



LABORATORY DATA CONSULTANTS, INC.

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GSI Pacific, Inc.
181 S. Kukui Street
Honolulu, HI 96813
ATTN: Ms. Sonia Shjegstad

September 26, 2014

SUBJECT: Makua Military Reservation, Data Validation

Dear Ms. Shjegstad

Enclosed are the final validation reports for the fraction listed below. These SDGs were received on September 23, 2014. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #32726:

SDG #

Fraction

4091104, 4091105

Pentachloropehnl

The data validation was performed under EPA Level III guidelines. The analyses were validated using the following documents, as applicable to each method:

- Final Supplemental Marine Resources Study Sampling and Analysis Plan at Makua Military Reservation, Oahu, Hawaii, August 2013
- Final Draft Version of the U.S. Department of Defense, and Department of Energy, Consolidated Quality Systems Manual, for Environmental Laboratories, Version 5.0, March 2013
- USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, June 2008
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; Update IV, February 2007

Please feel free to contact us if you have any questions.

Sincerely,

Andrew Kong
Project Manager/Senior Chemist

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: Supplemental Marine Resources Study, Makua Military Reservation

Collection Date: September 13, 2013 through March 28, 2014

LDC Report Date: September 26, 2014

Matrix: Tissue

Parameters: Pentachlorophenol

Validation Level: EPA Level III

Laboratory: USACE ERDC-EP-C

Sample Delivery Group (SDG): 4091104

Sample Identification

MAK001C	MAK029C	MAK017O	MAK030L
MAK002C	MAK030C	MAK018O	MAK033L
MAK004C	MAK031C	MAK019O	MAK034L
MAK005C	MAK032C	MAK020O	MAK038L
MAK006C	MAK001O	MAK021O	MAK041L
MAK007C	MAK002O	MAK022O	MAK042L
MAK008C	MAK003O	MAK023O	MAK043L
MAK009C	MAK004O	MAK024O	MAK044L
MAK010C	MAK005O	MAK001L/2L/26L	MAK045L
MAK014C	MAK006O	MAK007L	MAK046L
MAK015C	MAK007O	MAK009L	MAK109O
MAK018C	MAK008O	MAK010L (comp)	MAK110O
MAK019C	MAK009O	MAK011L	MAK111O
MAK020C	MAK010O	MAK013L	MAK112O
MAK022C	MAK011O	MAK016L/21L/27L	MAK113O
MAK024C	MAK012O	MAK022L	MAK114O
MAK025C	MAK013O	MAK023L	MAK115O
MAK026C	MAK014O	MAK024L/25L	MAK116O
MAK027C	MAK015O	MAK025L	MAK117O
MAK028C	MAK016O	MAK029L	MAK118O

MAK119O
MAK120O
MAK121O
MAK122O
MAK123O
MAK124O
MAK130L
MAK132L
MAK134L
MAK135L
MAK138L
MAK001CMS
MAK001CMSD
MAK029CMS
MAK029CMSD
MAK017OMS
MAK017OMSD
MAK042LMSD
MAK114OMS
MAK114OMSD
MAK132LMS
MAK132LMSD
MAK047L
MAK049L
MAK047LMS
MAK047LMSD

Introduction

This data review covers 106 tissue samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C utilizing Selective Ion Monitoring (SIM) for Pentachlorophenol.

This review follows the Final Supplemental Marine Resources Study Sampling and Analysis Plan at Makua Military Reservation, Oahu, Hawaii (August 2013), the Final Draft Version of the U.S. Department of Defense (DoD) and Department of Energy (DoE) Consolidated Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.0 (March 2013), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008).

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met with the following exceptions:

Sample	Compound	Total Days From Sample Collection Until Extraction	Required Holding Time (in Days) From Sample Collection Until Extraction	Flag	A or P
MAK001C MAK002C MAK004C MAK005C MAK001O MAK002O MAK003O MAK001L/2L/26L	All TCL compounds	368	365	J (all detects) UJ (all non-detects)	P

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

A curve fit, based on the initial calibration, was established for quantitation. The coefficient of determination (r^2) was greater than or equal to 0.990.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
9/24/14	Pentachlorophenol	50.7	MAK047LMS MAK047LMSD	J (all detects) UJ (all non-detects)	A

The percent differences (%D) of the second source calibration standard were less than or equal to 20.0%.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No pentachlorophenol contaminants were found in the method blanks.

No field blanks were identified in this SDG.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
MAK013O	Terphenyl-d14	137 (40-130)	Pentachlorophenol	J (all detects)	P
MAK018O	Terphenyl-d14	132 (40-130)	Pentachlorophenol	J (all detects)	P
MAK019O	Terphenyl-d14	139 (40-130)	Pentachlorophenol	J (all detects)	P
MAK030L	Terphenyl-d14	131 (40-130)	Pentachlorophenol	J (all detects)	P
MAK033L	Terphenyl-d14	134 (40-130)	Pentachlorophenol	J (all detects)	P
MAK038L	Terphenyl-d14	136 (40-130)	Pentachlorophenol	J (all detects)	P

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
MAK114OMS/MSD (MAK114O)	Pentachlorophenol	46.9 (50-130)	-	-	J (all detects) UJ (all non-detects)	A

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
B409182-BS1	Pentachlorophenol	314 (50-130)	MAK024L/25L MAK025L MAK029L MAK030L MAK033L MAK034L MAK038L MAK041L MAK042L MAK043L MAK044L MAK045L MAK046L MAK109O MAK110O MAK111O MAK112O MAK113O MAK114O MAK115O B409182-BLK1	J (all detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits with the following exceptions:

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
MAK024C	Phenanthrene-d10	363339 (397395-1589580)	Pentachlorophenol	J (all detects) UJ (all non-detects)	P
MAK016L/21L/27L	Phenanthrene-d10	531652 (582023-2328092)	Pentachlorophenol	J (all detects) UJ (all non-detects)	P
MAK001O	Phenanthrene-d10	1212548 (268979-1075914)	Pentachlorophenol	J (all detects) UJ (all non-detects)	P
MAK003O	Phenanthrene-d10	1420029 (268979-1075914)	Pentachlorophenol	J (all detects) UJ (all non-detects)	P
MAK047L	Phenanthrene-d10	1315184 (163403-653612)	Pentachlorophenol	J (all detects) UJ (all non-detects)	A

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Compound Quantitation

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

Data flags are summarized at the end of this report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

**Supplemental Marine Resources Study, Makua Military Reservation
Pentachlorophenol - Data Qualification Summary - SDG 4091104**

SDG	Sample	Compound	Flag	A or P	Reason
4091104	MAK001C MAK002C MAK004C MAK005C MAK001O MAK002O MAK003O MAK001L/2L/26L	Pentachlorophenol	J (all detects) UJ (all non-detects)	P	Technical holding time
4091104	MAK013O MAK018O MAK019O MAK030L MAK033L MAK038L	Pentachlorophenol	J (all detects)	P	Surrogate recovery (%R)
4091104	MAK114O	Pentachlorophenol	J (all detects) UJ (all non-detects)	A	Matrix spike/matrix spike duplicate (%R)
4091104	MAK024L/25L MAK025L MAK029L MAK030L MAK033L MAK034L MAK038L MAK041L MAK042L MAK043L MAK044L MAK045L MAK046L MAK109O MAK110O MAK111O MAK112O MAK113O MAK114O MAK115O	Pentachlorophenol	J (all detects)	P	Laboratory control spike (%R)
4091104	MAK024C MAK016L/21L/27L MAK001O MAK003O	Pentachlorophenol	J (all detects) UJ (all non-detects)	P	Internal standard (area)
4091104	MAK047L	Pentachlorophenol	J (all detects) UJ (all non-detects)	A	Internal standard (area)

**Supplemental Marine Resources Study, Makua Military Reservation
Pentachlorophenol - Laboratory Blank Data Qualification Summary - SDG
4091104**

No Sample Data Qualified in this SDG

**Supplemental Marine Resources Study, Makua Military Reservation
Pentachlorophenol - Field Blank Data Qualification Summary - SDG 4091104**

No Sample Data Qualified in this SDG

METHOD: GC/MS Pentachlorophenol (EPA SW 846 Method 8270C)-SIM

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	SW	Sampling dates: 9/9/13 → 3/28/14
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	± 5%, y ₀
IV.	Continuing calibration/ICV	SW	CCV/ICV ≤ 20
V.	Blanks	A	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	SW	
XI.	Target compound identification	N	
XII.	Compound quantitation/RL/LOQ/LODs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	

Note: A = Acceptable ND = No compounds detected D = Duplicate
 N = Not provided/applicable R = Rinsate TB = Trip blank
 SW = See worksheet FB = Field blank EB = Equipment blank

Validated Samples: tissue

1	MAK001C	11	MAK015C	21	MAK029C	31	MAK007O
2	MAK002C	12	MAK018C	22	MAK030C	32	MAK008O
3	MAK004C	13	MAK019C	23	MAK031C	33	MAK009O
4	MAK005C	14	MAK020C	24	MAK032C	34	MAK010O
5	MAK006C	15	MAK022C	25	MAK001O	35	MAK011O
6	MAK007C	16	MAK024C	26	MAK002O	36	MAK012O
7	MAK008C	17	MAK025C	27	MAK003O	37	MAK013O
8	MAK009C	18	MAK026C	28	MAK004O	38	MAK014O
9	MAK010C	19	MAK027C	29	MAK005O	39	MAK015O
10	MAK014C	20	MAK028C	30	MAK006O	40	MAK016O

LDC #: 32726A2

VALIDATION COMPLETENESS WORKSHEET

Date: 9-24-14

SDG #: 4091104

Level III

Page: 2 of 3

Laboratory: ARDL Inc./USACE ERDC-EP-C

Reviewer: *Ym*2nd Reviewer: *1***METHOD:** GC/MS Pentachlorophenol (EPA SW 846 Method 8270C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times		Sampling dates:
II.	GC/MS Instrument performance check		
III.	Initial calibration		
IV.	Continuing calibration/ICV		
V.	Blanks		
VI.	Surrogate spikes		
VII.	Matrix spike/Matrix spike duplicates		
VIII.	Laboratory control samples		
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards		
XI.	Target compound identification	N	
XII.	Compound quantitation/RL/LOQ/LODs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data		
XVI.	Field duplicates		
XVII.	Field blanks		

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet

ND = No compounds detected
R = Rinsate
FB = Field blank

D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples:

41	MAK017O	51	MAK009L	61	MAK030L	71	MAK109O
42	MAK018O	52	MAK010L (comp)	62	MAK033L	72	MAK110O
43	MAK019O	53	MAK011L	63	MAK034L	73	MAK111O
44	MAK020O	54	MAK013L	64	MAK038L	74	MAK112O
45	MAK021O	55	MAK016L/21L/27L	65	MAK041L	75	MAK113O
46	MAK022O	56	MAK022L	66	MAK042L	76	MAK114O
47	MAK023O	57	MAK023L	67	MAK043L	77	MAK115O
48	MAK024O	58	MAK024L/25L	68	MAK044L	78	MAK116O
49	MAK001L/2L/26L	59	MAK025L	69	MAK045L	79	MAK117O
50	MAK007L	60	MAK029L	70	MAK046L	80	MAK118O

LDC #: 32726A2

VALIDATION COMPLETENESS WORKSHEET

Date: 9-24-14

SDG #: 4091104

Level III

Page: 3 of 3

Laboratory: ARDL Inc./USACE ERDC-EP-C

Reviewer: *TR*2nd Reviewer: *TR*

METHOD: GC/MS Pentachlorophenol (EPA SW 846 Method 8270C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times		Sampling dates:
II.	GC/MS Instrument performance check		
III.	Initial calibration		
IV.	Continuing calibration/ICV		<i>TR</i>
V.	Blanks		
VI.	Surrogate spikes		
VII.	Matrix spike/Matrix spike duplicates		
VIII.	Laboratory control samples		
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards		
XI.	Target compound identification	N	
XII.	Compound quantitation/RL/LOQ/LODs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data		
XVI.	Field duplicates		
XVII.	Field blanks		

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet

ND = No compounds detected
R = Rinstate
FB = Field blank

D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples:

81 ⁵	MAK119O	91 ⁵	MAK138L	101 ⁵	MAK132LMS	111	
82 ⁵	MAK120O	92 ¹	MAK001CMS	102 ⁵	MAK132LMSD	112	
83 ⁵	MAK121O	93 ¹	MAK001CMSD	103 ⁴	MAK003C-test	113	
84 ⁵	MAK122O	94 ³	MAK029CMS	104 ⁴	MB-SO-HEE000-Test	114	
85 ⁵	MAK123O	95 ³	MAK029CMSD	105 ⁴	MB-SO-LIMIT000-test	115 ¹	B409180 - BLK1
86 ⁵	MAK124O	96 ⁴	MAK017OMS	106 ⁶	MAK047L	116 ²	B409182 - BLK1
87 ⁵	MAK130L	97 ⁴	MAK017OMSD	107 ⁶	MAK049L	117 ³	B409187 - BLK1
88 ⁵	MAK132L	98 ²	MAK042LMSD	108 ⁶	MAK047LMS	118 ⁴	B409221 - BLK1
89 ⁵	MAK134L	99 ²	MAK114OMS	109 ⁶	MAK047LMSD	119 ⁵	B409226 - BLK1
90 ⁵	MAK135L	100 ²	MAK114OMSD	110		120 ⁶	B409264 - BLK1

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS SVOA

A. Phenol	T. 4-Chloroaniline	MM. 4-Chlorophenyl-phenyl ether	FFF. Di-n-octylphthalate	YYY. 2,3,5-Trimethylnaphthalene
B. Bis (2-chloroethyl) ether	U. Hexachlorobutadiene	NN. Fluorene	GGG. Benzo(b)fluoranthene	ZZZ. Perylene
C. 2-Chlorophenol	V. 4-Chloro-3-methylphenol	OO. 4-Nitroaniline	HHH. Benzo(k)fluoranthene	AAAA. Dibenzothiophene
D. 1,3-Dichlorobenzene	W. 2-Methylnaphthalene	PP. 4,6-Dinitro-2-methylphenol	III. Benzo(a)pyrene	BBBB. Benzo(a)fluoranthene
E. 1,4-Dichlorobenzene	X. Hexachlorocyclopentadiene	QQ. N-Nitrosodiphenylamine	JJJ. Indeno(1,2,3-cd)pyrene	CCCC. Benzo(b)fluorene
F. 1,2-Dichlorobenzene	Y. 2,4,6-Trichlorophenol	RR. 4-Bromophenyl-phenylether	KKK. Dibenz(a,h)anthracene	DDDD. cis/trans-Decalin
G. 2-Methylphenol	Z. 2,4,5-Trichlorophenol	SS. Hexachlorobenzene	LLL. Benzo(g,h,i)perylene	EEEE. Biphenyl
H. 2,2'-Oxybis(1-chloropropane)	AA. 2-Chloronaphthalene	TT. Pentachlorophenol	MMM. Bis(2-Chloroisopropyl)ether	FFFF. Retene
I. 4-Methylphenol	BB. 2-Nitroaniline	UU. Phenanthrene	NNN. Aniline	GGGG. C30-Hopane
J. N-Nitroso-di-n-propylamine	CC. Dimethylphthalate	VV. Anthracene	OOO. N-Nitrosodimethylamine	HHHH. 1-Methylphenanthrene
K. Hexachloroethane	DD. Acenaphthylene	WW. Carbazole	PPP. Benzoic Acid	IIII. 1,4-Dioxane
L. Nitrobenzene	EE. 2,6-Dinitrotoluene	XX. Di-n-butylphthalate	QQQ. Benzyl alcohol	JJJJ. Acetophenone
M. Isophorone	FF. 3-Nitroaniline	YY. Fluoranthene	RRR. Pyridine	KKKK. Atrazine
N. 2-Nitrophenol	GG. Acenaphthene	ZZ. Pyrene	SSS. Benzidine	LLLL. Benzaldehyde
O. 2,4-Dimethylphenol	HH. 2,4-Dinitrophenol	AAA. Butylbenzylphthalate	TTT. 1-Methylnaphthalene	MMMM. Caprolactam
P. Bis(2-chloroethoxy)methane	II. 4-Nitrophenol	BBB. 3,3'-Dichlorobenzidine	UUU. Benzo(b)thiophene	NNNN.
Q. 2,4-Dichlorophenol	JJ. Dibenzofuran	CCC. Benzo(a)anthracene	VVV. Benzonaphthothiophene	OOOO.
R. 1,2,4-Trichlorobenzene	KK. 2,4-Dinitrotoluene	DDD. Chrysene	WWW. Benzo(e)pyrene	PPPP.
S. Naphthalene	LL. Diethylphthalate	EEE. Bis(2-ethylhexyl)phthalate	XXX. 2,6-Dimethylnaphthalene	QQQQ.

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: Supplemental Marine Resources Study, Makua Military Reservation

Collection Date: January 13 through March 28, 2014

LDC Report Date: September 26, 2014

Matrix: Tissue

Parameters: Pentachlorophenol

Validation Level: EPA Level III

Laboratory: USACE ERDC-EP-C

Sample Delivery Group (SDG): 4091105

Sample Identification

MAK101O	MAK108,109,110,113L	MAK116L
MAK102O	MAK111L	MAK117L
MAK103O	MAK112L	MAK118L
MAK104O	MAK115L	MAK121C
MAK105O	MAK111C	MAK122C
MAK106O	MAK113C	MAK123C
MAK107O	MAK114C	MAK124C
MAK108O	MAK115C	MAK125C
MAK102C	MAK116C	MAK126C
MAK103C	MAK117C	MAK127C
MAK104C	MAK118C	MAK128C
MAK105C	MAK120C	MAK105OMS
MAK106C	MAK120L	MAK105OMSD
MAK107C	MAK121L	MAK123LMS
MAK108C	MAK122L	MAK123LMSD
MAK110C	MAK123L	MAK123CMSD
MAK101L	MAK124L	MAK123CMS
MAK102L	MAK126L	
MAK105L	MAK127L	
MAK106L	MAK128L	

Introduction

This data review covers 57 tissue samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C utilizing Selective Ion Monitoring (SIM) for Pentachlorophenol.

This review follows the Final Supplemental Marine Resources Study Sampling and Analysis Plan at Makua Military Reservation, Oahu, Hawaii (August 2013), the Final Draft Version of the U.S. Department of Defense (DoD) and Department of Energy (DoE) Consolidated Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.0 (March 2013), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008).

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- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- NJ Presumptive evidence of presence of the compound at an estimated quantity.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

A curve fit, based on the initial calibration, was established for quantitation. The coefficient of determination (r^2) was greater than or equal to 0.990.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0%.

The percent differences (%D) of the second source calibration standard were less than or equal to 20.0%.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No pentachlorophenol contaminants were found in the method blanks.

No field blanks were identified in this SDG.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
MAK102O	Terphenyl-d14	131 (40-130)	Pentachlorophenol	J (all detects)	P
MAK101L	2-Fluorobiphenyl	196 (40-130)	Pentachlorophenol	J (all detects)	P

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
MAK102L	2-Fluorobiphenyl	172 (40-130)	Pentachlorophenol	J (all detects)	P
MAK106L	2-Fluorobiphenyl	135 (40-130)	Pentachlorophenol	J (all detects)	P
MAK108,109,110,113L	2-Fluorobiphenyl	213 (40-130)	Pentachlorophenol	J (all detects)	P
MAK111L	2-Fluorobiphenyl	199 (40-130)	Pentachlorophenol	J (all detects)	P
MAK112L	2-Fluorobiphenyl	266 (40-130)	Pentachlorophenol	J (all detects)	P
MAK115L	2-Fluorobiphenyl	153 (40-130)	Pentachlorophenol	J (all detects)	P

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
MAK105OMS/MSD (MAK105O)	Pentachlorophenol	133 (50-130)	-	-	J (all detects)	A

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits with the following exceptions:

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
MAK104C	Phenanthrene-d10	408962 (450519-1802074)	Pentachlorophenol	J (all detects) UJ (all non-detects)	P

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
MAK106C	Phenanthrene-d10	343924 (450519-1802074)	Pentachlorophenol	J (all detects) UJ (all non-detects)	P
MAK108C	Phenanthrene-d10	445596 (450519-1802074)	Pentachlorophenol	J (all detects) UJ (all non-detects)	P
MAK118L	Phenanthrene-d10	1167591 (211603-846412)	Pentachlorophenol	J (all detects) UJ (all non-detects)	P
MAK112L	Phenanthrene-d10	853494 (135981-543924)	Pentachlorophenol	J (all detects) UJ (all non-detects)	P
MAK120L	Phenanthrene-d10	910786 (125415-501658)	Pentachlorophenol	J (all detects) UJ (all non-detects)	P
MAK121L	Phenanthrene-d10	1066115 (125415-501658)	Pentachlorophenol	J (all detects) UJ (all non-detects)	P
MAK122L	Phenanthrene-d10	855428 (125415-501658)	Pentachlorophenol	J (all detects) UJ (all non-detects)	P
MAK123L	Phenanthrene-d10	559877 (125415-501658)	Pentachlorophenol	J (all detects) UJ (all non-detects)	A
MAK124L	Phenanthrene-d10	715922 (125415-501658)	Pentachlorophenol	J (all detects) UJ (all non-detects)	P
MAK126L	Phenanthrene-d10	799903 (125415-501658)	Pentachlorophenol	J (all detects) UJ (all non-detects)	P

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Compound Quantitation

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

Data flags are summarized at the end of this report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

**Supplemental Marine Resources Study, Makua Military Reservation
Pentachlorophenol - Data Qualification Summary - SDG 4091105**

SDG	Sample	Compound	Flag	A or P	Reason
4091105	MAK102O MAK101L MAK102L MAK106L MAK108,109,110,113L MAK111L MAK112L MAK115L	Pentachlorophenol	J (all detects)	P	Surrogate recovery (%R)
4091105	MAK105O	Pentachlorophenol	J (all detects)	A	Matrix spike/matrix spike duplicate (%R)
4091105	MAK104C MAK106C MAK108C MAK118L MAK112L MAK120L MAK121L MAK122L MAK124L MAK126L	Pentachlorophenol	J (all detects) UJ (all non-detects)	P	Internal standard (area)
4091105	MAK123L	Pentachlorophenol	J (all detects) UJ (all non-detects)	A	Internal standard (area)

**Supplemental Marine Resources Study, Makua Military Reservation
Pentachlorophenol - Laboratory Blank Data Qualification Summary - SDG
4091105**

No Sample Data Qualified in this SDG

**Supplemental Marine Resources Study, Makua Military Reservation
Pentachlorophenol - Field Blank Data Qualification Summary - SDG 4091105**

No Sample Data Qualified in this SDG

METHOD: GC/MS Pentachlorophenol (EPA SW 846 Method 8270C)-S/M

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 1/13/14 → 3/28/14
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	≤ 15 %
IV.	Continuing calibration/ICV	A	COV/ICV ≤ 20
V.	Blanks	A	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	SW	
XI.	Target compound identification	N	
XII.	Compound quantitation/RL/LOQ/LODs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	

Note: A = Acceptable
 N = Not provided/applicable
 SW = See worksheet

ND = No compounds detected
 R = Rinsate
 FB = Field blank

D = Duplicate
 TB = Trip blank
 EB = Equipment blank

Validated Samples: *tissue*

1	MAK101O	11	MAK104C	21	MAK108,109,110,113L	31	MAK118C
2	MAK102O	12	MAK105C	22	MAK111L	32	MAK120C
3	MAK103O	13	MAK106C	23	MAK112L	33	MAK120L
4	MAK104O	14	MAK107C	24	MAK115L	34	MAK121L
5	MAK105O	15	MAK108C	25	MAK111C	35	MAK122L
6	MAK106O	16	MAK110C	26	MAK113C	36	MAK123L
7	MAK107O	17	MAK101L	27	MAK114C	37	MAK124L
8	MAK108O	18	MAK102L	28	MAK115C	38	MAK126L
9	MAK102C	19	MAK105L	29	MAK116C	39	MAK127L
10	MAK103C	20	MAK106L	30	MAK117C	40	MAK128L

LDC #: 32726B2

VALIDATION COMPLETENESS WORKSHEET

Date: 9-24-14

SDG #: 4091105

Level III

Page: 2 of 2

Laboratory: ARDL Inc./USACE ERDC-EP-C

Reviewer: [Signature]

2nd Reviewer: [Signature]

METHOD: GC/MS Pentachlorophenol (EPA SW 846 Method 8270C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times		Sampling dates:
II.	GC/MS Instrument performance check		
III.	Initial calibration		
IV.	Continuing calibration/ICV		
V.	Blanks		
VI.	Surrogate spikes		
VII.	Matrix spike/Matrix spike duplicates		
VIII.	Laboratory control samples		
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards		
XI.	Target compound identification	N	
XII.	Compound quantitation/RL/LOQ/LODs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data		
XVI.	Field duplicates		
XVII.	Field blanks		

Note: A = Acceptable
 N = Not provided/applicable
 SW = See worksheet

ND = No compounds detected
 R = Rinsate
 FB = Field blank

D = Duplicate
 TB = Trip blank
 EB = Equipment blank

Validated Samples:

41	MAK116L	51	MAK128C	61		71	
42	MAK117L	52	MAK105OMS	62		72	
43	MAK118L	53	MAK105OMSD	63		73	
44	MAK121C	54	MAK123LMS	64		74	
45	MAK122C	55	MAK123LMSD	65		75	
46	MAK123C	56	MAK123CMSD	66		76	
47	MAK124C	57	MAK123CMS	67	1 B409224-BLK1	77	
48	MAK125C	58		68	2 B409210-BLK1	78	
49	MAK126C	59		69	3 B409210-BLK2	79	
50	MAK127C	60		70		80	

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS SVOA

A. Phenol	T. 4-Chloroaniline	MM. 4-Chlorophenyl-phenyl ether	FFF. Di-n-octylphthalate	YYY. 2,3,5-Trimethylnaphthalene
B. Bis (2-chloroethyl) ether	U. Hexachlorobutadiene	NN. Fluorene	GGG. Benzo(b)fluoranthene	ZZZ. Perylene
C. 2-Chlorophenol	V. 4-Chloro-3-methylphenol	OO. 4-Nitroaniline	HHH. Benzo(k)fluoranthene	AAAA. Dibenzothiophene
D. 1,3-Dichlorobenzene	W. 2-Methylnaphthalene	PP. 4,6-Dinitro-2-methylphenol	III. Benzo(a)pyrene	BBBB. Benzo(a)fluoranthene
E. 1,4-Dichlorobenzene	X. Hexachlorocyclopentadiene	QQ. N-Nitrosodiphenylamine	JJJ. Indeno(1,2,3-cd)pyrene	CCCC. Benzo(b)fluorene
F. 1,2-Dichlorobenzene	Y. 2,4,6-Trichlorophenol	RR. 4-Bromophenyl-phenylether	KKK. Dibenz(a,h)anthracene	DDDD. cis/trans-Decalin
G. 2-Methylphenol	Z. 2,4,5-Trichlorophenol	SS. Hexachlorobenzene	LLL. Benzo(g,h,i)perylene	EEEE. Biphenyl
H. 2,2'-Oxybis(1-chloropropane)	AA. 2-Chloronaphthalene	TT. Pentachlorophenol	MMM. Bis(2-Chloroisopropyl)ether	FFFF. Retene
I. 4-Methylphenol	BB. 2-Nitroaniline	UU. Phenanthrene	NNN. Aniline	GGGG. C30-Hopane
J. N-Nitroso-di-n-propylamine	CC. Dimethylphthalate	VV. Anthracene	OOO. N-Nitrosodimethylamine	HHHH. 1-Methylphenanthrene
K. Hexachloroethane	DD. Acenaphthylene	WW. Carbazole	PPP. Benzoic Acid	IIII. 1,4-Dioxane
L. Nitrobenzene	EE. 2,6-Dinitrotoluene	XX. Di-n-butylphthalate	QQQ. Benzyl alcohol	JJJJ. Acetophenone
M. Isophorone	FF. 3-Nitroaniline	YY. Fluoranthene	RRR. Pyridine	KKKK. Atrazine
N. 2-Nitrophenol	GG. Acenaphthene	ZZ. Pyrene	SSS. Benzidine	LLLL. Benzaldehyde
O. 2,4-Dimethylphenol	HH. 2,4-Dinitrophenol	AAA. Butylbenzylphthalate	TTT. 1-Methylnaphthalene	MMMM. Caprolactam
P. Bis(2-chloroethoxy)methane	II. 4-Nitrophenol	BBB. 3,3'-Dichlorobenzidine	UUU. Benzo(b)thiophene	NNNN.
Q. 2,4-Dichlorophenol	JJ. Dibenzofuran	CCC. Benzo(a)anthracene	VVV. Benzonaphthothiophene	OOOO.
R. 1,2,4-Trichlorobenzene	KK. 2,4-Dinitrotoluene	DDD. Chrysene	WWW. Benzo(e)pyrene	PPPP.
S. Naphthalene	LL. Diethylphthalate	EEE. Bis(2-ethylhexyl)phthalate	XXX. 2,6-Dimethylnaphthalene	QQQQ.

VALIDATION FINDINGS WORKSHEET
Surrogate Recovery

METHOD: GC/MS BNA (EPA SW 846 Method 8270C)

Please see qualification below for all questions answered "N". Not applicable questions are identified as "N/A".

- Y N N/A Were percent recoveries (%R) for surrogates within QC limits?
- Y N N/A If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?
- Y N N/A If any %R was less than 10 percent, was a reanalysis performed to confirm %R?

#	Date	Sample ID	Surrogate	%R (Limits)	Qualifications
		2	TPH	131 (40-130)	Jdets/P
		17	FBP	196 ()	↓
		18		172 ()	
		20		135 ()	
		21		213 ()	
		22		199 ()	
		23		266 ()	
		24	↓	153 (↓)	
				()	
				()	
				()	

- (NBZ) = Nitrobenzene-d5
- (FBP) = 2-Fluorobiphenyl
- (TPH) = Terphenyl-d14
- (PHL) = Phenol-d5
- (2FP) = 2-Fluorophenol
- (TBP) = 2,4,6-Tribromophenol
- (2CP) = 2-Chlorophenol-d4
- (DCB) = 1,2-Dichlorobenzene-d4

VALIDATION FINDINGS WORKSHEET

Internal Standards

METHOD: GC/MS BNA (EPA SW 846 Method 8270C)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

N N/A Were all internal standard area counts within -50 to +100 of the associated calibration standard?

N N/A Were the retention times of the internal standards within +/- 30 seconds of the retention times of the associated calibration standard?

#	Date	Sample ID	Internal Standard	Area (Limits)	RT (Limits)	Qualifications
		11	PHN	408962 (450519-1802074)		I/U/S/P
		13		343924		
		15		445596		
		43		1167591 (211603-846412)		I/U/S/P S/dets/P
		23		853494 (135981-543924)		
		33		916786 (125415-501658)		
		34		106615		
		35		855428		
		36		559877		I/U/S/A S/dets/A
		37		715922		I/U/S/P S/dets/P
		38		799903		

(DCB) = 1,4-Dichlorobenzene-d4
 (NPT) = Naphthalene-d8
 (ANT) = Acenaphthene-d10

(PHN) = Phenanthrene-d10
 (CRY) = Chrysene-d12
 (PRY) = Perylene-d12