906	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.124	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.246	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.346	Mean in Log Scale	-1.66
SD in Original Scale	0.398	SD in Log Scale	1.151
95% UTL95% Coverage	3.473	95% BCA UTL95% Coverage	1.2
95% Bootstrap (%) UTL95% Coverage	1.2	95% UPL (t)	1.522
90% Percentile (z)	0.831	95% Percentile (z)	1.263
99% Percentile (z)	2.767	95% USL	3.165

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-1.613	95% KM UTL (Lognormal)95% Coverage	2.849
KM SD of Logged Data	1.054	95% KM UPL (Lognormal)	1.338
95% KM Percentile Lognormal (z)	1.128	95% KM USL (Lognormal)	2.617

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.346	Mean in Log Scale	-1.683
SD in Original Scale	0.399	SD in Log Scale	1.19
95% UTL95% Coverage	3.745	95% UPL (t)	1.596
90% Percentile (z)	0.854	95% Percentile (z)	1.316
99% Percentile (z)	2.96	95% USL	3.402

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	1.2
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	1.2	95% USL	1.2
95% KM Chebyshev UPL	2.072		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

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General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	3	Number of Non-Detects	13
Number of Distinct Detects	3	Number of Distinct Non-Detects	12
Minimum Detect	0.24	Minimum Non-Detect	0.073
Maximum Detect	0.54	Maximum Non-Detect	0.3
Variance Detected	0.0258	Percent Non-Detects	81.25%
Mean Detected	0.423	SD Detected	0.161
Mean of Detected Logged Data	-0.919	SD of Detected Logged Data	0.443

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.871	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.328	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.139	SD	0.148
95% UTL95% Coverage	0.513	95% KM UPL (t)	0.407
90% KM Percentile (z)	0.329	95% KM Percentile (z)	0.383
99% KM Percentile (z)	0.484	95% KM USL	0.502

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.138	SD	0.156
95% UTL95% Coverage	0.532	95% UPL (t)	0.42
90% Percentile (z)	0.338	95% Percentile (z)	0.395
99% Percentile (z)	0.501	95% USL	0.519

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	8.597	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0492	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	51.58	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A		
MLE Sd (bias corrected)	N/A	95% Percentile of Chisquare (2k)	N/A

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.0875
Maximum	0.54	Median	0.01
SD	0.177	CV	2.019
k hat (MLE)	0.439	k star (bias corrected MLE)	0.398
Theta hat (MLE)	0.199	Theta star (bias corrected MLE)	0.22
nu hat (MLE)	14.04	nu star (bias corrected)	12.74
MLE Mean (bias corrected)	0.0875	MLE Sd (bias corrected)	0.139
95% Percentile of Chisquare (2k)	3.314	90% Percentile	0.247
95% Percentile	0.364	99% Percentile	0.658

The following statistics are computed using Gamma ROS Statistics on Imputed Data
Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.631	0.665	95% Approx. Gamma UPL	0.348	0.337
95% Gamma USL	0.594	0.619			

The following statistics are computed using gamma distribution and KM estimates
Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	0.886		nu hat (KM)	28.36
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.536	0.542	95% Approx. Gamma UPL	0.37	0.364
95% Gamma USL	0.515	0.519			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.838	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.345	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.512	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.133	Mean in Log Scale	-2.386
SD in Original Scale	0.156	SD in Log Scale	0.76
95% UTL95% Coverage	0.627	95% BCA UTL95% Coverage	0.54
95% Bootstrap (%) UTL95% Coverage	0.54	95% UPL (t)	0.363
90% Percentile (z)	0.244	95% Percentile (z)	0.321
99% Percentile (z)	0.539	95% USL	0.589

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.293	95% KM UTL (Lognormal)95% Coverage	0.567
KM SD of Logged Data	0.683	95% KM UPL (Lognormal)	0.347
95% KM Percentile Lognormal (z)	0.311	95% KM USL (Lognormal)	0.536

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.138	Mean in Log Scale	-2.374
SD in Original Scale	0.156	SD in Log Scale	0.833
95% UTL95% Coverage	0.761	95% UPL (t)	0.419
90% Percentile (z)	0.271	95% Percentile (z)	0.366
99% Percentile (z)	0.646	95% USL	0.712

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.54
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.54	95% USL	0.54
95% KM Chebyshev UPL	0.805		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations.
The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

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General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	14		
Number of Detects	5	Number of Non-Detects	11
Number of Distinct Detects	4	Number of Distinct Non-Detects	10
Minimum Detect	0.55	Minimum Non-Detect	0.35
Maximum Detect	6.9	Maximum Non-Detect	1.1
Variance Detected	9.048	Percent Non-Detects	68.75%
Mean Detected	4.69	SD Detected	3.008
Mean of Detected Logged Data	1.209	SD of Detected Logged Data	1.107

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.778	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.348	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.396	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	1.715	SD	2.507
95% UTL95% Coverage	8.043	95% KM UPL (t)	6.246
90% KM Percentile (z)	4.928	95% KM Percentile (z)	5.839
99% KM Percentile (z)	7.548	95% KM USL	7.841

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	1.674	SD	2.614
95% UTL95% Coverage	8.272	95% UPL (t)	6.398
90% Percentile (z)	5.024	95% Percentile (z)	5.974
99% Percentile (z)	7.755	95% USL	8.061

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.674	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.686	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.37	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.361	Data Not Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.631	k star (bias corrected MLE)	0.786
Theta hat (MLE)	2.876	Theta star (bias corrected MLE)	5.969
nu hat (MLE)	16.31	nu star (bias corrected)	7.857
MLE Mean (bias corrected)	4.69		
MLE Sd (bias corrected)	5.291	95% Percentile of Chisquare (2k)	5.131

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	1.473
Maximum	6.9	Median	0.01
SD	2.726	CV	1.851
k hat (MLE)	0.227	k star (bias corrected MLE)	0.226
Theta hat (MLE)	6.482	Theta star (bias corrected MLE)	6.509
nu hat (MLE)	7.269	nu star (bias corrected)	7.239
MLE Mean (bias corrected)	1.473	MLE Sd (bias corrected)	3.096
95% Percentile of Chisquare (2k)	2.255	90% Percentile	4.444
95% Percentile	7.337	99% Percentile	15.15

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	13.71	16.76	95% Approx. Gamma UPL	6.804	7.127
95% Gamma USL	12.77	15.38			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	0.468		nu hat (KM)	14.98
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	10.04	10.64	95% Approx. Gamma UPL	6.057	6.044
95% Gamma USL	9.522	10.02			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.765	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.335	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.396	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	1.561	Mean in Log Scale	-1.013
SD in Original Scale	2.676	SD in Log Scale	1.673
95% UTL95% Coverage	24.8	95% BCA UTL95% Coverage	6.9
95% Bootstrap (%) UTL95% Coverage	6.9	95% UPL (t)	7.472
90% Percentile (z)	3.101	95% Percentile (z)	5.696
99% Percentile (z)	17.82	95% USL	21.67

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-0.324	95% KM UTL (Lognormal)95% Coverage	14.06
KM SD of Logged Data	1.176	95% KM UPL (Lognormal)	6.053
95% KM Percentile Lognormal (z)	5.003	95% KM USL (Lognormal)	12.79

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	1.674	Mean in Log Scale	-0.492
SD in Original Scale	2.614	SD in Log Scale	1.352
95% UTL95% Coverage	18.54	95% UPL (t)	7.035
90% Percentile (z)	3.457	95% Percentile (z)	5.65
99% Percentile (z)	14.2	95% USL	16.63

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	6.9
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	6.9	95% USL	6.9
95% KM Chebyshev UPL	12.98		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

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General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	12	Number of Non-Detects	4
Number of Distinct Detects	11	Number of Distinct Non-Detects	2
Minimum Detect	0.32	Minimum Non-Detect	0.28
Maximum Detect	12	Maximum Non-Detect	0.3
Variance Detected	14.39	Percent Non-Detects	25%
Mean Detected	2.503	SD Detected	3.794
Mean of Detected Logged Data	0.0964	SD of Detected Logged Data	1.256

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.63	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.859	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.365	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.256	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	1.948	SD	3.29
95% UTL95% Coverage	10.25	95% KM UPL (t)	7.892
90% KM Percentile (z)	6.164	95% KM Percentile (z)	7.359
99% KM Percentile (z)	9.601	95% KM USL	9.986

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	1.914	SD	3.416
95% UTL95% Coverage	10.54	95% UPL (t)	8.086
90% Percentile (z)	6.291	95% Percentile (z)	7.532
99% Percentile (z)	9.86	95% USL	10.26

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.029	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.767	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.257	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.255	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.731	k star (bias corrected MLE)	0.604
Theta hat (MLE)	3.422	Theta star (bias corrected MLE)	4.144
nu hat (MLE)	17.55	nu star (bias corrected)	14.5
MLE Mean (bias corrected)	2.503		
MLE Sd (bias corrected)	3.221	95% Percentile of Chisquare (2k)	4.337

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	1.88
Maximum	12	Median	0.485
SD	3.435	CV	1.827
k hat (MLE)	0.387	k star (bias corrected MLE)	0.356
Theta hat (MLE)	4.86	Theta star (bias corrected MLE)	5.281
nu hat (MLE)	12.38	nu star (bias corrected)	11.39
MLE Mean (bias corrected)	1.88	MLE Sd (bias corrected)	3.151
95% Percentile of Chisquare (2k)	3.078	90% Percentile	5.415
95% Percentile	8.129	99% Percentile	15.04

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	14.8	18.19	95% Approx. Gamma UPL	8.158	8.96
95% Gamma USL	13.92	16.9			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	0.35		nu hat (KM)	11.21
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	11.41	11.99	95% Approx. Gamma UPL	6.841	6.769
95% Gamma USL	10.82	11.29			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.869	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.207	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.256	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	1.892	Mean in Log Scale	-0.651
SD in Original Scale	3.428	SD in Log Scale	1.728
95% UTL95% Coverage	40.86	95% BCA UTL95% Coverage	12
95% Bootstrap (%) UTL95% Coverage	12	95% UPL (t)	11.84
90% Percentile (z)	4.776	95% Percentile (z)	8.946
99% Percentile (z)	29.04	95% USL	35.54

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-0.246	95% KM UTL (Lognormal)95% Coverage	16.11
KM SD of Logged Data	1.199	95% KM UPL (Lognormal)	6.82
95% KM Percentile Lognormal (z)	5.615	95% KM USL (Lognormal)	14.62

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	1.914	Mean in Log Scale	-0.411
SD in Original Scale	3.416	SD in Log Scale	1.407
95% UTL95% Coverage	23.13	95% UPL (t)	8.433
90% Percentile (z)	4.026	95% Percentile (z)	6.712
99% Percentile (z)	17.51	95% USL	20.65

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	12
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	12	95% USL	12
95% KM Chebyshev UPL	16.73		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

2,4-Dinitrotoluene5

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	200
Maximum Detect	N/A	Maximum Non-Detect	200
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,4-Dinitrotoluene5 was not processed!

Hexahydro-trinitro-triazine (RDX)

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	500
Maximum Detect	N/A	Maximum Non-Detect	500
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Hexahydro-trinitro-triazine (RDX) was not processed!

Nitroglycerine

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	1		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	1
Minimum Detect	N/A	Minimum Non-Detect	500
Maximum Detect	N/A	Maximum Non-Detect	500
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Nitroglycerine was not processed!

Draft

Inorganic Arsenic

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	0.184	First Quartile	0.29
Second Largest	1.38	Median	0.402
Maximum	1.42	Third Quartile	0.521
Mean	0.55	SD	0.418
Coefficient of Variation	0.76	Skewness	1.507
Mean of logged Data	-0.809	SD of logged Data	0.634

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.727	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.315	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	1.605	90% Percentile (z)	1.086
95% UPL (t)	1.305	95% Percentile (z)	1.237
95% USL	1.571	99% Percentile (z)	1.522

Gamma GOF Test

A-D Test Statistic	1.119	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.747	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.246	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.217	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.516	k star (bias corrected MLE)	2.086
Theta hat (MLE)	0.219	Theta star (bias corrected MLE)	0.264
nu hat (MLE)	80.51	nu star (bias corrected)	66.75
MLE Mean (bias corrected)	0.55	MLE Sd (bias corrected)	0.381

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	1.337	90% Percentile	1.059
95% Hawkins Wixley (HW) Approx. Gamma UPL	1.348	95% Percentile	1.288
95% WH Approx. Gamma UTL with 95% Coverage	1.858	99% Percentile	1.793
95% HW Approx. Gamma UTL with 95% Coverage	1.919		
95% WH USL	1.793	95% HW USL	1.847

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.891	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.2	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	2.204	90% Percentile (z)	1.003
95% UPL (t)	1.399	95% Percentile (z)	1.263
95% USL	2.094	99% Percentile (z)	1.945

Nonparametric Distribution Free Background Statistics

Data appear Lognormal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	1.42
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	1.42	95% BCA Bootstrap UTL with 95% Coverage	1.42
95% UPL	1.42	90% Percentile	1.33
90% Chebyshev UPL	1.842	95% Percentile	1.39
95% Chebyshev UPL	2.427	99% Percentile	1.414
95% USL	1.42		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Arsenic(III)

General Statistics

Total Number of Observations	16	Number of Distinct Observations	15
		Number of Missing Observations	4
Minimum	0.163	First Quartile	0.261
Second Largest	1.05	Median	0.336
Maximum	1.39	Third Quartile	0.476
Mean	0.483	SD	0.361
Coefficient of Variation	0.748	Skewness	1.621
Mean of logged Data	-0.93	SD of logged Data	0.618

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.752	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.31	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	1.394	90% Percentile (z)	0.946
95% UPL (t)	1.135	95% Percentile (z)	1.077
95% USL	1.365	99% Percentile (z)	1.323

Gamma GOF Test

A-D Test Statistic	1.061	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.747	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.243	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.217	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.628	k star (bias corrected MLE)	2.177
Theta hat (MLE)	0.184	Theta star (bias corrected MLE)	0.222
nu hat (MLE)	84.1	nu star (bias corrected)	69.66
MLE Mean (bias corrected)	0.483	MLE Sd (bias corrected)	0.327

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	1.157	90% Percentile	0.921
95% Hawkins Wixley (HW) Approx. Gamma UPL	1.166	95% Percentile	1.115
95% WH Approx. Gamma UTL with 95% Coverage	1.599	99% Percentile	1.545
95% HW Approx. Gamma UTL with 95% Coverage	1.649		
95% WH USL	1.544	95% HW USL	1.588

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.902	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.198	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	1.878	90% Percentile (z)	0.871
95% UPL (t)	1.206	95% Percentile (z)	1.091
95% USL	1.786	99% Percentile (z)	1.662

Nonparametric Distribution Free Background Statistics

Data appear Lognormal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	1.39
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	1.39	95% BCA Bootstrap UTL with 95% Coverage	1.39
95% UPL	1.39	90% Percentile	1.05
90% Chebyshev UPL	1.6	95% Percentile	1.135
95% Chebyshev UPL	2.105	99% Percentile	1.339
95% USL	1.39		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Arsenic(V)

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	13		
Number of Detects	9	Number of Non-Detects	7
Number of Distinct Detects	9	Number of Distinct Non-Detects	5
Minimum Detect	0.041	Minimum Non-Detect	0.037
Maximum Detect	0.332	Maximum Non-Detect	0.075
Variance Detected	0.0104	Percent Non-Detects	43.75%
Mean Detected	0.111	SD Detected	0.102
Mean of Detected Logged Data	-2.475	SD of Detected Logged Data	0.715

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.679	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.829	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.388	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.295	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.079	SD	0.0805
95% UTL95% Coverage	0.282	95% KM UPL (t)	0.225
90% KM Percentile (z)	0.182	95% KM Percentile (z)	0.211
99% KM Percentile (z)	0.266	95% KM USL	0.276

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0718	SD	0.0873
95% UTL95% Coverage	0.292	95% UPL (t)	0.23
90% Percentile (z)	0.184	95% Percentile (z)	0.215
99% Percentile (z)	0.275	95% USL	0.285

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.113	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.73	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.34	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.283	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.982	k star (bias corrected MLE)	1.395
Theta hat (MLE)	0.0558	Theta star (bias corrected MLE)	0.0792
nu hat (MLE)	35.67	nu star (bias corrected)	25.11
MLE Mean (bias corrected)	0.111		
MLE Sd (bias corrected)	0.0936	95% Percentile of Chisquare (2k)	7.448

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.0666
Maximum	0.332	Median	0.0455
SD	0.0905	CV	1.36
k hat (MLE)	0.845	k star (bias corrected MLE)	0.728
Theta hat (MLE)	0.0788	Theta star (bias corrected MLE)	0.0914
nu hat (MLE)	27.04	nu star (bias corrected)	23.3
MLE Mean (bias corrected)	0.0666	MLE Sd (bias corrected)	0.078
95% Percentile of Chisquare (2k)	4.887	90% Percentile	0.166
95% Percentile	0.223	99% Percentile	0.361

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.379	0.416	95% Approx. Gamma UPL	0.235	0.242
95% Gamma USL	0.36	0.393			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	0.963		nu hat (KM)	30.81
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.287	0.289	95% Approx. Gamma UPL	0.201	0.198
95% Gamma USL	0.276	0.278			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.81	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.829	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.292	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.295	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Approximate Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0703	Mean in Log Scale	-3.161
SD in Original Scale	0.0882	SD in Log Scale	0.981
95% UTL95% Coverage	0.505	95% BCA UTL95% Coverage	0.332
95% Bootstrap (%) UTL95% Coverage	0.332	95% UPL (t)	0.25
90% Percentile (z)	0.149	95% Percentile (z)	0.213
99% Percentile (z)	0.416	95% USL	0.466

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.821	95% KM UTL (Lognormal)95% Coverage	0.303
KM SD of Logged Data	0.645	95% KM UPL (Lognormal)	0.191
95% KM Percentile Lognormal (z)	0.172	95% KM USL (Lognormal)	0.288

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0718	Mean in Log Scale	-3.077
SD in Original Scale	0.0873	SD in Log Scale	0.892
95% UTL95% Coverage	0.438	95% UPL (t)	0.231
90% Percentile (z)	0.144	95% Percentile (z)	0.2
99% Percentile (z)	0.367	95% USL	0.407

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.332
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.332	95% USL	0.332
95% KM Chebyshev UPL	0.441		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Dimethyl Arsenic

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	0.116	First Quartile	0.147
Second Largest	0.245	Median	0.198
Maximum	0.27	Third Quartile	0.23
Mean	0.193	SD	0.0466
Coefficient of Variation	0.241	Skewness	-0.225
Mean of logged Data	-1.675	SD of logged Data	0.258

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.946	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.14	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	0.311	90% Percentile (z)	0.253
95% UPL (t)	0.277	95% Percentile (z)	0.27
95% USL	0.307	99% Percentile (z)	0.301

Gamma GOF Test

A-D Test Statistic	0.52	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.737	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.151	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	16.96	k star (bias corrected MLE)	13.82
Theta hat (MLE)	0.0114	Theta star (bias corrected MLE)	0.014
nu hat (MLE)	542.6	nu star (bias corrected)	442.2
MLE Mean (bias corrected)	0.193	MLE Sd (bias corrected)	0.0519

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.289	90% Percentile	0.262
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.291	95% Percentile	0.285
95% WH Approx. Gamma UTL with 95% Coverage	0.337	99% Percentile	0.334
95% HW Approx. Gamma UTL with 95% Coverage	0.342		
95% WH USL	0.332	95% HW USL	0.336

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.923	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.169	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	0.359	90% Percentile (z)	0.261
95% UPL (t)	0.298	95% Percentile (z)	0.286
95% USL	0.352	99% Percentile (z)	0.341

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	0.27
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	0.27	95% BCA Bootstrap UTL with 95% Coverage	0.27
95% UPL	0.27	90% Percentile	0.24
90% Chebyshev UPL	0.337	95% Percentile	0.251
95% Chebyshev UPL	0.402	99% Percentile	0.266
95% USL	0.27		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Monomethyl Arsenic

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	4		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	4
Minimum Detect	N/A	Minimum Non-Detect	0.014
Maximum Detect	N/A	Maximum Non-Detect	0.037
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Monomethyl Arsenic was not processed!

Draft

Aluminum

General Statistics

Total Number of Observations	16	Number of Distinct Observations	15
		Number of Missing Observations	4
Minimum	21.1	First Quartile	71.9
Second Largest	543	Median	100.1
Maximum	838	Third Quartile	155
Mean	180.5	SD	215.9
Coefficient of Variation	1.196	Skewness	2.408
Mean of logged Data	4.746	SD of logged Data	0.924

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.657	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.343	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with	95% Coverage	725.5	90% Percentile (z)	457.2
	95% UPL (t)	570.7	95% Percentile (z)	535.7
	95% USL	708.1	99% Percentile (z)	682.8

Gamma GOF Test

A-D Test Statistic	0.92	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.759	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.234	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.22	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.252	k star (bias corrected MLE)	1.059
Theta hat (MLE)	144.1	Theta star (bias corrected MLE)	170.4
nu hat (MLE)	40.07	nu star (bias corrected)	33.89
MLE Mean (bias corrected)	180.5	MLE Sd (bias corrected)	175.4

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	551.9	90% Percentile	409.8
95% Hawkins Wixley (HW) Approx. Gamma UPL	558.3	95% Percentile	529.9
95% WH Approx. Gamma UTL with 95% Coverage	839.9	99% Percentile	807.6
95% HW Approx. Gamma UTL with 95% Coverage	885.9		
95% WH USL	803.4	95% HW USL	843.2

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.947	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.167	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with	95% Coverage	1186	90% Percentile (z)	376.2
	95% UPL (t)	611.4	95% Percentile (z)	526.3
	95% USL	1101	99% Percentile (z)	988

Nonparametric Distribution Free Background Statistics

Data appear Lognormal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	838
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	838	95% BCA Bootstrap UTL with 95% Coverage	838
95% UPL	838	90% Percentile	416.5
90% Chebyshev UPL	848.3	95% Percentile	616.8
95% Chebyshev UPL	1151	99% Percentile	793.8
95% USL	838		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Antimony

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	9		
Number of Detects	13	Number of Non-Detects	3
Number of Distinct Detects	8	Number of Distinct Non-Detects	1
Minimum Detect	0.009	Minimum Non-Detect	0.007
Maximum Detect	0.028	Maximum Non-Detect	0.007
Variance Detected	3.4641E-5	Percent Non-Detects	18.75%
Mean Detected	0.0142	SD Detected	0.00589
Mean of Detected Logged Data	-4.326	SD of Detected Logged Data	0.371

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.833	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.242	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.246	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0128	SD	0.00581
95% UTL95% Coverage	0.0275	95% KM UPL (t)	0.0233
90% KM Percentile (z)	0.0203	95% KM Percentile (z)	0.0224
99% KM Percentile (z)	0.0263	95% KM USL	0.027

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0122	SD	0.00679
95% UTL95% Coverage	0.0293	95% UPL (t)	0.0244
90% Percentile (z)	0.0209	95% Percentile (z)	0.0233
99% Percentile (z)	0.028	95% USL	0.0288

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.661	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.735	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.243	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.237	Data Not Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	7.485	k star (bias corrected MLE)	5.809
Theta hat (MLE)	0.00189	Theta star (bias corrected MLE)	0.00244
nu hat (MLE)	194.6	nu star (bias corrected)	151
MLE Mean (bias corrected)	0.0142		
MLE Sd (bias corrected)	0.00587	95% Percentile of Chisquare (2k)	20.51

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.009	Mean	0.0134
Maximum	0.028	Median	0.011
SD	0.00552	CV	0.413
k hat (MLE)	7.973	k star (bias corrected MLE)	6.52
Theta hat (MLE)	0.00168	Theta star (bias corrected MLE)	0.00205
nu hat (MLE)	255.1	nu star (bias corrected)	208.6
MLE Mean (bias corrected)	0.0134	MLE Sd (bias corrected)	0.00524
95% Percentile of Chisquare (2k)	22.41	90% Percentile	0.0204
95% Percentile	0.023	99% Percentile	0.0285

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.0289	0.0292	95% Approx. Gamma UPL	0.0234	0.0235
95% Gamma USL	0.0283	0.0285			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	4.86		nu hat (KM)	155.5
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.03	0.0306	95% Approx. Gamma UPL	0.0238	0.0239
95% Gamma USL	0.0293	0.0298			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.893	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.228	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.246	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0125	Mean in Log Scale	-4.491
SD in Original Scale	0.00632	SD in Log Scale	0.49
95% UTL95% Coverage	0.0386	95% BCA UTL95% Coverage	0.028
95% Bootstrap (%) UTL95% Coverage	0.028	95% UPL (t)	0.0271
90% Percentile (z)	0.021	95% Percentile (z)	0.0251
99% Percentile (z)	0.035	95% USL	0.0371

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-4.445	95% KM UTL (Lognormal)95% Coverage	0.0327
KM SD of Logged Data	0.406	95% KM UPL (Lognormal)	0.0244
95% KM Percentile Lognormal (z)	0.0229	95% KM USL (Lognormal)	0.0316

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0122	Mean in Log Scale	-4.575
SD in Original Scale	0.00679	SD in Log Scale	0.63
95% UTL95% Coverage	0.0506	95% UPL (t)	0.0322
90% Percentile (z)	0.0231	95% Percentile (z)	0.0291
99% Percentile (z)	0.0446	95% USL	0.048

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.028
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.028	95% USL	0.028
95% KM Chebyshev UPL	0.0389		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Arsenic

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	1.2	First Quartile	1.548
Second Largest	2.64	Median	1.66
Maximum	3.12	Third Quartile	2.065
Mean	1.819	SD	0.516
Coefficient of Variation	0.284	Skewness	1.266
Mean of logged Data	0.565	SD of logged Data	0.261

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.889	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.216	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	3.121	90% Percentile (z)	2.48
95% UPL (t)	2.751	95% Percentile (z)	2.667
95% USL	3.079	99% Percentile (z)	3.019

Gamma GOF Test

A-D Test Statistic	0.463	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.738	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.193	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	15.05	k star (bias corrected MLE)	12.27
Theta hat (MLE)	0.121	Theta star (bias corrected MLE)	0.148
nu hat (MLE)	481.6	nu star (bias corrected)	392.7
MLE Mean (bias corrected)	1.819	MLE Sd (bias corrected)	0.519

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	2.786	90% Percentile	2.508
95% Hawkins Wixley (HW) Approx. Gamma UPL	2.793	95% Percentile	2.748
95% WH Approx. Gamma UTL with 95% Coverage	3.274	99% Percentile	3.239
95% HW Approx. Gamma UTL with 95% Coverage	3.301		
95% WH USL	3.216	95% HW USL	3.241

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.95	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.177	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	3.4	90% Percentile (z)	2.458
95% UPL (t)	2.819	95% Percentile (z)	2.702
95% USL	3.329	99% Percentile (z)	3.229

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	3.12
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	3.12	95% BCA Bootstrap UTL with 95% Coverage	3.12
95% UPL	3.12	90% Percentile	2.445
90% Chebyshev UPL	3.414	95% Percentile	2.76
95% Chebyshev UPL	4.137	99% Percentile	3.048
95% USL	3.12		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Barium

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	0.37	First Quartile	1.388
Second Largest	22.8	Median	2.09
Maximum	34.9	Third Quartile	4.138
Mean	5.669	SD	9.423
Coefficient of Variation	1.662	Skewness	2.661
Mean of logged Data	0.972	SD of logged Data	1.157

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.552	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.387	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	29.45	90% Percentile (z)	17.74
95% UPL (t)	22.7	95% Percentile (z)	21.17
95% USL	28.69	99% Percentile (z)	27.59

Gamma GOF Test

A-D Test Statistic	1.293	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.773	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.242	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.223	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.78	k star (bias corrected MLE)	0.675
Theta hat (MLE)	7.267	Theta star (bias corrected MLE)	8.392
nu hat (MLE)	24.96	nu star (bias corrected)	21.62
MLE Mean (bias corrected)	5.669	MLE Sd (bias corrected)	6.897

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	19.88	90% Percentile	14.35
95% Hawkins Wixley (HW) Approx. Gamma UPL	19.84	95% Percentile	19.54
95% WH Approx. Gamma UTL with 95% Coverage	32.53	99% Percentile	31.98
95% HW Approx. Gamma UTL with 95% Coverage	34.31		
95% WH USL	30.89	95% HW USL	32.38

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.937	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.144	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	48.95	90% Percentile (z)	11.63
95% UPL (t)	21.36	95% Percentile (z)	17.71
95% USL	44.59	99% Percentile (z)	38.95

Nonparametric Distribution Free Background Statistics

Data appear Lognormal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	34.9
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	34.9	95% BCA Bootstrap UTL with 95% Coverage	34.9
95% UPL	34.9	90% Percentile	14.1
90% Chebyshev UPL	34.81	95% Percentile	25.83
95% Chebyshev UPL	48.01	99% Percentile	33.09
95% USL	34.9		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Beryllium

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	5		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	5
Minimum Detect	N/A	Minimum Non-Detect	0.025
Maximum Detect	N/A	Maximum Non-Detect	0.03
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Beryllium was not processed!

Draft

Cadmium

General Statistics

Total Number of Observations	16	Number of Distinct Observations	14
		Number of Missing Observations	4
Minimum	0.016	First Quartile	0.0268
Second Largest	0.052	Median	0.0375
Maximum	0.053	Third Quartile	0.042
Mean	0.0354	SD	0.0106
Coefficient of Variation	0.3	Skewness	-0.0772
Mean of logged Data	-3.388	SD of logged Data	0.331

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.974	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.121	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	0.0623	90% Percentile (z)	0.0491
95% UPL (t)	0.0547	95% Percentile (z)	0.0529
95% USL	0.0614	99% Percentile (z)	0.0602

Gamma GOF Test

A-D Test Statistic	0.271	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.739	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.159	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	10.65	k star (bias corrected MLE)	8.696
Theta hat (MLE)	0.00333	Theta star (bias corrected MLE)	0.00407
nu hat (MLE)	340.9	nu star (bias corrected)	278.3
MLE Mean (bias corrected)	0.0354	MLE Sd (bias corrected)	0.012

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.0583	90% Percentile	0.0514
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.059	95% Percentile	0.0572
95% WH Approx. Gamma UTL with 95% Coverage	0.0702	99% Percentile	0.0692
95% HW Approx. Gamma UTL with 95% Coverage	0.0718		
95% WH USL	0.0688	95% HW USL	0.0702

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.947	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.171	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	0.0779	90% Percentile (z)	0.0516
95% UPL (t)	0.0615	95% Percentile (z)	0.0582
95% USL	0.0759	99% Percentile (z)	0.073

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	0.053
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	0.053	95% BCA Bootstrap UTL with 95% Coverage	0.053
95% UPL	0.053	90% Percentile	0.049
90% Chebyshev UPL	0.0683	95% Percentile	0.0523
95% Chebyshev UPL	0.0832	99% Percentile	0.0529
95% USL	0.053		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Chromium

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	0.081	First Quartile	0.483
Second Largest	2.48	Median	0.603
Maximum	3.65	Third Quartile	1.058
Mean	0.97	SD	0.913
Coefficient of Variation	0.941	Skewness	2.1
Mean of logged Data	-0.377	SD of logged Data	0.89

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.756	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.239	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	3.275	90% Percentile (z)	2.14
95% UPL (t)	2.62	95% Percentile (z)	2.472
95% USL	3.201	99% Percentile (z)	3.094

Gamma GOF Test

A-D Test Statistic	0.456	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.754	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.152	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.219	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.588	k star (bias corrected MLE)	1.332
Theta hat (MLE)	0.611	Theta star (bias corrected MLE)	0.728
nu hat (MLE)	50.8	nu star (bias corrected)	42.61
MLE Mean (bias corrected)	0.97	MLE Sd (bias corrected)	0.841

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	2.755	90% Percentile	2.081
95% Hawkins Wixley (HW) Approx. Gamma UPL	2.843	95% Percentile	2.63
95% WH Approx. Gamma UTL with 95% Coverage	4.049	99% Percentile	3.881
95% HW Approx. Gamma UTL with 95% Coverage	4.352		
95% WH USL	3.887	95% HW USL	4.157

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.957	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.156	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	6.479	90% Percentile (z)	2.145
95% UPL (t)	3.423	95% Percentile (z)	2.963
95% USL	6.03	99% Percentile (z)	5.434

Nonparametric Distribution Free Background Statistics

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	3.65
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	3.65	95% BCA Bootstrap UTL with 95% Coverage	3.65
95% UPL	3.65	90% Percentile	1.945
90% Chebyshev UPL	3.794	95% Percentile	2.773
95% Chebyshev UPL	5.073	99% Percentile	3.475
95% USL	3.65		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Cobalt

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	0.037	First Quartile	0.0658
Second Largest	0.325	Median	0.101
Maximum	0.523	Third Quartile	0.136
Mean	0.138	SD	0.124
Coefficient of Variation	0.896	Skewness	2.399
Mean of logged Data	-2.233	SD of logged Data	0.691

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.707	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.278	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	0.451	90% Percentile (z)	0.297
95% UPL (t)	0.362	95% Percentile (z)	0.342
95% USL	0.441	99% Percentile (z)	0.427

Gamma GOF Test

A-D Test Statistic	0.635	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.75	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.185	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.218	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.111	k star (bias corrected MLE)	1.757
Theta hat (MLE)	0.0655	Theta star (bias corrected MLE)	0.0787
nu hat (MLE)	67.56	nu star (bias corrected)	56.23
MLE Mean (bias corrected)	0.138	MLE Sd (bias corrected)	0.104

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.355	90% Percentile	0.277
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.357	95% Percentile	0.342
95% WH Approx. Gamma UTL with 95% Coverage	0.503	99% Percentile	0.486
95% HW Approx. Gamma UTL with 95% Coverage	0.521		
95% WH USL	0.485	95% HW USL	0.5

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.957	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.131	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	0.613	90% Percentile (z)	0.26
95% UPL (t)	0.373	95% Percentile (z)	0.334
95% USL	0.579	99% Percentile (z)	0.535

Nonparametric Distribution Free Background Statistics

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	0.523
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	0.523	95% BCA Bootstrap UTL with 95% Coverage	0.523
95% UPL	0.523	90% Percentile	0.255
90% Chebyshev UPL	0.522	95% Percentile	0.375
95% Chebyshev UPL	0.695	99% Percentile	0.493
95% USL	0.523		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Copper

General Statistics

Total Number of Observations	16	Number of Distinct Observations	13
		Number of Missing Observations	4
Minimum	0.35	First Quartile	0.478
Second Largest	1.04	Median	0.52
Maximum	1.17	Third Quartile	0.655
Mean	0.603	SD	0.221
Coefficient of Variation	0.367	Skewness	1.692
Mean of logged Data	-0.558	SD of logged Data	0.315

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.796	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.264	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	1.16	90% Percentile (z)	0.886
95% UPL (t)	1.002	95% Percentile (z)	0.966
95% USL	1.142	99% Percentile (z)	1.116

Gamma GOF Test

A-D Test Statistic	0.962	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.739	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.236	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	9.943	k star (bias corrected MLE)	8.12
Theta hat (MLE)	0.0606	Theta star (bias corrected MLE)	0.0742
nu hat (MLE)	318.2	nu star (bias corrected)	259.8
MLE Mean (bias corrected)	0.603	MLE Sd (bias corrected)	0.211

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	1.004	90% Percentile	0.884
95% Hawkins Wixley (HW) Approx. Gamma UPL	1.005	95% Percentile	0.987
95% WH Approx. Gamma UTL with 95% Coverage	1.216	99% Percentile	1.2
95% HW Approx. Gamma UTL with 95% Coverage	1.227		
95% WH USL	1.191	95% HW USL	1.201

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.896	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.215	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	1.268	90% Percentile (z)	0.857
95% UPL (t)	1.012	95% Percentile (z)	0.961
95% USL	1.236	99% Percentile (z)	1.192

Nonparametric Distribution Free Background Statistics

Data appear Lognormal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	1.17
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	1.17	95% BCA Bootstrap UTL with 95% Coverage	1.17
95% UPL	1.17	90% Percentile	0.885
90% Chebyshev UPL	1.285	95% Percentile	1.073
95% Chebyshev UPL	1.595	99% Percentile	1.151
95% USL	1.17		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Iron

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	29.1	First Quartile	113.5
Second Largest	729	Median	247.5
Maximum	1140	Third Quartile	399
Mean	313	SD	290.3
Coefficient of Variation	0.928	Skewness	1.788
Mean of logged Data	5.356	SD of logged Data	0.961

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.823	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.201	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level

Data appear Approximate Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	1046	90% Percentile (z)	685.1
95% UPL (t)	837.6	95% Percentile (z)	790.6
95% USL	1022	99% Percentile (z)	988.4

Gamma GOF Test

A-D Test Statistic	0.16	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.756	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0954	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.219	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.425	k star (bias corrected MLE)	1.199
Theta hat (MLE)	219.7	Theta star (bias corrected MLE)	261
nu hat (MLE)	45.59	nu star (bias corrected)	38.38
MLE Mean (bias corrected)	313	MLE Sd (bias corrected)	285.8

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	929.7	90% Percentile	689.1
95% Hawkins Wixley (HW) Approx. Gamma UPL	968.6	95% Percentile	879.9
95% WH Approx. Gamma UTL with 95% Coverage	1388	99% Percentile	1317
95% HW Approx. Gamma UTL with 95% Coverage	1514		
95% WH USL	1330	95% HW USL	1443

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.987	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.106	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	2384	90% Percentile (z)	725.6
95% UPL (t)	1202	95% Percentile (z)	1029
95% USL	2215	99% Percentile (z)	1980

Nonparametric Distribution Free Background Statistics

Data appear Approximate Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	1140
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	1140	95% BCA Bootstrap UTL with 95% Coverage	1140
95% UPL	1140	90% Percentile	635
90% Chebyshev UPL	1211	95% Percentile	831.8
95% Chebyshev UPL	1618	99% Percentile	1078
95% USL	1140		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Lead

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	0.1	First Quartile	0.206
Second Largest	0.54	Median	0.26
Maximum	0.7	Third Quartile	0.407
Mean	0.312	SD	0.157
Coefficient of Variation	0.504	Skewness	1.08
Mean of logged Data	-1.28	SD of logged Data	0.499

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.923	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.17	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	0.709	90% Percentile (z)	0.513
95% UPL (t)	0.596	95% Percentile (z)	0.57
95% USL	0.696	99% Percentile (z)	0.678

Gamma GOF Test

A-D Test Statistic	0.182	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.742	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.121	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.216	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	4.518	k star (bias corrected MLE)	3.712
Theta hat (MLE)	0.069	Theta star (bias corrected MLE)	0.084
nu hat (MLE)	144.6	nu star (bias corrected)	118.8
MLE Mean (bias corrected)	0.312	MLE Sd (bias corrected)	0.162

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.635	90% Percentile	0.529
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.645	95% Percentile	0.617
95% WH Approx. Gamma UTL with 95% Coverage	0.827	99% Percentile	0.805
95% HW Approx. Gamma UTL with 95% Coverage	0.855		
95% WH USL	0.803	95% HW USL	0.829

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.99	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0891	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	0.981	90% Percentile (z)	0.527
95% UPL (t)	0.686	95% Percentile (z)	0.632
95% USL	0.942	99% Percentile (z)	0.889

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	0.7
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	0.7	95% BCA Bootstrap UTL with 95% Coverage	0.7
95% UPL	0.7	90% Percentile	0.495
90% Chebyshev UPL	0.798	95% Percentile	0.58
95% Chebyshev UPL	1.018	99% Percentile	0.676
95% USL	0.7		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Manganese

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	0.973	First Quartile	2.435
Second Largest	12.3	Median	3.66
Maximum	27.4	Third Quartile	4.635
Mean	5.439	SD	6.423
Coefficient of Variation	1.181	Skewness	3.058
Mean of logged Data	1.34	SD of logged Data	0.777

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.585	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.354	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	21.65	90% Percentile (z)	13.67
95% UPL (t)	17.05	95% Percentile (z)	16
95% USL	21.13	99% Percentile (z)	20.38

Gamma GOF Test

A-D Test Statistic	1.104	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.754	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.268	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.219	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.562	k star (bias corrected MLE)	1.311
Theta hat (MLE)	3.482	Theta star (bias corrected MLE)	4.15
nu hat (MLE)	49.98	nu star (bias corrected)	41.94
MLE Mean (bias corrected)	5.439	MLE Sd (bias corrected)	4.751

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	15.28	90% Percentile	11.71
95% Hawkins Wixley (HW) Approx. Gamma UPL	15.22	95% Percentile	14.83
95% WH Approx. Gamma UTL with 95% Coverage	22.53	99% Percentile	21.93
95% HW Approx. Gamma UTL with 95% Coverage	23.16		
95% WH USL	21.62	95% HW USL	22.14

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.926	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.2	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	27.18	90% Percentile (z)	10.35
95% UPL (t)	15.57	95% Percentile (z)	13.72
95% USL	25.53	99% Percentile (z)	23.31

Nonparametric Distribution Free Background Statistics

Data appear Lognormal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	27.4
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	27.4	95% BCA Bootstrap UTL with 95% Coverage	27.4
95% UPL	27.4	90% Percentile	9.645
90% Chebyshev UPL	25.3	95% Percentile	16.08
95% Chebyshev UPL	34.3	99% Percentile	25.14
95% USL	27.4		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Mercury

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	16		
Number of Detects	13	Number of Non-Detects	3
Number of Distinct Detects	13	Number of Distinct Non-Detects	3
Minimum Detect	1.7	Minimum Non-Detect	2.4
Maximum Detect	4.38	Maximum Non-Detect	2.72
Variance Detected	0.669	Percent Non-Detects	18.75%
Mean Detected	2.818	SD Detected	0.818
Mean of Detected Logged Data	0.998	SD of Detected Logged Data	0.286

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.937	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.202	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.246	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	2.691	SD	0.763
95% UTL95% Coverage	4.617	95% KM UPL (t)	4.07
90% KM Percentile (z)	3.669	95% KM Percentile (z)	3.946
99% KM Percentile (z)	4.466	95% KM USL	4.556

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	2.527	SD	0.964
95% UTL95% Coverage	4.959	95% UPL (t)	4.268
90% Percentile (z)	3.762	95% Percentile (z)	4.112
99% Percentile (z)	4.769	95% USL	4.881

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.331	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.734	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.201	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.237	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	13.35	k star (bias corrected MLE)	10.32
Theta hat (MLE)	0.211	Theta star (bias corrected MLE)	0.273
nu hat (MLE)	347.1	nu star (bias corrected)	268.3
MLE Mean (bias corrected)	2.818		
MLE Sd (bias corrected)	0.877	95% Percentile of Chisquare (2k)	32.22

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	1.7	Mean	2.696
Maximum	4.38	Median	2.285
SD	0.778	CV	0.288
k hat (MLE)	14.12	k star (bias corrected MLE)	11.51
Theta hat (MLE)	0.191	Theta star (bias corrected MLE)	0.234
nu hat (MLE)	451.9	nu star (bias corrected)	368.5
MLE Mean (bias corrected)	2.696	MLE Sd (bias corrected)	0.795
95% Percentile of Chisquare (2k)	35.21	90% Percentile	3.751
95% Percentile	4.122	99% Percentile	4.88

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	4.936	4.984	95% Approx. Gamma UPL	4.183	4.197
95% Gamma USL	4.847	4.891			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	12.42		nu hat (KM)	397.6
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	4.894	4.943	95% Approx. Gamma UPL	4.152	4.167
95% Gamma USL	4.807	4.851			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.961	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.185	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.246	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	2.698	Mean in Log Scale	0.957
SD in Original Scale	0.776	SD in Log Scale	0.271
95% UTL95% Coverage	5.154	95% BCA UTL95% Coverage	4.38
95% Bootstrap (%) UTL95% Coverage	4.38	95% UPL (t)	4.245
90% Percentile (z)	3.682	95% Percentile (z)	4.063
99% Percentile (z)	4.885	95% USL	5.042

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.952	95% KM UTL (Lognormal)95% Coverage	5.118
KM SD of Logged Data	0.27	95% KM UPL (Lognormal)	4.219
95% KM Percentile Lognormal (z)	4.038	95% KM USL (Lognormal)	5.008

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	2.527	Mean in Log Scale	0.855
SD in Original Scale	0.964	SD in Log Scale	0.401
95% UTL95% Coverage	6.469	95% UPL (t)	4.853
90% Percentile (z)	3.931	95% Percentile (z)	4.547
99% Percentile (z)	5.976	95% USL	6.263

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	4.38
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	4.38	95% USL	4.38
95% KM Chebyshev UPL	6.12		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Methyl Mercury

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	11		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	11
Minimum Detect	N/A	Minimum Non-Detect	0.85
Maximum Detect	N/A	Maximum Non-Detect	1.1
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Methyl Mercury was not processed!

Draft

Selenium

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	7		
Number of Detects	8	Number of Non-Detects	8
Number of Distinct Detects	5	Number of Distinct Non-Detects	2
Minimum Detect	0.08	Minimum Non-Detect	0.05
Maximum Detect	0.12	Maximum Non-Detect	0.06
Variance Detected	1.6964E-4	Percent Non-Detects	50%
Mean Detected	0.104	SD Detected	0.013
Mean of Detected Logged Data	-2.273	SD of Detected Logged Data	0.133

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.877	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.309	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	0.0769	SD	0.0282
95% UTL95% Coverage	0.148	95% KM UPL (t)	0.128
90% KM Percentile (z)	0.113	95% KM Percentile (z)	0.123
99% KM Percentile (z)	0.143	95% KM USL	0.146

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	0.0663	SD	0.0398
95% UTL95% Coverage	0.167	95% UPL (t)	0.138
90% Percentile (z)	0.117	95% Percentile (z)	0.132
99% Percentile (z)	0.159	95% USL	0.163

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.661	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.715	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.325	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.293	Data Not Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	67.45	k star (bias corrected MLE)	42.24
Theta hat (MLE)	0.00154	Theta star (bias corrected MLE)	0.00246
nu hat (MLE)	1079	nu star (bias corrected)	675.8
MLE Mean (bias corrected)	0.104		
MLE Sd (bias corrected)	0.016	95% Percentile of Chisquare (2k)	106.9

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0575	Mean	0.0879
Maximum	0.12	Median	0.0816
SD	0.0195	CV	0.222
k hat (MLE)	21.48	k star (bias corrected MLE)	17.5
Theta hat (MLE)	0.00409	Theta star (bias corrected MLE)	0.00502
nu hat (MLE)	687.5	nu star (bias corrected)	559.9
MLE Mean (bias corrected)	0.0879	MLE Sd (bias corrected)	0.021
95% Percentile of Chisquare (2k)	49.79	90% Percentile	0.116
95% Percentile	0.125	99% Percentile	0.144

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.145	0.147	95% Approx. Gamma UPL	0.127	0.127
95% Gamma USL	0.143	0.144			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	7.42		nu hat (KM)	237.4
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	0.167	0.17	95% Approx. Gamma UPL	0.135	0.136
95% Gamma USL	0.163	0.166			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.857	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.315	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Data Not Lognormal at 5% Significance Level

Detected Data appear Approximate Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	0.0887	Mean in Log Scale	-2.443
SD in Original Scale	0.0186	SD in Log Scale	0.209
95% UTL95% Coverage	0.147	95% BCA UTL95% Coverage	0.12
95% Bootstrap (%) UTL95% Coverage	0.12	95% UPL (t)	0.127
90% Percentile (z)	0.114	95% Percentile (z)	0.122
99% Percentile (z)	0.141	95% USL	0.145

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	-2.634	95% KM UTL (Lognormal)95% Coverage	0.183
KM SD of Logged Data	0.372	95% KM UPL (Lognormal)	0.14
95% KM Percentile Lognormal (z)	0.132	95% KM USL (Lognormal)	0.178

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	0.0663	Mean in Log Scale	-2.913
SD in Original Scale	0.0398	SD in Log Scale	0.669
95% UTL95% Coverage	0.294	95% UPL (t)	0.182
90% Percentile (z)	0.128	95% Percentile (z)	0.163
99% Percentile (z)	0.258	95% USL	0.279

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	0.12
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	0.12	95% USL	0.12
95% KM Chebyshev UPL	0.204		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Silver

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	4		
Number of Detects	0	Number of Non-Detects	16
Number of Distinct Detects	0	Number of Distinct Non-Detects	4
Minimum Detect	N/A	Minimum Non-Detect	0.017
Maximum Detect	N/A	Maximum Non-Detect	0.02
Variance Detected	N/A	Percent Non-Detects	100%
Mean Detected	N/A	SD Detected	N/A
Mean of Detected Logged Data	N/A	SD of Detected Logged Data	N/A

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Silver was not processed!

Draft

Thallium

General Statistics

Total Number of Observations	16	Number of Distinct Observations	5
		Number of Missing Observations	4
Minimum	0.003	First Quartile	0.004
Second Largest	0.006	Median	0.005
Maximum	0.008	Third Quartile	0.005
Mean	0.00469	SD	0.0013
Coefficient of Variation	0.278	Skewness	0.874
Mean of logged Data	-5.398	SD of logged Data	0.272

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.894	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.218	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	0.00797	90% Percentile (z)	0.00636
95% UPL (t)	0.00704	95% Percentile (z)	0.00683
95% USL	0.00787	99% Percentile (z)	0.00772

Gamma GOF Test

A-D Test Statistic	0.623	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.738	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.194	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	14.51	k star (bias corrected MLE)	11.83
Theta hat (MLE)	3.2312E-4	Theta star (bias corrected MLE)	3.9628E-4
nu hat (MLE)	464.2	nu star (bias corrected)	378.5
MLE Mean (bias corrected)	0.00469	MLE Sd (bias corrected)	0.00136

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	0.00723	90% Percentile	0.0065
95% Hawkins Wixley (HW) Approx. Gamma UPL	0.00727	95% Percentile	0.00713
95% WH Approx. Gamma UTL with 95% Coverage	0.00852	99% Percentile	0.00843
95% HW Approx. Gamma UTL with 95% Coverage	0.00862		
95% WH USL	0.00837	95% HW USL	0.00846

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.918	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.205	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	0.009	90% Percentile (z)	0.00642
95% UPL (t)	0.0074	95% Percentile (z)	0.00708
95% USL	0.0088	99% Percentile (z)	0.00853

Nonparametric Distribution Free Background Statistics

Data appear Normal at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	0.008
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	0.008	95% BCA Bootstrap UTL with 95% Coverage	0.008
95% UPL	0.008	90% Percentile	0.005
90% Chebyshev UPL	0.00871	95% Percentile	0.0065
95% Chebyshev UPL	0.0105	99% Percentile	0.0077
95% USL	0.008		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Vanadium

General Statistics

Total Number of Observations	16	Number of Distinct Observations	16
		Number of Missing Observations	4
Minimum	0.906	First Quartile	1.743
Second Largest	4.09	Median	2.25
Maximum	8.41	Third Quartile	2.75
Mean	2.576	SD	1.745
Coefficient of Variation	0.677	Skewness	2.737
Mean of logged Data	0.803	SD of logged Data	0.518

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test

Shapiro Wilk Test Statistic	0.698	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.29	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Background Statistics Assuming Normal Distribution

95% UTL with 95% Coverage	6.979	90% Percentile (z)	4.812
95% UPL (t)	5.729	95% Percentile (z)	5.446
95% USL	6.839	99% Percentile (z)	6.635

Gamma GOF Test

A-D Test Statistic	0.623	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.743	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.206	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.216	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.645	k star (bias corrected MLE)	3.003
Theta hat (MLE)	0.707	Theta star (bias corrected MLE)	0.858
nu hat (MLE)	116.6	nu star (bias corrected)	96.1
MLE Mean (bias corrected)	2.576	MLE Sd (bias corrected)	1.486

Background Statistics Assuming Gamma Distribution

95% Wilson Hilferty (WH) Approx. Gamma UPL	5.552	90% Percentile	4.569
95% Hawkins Wixley (HW) Approx. Gamma UPL	5.566	95% Percentile	5.404
95% WH Approx. Gamma UTL with 95% Coverage	7.383	99% Percentile	7.215
95% HW Approx. Gamma UTL with 95% Coverage	7.53		
95% WH USL	7.16	95% HW USL	7.286

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.945	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.887	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.17	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.222	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Background Statistics assuming Lognormal Distribution

95% UTL with 95% Coverage	8.248	90% Percentile (z)	4.334
95% UPL (t)	5.69	95% Percentile (z)	5.231
95% USL	7.91	99% Percentile (z)	7.445

Nonparametric Distribution Free Background Statistics

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Upper Limits for Background Threshold Values

Order of Statistic, r	16	95% UTL with 95% Coverage	8.41
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% Percentile Bootstrap UTL with 95% Coverage	8.41	95% BCA Bootstrap UTL with 95% Coverage	8.41
95% UPL	8.41	90% Percentile	3.52
90% Chebyshev UPL	7.971	95% Percentile	5.17
95% Chebyshev UPL	10.41	99% Percentile	7.762
95% USL	8.41		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

Draft

Zinc

General Statistics

Total Number of Observations	16	Number of Missing Observations	4
Number of Distinct Observations	15		
Number of Detects	15	Number of Non-Detects	1
Number of Distinct Detects	14	Number of Distinct Non-Detects	1
Minimum Detect	0.6	Minimum Non-Detect	0.9
Maximum Detect	2.81	Maximum Non-Detect	0.9
Variance Detected	0.484	Percent Non-Detects	6.25%
Mean Detected	1.473	SD Detected	0.696
Mean of Detected Logged Data	0.281	SD of Detected Logged Data	0.484

Critical Values for Background Threshold Values (BTVs)

Tolerance Factor K (For UTL)	2.524	d2max (for USL)	2.443

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.929	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.881	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.165	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.229	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan Meier (KM) Background Statistics Assuming Normal Distribution

Mean	1.428	SD	0.675
95% UTL95% Coverage	3.131	95% KM UPL (t)	2.647
90% KM Percentile (z)	2.293	95% KM Percentile (z)	2.538
99% KM Percentile (z)	2.998	95% KM USL	3.077

DL/2 Substitution Background Statistics Assuming Normal Distribution

Mean	1.409	SD	0.719
95% UTL95% Coverage	3.224	95% UPL (t)	2.709
90% Percentile (z)	2.331	95% Percentile (z)	2.592
99% Percentile (z)	3.082	95% USL	3.166

DL/2 is not a recommended method. DL/2 provided for comparisons and historical reasons

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.236	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.739	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.118	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.222	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	4.85	k star (bias corrected MLE)	3.925
Theta hat (MLE)	0.304	Theta star (bias corrected MLE)	0.375
nu hat (MLE)	145.5	nu star (bias corrected)	117.7
MLE Mean (bias corrected)	1.473		
MLE Sd (bias corrected)	0.744	95% Percentile of Chisquare (2k)	15.29

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.6	Mean	1.424
Maximum	2.81	Median	1.24
SD	0.7	CV	0.492
k hat (MLE)	4.558	k star (bias corrected MLE)	3.745
Theta hat (MLE)	0.312	Theta star (bias corrected MLE)	0.38
nu hat (MLE)	145.9	nu star (bias corrected)	119.9
MLE Mean (bias corrected)	1.424	MLE Sd (bias corrected)	0.736
95% Percentile of Chisquare (2k)	14.78	90% Percentile	2.411
95% Percentile	2.81	99% Percentile	3.664

The following statistics are computed using Gamma ROS Statistics on Imputed Data

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	3.766	3.894	95% Approx. Gamma UPL	2.897	2.941
95% Gamma USL	3.661	3.777			

The following statistics are computed using gamma distribution and KM estimates

Upper Limits using Wilson Hilferty (WH) and Hawkins Wixley (HW) Methods

	k hat (KM)	4.472		nu hat (KM)	143.1
	WH	HW		WH	HW
95% Approx. Gamma UTL with 95% Coverage	3.652	3.767	95% Approx. Gamma UPL	2.83	2.869
95% Gamma USL	3.552	3.656			

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.963	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.881	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0964	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.229	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Background Lognormal ROS Statistics Assuming Lognormal Distribution Using Imputed Non-Detects

Mean in Original Scale	1.427	Mean in Log Scale	0.244
SD in Original Scale	0.697	SD in Log Scale	0.49
95% UTL95% Coverage	4.401	95% BCA UTL95% Coverage	2.81
95% Bootstrap (%) UTL95% Coverage	2.81	95% UPL (t)	3.097
90% Percentile (z)	2.393	95% Percentile (z)	2.86
99% Percentile (z)	3.995	95% USL	4.23

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean of Logged Data	0.244	95% KM UTL (Lognormal)95% Coverage	4.255
KM SD of Logged Data	0.477	95% KM UPL (Lognormal)	3.022
95% KM Percentile Lognormal (z)	2.797	95% KM USL (Lognormal)	4.094

Background DL/2 Statistics Assuming Lognormal Distribution

Mean in Original Scale	1.409	Mean in Log Scale	0.213
SD in Original Scale	0.719	SD in Log Scale	0.54
95% UTL95% Coverage	4.84	95% UPL (t)	3.286
90% Percentile (z)	2.474	95% Percentile (z)	3.01
99% Percentile (z)	4.35	95% USL	4.634

DL/2 is not a Recommended Method. DL/2 provided for comparisons and historical reasons.

Nonparametric Distribution Free Background Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Upper Limits for BTVs(no distinction made between detects and nondetects)

Order of Statistic, r	16	95% UTL with95% Coverage	2.81
Approximate f	0.842	Confidence Coefficient (CC) achieved by UTL	0.56
95% UPL	2.81	95% USL	2.81
95% KM Chebyshev UPL	4.461		

Note: The use of USL to estimate a BTV is recommended only when the data set represents a background data set free of outliers and consists of observations collected from clean unimpacted locations. The use of USL tends to provide a balance between false positives and false negatives provided the data represents a background data set and when many onsite observations need to be compared with the BTV.

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Appendix C
Exposure Point Concentrations - 95% UCL Calculations

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Round 1 – September to October 2013

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Octopus (he‘e)

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1,2,3,4,6,7,8-HpCDF

General Statistics

Total Number of Observations	8	Number of Distinct Observations	7
Number of Detects	1	Number of Non-Detects	7
Number of Distinct Detects	1	Number of Distinct Non-Detects	6

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,4,6,7,8-HpCDF was not processed!

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1,2,3,4,6,7,8-HpCDD

General Statistics

Total Number of Observations	8	Number of Distinct Observations	7
Number of Detects	7	Number of Non-Detects	1
Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	0.2	Minimum Non-Detect	0.13
Maximum Detect	0.37	Maximum Non-Detect	0.13
Variance Detects	0.00316	Percent Non-Detects	12.5%
Mean Detects	0.287	SD Detects	0.0562
Median Detects	0.28	CV Detects	0.196
Skewness Detects	0.0217	Kurtosis Detects	-0.0758
Mean of Logged Detects	-1.265	SD of Logged Detects	0.202

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.974	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.172	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.335	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.268	Standard Error of Mean	0.0272
SD	0.0712	95% KM (BCA) UCL	0.308
95% KM (t) UCL	0.319	95% KM (Percentile Bootstrap) UCL	0.309
95% KM (z) UCL	0.312	95% KM Bootstrap t UCL	0.31
90% KM Chebyshev UCL	0.349	95% KM Chebyshev UCL	0.386
97.5% KM Chebyshev UCL	0.437	99% KM Chebyshev UCL	0.538

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.218	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.707	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.177	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.311	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	29.54	k star (bias corrected MLE)	16.97
Theta hat (MLE)	0.00972	Theta star (bias corrected MLE)	0.0169
nu hat (MLE)	413.5	nu star (bias corrected)	237.6
MLE Mean (bias corrected)	0.287	MLE Sd (bias corrected)	0.0697

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	14.12	nu hat (KM)	225.9
Approximate Chi Square Value (225.87, α)	192.1	Adjusted Chi Square Value (225.87, β)	184.2
95% Gamma Approximate KM-UCL (use when n>=50)	0.315	95% Gamma Adjusted KM-UCL (use when n<50)	0.328

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.161	Mean	0.271
Maximum	0.37	Median	0.27
SD	0.0686	CV	0.253
k hat (MLE)	16.35	k star (bias corrected MLE)	10.3
Theta hat (MLE)	0.0166	Theta star (bias corrected MLE)	0.0263
nu hat (MLE)	261.7	nu star (bias corrected)	164.9
MLE Mean (bias corrected)	0.271	MLE Sd (bias corrected)	0.0845
		Adjusted Level of Significance (β)	0.0195
Approximate Chi Square Value (164.88, α)	136.2	Adjusted Chi Square Value (164.88, β)	129.6
95% Gamma Approximate UCL (use when n>=50)	0.328	95% Gamma Adjusted UCL (use when n<50)	0.345

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.964	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.199	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.335	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.273	Mean in Log Scale	-1.327
SD in Original Scale	0.0661	SD in Log Scale	0.256
95% t UCL (assumes normality of ROS data)	0.317	95% Percentile Bootstrap UCL	0.31
95% BCA Bootstrap UCL	0.31	95% Bootstrap t UCL	0.319
95% H-UCL (Log ROS)	0.333		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-1.362	95% H-UCL (KM -Log)	0.343
KM SD (logged)	0.31	95% Critical H Value (KM-Log)	2.071
KM Standard Error of Mean (logged)	0.118		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.259	Mean in Log Scale	-1.448
SD in Original Scale	0.0942	SD in Log Scale	0.552
95% t UCL (Assumes normality)	0.322	95% H-Stat UCL	0.455

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.319	95% KM (Percentile Bootstrap) UCL	0.309

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Draft

Lead

General Statistics

Total Number of Observations	8	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	0.004	Mean	0.06
Maximum	0.36	Median	0.007
SD	0.124	Std. Error of Mean	0.0438
Coefficient of Variation	2.065	Skewness	2.612

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.535	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.407	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.143	95% Adjusted-CLT UCL (Chen-1995)	0.175
		95% Modified-t UCL (Johnson-1978)	0.15

Gamma GOF Test

A-D Test Statistic	1.32	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.77	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.409	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.311	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.454	k star (bias corrected MLE)	0.367
Theta hat (MLE)	0.132	Theta star (bias corrected MLE)	0.163
nu hat (MLE)	7.271	nu star (bias corrected)	5.878
MLE Mean (bias corrected)	0.06	MLE Sd (bias corrected)	0.099
		Approximate Chi Square Value (0.05)	1.578
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	1.082

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	0.224	95% Adjusted Gamma UCL (use when n<50)	0.326

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.756	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.343	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.313	Data Not Lognormal at 5% Significance Level

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-5.521	Mean of logged Data	-4.232
Maximum of Logged Data	-1.022	SD of logged Data	1.593

Assuming Lognormal Distribution

95% H-UCL	1.044	90% Chebyshev (MVUE) UCL	0.106
95% Chebyshev (MVUE) UCL	0.136	97.5% Chebyshev (MVUE) UCL	0.178
99% Chebyshev (MVUE) UCL	0.261		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	0.132	95% Jackknife UCL	0.143
95% Standard Bootstrap UCL	0.128	95% Bootstrap-t UCL	3.64
95% Hall's Bootstrap UCL	1.017	95% Percentile Bootstrap UCL	0.139
95% BCA Bootstrap UCL	0.184		
90% Chebyshev(Mean, Sd) UCL	0.191	95% Chebyshev(Mean, Sd) UCL	0.251
97.5% Chebyshev(Mean, Sd) UCL	0.334	99% Chebyshev(Mean, Sd) UCL	0.496

Suggested UCL to Use

95% Hall's Bootstrap UCL	1.017

Recommended UCL exceeds the maximum observation

In Case Bootstrap t and/or Hall's Bootstrap yields an unreasonably large UCL value, use 97.5% or 99% Chebyshev (Mean, Sd) UCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Draft

Sea Cucumber (loli)

Draft

Inorganic Arsenic

General Statistics

Total Number of Observations	8	Number of Distinct Observations	7
		Number of Missing Observations	0
Minimum	0.007	Mean	0.0151
Maximum	0.034	Median	0.012
SD	0.00872	Std. Error of Mean	0.00308
Coefficient of Variation	0.577	Skewness	1.688

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.831	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.265	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.021	95% Adjusted-CLT UCL (Chen-1995)	0.0222
		95% Modified-t UCL (Johnson-1978)	0.0213

Gamma GOF Test

A-D Test Statistic	0.353	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.719	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.243	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.295	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	4.327	k star (bias corrected MLE)	2.787
Theta hat (MLE)	0.0035	Theta star (bias corrected MLE)	0.00543
nu hat (MLE)	69.22	nu star (bias corrected)	44.6
MLE Mean (bias corrected)	0.0151	MLE Sd (bias corrected)	0.00906
		Approximate Chi Square Value (0.05)	30.28
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	27.33

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	0.0223	95% Adjusted Gamma UCL (use when n<50)	0.0247

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.955	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.213	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.313	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-4.962	Mean of logged Data	-4.311
Maximum of Logged Data	-3.381	SD of logged Data	0.503

Assuming Lognormal Distribution

95% H-UCL	0.0239	90% Chebyshev (MVUE) UCL	0.023
95% Chebyshev (MVUE) UCL	0.0267	97.5% Chebyshev (MVUE) UCL	0.0318
99% Chebyshev (MVUE) UCL	0.0417		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	0.0202	95% Jackknife UCL	0.021
95% Standard Bootstrap UCL	0.0198	95% Bootstrap-t UCL	0.0268
95% Hall's Bootstrap UCL	0.0418	95% Percentile Bootstrap UCL	0.0203
95% BCA Bootstrap UCL	0.0215		
90% Chebyshev(Mean, Sd) UCL	0.0244	95% Chebyshev(Mean, Sd) UCL	0.0286
97.5% Chebyshev(Mean, Sd) UCL	0.0344	99% Chebyshev(Mean, Sd) UCL	0.0458

Suggested UCL to Use

95% Student's-t UCL	0.021

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Draft

Chromium

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Number of Detects	1	Number of Non-Detects	7
Number of Distinct Detects	1	Number of Distinct Non-Detects	7

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Chromium was not processed!

Draft

Limu Kohu

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Heptachlor

General Statistics

Total Number of Observations	8	Number of Distinct Observations	7
Number of Detects	6	Number of Non-Detects	2
Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	27.3	Minimum Non-Detect	4
Maximum Detect	67	Maximum Non-Detect	4
Variance Detects	263.8	Percent Non-Detects	25%
Mean Detects	48.9	SD Detects	16.24
Median Detects	51.6	CV Detects	0.332
Skewness Detects	-0.338	Kurtosis Detects	-1.924
Mean of Logged Detects	3.838	SD of Logged Detects	0.365

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.922	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.2	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	37.68	Standard Error of Mean	9.024
SD	23.3	95% KM (BCA) UCL	51.11
95% KM (t) UCL	54.77	95% KM (Percentile Bootstrap) UCL	50.44
95% KM (z) UCL	52.52	95% KM Bootstrap t UCL	50.85
90% KM Chebyshev UCL	64.75	95% KM Chebyshev UCL	77.01
97.5% KM Chebyshev UCL	94.03	99% KM Chebyshev UCL	127.5

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.35	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.698	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.232	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.332	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	9.74	k star (bias corrected MLE)	4.981
Theta hat (MLE)	5.02	Theta star (bias corrected MLE)	9.817
nu hat (MLE)	116.9	nu star (bias corrected)	59.77
MLE Mean (bias corrected)	48.9	MLE Sd (bias corrected)	21.91

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	2.615	nu hat (KM)	41.83
Approximate Chi Square Value (41.83, α)	28.01	Adjusted Chi Square Value (41.83, β)	25.18
95% Gamma Approximate KM-UCL (use when n>=50)	56.27	95% Gamma Adjusted KM-UCL (use when n<50)	62.59

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	10.64	Mean	40.28
Maximum	67	Median	39.45
SD	21.15	CV	0.525
k hat (MLE)	3.292	k star (bias corrected MLE)	2.141
Theta hat (MLE)	12.23	Theta star (bias corrected MLE)	18.81
nu hat (MLE)	52.67	nu star (bias corrected)	34.25
MLE Mean (bias corrected)	40.28	MLE Sd (bias corrected)	27.53
		Adjusted Level of Significance (β)	0.0195
Approximate Chi Square Value (34.25, α)	21.87	Adjusted Chi Square Value (34.25, β)	19.4
95% Gamma Approximate UCL (use when n>=50)	63.09	95% Gamma Adjusted UCL (use when n<50)	71.1

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.904	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.22	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	41.41	Mean in Log Scale	3.611
SD in Original Scale	19.56	SD in Log Scale	0.524
95% t UCL (assumes normality of ROS data)	54.51	95% Percentile Bootstrap UCL	51.7
95% BCA Bootstrap UCL	52	95% Bootstrap t UCL	55.29
95% H-UCL (Log ROS)	68.28		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	3.225	95% H-UCL (KM -Log)	212.4
KM SD (logged)	1.1	95% Critical H Value (KM-Log)	3.677
KM Standard Error of Mean (logged)	0.426		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	37.18	Mean in Log Scale	3.051
SD in Original Scale	25.69	SD in Log Scale	1.488
95% t UCL (Assumes normality)	54.38	95% H-Stat UCL	903.5

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	54.77	95% KM (Percentile Bootstrap) UCL	50.44

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Draft

Heptachlor Epoxide

General Statistics

Total Number of Observations	8	Number of Distinct Observations	2
Number of Detects	1	Number of Non-Detects	7
Number of Distinct Detects	1	Number of Distinct Non-Detects	1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Heptachlor Epoxide was not processed!

Draft

2378-TCDF

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Number of Detects	4	Number of Non-Detects	4
Number of Distinct Detects	4	Number of Distinct Non-Detects	4
Minimum Detect	0.089	Minimum Non-Detect	0.086
Maximum Detect	0.12	Maximum Non-Detect	0.15
Variance Detects	2.0692E-4	Percent Non-Detects	50%
Mean Detects	0.0998	SD Detects	0.0144
Median Detects	0.095	CV Detects	0.144
Skewness Detects	1.374	Kurtosis Detects	1.335
Mean of Logged Detects	-2.312	SD of Logged Detects	0.138

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.851	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.251	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.443	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.096	Standard Error of Mean	0.00565
SD	0.0117	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.107	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.105	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.113	95% KM Chebyshev UCL	0.121
97.5% KM Chebyshev UCL	0.131	99% KM Chebyshev UCL	0.152

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.432	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.656	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.286	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.394	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	67.82	k star (bias corrected MLE)	17.12
Theta hat (MLE)	0.00147	Theta star (bias corrected MLE)	0.00583
nu hat (MLE)	542.6	nu star (bias corrected)	137
MLE Mean (bias corrected)	0.0998	MLE Sd (bias corrected)	0.0241

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	66.9	nu hat (KM)	1070
Approximate Chi Square Value (N/A, α)	995.5	Adjusted Chi Square Value (N/A, β)	977.1
95% Gamma Approximate KM-UCL (use when n>=50)	0.103	95% Gamma Adjusted KM-UCL (use when n<50)	0.105

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0705	Mean	0.0928
Maximum	0.12	Median	0.0911
SD	0.0138	CV	0.149
k hat (MLE)	52.76	k star (bias corrected MLE)	33.06
Theta hat (MLE)	0.00176	Theta star (bias corrected MLE)	0.00281
nu hat (MLE)	844.2	nu star (bias corrected)	528.9
MLE Mean (bias corrected)	0.0928	MLE Sd (bias corrected)	0.0161
		Adjusted Level of Significance (β)	0.0195
Approximate Chi Square Value (528.94, α)	476.6	Adjusted Chi Square Value (528.94, β)	464
95% Gamma Approximate UCL (use when n>=50)	0.103	95% Gamma Adjusted UCL (use when n<50)	N/A

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.865	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.255	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.443	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0932	Mean in Log Scale	-2.382
SD in Original Scale	0.0132	SD in Log Scale	0.138
95% t UCL (assumes normality of ROS data)	0.102	95% Percentile Bootstrap UCL	0.101
95% BCA Bootstrap UCL	0.102	95% Bootstrap t UCL	0.105
95% H-UCL (Log ROS)	0.103		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-2.35	95% H-UCL (KM -Log)	0.104
KM SD (logged)	0.115	95% Critical H Value (KM-Log)	1.862
KM Standard Error of Mean (logged)	0.0555		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0796	Mean in Log Scale	-2.578
SD in Original Scale	0.0251	SD in Log Scale	0.336
95% t UCL (Assumes normality)	0.0965	95% H-Stat UCL	0.105

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.107	95% KM (Percentile Bootstrap) UCL	N/A

Warning: One or more Recommended UCL(s) not available!

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Draft

12378-PeCDD

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Number of Detects	1	Number of Non-Detects	7
Number of Distinct Detects	1	Number of Distinct Non-Detects	7

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 12378-PeCDD was not processed!

Draft

123678-HxCDF

General Statistics

Total Number of Observations	8	Number of Distinct Observations	7
Number of Detects	2	Number of Non-Detects	6
Number of Distinct Detects	2	Number of Distinct Non-Detects	6
Minimum Detect	0.05	Minimum Non-Detect	0.031
Maximum Detect	0.057	Maximum Non-Detect	0.057
Variance Detects	2.4500E-5	Percent Non-Detects	75%
Mean Detects	0.0535	SD Detects	0.00495
Median Detects	0.0535	CV Detects	0.0925
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-2.93	SD of Logged Detects	0.0927

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test on Detects Only
Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.037	Standard Error of Mean	0.0052
SD	0.01	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0469	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0456	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0526	95% KM Chebyshev UCL	0.0597
97.5% KM Chebyshev UCL	0.0695	99% KM Chebyshev UCL	0.0888

Gamma GOF Tests on Detected Observations Only
Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	233.3	k star (bias corrected MLE)	N/A
Theta hat (MLE)	2.2930E-4	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	933.3	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	13.58	nu hat (KM)	217.3
		Adjusted Level of Significance (β)	0.0195
Approximate Chi Square Value (217.34, α)	184.2	Adjusted Chi Square Value (217.34, β)	176.5
95% Gamma Approximate KM-UCL (use when n>=50)	0.0437	95% Gamma Adjusted KM-UCL (use when n<50)	0.0456

Lognormal GOF Test on Detected Observations Only
Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0434	Mean in Log Scale	-3.146
SD in Original Scale	0.00653	SD in Log Scale	0.138
95% t UCL (assumes normality of ROS data)	0.0478	95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A	95% Bootstrap t UCL	N/A
95% H-UCL (Log ROS)	0.0479		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0281	Mean in Log Scale	-3.696
SD in Original Scale	0.0163	SD in Log Scale	0.51
95% t UCL (Assumes normality)	0.039	95% H-Stat UCL	0.0447

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.0469	95% KM (% Bootstrap) UCL	N/A

Warning: One or more Recommended UCL(s) not available!

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Draft

123789-HxCDD

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Number of Detects	2	Number of Non-Detects	6
Number of Distinct Detects	2	Number of Distinct Non-Detects	6
Minimum Detect	0.51	Minimum Non-Detect	0.071
Maximum Detect	1.1	Maximum Non-Detect	0.11
Variance Detects	0.174	Percent Non-Detects	75%
Mean Detects	0.805	SD Detects	0.417
Median Detects	0.805	CV Detects	0.518
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-0.289	SD of Logged Detects	0.544

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test on Detects Only
Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.255	Standard Error of Mean	0.175
SD	0.35	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.586	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.543	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.78	95% KM Chebyshev UCL	1.018
97.5% KM Chebyshev UCL	1.349	99% KM Chebyshev UCL	1.998

Gamma GOF Tests on Detected Observations Only
Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	7.097	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.113	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	28.39	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.528	nu hat (KM)	8.441
		Adjusted Level of Significance (β)	0.0195
Approximate Chi Square Value (8.44, α)	2.993	Adjusted Chi Square Value (8.44, β)	2.235
95% Gamma Approximate KM-UCL (use when n>=50)	0.718	95% Gamma Adjusted KM-UCL (use when n<50)	0.961

Lognormal GOF Test on Detected Observations Only
Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.237	Mean in Log Scale	-2.361
SD in Original Scale	0.385	SD in Log Scale	1.295
95% t UCL (assumes normality of ROS data)	0.494	95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A	95% Bootstrap t UCL	N/A
95% H-UCL (Log ROS)	1.696		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.234	Mean in Log Scale	-2.419
SD in Original Scale	0.386	SD in Log Scale	1.337
95% t UCL (Assumes normality)	0.493	95% H-Stat UCL	1.911

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.586	95% KM (% Bootstrap) UCL	N/A

Warning: One or more Recommended UCL(s) not available!

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Draft

1234678-HpCDF

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Number of Detects	7	Number of Non-Detects	1
Number of Distinct Detects	7	Number of Distinct Non-Detects	1
Minimum Detect	0.06	Minimum Non-Detect	0.046
Maximum Detect	0.75	Maximum Non-Detect	0.046
Variance Detects	0.0661	Percent Non-Detects	12.5%
Mean Detects	0.168	SD Detects	0.257
Median Detects	0.074	CV Detects	1.534
Skewness Detects	2.638	Kurtosis Detects	6.968
Mean of Logged Detects	-2.322	SD of Logged Detects	0.907

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.488	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.48	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.335	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.152	Standard Error of Mean	0.0864
SD	0.226	95% KM (BCA) UCL	0.321
95% KM (t) UCL	0.316	95% KM (Percentile Bootstrap) UCL	0.322
95% KM (z) UCL	0.294	95% KM Bootstrap t UCL	2.418
90% KM Chebyshev UCL	0.411	95% KM Chebyshev UCL	0.529
97.5% KM Chebyshev UCL	0.692	99% KM Chebyshev UCL	1.012

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.686	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.727	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.464	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.319	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.069	k star (bias corrected MLE)	0.706
Theta hat (MLE)	0.157	Theta star (bias corrected MLE)	0.237
nu hat (MLE)	14.96	nu star (bias corrected)	9.883
MLE Mean (bias corrected)	0.168	MLE Sd (bias corrected)	0.199

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.454	nu hat (KM)	7.262
Approximate Chi Square Value (7.26, α)	2.315	Adjusted Chi Square Value (7.26, β)	1.674
95% Gamma Approximate KM-UCL (use when n>=50)	0.478	95% Gamma Adjusted KM-UCL (use when n<50)	0.661

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.148
Maximum	0.75	Median	0.069
SD	0.244	CV	1.653
k hat (MLE)	0.846	k star (bias corrected MLE)	0.612
Theta hat (MLE)	0.175	Theta star (bias corrected MLE)	0.242
nu hat (MLE)	13.54	nu star (bias corrected)	9.795
MLE Mean (bias corrected)	0.148	MLE Sd (bias corrected)	0.189
		Adjusted Level of Significance (β)	0.0195
Approximate Chi Square Value (9.79, α)	3.814	Adjusted Chi Square Value (9.79, β)	2.931
95% Gamma Approximate UCL (use when n>=50)	0.38	95% Gamma Adjusted UCL (use when n<50)	0.494

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.59	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.41	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.335	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.149	Mean in Log Scale	-2.545
SD in Original Scale	0.244	SD in Log Scale	1.05
95% t UCL (assumes normality of ROS data)	0.312	95% Percentile Bootstrap UCL	0.318
95% BCA Bootstrap UCL	0.329	95% Bootstrap t UCL	2.043
95% H-UCL (Log ROS)	0.557		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.15	Mean in Log Scale	-2.504
SD in Original Scale	0.243	SD in Log Scale	0.984
95% t UCL (Assumes normality)	0.313	95% H-Stat UCL	0.468

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL 0.529

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Draft

1234789-HpCDF

General Statistics

Total Number of Observations	8	Number of Distinct Observations	7
Number of Detects	1	Number of Non-Detects	7
Number of Distinct Detects	1	Number of Distinct Non-Detects	6

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1234789-HpCDF was not processed!

1234678-HpCDD

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Number of Detects	1	Number of Non-Detects	7
Number of Distinct Detects	1	Number of Distinct Non-Detects	7

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1234678-HpCDD was not processed!

OCDF

General Statistics

Total Number of Observations	8	Number of Distinct Observations	6
Number of Detects	1	Number of Non-Detects	7
Number of Distinct Detects	1	Number of Distinct Non-Detects	5

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable OCDF was not processed!

OCDD

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Number of Detects	1	Number of Non-Detects	7
Number of Distinct Detects	1	Number of Distinct Non-Detects	7

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable OCDD was not processed!

Draft

Cobalt

General Statistics

Total Number of Observations	8	Number of Distinct Observations	7
		Number of Missing Observations	0
Minimum	0.03	Mean	0.0638
Maximum	0.1	Median	0.065
SD	0.0239	Std. Error of Mean	0.00844
Coefficient of Variation	0.374	Skewness	0.164

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.971	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.147	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.0797	95% Adjusted-CLT UCL (Chen-1995)	0.0782
		95% Modified-t UCL (Johnson-1978)	0.0798

Gamma GOF Test

A-D Test Statistic	0.188	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.717	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.149	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.295	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	7.552	k star (bias corrected MLE)	4.803
Theta hat (MLE)	0.00844	Theta star (bias corrected MLE)	0.0133
nu hat (MLE)	120.8	nu star (bias corrected)	76.85
MLE Mean (bias corrected)	0.0638	MLE Sd (bias corrected)	0.0291
		Approximate Chi Square Value (0.05)	57.66
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	53.47

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	0.085	95% Adjusted Gamma UCL (use when n<50)	0.0916

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.963	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.155	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.313	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-3.507	Mean of logged Data	-2.82
Maximum of Logged Data	-2.303	SD of logged Data	0.405

Assuming Lognormal Distribution

95% H-UCL	0.0907	90% Chebyshev (MVUE) UCL	0.0917
95% Chebyshev (MVUE) UCL	0.104	97.5% Chebyshev (MVUE) UCL	0.122
99% Chebyshev (MVUE) UCL	0.156		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	0.0776	95% Jackknife UCL	0.0797
95% Standard Bootstrap UCL	0.0768	95% Bootstrap-t UCL	0.0812
95% Hall's Bootstrap UCL	0.0814	95% Percentile Bootstrap UCL	0.0763
95% BCA Bootstrap UCL	0.0763		
90% Chebyshev(Mean, Sd) UCL	0.0891	95% Chebyshev(Mean, Sd) UCL	0.101
97.5% Chebyshev(Mean, Sd) UCL	0.116	99% Chebyshev(Mean, Sd) UCL	0.148

Suggested UCL to Use

95% Student's-t UCL	0.0797

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Draft

Lead

General Statistics

Total Number of Observations	8	Number of Distinct Observations	7
		Number of Missing Observations	0
Minimum	0.13	Mean	0.361
Maximum	0.63	Median	0.37
SD	0.162	Std. Error of Mean	0.0573
Coefficient of Variation	0.449	Skewness	0.224

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.973	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.156	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.47	95% Adjusted-CLT UCL (Chen-1995)	0.46
		95% Modified-t UCL (Johnson-1978)	0.471

Gamma GOF Test

A-D Test Statistic	0.245	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.719	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.206	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.295	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	4.96	k star (bias corrected MLE)	3.183
Theta hat (MLE)	0.0728	Theta star (bias corrected MLE)	0.113
nu hat (MLE)	79.35	nu star (bias corrected)	50.93
MLE Mean (bias corrected)	0.361	MLE Sd (bias corrected)	0.202
		Approximate Chi Square Value (0.05)	35.54
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	32.32

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	0.518	95% Adjusted Gamma UCL (use when n<50)	0.569

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.943	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.223	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.313	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-2.04	Mean of logged Data	-1.122
Maximum of Logged Data	-0.462	SD of logged Data	0.515

Assuming Lognormal Distribution

95% H-UCL	0.591	90% Chebyshev (MVUE) UCL	0.567
95% Chebyshev (MVUE) UCL	0.658	97.5% Chebyshev (MVUE) UCL	0.785
99% Chebyshev (MVUE) UCL	1.034		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	0.456	95% Jackknife UCL	0.47
95% Standard Bootstrap UCL	0.45	95% Bootstrap-t UCL	0.476
95% Hall's Bootstrap UCL	0.487	95% Percentile Bootstrap UCL	0.45
95% BCA Bootstrap UCL	0.451		
90% Chebyshev(Mean, Sd) UCL	0.533	95% Chebyshev(Mean, Sd) UCL	0.611
97.5% Chebyshev(Mean, Sd) UCL	0.719	99% Chebyshev(Mean, Sd) UCL	0.931

Suggested UCL to Use

95% Student's-t UCL	0.47

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Draft

Thallium

General Statistics

Total Number of Observations	8	Number of Distinct Observations	4
		Number of Missing Observations	0
Minimum	0.003	Mean	0.00488
Maximum	0.007	Median	0.0045
SD	0.00146	Std. Error of Mean	5.1539E-4
Coefficient of Variation	0.299	Skewness	0.651

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.871	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.226	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.00585	95% Adjusted-CLT UCL (Chen-1995)	0.00585
		95% Modified-t UCL (Johnson-1978)	0.00587

Gamma GOF Test

A-D Test Statistic	0.477	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.715	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.227	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.294	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	13.29	k star (bias corrected MLE)	8.389
Theta hat (MLE)	3.6684E-4	Theta star (bias corrected MLE)	5.8111E-4
nu hat (MLE)	212.6	nu star (bias corrected)	134.2
MLE Mean (bias corrected)	0.00488	MLE Sd (bias corrected)	0.00168
		Approximate Chi Square Value (0.05)	108.5
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	102.6

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	0.00603	95% Adjusted Gamma UCL (use when n<50)	0.00638

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.909	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.207	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.313	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-5.809	Mean of logged Data	-5.362
Maximum of Logged Data	-4.962	SD of logged Data	0.294

Assuming Lognormal Distribution

95% H-UCL	0.00615	90% Chebyshev (MVUE) UCL	0.0064
95% Chebyshev (MVUE) UCL	0.00709	97.5% Chebyshev (MVUE) UCL	0.00805
99% Chebyshev (MVUE) UCL	0.00993		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	0.00572	95% Jackknife UCL	0.00585
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A		
90% Chebyshev(Mean, Sd) UCL	0.00642	95% Chebyshev(Mean, Sd) UCL	0.00712
97.5% Chebyshev(Mean, Sd) UCL	0.00809	99% Chebyshev(Mean, Sd) UCL	0.01

Suggested UCL to Use

95% Student's-t UCL	0.00585

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Draft

Round 2 – January to March 2014

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Octopus (he‘e)

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2,3,7,8-TCDF

General Statistics

Total Number of Observations	8	Number of Distinct Observations	7
Number of Detects	6	Number of Non-Detects	2
Number of Distinct Detects	5	Number of Distinct Non-Detects	2
Minimum Detect	0.065	Minimum Non-Detect	0.037
Maximum Detect	0.075	Maximum Non-Detect	0.051
Variance Detects	1.7367E-5	Percent Non-Detects	25%
Mean Detects	0.0708	SD Detects	0.00417
Median Detects	0.072	CV Detects	0.0588
Skewness Detects	-0.496	Kurtosis Detects	-1.894
Mean of Logged Detects	-2.649	SD of Logged Detects	0.0595

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.881	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.276	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.0624	Standard Error of Mean	0.00582
SD	0.015	95% KM (BCA) UCL	0.0713
95% KM (t) UCL	0.0734	95% KM (Percentile Bootstrap) UCL	0.071
95% KM (z) UCL	0.0719	95% KM Bootstrap t UCL	0.069
90% KM Chebyshev UCL	0.0798	95% KM Chebyshev UCL	0.0877
97.5% KM Chebyshev UCL	0.0987	99% KM Chebyshev UCL	0.12

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.456	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.696	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.297	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.332	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	341.7	k star (bias corrected MLE)	170.9
Theta hat (MLE)	2.0732E-4	Theta star (bias corrected MLE)	4.1436E-4
nu hat (MLE)	4100	nu star (bias corrected)	2051
MLE Mean (bias corrected)	0.0708	MLE Sd (bias corrected)	0.00542

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	17.25	nu hat (KM)	276.1
Approximate Chi Square Value (276.07, α)	238.6	Adjusted Chi Square Value (276.07, β)	229.8
95% Gamma Approximate KM-UCL (use when n>=50)	0.0722	95% Gamma Adjusted KM-UCL (use when n<50)	0.075

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0611	Mean	0.0684
Maximum	0.075	Median	0.0685
SD	0.00573	CV	0.0838
k hat (MLE)	161	k star (bias corrected MLE)	100.7
Theta hat (MLE)	4.2491E-4	Theta star (bias corrected MLE)	6.7930E-4
nu hat (MLE)	2575	nu star (bias corrected)	1611
MLE Mean (bias corrected)	0.0684	MLE Sd (bias corrected)	0.00682
		Adjusted Level of Significance (β)	0.0195
Approximate Chi Square Value (N/A, α)	1519	Adjusted Chi Square Value (N/A, β)	1496
95% Gamma Approximate UCL (use when n>=50)	0.0725	95% Gamma Adjusted UCL (use when n<50)	0.0737

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.88	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.276	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0684	Mean in Log Scale	-2.685
SD in Original Scale	0.00565	SD in Log Scale	0.0832
95% t UCL (assumes normality of ROS data)	0.0722	95% Percentile Bootstrap UCL	0.0715
95% BCA Bootstrap UCL	0.0714	95% Bootstrap t UCL	0.072
95% H-UCL (Log ROS)	N/A		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-2.811	95% H-UCL (KM -Log)	0.078
KM SD (logged)	0.284	95% Critical H Value (KM-Log)	2.039
KM Standard Error of Mean (logged)	0.11		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0586	Mean in Log Scale	-2.944
SD in Original Scale	0.023	SD in Log Scale	0.556
95% t UCL (Assumes normality)	0.074	95% H-Stat UCL	0.103

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.0734	95% KM (Percentile Bootstrap) UCL	0.071

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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1,2,3,4,7,8-HxCDF

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Number of Detects	1	Number of Non-Detects	7
Number of Distinct Detects	1	Number of Distinct Non-Detects	7

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,4,7,8-HxCDF was not processed!

1,2,3,6,7,8-HxCDD

General Statistics

Total Number of Observations	8	Number of Distinct Observations	7
Number of Detects	1	Number of Non-Detects	7
Number of Distinct Detects	1	Number of Distinct Non-Detects	6

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,6,7,8-HxCDD was not processed!

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Lead

General Statistics

Total Number of Observations	8	Number of Distinct Observations	4
		Number of Missing Observations	0
Minimum	0.007	Mean	0.0259
Maximum	0.05	Median	0.025
SD	0.0125	Std. Error of Mean	0.00442
Coefficient of Variation	0.483	Skewness	0.676

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.907	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.246	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.0342	95% Adjusted-CLT UCL (Chen-1995)	0.0343
		95% Modified-t UCL (Johnson-1978)	0.0344

Gamma GOF Test

A-D Test Statistic	0.488	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.719	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.241	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.295	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	4.252	k star (bias corrected MLE)	2.741
Theta hat (MLE)	0.00609	Theta star (bias corrected MLE)	0.00944
nu hat (MLE)	68.03	nu star (bias corrected)	43.85
MLE Mean (bias corrected)	0.0259	MLE Sd (bias corrected)	0.0156
		Approximate Chi Square Value (0.05)	29.66
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	26.75

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	0.0382	95% Adjusted Gamma UCL (use when n<50)	0.0424

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.871	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.281	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.313	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-4.962	Mean of logged Data	-3.777
Maximum of Logged Data	-2.996	SD of logged Data	0.572

Assuming Lognormal Distribution

95% H-UCL	0.0461	90% Chebyshev (MVUE) UCL	0.0425
95% Chebyshev (MVUE) UCL	0.0499	97.5% Chebyshev (MVUE) UCL	0.0601
99% Chebyshev (MVUE) UCL	0.08		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	0.0331	95% Jackknife UCL	0.0342
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A		
90% Chebyshev(Mean, Sd) UCL	0.0391	95% Chebyshev(Mean, Sd) UCL	0.0451
97.5% Chebyshev(Mean, Sd) UCL	0.0535	99% Chebyshev(Mean, Sd) UCL	0.0698

Suggested UCL to Use

95% Student's-t UCL 0.0342

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). However, simulations results will not cover all Real World data sets. For additional insight the user may want to consult a statistician.

Draft

Sea Cucumber (loli)

Draft

Inorganic Arsenic

General Statistics

Total Number of Observations	8	Number of Distinct Observations	7
		Number of Missing Observations	0
Minimum	0.006	Mean	0.0303
Maximum	0.071	Median	0.025
SD	0.0229	Std. Error of Mean	0.00809
Coefficient of Variation	0.757	Skewness	0.875

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.909	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.216	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.0456	95% Adjusted-CLT UCL (Chen-1995)	0.0462
		95% Modified-t UCL (Johnson-1978)	0.046

Gamma GOF Test

A-D Test Statistic	0.206	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.725	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.152	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.298	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.89	k star (bias corrected MLE)	1.265
Theta hat (MLE)	0.016	Theta star (bias corrected MLE)	0.0239
nu hat (MLE)	30.24	nu star (bias corrected)	20.24
MLE Mean (bias corrected)	0.0303	MLE Sd (bias corrected)	0.0269
		Approximate Chi Square Value (0.05)	11.03
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	9.354

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	0.0555	95% Adjusted Gamma UCL (use when n<50)	0.0654

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.965	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.17	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.313	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-5.116	Mean of logged Data	-3.786
Maximum of Logged Data	-2.645	SD of logged Data	0.853

Assuming Lognormal Distribution

95% H-UCL	0.088	90% Chebyshev (MVUE) UCL	0.0594
95% Chebyshev (MVUE) UCL	0.0723	97.5% Chebyshev (MVUE) UCL	0.0902
99% Chebyshev (MVUE) UCL	0.125		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	0.0436	95% Jackknife UCL	0.0456
95% Standard Bootstrap UCL	0.0432	95% Bootstrap-t UCL	0.052
95% Hall's Bootstrap UCL	0.0529	95% Percentile Bootstrap UCL	0.0433
95% BCA Bootstrap UCL	0.0448		
90% Chebyshev(Mean, Sd) UCL	0.0545	95% Chebyshev(Mean, Sd) UCL	0.0655
97.5% Chebyshev(Mean, Sd) UCL	0.0808	99% Chebyshev(Mean, Sd) UCL	0.111

Suggested UCL to Use

95% Student's-t UCL 0.0456

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). However, simulations results will not cover all Real World data sets. For additional insight the user may want to consult a statistician.

Draft

Chromium

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
		Number of Missing Observations	0
Minimum	0.046	Mean	0.164
Maximum	0.326	Median	0.149
SD	0.0839	Std. Error of Mean	0.0297
Coefficient of Variation	0.511	Skewness	0.756

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.952	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.174	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.221	95% Adjusted-CLT UCL (Chen-1995)	0.222
		95% Modified-t UCL (Johnson-1978)	0.222

Gamma GOF Test

A-D Test Statistic	0.244	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.719	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.199	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.295	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.961	k star (bias corrected MLE)	2.559
Theta hat (MLE)	0.0415	Theta star (bias corrected MLE)	0.0642
nu hat (MLE)	63.37	nu star (bias corrected)	40.94
MLE Mean (bias corrected)	0.164	MLE Sd (bias corrected)	0.103
		Approximate Chi Square Value (0.05)	27.28
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	24.49

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	0.247	95% Adjusted Gamma UCL (use when n<50)	0.275

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.94	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.235	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.313	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-3.079	Mean of logged Data	-1.937
Maximum of Logged Data	-1.121	SD of logged Data	0.585

Assuming Lognormal Distribution

95% H-UCL	0.298	90% Chebyshev (MVUE) UCL	0.272
95% Chebyshev (MVUE) UCL	0.319	97.5% Chebyshev (MVUE) UCL	0.385
99% Chebyshev (MVUE) UCL	0.515		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	0.213	95% Jackknife UCL	0.221
95% Standard Bootstrap UCL	0.208	95% Bootstrap-t UCL	0.23
95% Hall's Bootstrap UCL	0.26	95% Percentile Bootstrap UCL	0.213
95% BCA Bootstrap UCL	0.214		
90% Chebyshev(Mean, Sd) UCL	0.253	95% Chebyshev(Mean, Sd) UCL	0.294
97.5% Chebyshev(Mean, Sd) UCL	0.35	99% Chebyshev(Mean, Sd) UCL	0.46

Suggested UCL to Use

95% Student's-t UCL 0.221

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). However, simulations results will not cover all Real World data sets. For additional insight the user may want to consult a statistician.

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Limu Kohu

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1,2,3,4,7,8-HxCDF

General Statistics

Total Number of Observations	8	Number of Distinct Observations	7
Number of Detects	1	Number of Non-Detects	7
Number of Distinct Detects	1	Number of Distinct Non-Detects	7

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,4,7,8-HxCDF was not processed!

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1,2,3,6,7,8-HxCDF

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Number of Detects	2	Number of Non-Detects	6
Number of Distinct Detects	2	Number of Distinct Non-Detects	6
Minimum Detect	0.023	Minimum Non-Detect	0.016
Maximum Detect	0.029	Maximum Non-Detect	0.043
Variance Detects	1.8000E-5	Percent Non-Detects	75%
Mean Detects	0.026	SD Detects	0.00424
Median Detects	0.026	CV Detects	0.163
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-3.656	SD of Logged Detects	0.164

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test on Detects Only
Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.0214	Standard Error of Mean	0.00369
SD	0.00492	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0284	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0275	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0325	95% KM Chebyshev UCL	0.0375
97.5% KM Chebyshev UCL	0.0444	99% KM Chebyshev UCL	0.0581

Gamma GOF Tests on Detected Observations Only
Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	74.78	k star (bias corrected MLE)	N/A
Theta hat (MLE)	3.4770E-4	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	299.1	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	18.89	nu hat (KM)	302.3
		Adjusted Level of Significance (β)	0.0195
Approximate Chi Square Value (302.28, α)	263	Adjusted Chi Square Value (302.28, β)	253.7
95% Gamma Approximate KM-UCL (use when n>=50)	0.0246	95% Gamma Adjusted KM-UCL (use when n<50)	0.0255

Lognormal GOF Test on Detected Observations Only
Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.022	Mean in Log Scale	-3.824
SD in Original Scale	0.00318	SD in Log Scale	0.136
95% t UCL (assumes normality of ROS data)	0.0242	95% Percentile Bootstrap UCL	0.0239
95% BCA Bootstrap UCL	0.0244	95% Bootstrap t UCL	0.0255
95% H-UCL (Log ROS)	0.0243		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0174	Mean in Log Scale	-4.12
SD in Original Scale	0.00682	SD in Log Scale	0.413
95% t UCL (Assumes normality)	0.022	95% H-Stat UCL	0.025

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.0284	95% KM (% Bootstrap) UCL	N/A

Warning: One or more Recommended UCL(s) not available!

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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2,3,4,6,7,8-HxCDF

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Number of Detects	1	Number of Non-Detects	7
Number of Distinct Detects	1	Number of Distinct Non-Detects	7

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 2,3,4,6,7,8-HxCDF was not processed!

1,2,3,7,8,9-HxCDF

General Statistics

Total Number of Observations	8	Number of Distinct Observations	7
Number of Detects	1	Number of Non-Detects	7
Number of Distinct Detects	1	Number of Distinct Non-Detects	6

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,2,3,7,8,9-HxCDF was not processed!

Draft

1,2,3,4,7,8-HxCDD

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Number of Detects	2	Number of Non-Detects	6
Number of Distinct Detects	2	Number of Distinct Non-Detects	6
Minimum Detect	0.056	Minimum Non-Detect	0.033
Maximum Detect	0.09	Maximum Non-Detect	0.079
Variance Detects	5.7800E-4	Percent Non-Detects	75%
Mean Detects	0.073	SD Detects	0.024
Median Detects	0.073	CV Detects	0.329
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-2.645	SD of Logged Detects	0.335

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test on Detects Only
Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.0442	Standard Error of Mean	0.01
SD	0.0193	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0632	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0607	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0743	95% KM Chebyshev UCL	0.088
97.5% KM Chebyshev UCL	0.107	99% KM Chebyshev UCL	0.144

Gamma GOF Tests on Detected Observations Only
Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	18.1	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00403	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	72.4	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	5.207	nu hat (KM)	83.31
		Adjusted Level of Significance (β)	0.0195
Approximate Chi Square Value (83.31, α)	63.27	Adjusted Chi Square Value (83.31, β)	58.87
95% Gamma Approximate KM-UCL (use when n>=50)	0.0581	95% Gamma Adjusted KM-UCL (use when n<50)	0.0625

Lognormal GOF Test on Detected Observations Only
Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0389	Mean in Log Scale	-3.358
SD in Original Scale	0.023	SD in Log Scale	0.462
95% t UCL (assumes normality of ROS data)	0.0543	95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A	95% Bootstrap t UCL	N/A
95% H-UCL (Log ROS)	0.0578		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0386	Mean in Log Scale	-3.394
SD in Original Scale	0.024	SD in Log Scale	0.538
95% t UCL (Assumes normality)	0.0546	95% H-Stat UCL	0.0635

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.0632	95% KM (% Bootstrap) UCL	N/A

Warning: One or more Recommended UCL(s) not available!

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Draft

1,2,3,4,6,7,8-HpCDF

General Statistics

Total Number of Observations	8	Number of Distinct Observations	7
Number of Detects	6	Number of Non-Detects	2
Number of Distinct Detects	6	Number of Distinct Non-Detects	2
Minimum Detect	0.04	Minimum Non-Detect	0.035
Maximum Detect	0.064	Maximum Non-Detect	0.04
Variance Detects	6.3467E-5	Percent Non-Detects	25%
Mean Detects	0.0523	SD Detects	0.00797
Median Detects	0.0525	CV Detects	0.152
Skewness Detects	-0.162	Kurtosis Detects	1.045
Mean of Logged Detects	-2.96	SD of Logged Detects	0.157

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.983	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.171	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.048	Standard Error of Mean	0.00379
SD	0.0098	95% KM (BCA) UCL	0.0543
95% KM (t) UCL	0.0552	95% KM (Percentile Bootstrap) UCL	0.0539
95% KM (z) UCL	0.0542	95% KM Bootstrap t UCL	0.0537
90% KM Chebyshev UCL	0.0594	95% KM Chebyshev UCL	0.0645
97.5% KM Chebyshev UCL	0.0717	99% KM Chebyshev UCL	0.0858

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.216	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.697	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.173	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.332	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	50.12	k star (bias corrected MLE)	25.17
Theta hat (MLE)	0.00104	Theta star (bias corrected MLE)	0.00208
nu hat (MLE)	601.4	nu star (bias corrected)	302
MLE Mean (bias corrected)	0.0523	MLE Sd (bias corrected)	0.0104

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	24	nu hat (KM)	384
Approximate Chi Square Value (384.00, α)	339.6	Adjusted Chi Square Value (384.00, β)	329
95% Gamma Approximate KM-UCL (use when n>=50)	0.0543	95% Gamma Adjusted KM-UCL (use when n<50)	0.056

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0338	Mean	0.0477
Maximum	0.064	Median	0.05
SD	0.0109	CV	0.229
k hat (MLE)	20.88	k star (bias corrected MLE)	13.13
Theta hat (MLE)	0.00228	Theta star (bias corrected MLE)	0.00363
nu hat (MLE)	334.1	nu star (bias corrected)	210.2
MLE Mean (bias corrected)	0.0477	MLE Sd (bias corrected)	0.0132
		Adjusted Level of Significance (β)	0.0195
Approximate Chi Square Value (210.15, α)	177.6	Adjusted Chi Square Value (210.15, β)	170
95% Gamma Approximate UCL (use when n>=50)	0.0564	95% Gamma Adjusted UCL (use when n<50)	0.059

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.969	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.194	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0481	Mean in Log Scale	-3.056
SD in Original Scale	0.0104	SD in Log Scale	0.222
95% t UCL (assumes normality of ROS data)	0.055	95% Percentile Bootstrap UCL	0.0536
95% BCA Bootstrap UCL	0.0537	95% Bootstrap t UCL	0.0547
95% H-UCL (Log ROS)	0.0569		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-3.058	95% H-UCL (KM -Log)	0.0561
KM SD (logged)	0.21	95% Critical H Value (KM-Log)	1.954
KM Standard Error of Mean (logged)	0.0814		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0439	Mean in Log Scale	-3.215
SD in Original Scale	0.017	SD in Log Scale	0.491
95% t UCL (Assumes normality)	0.0553	95% H-Stat UCL	0.0699

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.0552	95% KM (Percentile Bootstrap) UCL	0.0539

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Draft

1,2,3,4,6,7,8-HpCDD

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Number of Detects	6	Number of Non-Detects	2
Number of Distinct Detects	6	Number of Distinct Non-Detects	2
Minimum Detect	0.045	Minimum Non-Detect	0.051
Maximum Detect	0.1	Maximum Non-Detect	0.075
Variance Detects	4.4227E-4	Percent Non-Detects	25%
Mean Detects	0.0767	SD Detects	0.021
Median Detects	0.076	CV Detects	0.274
Skewness Detects	-0.357	Kurtosis Detects	-0.773
Mean of Logged Detects	-2.603	SD of Logged Detects	0.299

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.944	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.178	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.0702	Standard Error of Mean	0.0082
SD	0.0207	95% KM (BCA) UCL	0.0838
95% KM (t) UCL	0.0857	95% KM (Percentile Bootstrap) UCL	0.0836
95% KM (z) UCL	0.0836	95% KM Bootstrap t UCL	0.0837
90% KM Chebyshev UCL	0.0947	95% KM Chebyshev UCL	0.106
97.5% KM Chebyshev UCL	0.121	99% KM Chebyshev UCL	0.152

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.275	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.698	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.188	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.332	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	14.42	k star (bias corrected MLE)	7.323
Theta hat (MLE)	0.00532	Theta star (bias corrected MLE)	0.0105
nu hat (MLE)	173.1	nu star (bias corrected)	87.87
MLE Mean (bias corrected)	0.0767	MLE Sd (bias corrected)	0.0283

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	11.51	nu hat (KM)	184.1
Approximate Chi Square Value (184.13, α)	153.7	Adjusted Chi Square Value (184.13, β)	146.7
95% Gamma Approximate KM-UCL (use when n>=50)	0.084	95% Gamma Adjusted KM-UCL (use when n<50)	0.0881

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.045	Mean	0.0705
Maximum	0.1	Median	0.0675
SD	0.0213	CV	0.302
k hat (MLE)	12.43	k star (bias corrected MLE)	7.85
Theta hat (MLE)	0.00568	Theta star (bias corrected MLE)	0.00898
nu hat (MLE)	198.8	nu star (bias corrected)	125.6
MLE Mean (bias corrected)	0.0705	MLE Sd (bias corrected)	0.0252
		Adjusted Level of Significance (β)	0.0195
Approximate Chi Square Value (125.59, α)	100.7	Adjusted Chi Square Value (125.59, β)	95.08
95% Gamma Approximate UCL (use when n>=50)	0.0879	95% Gamma Adjusted UCL (use when n<50)	0.0932

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.923	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.165	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0705	Mean in Log Scale	-2.693
SD in Original Scale	0.0213	SD in Log Scale	0.307
95% t UCL (assumes normality of ROS data)	0.0847	95% Percentile Bootstrap UCL	0.0824
95% BCA Bootstrap UCL	0.0829	95% Bootstrap t UCL	0.086
95% H-UCL (Log ROS)	0.0901		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-2.702	95% H-UCL (KM -Log)	0.0891
KM SD (logged)	0.305	95% Critical H Value (KM-Log)	2.065
KM Standard Error of Mean (logged)	0.122		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0654	Mean in Log Scale	-2.822
SD in Original Scale	0.0276	SD in Log Scale	0.488
95% t UCL (Assumes normality)	0.0839	95% H-Stat UCL	0.103

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.0857	95% KM (Percentile Bootstrap) UCL	0.0836

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Draft

OCDF

General Statistics

Total Number of Observations	8	Number of Distinct Observations	4
Number of Detects	1	Number of Non-Detects	7
Number of Distinct Detects	1	Number of Distinct Non-Detects	4

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable OCDF was not processed!

Draft

OCDD

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Number of Detects	3	Number of Non-Detects	5
Number of Distinct Detects	3	Number of Distinct Non-Detects	5
Minimum Detect	0.69	Minimum Non-Detect	0.25
Maximum Detect	0.8	Maximum Non-Detect	0.51
Variance Detects	0.0037	Percent Non-Detects	62.5%
Mean Detects	0.76	SD Detects	0.0608
Median Detects	0.79	CV Detects	0.08
Skewness Detects	-1.68	Kurtosis Detects	N/A
Mean of Logged Detects	-0.277	SD of Logged Detects	0.082

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.818	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.356	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.441	Standard Error of Mean	0.108
SD	0.249	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.645	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.618	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.764	95% KM Chebyshev UCL	0.911
97.5% KM Chebyshev UCL	1.114	99% KM Chebyshev UCL	1.513

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	226.8	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00335	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	1361	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	3.146	nu hat (KM)	50.34
		Adjusted Level of Significance (β)	0.0195
Approximate Chi Square Value (50.34, α)	35.05	Adjusted Chi Square Value (50.34, β)	31.85
95% Gamma Approximate KM-UCL (use when n>=50)	0.634	95% Gamma Adjusted KM-UCL (use when n<50)	0.697

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.813	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.358	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.512	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.647	Mean in Log Scale	-0.444
SD in Original Scale	0.0987	SD in Log Scale	0.146
95% t UCL (assumes normality of ROS data)	0.714	95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A	95% Bootstrap t UCL	N/A
95% H-UCL (Log ROS)	0.719		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-0.97	95% H-UCL (KM -Log)	0.718
KM SD (logged)	0.539	95% Critical H Value (KM-Log)	2.421
KM Standard Error of Mean (logged)	0.233		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.408	Mean in Log Scale	-1.139
SD in Original Scale	0.296	SD in Log Scale	0.744
95% t UCL (Assumes normality)	0.606	95% H-Stat UCL	0.935

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.645	95% KM (Percentile Bootstrap) UCL	N/A

Warning: One or more Recommended UCL(s) not available!

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Draft

Cobalt

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
Number of Detects	7	Number of Non-Detects	1
Number of Distinct Detects	7	Number of Distinct Non-Detects	1
Minimum Detect	0.04	Minimum Non-Detect	0.02
Maximum Detect	0.59	Maximum Non-Detect	0.02
Variance Detects	0.0581	Percent Non-Detects	12.5%
Mean Detects	0.26	SD Detects	0.241
Median Detects	0.11	CV Detects	0.927
Skewness Detects	0.445	Kurtosis Detects	-2.363
Mean of Logged Detects	-1.852	SD of Logged Detects	1.152

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.799	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.304	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.335	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.23	Standard Error of Mean	0.0853
SD	0.223	95% KM (BCA) UCL	0.369
95% KM (t) UCL	0.392	95% KM (Percentile Bootstrap) UCL	0.364
95% KM (z) UCL	0.37	95% KM Bootstrap t UCL	0.422
90% KM Chebyshev UCL	0.486	95% KM Chebyshev UCL	0.602
97.5% KM Chebyshev UCL	0.763	99% KM Chebyshev UCL	1.079

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.631	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.726	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.27	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.319	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.128	k star (bias corrected MLE)	0.74
Theta hat (MLE)	0.231	Theta star (bias corrected MLE)	0.352
nu hat (MLE)	15.79	nu star (bias corrected)	10.35
MLE Mean (bias corrected)	0.26	MLE Sd (bias corrected)	0.302

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	1.06	nu hat (KM)	16.96
Approximate Chi Square Value (16.96, α)	8.645	Adjusted Chi Square Value (16.96, β)	7.195
95% Gamma Approximate KM-UCL (use when n>=50)	0.451	95% Gamma Adjusted KM-UCL (use when n<50)	0.542

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.229
Maximum	0.59	Median	0.095
SD	0.24	CV	1.05
k hat (MLE)	0.82	k star (bias corrected MLE)	0.596
Theta hat (MLE)	0.279	Theta star (bias corrected MLE)	0.384
nu hat (MLE)	13.13	nu star (bias corrected)	9.537
MLE Mean (bias corrected)	0.229	MLE Sd (bias corrected)	0.296
		Adjusted Level of Significance (β)	0.0195
Approximate Chi Square Value (9.54, α)	3.655	Adjusted Chi Square Value (9.54, β)	2.794
95% Gamma Approximate UCL (use when n>=50)	0.597	95% Gamma Adjusted UCL (use when n<50)	0.781

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.856	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.258	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.335	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.229	Mean in Log Scale	-2.2
SD in Original Scale	0.24	SD in Log Scale	1.45
95% t UCL (assumes normality of ROS data)	0.39	95% Percentile Bootstrap UCL	0.359
95% BCA Bootstrap UCL	0.366	95% Bootstrap t UCL	0.423
95% H-UCL (Log ROS)	3.964		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-2.11	95% H-UCL (KM -Log)	1.533
KM SD (logged)	1.208	95% Critical H Value (KM-Log)	3.957
KM Standard Error of Mean (logged)	0.461		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.229	Mean in Log Scale	-2.196
SD in Original Scale	0.24	SD in Log Scale	1.444
95% t UCL (Assumes normality)	0.39	95% H-Stat UCL	3.858

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.392	95% KM (Percentile Bootstrap) UCL	0.364

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

Total Number of Observations	8	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	0.14	Mean	0.764
Maximum	1.58	Median	0.705
SD	0.663	Std. Error of Mean	0.234
Coefficient of Variation	0.868	Skewness	0.0814

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.755	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.319	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.208	95% Adjusted-CLT UCL (Chen-1995)	1.157
		95% Modified-t UCL (Johnson-1978)	1.209

Gamma GOF Test

A-D Test Statistic	1.145	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.734	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.33	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.301	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.094	k star (bias corrected MLE)	0.767
Theta hat (MLE)	0.698	Theta star (bias corrected MLE)	0.995
nu hat (MLE)	17.51	nu star (bias corrected)	12.28
MLE Mean (bias corrected)	0.764	MLE Sd (bias corrected)	0.872
		Approximate Chi Square Value (0.05)	5.409
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	4.313

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	1.733	95% Adjusted Gamma UCL (use when n<50)	2.174

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.724	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.31	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.313	Data appear Lognormal at 5% Significance Level

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.966	Mean of logged Data	-0.792
Maximum of Logged Data	0.457	SD of logged Data	1.187

Assuming Lognormal Distribution

95% H-UCL	5.281	90% Chebyshev (MVUE) UCL	1.848
95% Chebyshev (MVUE) UCL	2.318	97.5% Chebyshev (MVUE) UCL	2.971
99% Chebyshev (MVUE) UCL	4.254		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	1.149	95% Jackknife UCL	1.208
95% Standard Bootstrap UCL	1.124	95% Bootstrap-t UCL	1.203
95% Hall's Bootstrap UCL	1.032	95% Percentile Bootstrap UCL	1.104
95% BCA Bootstrap UCL	1.104		
90% Chebyshev(Mean, Sd) UCL	1.467	95% Chebyshev(Mean, Sd) UCL	1.786
97.5% Chebyshev(Mean, Sd) UCL	2.228	99% Chebyshev(Mean, Sd) UCL	3.097

Suggested UCL to Use

95% Hall's Bootstrap UCL	1.032

In Case Bootstrap t and/or Hall's Bootstrap yields an unreasonably large UCL value, use 97.5% or 99% Chebyshev (Mean, Sd) UCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

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Thallium

General Statistics

Total Number of Observations	8	Number of Distinct Observations	5
Number of Detects	7	Number of Non-Detects	1
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	0.003	Minimum Non-Detect	0.002
Maximum Detect	0.008	Maximum Non-Detect	0.002
Variance Detects	3.4762E-6	Percent Non-Detects	12.5%
Mean Detects	0.00486	SD Detects	0.00186
Median Detects	0.004	CV Detects	0.384
Skewness Detects	1.151	Kurtosis Detects	-0.275
Mean of Logged Detects	-5.384	SD of Logged Detects	0.352

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.777	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.391	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.335	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.0045	Standard Error of Mean	7.1443E-4
SD	0.00187	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.00585	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.00568	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.00664	95% KM Chebyshev UCL	0.00761
97.5% KM Chebyshev UCL	0.00896	99% KM Chebyshev UCL	0.0116

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.866	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.709	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.389	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.312	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	9.046	k star (bias corrected MLE)	5.265
Theta hat (MLE)	5.3691E-4	Theta star (bias corrected MLE)	9.2260E-4
nu hat (MLE)	126.7	nu star (bias corrected)	73.7
MLE Mean (bias corrected)	0.00486	MLE Sd (bias corrected)	0.00212

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	5.786	nu hat (KM)	92.57
Approximate Chi Square Value (92.57, α)	71.38	Adjusted Chi Square Value (92.57, β)	66.69
95% Gamma Approximate KM-UCL (use when n>=50)	0.00584	95% Gamma Adjusted KM-UCL (use when n<50)	0.00625

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.003	Mean	0.0055
Maximum	0.01	Median	0.004
SD	0.00251	CV	0.456
k hat (MLE)	6.166	k star (bias corrected MLE)	3.937
Theta hat (MLE)	8.9205E-4	Theta star (bias corrected MLE)	0.0014
nu hat (MLE)	98.65	nu star (bias corrected)	62.99
MLE Mean (bias corrected)	0.0055	MLE Sd (bias corrected)	0.00277
		Adjusted Level of Significance (β)	0.0195
Approximate Chi Square Value (62.99, α)	45.73	Adjusted Chi Square Value (62.99, β)	42.04
95% Gamma Approximate UCL (use when n>=50)	0.00758	95% Gamma Adjusted UCL (use when n<50)	0.00824

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.821	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.367	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.335	Detected Data Not Lognormal at 5% Significance Level

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0045	Mean in Log Scale	-5.485
SD in Original Scale	0.00199	SD in Log Scale	0.435
95% t UCL (assumes normality of ROS data)	0.00584	95% Percentile Bootstrap UCL	0.00563
95% BCA Bootstrap UCL	0.00575	95% Bootstrap t UCL	0.00698
95% H-UCL (Log ROS)	0.0066		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-5.487	95% H-UCL (KM -Log)	0.00634
KM SD (logged)	0.41	95% Critical H Value (KM-Log)	2.211
KM Standard Error of Mean (logged)	0.157		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.00438	Mean in Log Scale	-5.574
SD in Original Scale	0.0022	SD in Log Scale	0.63
95% t UCL (Assumes normality)	0.00585	95% H-Stat UCL	0.00857

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL 0.00761

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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Appendix D
HHRA Risk Characterization Spreadsheets

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High-End Seafood Consumer

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Round 1 – September to October 2013

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High-End Consumer
Octopus Ingestion Pathway
Round 1
Mauka Military Reservation

Ingestion Pathway
Octopus Ingestion

Child	Adult	
		Fish Ingestion Intake CDI (mg/kg/day) = Cfish x CF x IR x FI x EF x ED/(BW x AT)
		RME = Max Detected Concentration
		CDI = Chronic Daily Intake (mg/kg/day)
		Cfish = Chemical concentration in fish (mg/kg wet tissue weight)
1.00E-03	1.00E-03	CF = Conversion factor, kg/g
20.10	43.96	IR = Ingestion Rate, g/day
175.00	175.00	EF = Exposure Frequency (days/yr)
6.00	24.00	ED = Exposure Duration (yr)
15.00	70.00	BW = Body Weight (kg)
1.00	1.00	FI = Fraction ingested from source
2190.00	8760.00	AT = Noncancer Averaging Time (days over which exposure is averaged)
25550	25550	AT = Cancer Averaging Time (days over which exposure is averaged)

CHEMICAL	Chemical Concentration (wet weight) Child	Chemical Concentration (wet weight) Adult	Carcinogenic CDI (mg/kg/day) Child	Carcinogenic CDI (mg/kg/day) Adult	Noncarcinogenic CDI (mg/kg/day) Child	Noncarcinogenic CDI (mg/kg/day) Adult	Cancer Slope Factor (mg/kg/day)-1	Cancer Slope Factor Source	Reference Dose mg/kg/day	Reference Dose Source	Cancer Risk Child	Cancer Risk % of Total	Cancer Risk Adult	Cancer Risk % of Total	Hazard Quotient Child	Hazard Quotient % of Total	Hazard Quotient Adult	Hazard Quotient % of Total
Metals (mg/kg)																		
Lead	0.251	0.251	1.4E-05	2.6E-05	1.6E-04	7.6E-05	NA		NA									
Polychlorinated Dioxins/Furans (ng/kg)																		
2,3,7,8-TCDD	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+05	HEAST	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,7,8-PeCDD	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+05	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,4,7,8-HxCDD	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,6,7,8-HxCDD	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,7,8,9-HxCDD	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,4,6,7,8-HpCDD	0.319	0.319	1.76E-11	3.29E-11	2.05E-10	9.61E-11	1.30E+03	(a)	NA		2E-08	82.43%	4E-08	82.43%				
OCDD	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E+01	(a)	NA		0E+00	0.00%	0E+00	0.00%				
2,3,7,8-TCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,7,8-PeCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
2,3,4,7,8-PeCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,4,7,8-HxCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,6,7,8-HxCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,7,8,9-HxCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
2,3,4,6,7,8-HxCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,4,6,7,8-HpCDF	0.068	0.068	3.75E-12	7.02E-12	4.37E-11	2.05E-11	1.30E+03	(a)	NA		5E-09	17.57%	9E-09	17.57%				
1,2,3,4,7,8,9-HpCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+03	(a)	NA		0E+00	0.00%	0E+00	0.00%				
OCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E+01	(a)	NA		0E+00	0.00%	0E+00	0.00%				
Cumulative Health Risk											3E-08	100.00%	5E-08	100.00%	0.E+00	-	0.E+00	-

Notes:
Where risk values forspecific chemicals were > 0.01, the default equation (Risk = +CDI*SF) is replaced with Risk = 1-EXP(-CDI*SF).
(a) CSFs for the dioxin congeners are calculated from the toxicity of 2,3,7,8-TCDD based on World Health Organization toxic equivalency factors (WHO, 2005)

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High-End Consumer
Sea Cucumber Ingestion Pathway
Round 1
Mauka Military Reservation

Ingestion Pathway
Sea Cucumber Ingestion

Child	Adult	
		Fish Ingestion Intake CDI (mg/kg/day) = Cfish x CF x IR x FI x EF x ED/(BW x AT)
		RME = Max Detected Concentration
		CDI = Chronic Daily Intake (mg/kg/day)
		Cfish = Chemical concentration in fish (mg/kg wet tissue weight)
1.00E-03	1.00E-03	CF = Conversion factor, kg/g
10.77	23.56	IR = Ingestion Rate, g/day
175.00	175.00	EF = Exposure Frequency (days/yr)
6.00	24.00	ED = Exposure Duration (yr)
15.00	70.00	BW = Body Weight (kg)
1.00	1.00	FI = Fraction ingested from source
2190.00	8760.00	AT = Noncancer Averaging Time (days over which exposure is averaged)
25550	25550	AT = Cancer Averaging Time (days over which exposure is averaged)

CHEMICAL	Chemical Concentration (wet weight) Child	Chemical Concentration (wet weight) Adult	Carcinogenic CDI (mg/kg/day) Child	Carcinogenic CDI (mg/kg/day) Adult	Noncarcinogenic CDI (mg/kg/day) Child	Noncarcinogenic CDI (mg/kg/day) Adult	Cancer Slope Factor (mg/kg/day)-1	Cancer Slope Factor Source	Reference Dose mg/kg/day	Reference Dose Source	Cancer Risk Child	Cancer Risk % of Total	Cancer Risk Adult	Cancer Risk % of Total	Hazard Quotient Child	Hazard Quotient % of Total	Hazard Quotient Adult	Hazard Quotient % of Total
Metals (mg/kg)																		
Arsenic	0.021	0.021	6.2E-08	1.2E-07	7.2E-07	3.4E-07	1.50E+00	IRIS	3.00E-04	IRIS	9.3E-08	100.0%	1.7E-07	100.0%	2.4E-03	100.0%	1.1E-03	100.0%
Chromium							5.00E-01	NJ	3.00E-03	IRIS								
Cumulative Health Risk											9E-08	100.00%	2E-07	100.00%	2.E-03	100.00%	1.E-03	100.00%

Notes:
Where risk values forspecific chemicals were > 0.01, the default equation (Risk = +CDI*SF) is replaced with Risk = 1-EXP(-CDI*SF).
Studies indicate that chromium present in biological species generally exists in the nontoxic trivalent (Chromium III) state (DeCarlo 2004, 2005 and Frey 1994) therefore this assessment assumes that the chromium detected in site biota would not contribute to health risks.

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High-End Consumer
Limu Ingestion Pathway
Round 1
Mauka Military Reservation

Ingestion Pathway
Limu Ingestion

Child	Adult	
		Fish Ingestion Intake CDI (mg/kg/day) = Cfish x CF x IR x FI x EF x ED/(BW x AT)
		RME = Max Detected Concentration
		CDI = Chronic Daily Intake (mg/kg/day)
		Cfish = Chemical concentration in fish (mg/kg wet tissue weight)
1.00E-03	1.00E-03	CF = Conversion factor, kg/g
9.87	21.59	IR = Ingestion Rate, g/day
175.00	175.00	EF = Exposure Frequency (days/yr)
6.00	24.00	ED = Exposure Duration (yr)
15.00	70.00	BW = Body Weight (kg)
1.00	1.00	FI = Fraction ingested from source
2190.00	8760.00	AT = Noncancer Averaging Time (days over which exposure is averaged)
25550	25550	AT = Cancer Averaging Time (days over which exposure is averaged)

CHEMICAL	Chemical Concentration (wet weight) Child	Chemical Concentration (wet weight) Adult	Carcinogenic CDI (mg/kg/day) Child	Carcinogenic CDI (mg/kg/day) Adult	Noncarcinogenic CDI (mg/kg/day) Child	Noncarcinogenic CDI (mg/kg/day) Adult	Cancer Slope Factor (mg/kg/day)-1	Cancer Slope Factor Source	Reference Dose mg/kg/day	Reference Dose Source	Cancer Risk Child	Cancer Risk % of Total	Cancer Risk Adult	Cancer Risk % of Total	Hazard Quotient Child	Hazard Quotient % of Total	Hazard Quotient Adult	Hazard Quotient % of Total
Metals (mg/kg)																		
Cobalt	0.0797	0.0797	2.2E-06	4.0E-06	2.5E-05	1.2E-05	NA		3.00E-04	PPRTV					8.4E-02	3.6%	3.9E-02	3.6%
Lead	0.47	0.47	1.3E-05	2.4E-05	1.5E-04	7.0E-05	NA		NA									
Thallium	0.00585	0.00585	1.6E-07	3.0E-07	1.8E-06	8.7E-07	NA		1.00E-05	IRIS					1.8E-01	7.9%	8.7E-02	7.9%
Chlorinated Pesticides (µg/kg)																		
Heptachlor	54.77	54.77	1.48E-06	2.78E-06	1.73E-05	8.10E-06	4.50E+00	IRIS	5.00E-04	IRIS	7E-06	23.69%	1E-05	23.69%	3.46E-02	1.48%	1.62E-02	1.48%
Heptachlor epoxide	83.9	83.9	2.27E-06	4.25E-06	2.65E-05	1.24E-05	9.10E+00	IRIS	1.30E-05	IRIS	2E-05	73.37%	4E-05	73.37%	2.04E+00	87.05%	9.54E-01	87.05%
Polychlorinated Dioxins/Furans (ng/kg)																		
2,3,7,8-TCDD			0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+05	CalEPA	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,7,8-PeCDD	0.046	0.046	1.24E-12	2.33E-12	1.45E-11	6.80E-12	1.30E+05	(a)	NA		2E-07	0.57%	3E-07	0.57%				
1,2,3,4,7,8-HxCDD			0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,6,7,8-HxCDD			0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,7,8,9-HxCDD	1.1	1.1	2.97E-11	5.58E-11	3.47E-10	1.63E-10	1.30E+04	(a)	NA		4E-07	1.37%	7E-07	1.37%				
1,2,3,4,6,7,8-HpCDD	3.6	3.6	9.73E-11	1.83E-10	1.14E-09	5.32E-10	1.30E+03	(a)	NA		1E-07	0.45%	2E-07	0.45%				
OCDD	60	60	1.62E-09	3.04E-09	1.89E-08	8.87E-09	3.90E+01	(a)	NA		6E-08	0.22%	1E-07	0.22%				
2,3,7,8-TCDF	0.107	0.107	2.89E-12	5.42E-12	3.38E-11	1.58E-11	1.30E+04	(a)	NA		4E-08	0.13%	7E-08	0.13%				
1,2,3,7,8-PeCDF			0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
2,3,4,7,8-PeCDF			0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,4,7,8-HxCDF			0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,6,7,8-HxCDF	0.057	0.057	1.54E-12	2.89E-12	1.80E-11	8.43E-12	1.30E+04	(a)	NA		2E-08	0.07%	4E-08	0.07%				
1,2,3,7,8,9-HxCDF			0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
2,3,4,6,7,8-HxCDF			0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,4,6,7,8-HpCDF	0.529	0.529	1.43E-11	2.68E-11	1.67E-10	7.82E-11	1.30E+03	(a)	NA		2E-08	0.07%	3E-08	0.07%				
1,2,3,4,7,8,9-HpCDF	0.057	0.057	1.54E-12	2.89E-12	1.80E-11	8.43E-12	1.30E+03	(a)	NA		2E-09	0.01%	4E-09	0.01%				
OCDF	10	10	2.70E-10	5.07E-10	3.15E-09	1.48E-09	3.90E+01	(a)	NA		1E-08	0.04%	2E-08	0.04%				
Cumulative Health Risk											3E-05	100.00%	5E-05	100.00%	2.E+00	100.00%	1.E+00	100.00%

Notes:
Where risk values forspecific chemicals were > 0.01, the default equation (Risk = +CDI*SF) is replaced with Risk = 1-EXP(-CDI*SF).
(a) CSFs for the dioxin congeners are calculated from the toxicity of 2,3,7,8-TCDD based on World Health Organization toxic equivalency factors (WHO, 2005)

Draft

Round 2 – January to March 2014

Draft

High-End Consumer
Octopus Ingestion Pathway
Round 2
Mauka Military Reservation

Ingestion Pathway
Octopus Ingestion

Child	Adult	
		Fish Ingestion Intake CDI (mg/kg/day) = Cfish x CF x IR x FI x EF x ED/(BW x AT)
		RME = Max Detected Concentration
		CDI = Chronic Daily Intake (mg/kg/day)
		Cfish = Chemical concentration in fish (mg/kg wet tissue weight)
1.00E-03	1.00E-03	CF = Conversion factor, kg/g
20.10	43.96	IR = Ingestion Rate, g/day
175.00	175.00	EF = Exposure Frequency (days/yr)
6.00	24.00	ED = Exposure Duration (yr)
15.00	70.00	BW = Body Weight (kg)
1.00	1.00	FI = Fraction ingested from source
2190.00	8760.00	AT = Noncancer Averaging Time (days over which exposure is averaged)
25550	25550	AT = Cancer Averaging Time (days over which exposure is averaged)

CHEMICAL	Chemical Concentration (wet weight) Child	Chemical Concentration (wet weight) Adult	Carcinogenic CDI (mg/kg/day) Child	Carcinogenic CDI (mg/kg/day) Adult	Noncarcinogenic CDI (mg/kg/day) Child	Noncarcinogenic CDI (mg/kg/day) Adult	Cancer Slope Factor (mg/kg/day)-1	Cancer Slope Factor Source	Reference Dose mg/kg/day	Reference Dose Source	Cancer Risk Child	Cancer Risk % of Total	Cancer Risk Adult	Cancer Risk % of Total	Hazard Quotient Child	Hazard Quotient % of Total	Hazard Quotient Adult	Hazard Quotient % of Total
Metals (mg/kg)																		
Lead	0.0342	0.0342	1.9E-06	3.5E-06	2.2E-05	1.0E-05	NA		NA									
Polychlorinated Dioxins/Furans (ng/kg)																		
2,3,7,8-TCDD	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+05	HEAST	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,7,8-PeCDD	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+05	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,4,7,8-HxCDD	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,6,7,8-HxCDD	0.047	0.047	2.59E-12	4.85E-12	3.02E-11	1.42E-11	1.30E+04	(a)	NA		3E-08	30.44%	6E-08	30.44%				
1,2,3,7,8,9-HxCDD	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,4,6,7,8-HpCDD	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+03	(a)	NA		0E+00	0.00%	0E+00	0.00%				
OCDD	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E+01	(a)	NA		0E+00	0.00%	0E+00	0.00%				
2,3,7,8-TCDF	0.0734	0.0734	4.04E-12	7.58E-12	4.72E-11	2.21E-11	1.30E+04	(a)	NA		5E-08	47.54%	1E-07	47.54%				
1,2,3,7,8-PeCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
2,3,4,7,8-PeCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,4,7,8-HxCDF	0.034	0.034	1.87E-12	3.51E-12	2.18E-11	1.02E-11	1.30E+04	(a)	NA		2E-08	22.02%	5E-08	22.02%				
1,2,3,6,7,8-HxCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,7,8,9-HxCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
2,3,4,6,7,8-HxCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,4,6,7,8-HpCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+03	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,4,7,8,9-HpCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+03	(a)	NA		0E+00	0.00%	0E+00	0.00%				
OCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E+01	(a)	NA		0E+00	0.00%	0E+00	0.00%				
Cumulative Health Risk											1E-07	100.00%	2E-07	100.00%	0.E+00	-	0.E+00	-

Notes:
Where risk values forspecific chemicals were > 0.01, the default equation (Risk = +CDI*SF) is replaced with Risk = 1-EXP(-CDI*SF).
(a) CSFs for the dioxin congeners are calculated from the toxicity of 2,3,7,8-TCDD based on World Health Organization toxic equivalency factors (WHO, 2005)

Draft

High-End Consumer
Sea Cucumber Ingestion Pathway
Round 2
Mauka Military Reservation

Ingestion Pathway
Sea Cucumber Ingestion

Child	Adult	
		Fish Ingestion Intake CDI (mg/kg/day) = Cfish x CF x IR x FI x EF x ED/(BW x AT)
		RME = Max Detected Concentration
		CDI = Chronic Daily Intake (mg/kg/day)
		Cfish = Chemical concentration in fish (mg/kg wet tissue weight)
1.00E-03	1.00E-03	CF = Conversion factor, kg/g
10.77	23.56	IR = Ingestion Rate, g/day
175.00	175.00	EF = Exposure Frequency (days/yr)
6.00	24.00	ED = Exposure Duration (yr)
15.00	70.00	BW = Body Weight (kg)
1.00	1.00	FI = Fraction ingested from source
2190.00	8760.00	AT = Noncancer Averaging Time (days over which exposure is averaged)
25550	25550	AT = Cancer Averaging Time (days over which exposure is averaged)

CHEMICAL	Chemical Concentration (wet weight) Child	Chemical Concentration (wet weight) Adult	Carcinogenic CDI (mg/kg/day) Child	Carcinogenic CDI (mg/kg/day) Adult	Noncarcinogenic CDI (mg/kg/day) Child	Noncarcinogenic CDI (mg/kg/day) Adult	Cancer Slope Factor (mg/kg/day)-1	Cancer Slope Factor Source	Reference Dose mg/kg/day	Reference Dose Source	Cancer Risk Child	Cancer Risk % of Total	Cancer Risk Adult	Cancer Risk % of Total	Hazard Quotient Child	Hazard Quotient % of Total	Hazard Quotient Adult	Hazard Quotient % of Total
Metals (mg/kg)																		
Arsenic	0.0456	0.0456	1.3E-07	2.5E-07	1.6E-06	7.4E-07	1.50E+00	IRIS	3.00E-04	IRIS	2.0E-07	100.0%	3.8E-07	100.0%	5.2E-03	100.0%	2.5E-03	100.0%
Chromium							5.00E-01	NJ	3.00E-03	IRIS								
Cumulative Health Risk											2E-07	100.00%	4E-07	100.00%	5.E-03	100.00%	2.E-03	100.00%

Notes:
Where risk values forspecific chemicals were > 0.01, the default equation (Risk = +CDI*SF) is replaced with Risk = 1-EXP(-CDI*SF).
Studies indicate that chromium present in biological species generally exists in the nontoxic trivalent (Chromium III) state (DeCarlo 2004, 2005 and Frey 1994) therefore this assessment assumes that the chromium detected in site biota would not contribute to health risks.

Draft

High-End Consumer
Limu Ingestion Pathway
Round 2
Mauka Military Reservation

Ingestion Pathway
Limu Ingestion

Child	Adult	
		Fish Ingestion Intake CDI (mg/kg/day) = Cfish x CF x IR x FI x EF x ED/(BW x AT)
		RME = Max Detected Concentration
		CDI = Chronic Daily Intake (mg/kg/day)
		Cfish = Chemical concentration in fish (mg/kg wet tissue weight)
1.00E-03	1.00E-03	CF = Conversion factor, kg/g
9.87	21.59	IR = Ingestion Rate, g/day
175.00	175.00	EF = Exposure Frequency (days/yr)
6.00	24.00	ED = Exposure Duration (yr)
15.00	70.00	BW = Body Weight (kg)
1.00	1.00	FI = Fraction ingested from source
2190.00	8760.00	AT = Noncancer Averaging Time (days over which exposure is averaged)
25550	25550	AT = Cancer Averaging Time (days over which exposure is averaged)

CHEMICAL	Chemical Concentration (wet weight) Child	Chemical Concentration (wet weight) Adult	Carcinogenic CDI (mg/kg/day) Child	Carcinogenic CDI (mg/kg/day) Adult	Noncarcinogenic CDI (mg/kg/day) Child	Noncarcinogenic CDI (mg/kg/day) Adult	Cancer Slope Factor (mg/kg/day)-1	Cancer Slope Factor Source	Reference Dose mg/kg/day	Reference Dose Source	Cancer Risk Child	Cancer Risk % of Total	Cancer Risk Adult	Cancer Risk % of Total	Hazard Quotient Child	Hazard Quotient % of Total	Hazard Quotient Adult	Hazard Quotient % of Total
Metals (mg/kg)																		
Cobalt	0.392	0.392	1.1E-05	2.0E-05	1.2E-04	5.8E-05	NA		3.00E-04	PPRTV					4.1E-01	63.2%	1.9E-01	63.2%
Lead	1.58	1.58	4.3E-05	8.0E-05	5.0E-04	2.3E-04	NA		NA									
Thallium	0.00761	0.00761	2.1E-07	3.9E-07	2.4E-06	1.1E-06	NA		1.00E-05	IRIS					2.4E-01	36.8%	1.1E-01	36.8%
Chlorinated Pesticides (µg/kg)																		
Heptachlor			0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.50E+00	IRIS	5.00E-04	IRIS	0E+00	0.00%	0E+00	0.00%	0.00E+00	0.00%	0.00E+00	0.00%
Heptachlor epoxide			0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.10E+00	IRIS	1.30E-05	IRIS	0E+00	0.00%	0E+00	0.00%	0.00E+00	0.00%	0.00E+00	0.00%
Polychlorinated Dioxins/Furans (ng/kg)																		
2,3,7,8-TCDD			0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+05	CalEPA	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,7,8-PeCDD			0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+05	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,4,7,8-HxCDD	0.09	0.09	2.43E-12	4.56E-12	2.84E-11	1.33E-11	1.30E+04	(a)	NA		3E-08	44.69%	6E-08	44.69%				
1,2,3,6,7,8-HxCDD			0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,7,8,9-HxCDD			0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,4,6,7,8-HpCDD	0.0857	0.0857	2.32E-12	4.35E-12	2.70E-11	1.27E-11	1.30E+03	(a)	NA		3E-09	4.26%	6E-09	4.26%				
OCDD	0.645	0.645	1.74E-11	3.27E-11	2.03E-10	9.54E-11	3.90E+01	(a)	NA		7E-10	0.96%	1E-09	0.96%				
2,3,7,8-TCDF			0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,7,8-PeCDF			0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
2,3,4,7,8-PeCDF			0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,4,7,8-HxCDF	0.023	0.023	6.22E-13	1.17E-12	7.26E-12	3.40E-12	1.30E+04	(a)	NA		8E-09	11.42%	2E-08	11.42%				
1,2,3,6,7,8-HxCDF	0.029	0.029	7.84E-13	1.47E-12	9.15E-12	4.29E-12	1.30E+04	(a)	NA		1E-08	14.40%	2E-08	14.40%				
1,2,3,7,8,9-HxCDF	0.024	0.024	6.49E-13	1.22E-12	7.57E-12	3.55E-12	1.30E+04	(a)	NA		8E-09	11.92%	2E-08	11.92%				
2,3,4,6,7,8-HxCDF	0.019	0.019	5.14E-13	9.63E-13	5.99E-12	2.81E-12	1.30E+04	(a)	NA		7E-09	9.43%	1E-08	9.43%				
1,2,3,4,6,7,8-HpCDF	0.0552	0.0552	1.49E-12	2.80E-12	1.74E-11	8.16E-12	1.30E+03	(a)	NA		2E-09	2.74%	4E-09	2.74%				
1,2,3,4,7,8,9-HpCDF			0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+03	(a)	NA		0E+00	0.00%	0E+00	0.00%				
OCDF	0.12	0.12	3.24E-12	6.08E-12	3.79E-11	1.77E-11	3.90E+01	(a)	NA		1E-10	0.18%	2E-10	0.18%				
Cumulative Health Risk											7E-08	100.00%	1E-07	100.00%	7.E-01	100.00%	3.E-01	100.00%

Notes:
Where risk values forspecific chemicals were > 0.01, the default equation (Risk = +CDI*SF) is replaced with Risk = 1-EXP(-CDI*SF).
(a) CSFs for the dioxin congeners are calculated from the toxicity of 2,3,7,8-TCDD based on World Health Organization toxic equivalency factors (WHO, 2005)

Draft

Average Seafood Consumer

Draft

Round 1 – September to October 2013

Draft

Average Consumer
Octopus Ingestion Pathway
Round 1
Mauka Military Reservation

Ingestion Pathway
Octopus Ingestion

Child	Adult	
		Fish Ingestion Intake CDI (mg/kg/day) = Cfish x CF x IR x FI x EF x ED/(BW x AT)
		RME = Max Detected Concentration
		CDI = Chronic Daily Intake (mg/kg/day)
		Cfish = Chemical concentration in fish (mg/kg wet tissue weight)
1.00E-03	1.00E-03	CF = Conversion factor, kg/g
9.76	23.00	IR = Ingestion Rate, g/day
175.00	175.00	EF = Exposure Frequency (days/yr)
6.00	24.00	ED = Exposure Duration (yr)
15.00	70.00	BW = Body Weight (kg)
1.00	1.00	FI = Fraction ingested from source
2190.00	8760.00	AT = Noncancer Averaging Time (days over which exposure is averaged)
25550	25550	AT = Cancer Averaging Time (days over which exposure is averaged)

CHEMICAL	Chemical Concentration (wet weight) Child	Chemical Concentration (wet weight) Adult	Carcinogenic CDI (mg/kg/day) Child	Carcinogenic CDI (mg/kg/day) Adult	Noncarcinogenic CDI (mg/kg/day) Child	Noncarcinogenic CDI (mg/kg/day) Adult	Cancer Slope Factor (mg/kg/day)-1	Cancer Slope Factor Source	Reference Dose mg/kg/day	Reference Dose Source	Cancer Risk Child	Cancer Risk % of Total	Cancer Risk Adult	Cancer Risk % of Total	Hazard Quotient Child	Hazard Quotient % of Total	Hazard Quotient Adult	Hazard Quotient % of Total
Metals (mg/kg)																		
Lead	0.06	0.06	1.6E-06	3.2E-06	1.9E-05	9.5E-06	NA		NA									
Dioxins/Furans (ng/kg)																		
2,3,7,8-TCDD	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+05	HEAST	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,7,8-PeCDD	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+05	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,4,7,8-HxCDD	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,6,7,8-HxCDD	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,7,8,9-HxCDD	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,4,6,7,8-HpCDD	0.2675	0.2675	7.15E-12	1.44E-11	8.34E-11	4.21E-11	1.30E+03	(a)	NA		9E-09	79.73%	2E-08	79.73%				
OCDD	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E+01	(a)	NA		0E+00	0.00%	0E+00	0.00%				
2,3,7,8-TCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,7,8-PeCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
2,3,4,7,8-PeCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,4,7,8-HxCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,6,7,8-HxCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,7,8,9-HxCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
2,3,4,6,7,8-HxCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,4,6,7,8-HpCDF	0.068	0.068	1.82E-12	3.67E-12	2.12E-11	1.07E-11	1.30E+03	(a)	NA		2E-09	20.27%	5E-09	20.27%				
1,2,3,4,7,8,9-HpCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+03	(a)	NA		0E+00	0.00%	0E+00	0.00%				
OCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E+01	(a)	NA		0E+00	0.00%	0E+00	0.00%				
Cumulative Health Risk											1E-08	100.00%	2E-08	100.00%	0.E+00		0.E+00	

Notes:
Where risk values forspecific chemicals were > 0.01, the default equation (Risk = +CDI*SF) is replaced with Risk = 1-EXP(-CDI*SF).
(a) CSFs for the dioxin congeners are calculated from the toxicity of 2,3,7,8-TCDD based on World Health Organization toxic equivalency factors (WHO, 2005)

Draft

Average Consumer
Sea Cucumber Ingestion Pathway
Round 1
Mauka Military Reservation

Ingestion Pathway
Sea Cucumber Ingestion

Child	Adult	
		Fish Ingestion Intake CDI (mg/kg/day) = Cfish x CF x IR x FI x EF x ED/(BW x AT)
		RME = Max Detected Concentration
		CDI = Chronic Daily Intake (mg/kg/day)
		Cfish = Chemical concentration in fish (mg/kg wet tissue weight)
1.00E-03	1.00E-03	CF = Conversion factor, kg/g
5.23	12.32	IR = Ingestion Rate, g/day
175.00	175.00	EF = Exposure Frequency (days/yr)
6.00	24.00	ED = Exposure Duration (yr)
15.00	70.00	BW = Body Weight (kg)
1.00	1.00	FI = Fraction ingested from source
2190.00	8760.00	AT = Noncancer Averaging Time (days over which exposure is averaged)
25550	25550	AT = Cancer Averaging Time (days over which exposure is averaged)

CHEMICAL	Chemical Concentration (wet weight) Child	Chemical Concentration (wet weight) Adult	Carcinogenic CDI (mg/kg/day) Child	Carcinogenic CDI (mg/kg/day) Adult	Noncarcinogenic CDI (mg/kg/day) Child	Noncarcinogenic CDI (mg/kg/day) Adult	Cancer Slope Factor (mg/kg/day)-1	Cancer Slope Factor Source	Reference Dose mg/kg/day	Reference Dose Source	Cancer Risk Child	Cancer Risk % of Total	Cancer Risk Adult	Cancer Risk % of Total	Hazard Quotient Child	Hazard Quotient % of Total	Hazard Quotient Adult	Hazard Quotient % of Total
Metals (mg/kg)																		
Arsenic	0.015125	0.015125	2.2E-08	4.4E-08	2.5E-07	1.3E-07	1.50E+00	IRIS	3.00E-04	IRIS	3.3E-08	100.0%	6.6E-08	100.0%	8.4E-04	100.0%	4.3E-04	100.0%
Chromium							5.00E-01	NJ	3.00E-03	IRIS								
Cumulative Health Risk											3E-08	100.00%	7E-08	100.00%	8.E-04	100.00%	4.E-04	100.00%

Notes:
Where risk values forspecific chemicals were > 0.01, the default equation (Risk = +CDI*SF) is replaced with Risk = 1-EXP(-CDI*SF).
Studies indicate that chromium present in biological species generally exists in the nontoxic trivalent (Chromium III) state (DeCarlo 2004, 2005 and Frey 1994) therefore this assessment assumes that the chromium detected in site biota would not contribute to health risks.

Draft

Average Consumer
Limu Ingestion Pathway
Round 1
Mauka Military Reservation

Ingestion Pathway
Limu Ingestion

Child	Adult	
		Fish Ingestion Intake CDI (mg/kg/day) = Cfish x CF x IR x FI x EF x ED/(BW x AT)
		RME = Max Detected Concentration
		CDI = Chronic Daily Intake (mg/kg/day)
		Cfish = Chemical concentration in fish (mg/kg wet tissue weight)
1.00E-03	1.00E-03	CF = Conversion factor, kg/g
4.79	11.29	IR = Ingestion Rate, g/day
175.00	175.00	EF = Exposure Frequency (days/yr)
6.00	24.00	ED = Exposure Duration (yr)
15.00	70.00	BW = Body Weight (kg)
1.00	1.00	FI = Fraction ingested from source
2190.00	8760.00	AT = Noncancer Averaging Time (days over which exposure is averaged)
25550	25550	AT = Cancer Averaging Time (days over which exposure is averaged)

CHEMICAL	Chemical Concentration (wet weight) Child	Chemical Concentration (wet weight) Adult	Carcinogenic CDI (mg/kg/day) Child	Carcinogenic CDI (mg/kg/day) Adult	Noncarcinogenic CDI (mg/kg/day) Child	Noncarcinogenic CDI (mg/kg/day) Adult	Cancer Slope Factor (mg/kg/day)-1	Cancer Slope Factor Source	Reference Dose mg/kg/day	Reference Dose Source	Cancer Risk Child	Cancer Risk % of Total	Cancer Risk Adult	Cancer Risk % of Total	Hazard Quotient Child	Hazard Quotient % of Total	Hazard Quotient Adult	Hazard Quotient % of Total
Metals (mg/kg)																		
Cobalt	0.064	0.064	8.4E-07	1.7E-06	9.8E-06	4.9E-06	NA		3.00E-04	PPRTV					3.3E-02	11.5%	1.6E-02	11.5%
Lead	0.361	0.361	4.7E-06	9.6E-06	5.5E-05	2.8E-05	NA		NA									
Thallium	0.0049	0.0049	6.4E-08	1.3E-07	7.5E-07	3.8E-07	NA		1.00E-05	IRIS					7.5E-02	26.4%	3.8E-02	26.4%
Chlorinated Pesticides (µg/kg)																		
Heptachlor	37.675	37.675	4.95E-07	9.99E-07	5.77E-06	2.91E-06	4.50E+00	IRIS	5.00E-04	IRIS	2E-06	54.79%	4E-06	54.79%	1.15E-02	4.06%	5.83E-03	4.06%
Heptachlor epoxide	13.9875	13.9875	1.84E-07	3.71E-07	2.14E-06	1.08E-06	9.10E+00	IRIS	1.30E-05	IRIS	2E-06	41.13%	3E-06	41.13%	1.65E-01	58.01%	8.32E-02	58.01%
Dioxins/Furans (ng/kg)																		
2,3,7,8-TCDD			0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+05	CalEPA	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,7,8-PeCDD	0.045	0.045	5.91E-13	1.19E-12	6.89E-12	3.48E-12	1.30E+05	(a)	NA		8E-08	1.89%	2E-07	1.89%				
1,2,3,4,7,8-HxCDD			0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,6,7,8-HxCDD			0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,7,8,9-HxCDD	0.268	0.268	3.52E-12	7.11E-12	4.10E-11	2.07E-11	1.30E+04	(a)	NA		5E-08	1.13%	9E-08	1.13%				
1,2,3,4,6,7,8-HpCDD	0.54	0.54	7.09E-12	1.43E-11	8.27E-11	4.18E-11	1.30E+03	(a)	NA		9E-09	0.23%	2E-08	0.23%				
OCDD	7.978	7.978	1.05E-10	2.12E-10	1.22E-09	6.17E-10	3.90E+01	(a)	NA		4E-09	0.10%	8E-09	0.10%				
2,3,7,8-TCDF	0.107	0.107	1.40E-12	2.84E-12	1.64E-11	8.28E-12	1.30E+04	(a)	NA		2E-08	0.45%	4E-08	0.45%				
1,2,3,7,8-PeCDF			0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
2,3,4,7,8-PeCDF			0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,4,7,8-HxCDF			0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,6,7,8-HxCDF	0.043	0.043	5.64E-13	1.14E-12	6.58E-12	3.33E-12	1.30E+04	(a)	NA		7E-09	0.18%	1E-08	0.18%				
1,2,3,7,8,9-HxCDF			0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
2,3,4,6,7,8-HxCDF			0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,4,6,7,8-HpCDF	0.152	0.152	2.00E-12	4.03E-12	2.33E-11	1.18E-11	1.30E+03	(a)	NA		3E-09	0.06%	5E-09	0.06%				
1,2,3,4,7,8,9-HpCDF	0.057	0.057	7.48E-13	1.51E-12	8.73E-12	4.41E-12	1.30E+03	(a)	NA		1E-09	0.02%	2E-09	0.02%				
OCDF	1.386	1.386	1.82E-11	3.68E-11	2.12E-10	1.07E-10	3.90E+01	(a)	NA		7E-10	0.02%	1E-09	0.02%				
Cumulative Health Risk											4E-06	100.00%	8E-06	100.00%	3.E-01	100.00%	1.E-01	100.00%

Notes:
Where risk values forspecific chemicals were > 0.01, the default equation (Risk = +CDI*SF) is replaced with Risk = 1-EXP(-CDI*SF).
(a) CSFs for the dioxin congeners are calculated from the toxicity of 2,3,7,8-TCDD based on World Health Organization toxic equivalency factors (WHO, 2005)

Draft

Round 2 – January to March 2014

Draft

Average Consumer
Octopus Ingestion Pathway
Round 2
Mauka Military Reservation

Ingestion Pathway
Octopus Ingestion

Child	Adult	
		Fish Ingestion Intake CDI (mg/kg/day) = Cfish x CF x IR x FI x EF x ED/(BW x AT)
		RME = Max Detected Concentration
		CDI = Chronic Daily Intake (mg/kg/day)
		Cfish = Chemical concentration in fish (mg/kg wet tissue weight)
1.00E-03	1.00E-03	CF = Conversion factor, kg/g
9.76	23.00	IR = Ingestion Rate, g/day
175.00	175.00	EF = Exposure Frequency (days/yr)
6.00	24.00	ED = Exposure Duration (yr)
15.00	70.00	BW = Body Weight (kg)
1.00	1.00	FI = Fraction ingested from source
2190.00	8760.00	AT = Noncancer Averaging Time (days over which exposure is averaged)
25550	25550	AT = Cancer Averaging Time (days over which exposure is averaged)

CHEMICAL	Chemical Concentration (wet weight) Child	Chemical Concentration (wet weight) Adult	Carcinogenic CDI (mg/kg/day) Child	Carcinogenic CDI (mg/kg/day) Adult	Noncarcinogenic CDI (mg/kg/day) Child	Noncarcinogenic CDI (mg/kg/day) Adult	Cancer Slope Factor (mg/kg/day)-1	Cancer Slope Factor Source	Reference Dose mg/kg/day	Reference Dose Source	Cancer Risk Child	Cancer Risk % of Total	Cancer Risk Adult	Cancer Risk % of Total	Hazard Quotient Child	Hazard Quotient % of Total	Hazard Quotient Adult	Hazard Quotient % of Total
Metals (mg/kg)																		
Lead	0.025875	0.025875	6.9E-07	1.4E-06	8.1E-06	4.1E-06	NA		NA									
Dioxins/Furans (ng/kg)																		
2,3,7,8-TCDD	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+05	HEAST	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,7,8-PeCDD	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+05	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,4,7,8-HxCDD	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,6,7,8-HxCDD	0.040875	0.040875	1.09E-12	2.21E-12	1.27E-11	6.44E-12	1.30E+04	(a)	NA		1E-08	28.21%	3E-08	28.21%				
1,2,3,7,8,9-HxCDD	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,4,6,7,8-HpCDD	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+03	(a)	NA		0E+00	0.00%	0E+00	0.00%				
OCDD	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E+01	(a)	NA		0E+00	0.00%	0E+00	0.00%				
2,3,7,8-TCDF	0.064125	0.064125	1.71E-12	3.46E-12	2.00E-11	1.01E-11	1.30E+04	(a)	NA		2E-08	44.26%	5E-08	44.26%				
1,2,3,7,8-PeCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
2,3,4,7,8-PeCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,4,7,8-HxCDF	0.039875	0.039875	1.07E-12	2.15E-12	1.24E-11	6.28E-12	1.30E+04	(a)	NA		1E-08	27.52%	3E-08	27.52%				
1,2,3,6,7,8-HxCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,7,8,9-HxCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
2,3,4,6,7,8-HxCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,4,6,7,8-HpCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+03	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,4,7,8,9-HpCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+03	(a)	NA		0E+00	0.00%	0E+00	0.00%				
OCDF	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E+01	(a)	NA		0E+00	0.00%	0E+00	0.00%				
Cumulative Health Risk											5E-08	100.00%	1E-07	100.00%	0.E+00	#DIV/0!	0.E+00	#DIV/0!

Notes:
Where risk values forspecific chemicals were > 0.01, the default equation (Risk = +CDI*SF) is replaced with Risk = 1-EXP(-CDI*SF).
(a) CSFs for the dioxin congeners are calculated from the toxicity of 2,3,7,8-TCDD based on World Health Organization toxic equivalency factors (WHO, 2005)

Draft

Average Consumer
Sea Cucumber Ingestion Pathway
Round 2
Mauka Military Reservation

Ingestion Pathway
Sea Cucumber Ingestion

Child	Adult	
		Fish Ingestion Intake CDI (mg/kg/day) = Cfish x CF x IR x FI x EF x ED/(BW x AT)
		RME = Max Detected Concentration
		CDI = Chronic Daily Intake (mg/kg/day)
		Cfish = Chemical concentration in fish (mg/kg wet tissue weight)
1.00E-03	1.00E-03	CF = Conversion factor, kg/g
5.23	12.32	IR = Ingestion Rate, g/day
175.00	175.00	EF = Exposure Frequency (days/yr)
6.00	24.00	ED = Exposure Duration (yr)
15.00	70.00	BW = Body Weight (kg)
1.00	1.00	FI = Fraction ingested from source
2190.00	8760.00	AT = Noncancer Averaging Time (days over which exposure is averaged)
25550	25550	AT = Cancer Averaging Time (days over which exposure is averaged)

CHEMICAL	Chemical Concentration (wet weight) Child	Chemical Concentration (wet weight) Adult	Carcinogenic CDI (mg/kg/day) Child	Carcinogenic CDI (mg/kg/day) Adult	Noncarcinogenic CDI (mg/kg/day) Child	Noncarcinogenic CDI (mg/kg/day) Adult	Cancer Slope Factor (mg/kg/day)-1	Cancer Slope Factor Source	Reference Dose mg/kg/day	Reference Dose Source	Cancer Risk Child	Cancer Risk % of Total	Cancer Risk Adult	Cancer Risk % of Total	Hazard Quotient Child	Hazard Quotient % of Total	Hazard Quotient Adult	Hazard Quotient % of Total
Metals (mg/kg)																		
Arsenic	0.03025	0.03025	4.3E-08	8.8E-08	5.1E-07	2.6E-07	1.50E+00	IRIS	3.00E-04	IRIS	6.5E-08	100.0%	1.3E-07	100.0%	1.7E-03	100.0%	8.5E-04	100.0%
Chromium							5.00E-01	NJ	3.00E-03	IRIS								
Cumulative Health Risk											7E-08	100.00%	1E-07	100.00%	2.E-03	100.00%	9.E-04	100.00%

Notes:
Where risk values forspecific chemicals were > 0.01, the default equation (Risk = +CDI*SF) is replaced with Risk = 1-EXP(-CDI*SF).
Studies indicate that chromium present in biological species generally exists in the nontoxic trivalent (Chromium III) state (DeCarlo 2004, 2005 and Frey 1994) therefore this assessment assumes that the chromium detected in site biota would not contribute to health risks.

Draft

Average Consumer
Limu Ingestion Pathway
Round 2
Mauka Military Reservation

Ingestion Pathway
Limu Ingestion

Child	Adult	
		Fish Ingestion Intake CDI (mg/kg/day) = Cfish x CF x IR x FI x EF x ED/(BW x AT)
		RME = Max Detected Concentration
		CDI = Chronic Daily Intake (mg/kg/day)
		Cfish = Chemical concentration in fish (mg/kg wet tissue weight)
1.00E-03	1.00E-03	CF = Conversion factor, kg/g
4.79	11.29	IR = Ingestion Rate, g/day
175.00	175.00	EF = Exposure Frequency (days/yr)
6.00	24.00	ED = Exposure Duration (yr)
15.00	70.00	BW = Body Weight (kg)
1.00	1.00	FI = Fraction ingested from source
2190.00	8760.00	AT = Noncancer Averaging Time (days over which exposure is averaged)
25550	25550	AT = Cancer Averaging Time (days over which exposure is averaged)

CHEMICAL	Chemical Concentration (wet weight) Child	Chemical Concentration (wet weight) Adult	Carcinogenic CDI (mg/kg/day) Child	Carcinogenic CDI (mg/kg/day) Adult	Noncarcinogenic CDI (mg/kg/day) Child	Noncarcinogenic CDI (mg/kg/day) Adult	Cancer Slope Factor (mg/kg/day)-1	Cancer Slope Factor Source	Reference Dose mg/kg/day	Reference Dose Source	Cancer Risk Child	Cancer Risk % of Total	Cancer Risk Adult	Cancer Risk % of Total	Hazard Quotient Child	Hazard Quotient % of Total	Hazard Quotient Adult	Hazard Quotient % of Total
Metals (mg/kg)																		
Cobalt	0.23	0.23	3.0E-06	6.1E-06	3.5E-05	1.8E-05	NA		3.00E-04	PPRTV					1.2E-01	63.0%	5.9E-02	63.0%
Lead	0.76375	0.76375	1.0E-05	2.0E-05	1.2E-04	5.9E-05	NA		NA									
Thallium	0.0045	0.0045	5.9E-08	1.2E-07	6.9E-07	3.5E-07	NA		1.00E-05	IRIS					6.9E-02	37.0%	3.5E-02	37.0%
Chlorinated Pesticides (µg/kg)																		
Heptachlor			0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.50E+00	IRIS	5.00E-04	IRIS	0E+00	0.00%	0E+00	0.00%	0.00E+00	0.00%	0.00E+00	0.00%
Heptachlor epoxide			0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.10E+00	IRIS	1.30E-05	IRIS	0E+00	0.00%	0E+00	0.00%	0.00E+00	0.00%	0.00E+00	0.00%
Dioxins/Furans (ng/kg)																		
2,3,7,8-TCDD			0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+05	CalEPA	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,7,8-PeCDD			0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+05	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,4,7,8-HxCDD	0.058875	0.058875	7.73E-13	1.56E-12	9.02E-12	4.55E-12	1.30E+04	(a)	NA		1E-08	35.17%	2E-08	35.17%				
1,2,3,6,7,8-HxCDD			0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,7,8,9-HxCDD			0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,4,6,7,8-HpCDD	0.07325	0.07325	9.61E-13	1.94E-12	1.12E-11	5.66E-12	1.30E+03	(a)	NA		1E-09	4.38%	3E-09	4.38%				
OCDD	0.53	0.53	6.96E-12	1.41E-11	8.12E-11	4.10E-11	3.90E+01	(a)	NA		3E-10	0.95%	5E-10	0.95%				
2,3,7,8-TCDF			0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,7,8-PeCDF			0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
2,3,4,7,8-PeCDF			0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E+04	(a)	NA		0E+00	0.00%	0E+00	0.00%				
1,2,3,4,7,8-HxCDF	0.023	0.023	3.02E-13	6.10E-13	3.52E-12	1.78E-12	1.30E+04	(a)	NA		4E-09	13.74%	8E-09	13.74%				
1,2,3,6,7,8-HxCDF	0.028375	0.028375	3.72E-13	7.52E-13	4.35E-12	2.19E-12	1.30E+04	(a)	NA		5E-09	16.95%	1E-08	16.95%				
1,2,3,7,8,9-HxCDF	0.024	0.024	3.15E-13	6.36E-13	3.68E-12	1.86E-12	1.30E+04	(a)	NA		4E-09	14.34%	8E-09	14.34%				
2,3,4,6,7,8-HxCDF	0.019	0.019	2.49E-13	5.04E-13	2.91E-12	1.47E-12	1.30E+04	(a)	NA		3E-09	11.35%	7E-09	11.35%				
1,2,3,4,6,7,8-HpCDF	0.048625	0.048625	6.38E-13	1.29E-12	7.45E-12	3.76E-12	1.30E+03	(a)	NA		8E-10	2.90%	2E-09	2.90%				
1,2,3,4,7,8,9-HpCDF			0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+03	(a)	NA		0E+00	0.00%	0E+00	0.00%				
OCDF	0.12	0.12	1.58E-12	3.18E-12	1.84E-11	9.28E-12	3.90E+01	(a)	NA		6E-11	0.22%	1E-10	0.22%				
Cumulative Health Risk											3E-08	100.00%	6E-08	100.00%	2.E-01	100.00%	9.E-02	100.00%

Notes:
Where risk values forspecific chemicals were > 0.01, the default equation (Risk = +CDI*SF) is replaced with Risk = 1-EXP(-CDI*SF).
(a) CSFs for the dioxin congeners are calculated from the toxicity of 2,3,7,8-TCDD based on World Health Organization toxic equivalency factors (WHO, 2005)

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Appendix E
IEUBK Outputs

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Table 1. Estimated food consumption for a Pacific-Asian diet.

	Child (Ave 6mo-5yr)		Mean Population	
Food Group	[1]Consumption (g/d)	Percent of Total	[1]Consumption (g/d)	Percent of Total
Cereals & Cereal Products	**166**	**32%**	**364**	**43%**
Rice & Products	122	23%	303	58%
Corn and Products	17	3%	31	6%
Other Cereals and Products	27	5%	30	6%
Starch Roots and Tubers	**8**	**2%**	**19**	**4%**
Sugars and Syrups	**15**	**3%**	**24**	**5%**
Fats and Oils	**6**	**1%**	**18**	**3%**
Fish, Meat & Poultry	**95**	**18%**	**185**	**35%**
Fish and Products	57	11%	104	20%
Meat and Products	27	5%	61	12%
Poultry and Products	11	2%	20	4%
Eggs	**8**	2%	**13**	**2%**
Milk and Products	**179**	**34%**	**49**	**9%**
Whole Milk	158	30%	35	7%
Milk Products	21	4%	14	3%
Dried Beans, Nuts & Seeds	**4**	**1%**	**10**	**2%**
Vegetables	**13**	**2%**	**111**	**21%**
Green Leafy & Yellow	10	2%	31	6%
Other Vegetables	3	1%	80	15%
Fruits	**31**	**6%**	**54**	**10%**
Vitamin C-rich Fruits	4	1%	12	2%
Other Fruits	27	5%	42	8%
Total Food Consumption:	525		847	

	Consumption (kg/day)	
Combined Food Groups	Child	Mean
[1]**Fuits & Vegetables**	0.237	0.582
Dairy	0.179	0.049
[2]**Meat**	0.044	0.099
Fish	0.057	0.104
Eggs	0.008	0.013
Total:	0.525	0.847

1. Including cereals and cereal products, starch roots and tubers, dried beans, nuts and seeds.

2. Including fats, oil & poultry.

Reference: FNRI, 2003, The 6th National Nutrition Survey: Food, Philippine Department of Science and Technology, Nutrition and Research Institute, http://www.fnri.dost.gov.ph/index.php?option=content&task=view&id=1130

1. Raw as purchased (rice and cereals presumably dry weight).

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High-End Seafood Consumer

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Round 1 – September to October 2013

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LEAD MODEL FOR WINDOWS Version 1.1

==========
Model Version: 1.1 Build11
User Name:
Date:
Site Name:
Operable Unit:
Run Mode: Research
==========

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m^3)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

****** Diet ******

Age	Diet Intake(µg/day)
.5-1	4.023
1-2	6.803
2-3	8.431
3-4	8.758
4-5	9.087
5-6	9.733
6-7	10.999

Alternative Dietary Values
Home grown fruits concentration: 0.000 µg/g
Home grown vegetables concentration: 0.470 µg/g
Fish from fishing concentration: 0.251 µg/g
Game animals from hunting concentration: 0.000 µg/g
Home grown fruits factor: 0.000 % of all fruits
Home grown vegetables factor: 23.000 % of all vegetables
Fish from fishing factor: 60.000 %of all meat
Game animals from hunting factor: 0.000 % of all meat

****** Drinking Water ******

Water Consumption:

Age	Water (L/day)
.5-1	0.200
1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 4.000 µg Pb/L

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****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 23.300 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700
Outdoor airborne lead to indoor household dust lead concentration: 100.000
Use alternate indoor dust Pb sources? No

Age	Soil (µg Pb/g)	House Dust (µg Pb/g)
.5-1	19.000	23.300
1-2	19.000	23.300
2-3	19.000	23.300
3-4	19.000	23.300
4-5	19.000	23.300
5-6	19.000	23.300
6-7	19.000	23.300

****** Alternate Intake ******

Age	Alternate (µg Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

****** Maternal Contribution: Infant Model ******

Maternal Blood Concentration: 1.000 µg Pb/dL

****
CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

Year	Air (µg/day)	Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
.5-1	0.021	1.948	0.000	0.387
1-2	0.034	3.255	0.000	0.957
2-3	0.062	4.036	0.000	0.996
3-4	0.067	4.214	0.000	1.020
4-5	0.067	4.395	0.000	1.064
5-6	0.093	4.718	0.000	1.125
6-7	0.093	5.331	0.000	1.144

Year	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)
.5-1	0.527	2.883	1.6
1-2	0.828	5.075	2.1
2-3	0.828	5.922	2.2
3-4	0.833	6.133	2.1
4-5	0.620	6.146	2.0
5-6	0.559	6.495	2.0
6-7	0.528	7.096	2.0

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Round 2 – January to March 2014

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LEAD MODEL FOR WINDOWS Version 1.1

==========
Model Version: 1.1 Build11
User Name:
Date:
Site Name:
Operable Unit:
Run Mode: Research
==========

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m^3)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

****** Diet ******

Age	Diet Intake(µg/day)
.5-1	3.102
1-2	4.058
2-3	5.057
3-4	5.024
4-5	4.994
5-6	5.203
6-7	5.603

Alternative Dietary Values
Home grown fruits concentration: 0.000 µg/g
Home grown vegetables concentration: 1.580 µg/g
Fish from fishing concentration: 0.034 µg/g
Game animals from hunting concentration: 0.000 µg/g
Home grown fruits factor: 0.000 % of all fruits
Home grown vegetables factor: 23.000 % of all vegetables
Fish from fishing factor: 60.000 %of all meat
Game animals from hunting factor: 0.000 % of all meat

****** Drinking Water ******

Water Consumption:

Age	Water (L/day)
.5-1	0.200
1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 4.000 µg Pb/L

Draft

****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 23.300 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700
Outdoor airborne lead to indoor household dust lead concentration: 100.000
Use alternate indoor dust Pb sources? No

Age	Soil (µg Pb/g)	House Dust (µg Pb/g)
.5-1	19.000	23.300
1-2	19.000	23.300
2-3	19.000	23.300
3-4	19.000	23.300
4-5	19.000	23.300
5-6	19.000	23.300
6-7	19.000	23.300

****** Alternate Intake ******

Age	Alternate (µg Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

****** Maternal Contribution: Infant Model ******

Maternal Blood Concentration: 1.000 µg Pb/dL

****
CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

Year	Air (µg/day)	Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
.5-1	0.021	1.509	0.000	0.389
1-2	0.034	1.963	0.000	0.968
2-3	0.062	2.449	0.000	1.007
3-4	0.067	2.444	0.000	1.031
4-5	0.067	2.441	0.000	1.075
5-6	0.093	2.549	0.000	1.136
6-7	0.093	2.747	0.000	1.157

Year	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)
.5-1	0.530	2.449	1.3
1-2	0.837	3.803	1.6
2-3	0.838	4.357	1.6
3-4	0.842	4.385	1.5
4-5	0.627	4.210	1.4
5-6	0.565	4.344	1.3
6-7	0.534	4.532	1.3

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Average Seafood Consumer

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Round 1 – September to October 2013

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LEAD MODEL FOR WINDOWS Version 1.1

==========
Model Version: 1.1 Build11
User Name:
Date:
Site Name:
Operable Unit:
Run Mode: Research
==========

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m^3)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

****** Diet ******

Age	Diet Intake(µg/day)
.5-1	2.761
1-2	3.301
2-3	3.907
3-4	3.910
4-5	3.915
5-6	4.144
6-7	4.579

Alternative Dietary Values
Home grown fruits concentration: 0.000 µg/g
Home grown vegetables concentration: 0.361 µg/g
Fish from fishing concentration: 0.060 µg/g
Game animals from hunting concentration: 0.000 µg/g
Home grown fruits factor: 0.000 % of all fruits
Home grown vegetables factor: 23.000 % of all vegetables
Fish from fishing factor: 60.000 %of all meat
Game animals from hunting factor: 0.000 % of all meat

****** Drinking Water ******

Water Consumption:

Age	Water (L/day)
.5-1	0.200
1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 4.000 µg Pb/L

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****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 23.300 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700
Outdoor airborne lead to indoor household dust lead concentration: 100.000
Use alternate indoor dust Pb sources? No

Age	Soil (µg Pb/g)	House Dust (µg Pb/g)
.5-1	19.000	23.300
1-2	19.000	23.300
2-3	19.000	23.300
3-4	19.000	23.300
4-5	19.000	23.300
5-6	19.000	23.300
6-7	19.000	23.300

****** Alternate Intake ******

Age	Alternate (µg Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

****** Maternal Contribution: Infant Model ******

Maternal Blood Concentration: 1.000 µg Pb/dL

****
CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

Year	Air (µg/day)	Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
.5-1	0.021	1.346	0.000	0.390
1-2	0.034	1.602	0.000	0.971
2-3	0.062	1.900	0.000	1.012
3-4	0.067	1.909	0.000	1.035
4-5	0.067	1.919	0.000	1.078
5-6	0.093	2.035	0.000	1.139
6-7	0.093	2.250	0.000	1.160

Year	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)
.5-1	0.531	2.288	1.3
1-2	0.840	3.447	1.4
2-3	0.842	3.815	1.4
3-4	0.845	3.855	1.4
4-5	0.628	3.693	1.3
5-6	0.567	3.834	1.2
6-7	0.535	4.038	1.1

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Round 2 – January to March 2014

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LEAD MODEL FOR WINDOWS Version 1.1

==========
Model Version: 1.1 Build11
User Name:
Date:
Site Name:
Operable Unit:
Run Mode: Research
==========

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (µg Pb/m^3)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

****** Diet ******

Age	Diet Intake(µg/day)
.5-1	2.710
1-2	3.096
2-3	3.701
3-4	3.649
4-5	3.599
5-6	3.766
6-7	4.080

Alternative Dietary Values
Home grown fruits concentration: 0.000 µg/g
Home grown vegetables concentration: 0.760 µg/g
Fish from fishing concentration: 0.026 µg/g
Game animals from hunting concentration: 0.000 µg/g
Home grown fruits factor: 0.000 % of all fruits
Home grown vegetables factor: 23.000 % of all vegetables
Fish from fishing factor: 60.000 %of all meat
Game animals from hunting factor: 0.000 % of all meat

****** Drinking Water ******

Water Consumption:

Age	Water (L/day)
.5-1	0.200
1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 4.000 µg Pb/L

Draft

****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 23.300 µg/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700
Outdoor airborne lead to indoor household dust lead concentration: 100.000
Use alternate indoor dust Pb sources? No

Age	Soil (µg Pb/g)	House Dust (µg Pb/g)
.5-1	19.000	23.300
1-2	19.000	23.300
2-3	19.000	23.300
3-4	19.000	23.300
4-5	19.000	23.300
5-6	19.000	23.300
6-7	19.000	23.300

****** Alternate Intake ******

Age	Alternate (µg Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

****** Maternal Contribution: Infant Model ******

Maternal Blood Concentration: 1.000 µg Pb/dL

****
CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

Year	Air (µg/day)	Diet (µg/day)	Alternate (µg/day)	Water (µg/day)
.5-1	0.021	1.321	0.000	0.390
1-2	0.034	1.504	0.000	0.972
2-3	0.062	1.801	0.000	1.012
3-4	0.067	1.783	0.000	1.036
4-5	0.067	1.766	0.000	1.079
5-6	0.093	1.851	0.000	1.140
6-7	0.093	2.007	0.000	1.161

Year	Soil+Dust (µg/day)	Total (µg/day)	Blood (µg/dL)
.5-1	0.531	2.263	1.2
1-2	0.841	3.351	1.4
2-3	0.842	3.718	1.4
3-4	0.846	3.731	1.3
4-5	0.629	3.541	1.2
5-6	0.567	3.652	1.1
6-7	0.536	3.797	1.1

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