APPENDIX E

ERA

Appendix E.1-1
ERA Summary Statistics
Sediment
Makua Military Reservation

Area	Riskstats_v3.06_Parameter	MinDepth	MaxDepth	Units	N	#D	%D	Min	Max	MinD	MaxD	ProUCL_Distribution	ProUCL_Recommended UCL	RME
North Muliwai	4,4'-DDT	All	All	mg/kg	6	1	16.67	0.000016971	0.0001	0.0001	0.0001	NON-PARAMETRIC	9.09198E-05	0.00009
North Muliwai	Aluminum	All	All	mg/kg	21	21	100	796	49700	796	49700	NON-PARAMETRIC	47918.37729	47918
North Muliwai	Antimony	All	All	mg/kg	21	13	61.9	0.084853	3.7	0.67	3.7	NON-PARAMETRIC	3.664381544	3.66
North Muliwai	Arsenic	All	All	mg/kg	22	14	63.64	0.077782	5.6	0.26	5.6	NON-PARAMETRIC	6.794666942	5.60
North Muliwai	Barium	All	All	mg/kg	22	22	100	3.8	123	3.8	123	NON-PARAMETRIC	129.4947946	123
North Muliwai	Benzene	All	All	mg/kg	6	2	33.33	0.00004	0.00022	0.00004	0.000044	NORMAL	0.000203628	0.00004
North Muliwai	bis(2-ethylhexyl)phthalate	All	All	mg/kg	6	1	16.67	0.014142	0.02687	0.022	0.022	NORMAL	0.0184307	0.02
North Muliwai	Cadmium	All	All	mg/kg	22	13	59.09	0.0077782	0.13	0.013	0.13	NON-PARAMETRIC	0.108739206	0.11
North Muliwai	Chromium	All	All	mg/kg	22	22	100	15.5	176	15.5	176	NON-PARAMETRIC	131.7095181	132
North Muliwai	Cobalt	All	All	mg/kg	22	22	100	5	60.4	5	60.4	NON-PARAMETRIC	45.59821474	46
North Muliwai	Copper	All	All	mg/kg	22	22	100	2.4	121	2.4	121	NON-PARAMETRIC	100.2345247	100
North Muliwai	Ethylbenzene	All	All	mg/kg	6	4	66.67	0.000098995	0.002	0.0003	0.002	NORMAL	0.001245813	0.001
North Muliwai	Lead	All	All	mg/kg	22	9	40.91	0.036062	9.6	0.24	9.6	NON-PARAMETRIC	5.808298119	5.81
North Muliwai	m,p-Xylenes	All	All	mg/kg	6	4	66.67	0.0002	0.001	0.0002	0.001	GAMMA	0.000991208	0.001
North Muliwai	Mercury	All	All	mg/kg	22	22	100	0.014	0.08	0.014	0.08	GAMMA	0.042492185	0.04
North Muliwai	OCDD	All	All	mg/kg	6	1	16.67	0.000014142	0.00015	0.00015	0.00015	NON-PARAMETRIC	0.000266936	0.0002
North Muliwai	o-Xylene	All	All	mg/kg	6	2	33.33	0.00009	0.00024042	0.00009	0.0001	NORMAL	0.000154434	0.0001
North Muliwai	RDX	All	All	mg/kg	22	1	4.545	0.033234	0.23	0.23	0.23	NON-PARAMETRIC	0.052694108	0.05
North Muliwai	Selenium	All	All	mg/kg	22	10	45.45	0.049497	4	0.3	4	NON-PARAMETRIC	4.297199906	4.00
North Muliwai	Toluene	All	All	mg/kg	6	6	100	0.0003	0.0007	0.0003	0.0007	NORMAL	0.000637654	0.001
North Muliwai	Vanadium	All	All	mg/kg	22	22	100	7.4	185	7.4	185	NON-PARAMETRIC	203.5614089	185
North Muliwai	Zinc	All	All	mg/kg	22	22	100	7.6	142	7.6	142	NON-PARAMETRIC	83.79020752	84
South Muliwai	2,3,7,8-TCDD	All	All	mg/kg	5	1	20	2.8284E-06	0.00003	0.00003	0.00003	NON-PARAMETRIC	6.2904E-05	0.00003
South Muliwai	Aluminum	All	All	mg/kg	12	12	100	925	67500	925	67500	NORMAL	43491.63043	43492
South Muliwai	Antimony	All	All	mg/kg	12	2	16.67	0.098995	0.98	0.86	0.98	NON-PARAMETRIC	0.634531975	0.63
South Muliwai	Arsenic	All	All	mg/kg	12	5	41.67	0.091924	5.2	0.35	5.2	NON-PARAMETRIC	6.290401781	5.20
South Muliwai	Barium	All	All	mg/kg	12	12	100	3.8	118	3.8	118	NORMAL	65.6873369	66
South Muliwai	Cadmium	All	All	mg/kg	12	12	100	0.019	0.16	0.019	0.16	NORMAL	0.087138472	0.09
South Muliwai	Chromium	All	All	mg/kg	12	12	100	20.3	271	20.3	271	NORMAL	179.8168625	180
South Muliwai	Cobalt	All	All	mg/kg	12	12	100	6.7	74	6.7	74	NORMAL	54.9804361	55
South Muliwai	Copper	All	All	mg/kg	12	12	100	3.4	108	3.4	108	NORMAL	82.0440402	82
South Muliwai	Ethylbenzene	All	All	mg/kg	3	3	100	0.0006	0.001	0.0006	0.001	N/A		0.001
South Muliwai	Lead	All	All	mg/kg	12	7	58.33	0.03677	26.9	1.2	26.9	GAMMA	18.90599221	19
South Muliwai	m,p-Xylenes	All	All	mg/kg	3	2	66.67	0.00038184	0.0007	0.0007	0.0007	N/A		0.001
South Muliwai	Mercury	All	All	mg/kg	12	10	83.33	0.0070711	0.082	0.016	0.082	NORMAL	0.052939827	0.05
South Muliwai	Pentachlorophenol-8151A	All	All	mg/kg	3	1	33.33	0.00070711	0.000823	0.000823	0.000823	N/A		0.0008
South Muliwai	Picloram	All	All	mg/kg	3	1	33.33	0.00029698	0.0004	0.0004	0.0004	N/A		0.0004
South Muliwai	Selenium	All	All	mg/kg	12	10	83.33	0.0355	7.7	2.2	7.7	NORMAL	4.74255695	4.74
South Muliwai	Toluene	All	All	mg/kg	3	3	100	0.0004	0.0006	0.0004	0.0006	N/A		0.00
South Muliwai	Vanadium	All	All	mg/kg	12	12	100	3.5	194	3.5	194	NORMAL	154.1653881	154
South Muliwai	Zinc	All	All	mg/kg	12	12	100	9.2	188	9.2	188	NORMAL	109.4232539	109

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Sediment
Makua Military Reservation

Area	Riskstats_v3.06_Parameter	MinDepth	MaxDepth	Units	N	#D	%D	Min	Max	MinD	MaxD	ProUCL_Distribution	ProUCL_Recommended UCL	RME
North Background	Aluminum	All	All	mg/kg	4	4	100	22600	25100	22600	25100	NORMAL	25033.60811	25034
North Background	Arsenic	All	All	mg/kg	4	1	25	0.077782	0.15	0.15	0.15	NON-PARAMETRIC	0.18227385	0.15
North Background	Barium	All	All	mg/kg	4	4	100	109	186	109	186	NORMAL	176.723426	177
North Background	Chromium	All	All	mg/kg	4	4	100	112	138	112	138	NORMAL	136.3169652	136
North Background	Cobalt	All	All	mg/kg	4	4	100	46.7	70.9	46.7	70.9	NORMAL	68.10330344	68
North Background	Copper	All	All	mg/kg	4	4	100	50.3	56.7	50.3	56.7	NORMAL	57.44084083	57
North Background	Lead	All	All	mg/kg	4	4	100	0.32	1.7	0.32	1.7	NORMAL	1.606700783	1.61
North Background	Mercury	All	All	mg/kg	4	4	100	0.059	0.064	0.059	0.064	NORMAL	0.063675791	0.06
North Background	Vanadium	All	All	mg/kg	4	4	100	138	166	138	166	NORMAL	167.018516	166
North Background	Zinc	All	All	mg/kg	4	4	100	76.5	86.5	76.5	86.5	NORMAL	87.27674231	87
South Background	Aluminum	All	All	mg/kg	4	4	100	30200	54700	30200	54700	NORMAL	58262.68356	54700
South Background	Arsenic	All	All	mg/kg	4	3	75	0.084853	1.5	0.21	1.5	NORMAL	1.49041249	1.49
South Background	Barium	All	All	mg/kg	4	4	100	134	157	134	157	NORMAL	162.0451407	157
South Background	Chromium	All	All	mg/kg	4	4	100	195	227	195	227	NORMAL	226.9892623	227
South Background	Cobalt	All	All	mg/kg	4	4	100	70.1	83.1	70.1	83.1	NORMAL	83.06262935	83
South Background	Copper	All	All	mg/kg	4	4	100	89.9	110	89.9	110	NORMAL	110.7830879	110
South Background	Lead	All	All	mg/kg	4	4	100	1.3	2.4	1.3	2.4	NORMAL	2.604448502	2.40
South Background	Mercury	All	All	mg/kg	4	4	100	0.052	0.06	0.052	0.06	NORMAL	0.060803783	0.06
South Background	Vanadium	All	All	mg/kg	4	4	100	147	166	147	166	NORMAL	169.1590753	166
South Background	Zinc	All	All	mg/kg	4	4	100	103	125	103	125	NORMAL	124.9543098	125

Appendix E.1-2
ERA Summary Statistics
Fish Tissue
Makua Military Reservation

Area	Riskstats_v1.19_Parameter	MinDepth	MaxDepth	Units	N	#D	%D	Min	Max	MinD	MaxD	Distribution	Mean_Arith	StdDev_Arith	StdError_Arith	UCL_95	RME
Nanakuli Muliwai	1,2,3,4,6,7,8-hpcdf	All	All	mg/kg	3	3	100	1.78E-07	3.71E-07	1.78E-07	3.71E-07	LogNormal+	2.52E-07	1.04E-07	6.01E-08	1.04E-06	0.000000371
Nanakuli Muliwai	4,4'-ddt	All	All	mg/kg	3	2	66.67	0.0009899	0.0014	0.0013	0.0014	LogNormal+	0.00123	0.0002138	0.00012344	0.0018713	0.0014
Nanakuli Muliwai	aluminum	All	All	mg/kg	3	3	100	3810	5170	3810	5170	LogNormal+	4466.7	681.2	393.29	6242	5170
Nanakuli Muliwai	arsenic	All	All	mg/kg	3	3	100	2.51	2.57	2.51	2.57	LogNormal+	2.54	0.03	0.01732	2.547	2.547
Nanakuli Muliwai	barium	All	All	mg/kg	3	3	100	39.1	43.6	39.1	43.6	LogNormal+	40.8	2.4434	1.4107	43.681	43.6
Nanakuli Muliwai	beryllium	All	All	mg/kg	3	3	100	0.078	0.094	0.078	0.094	LogNormal+	0.084667	0.0083267	0.0048074	0.10166	0.094
Nanakuli Muliwai	cadmium	All	All	mg/kg	3	3	100	0.11	0.13	0.11	0.13	LogNormal+	0.12	0.01	0.0057735	0.13761	0.13
Nanakuli Muliwai	chromium	All	All	mg/kg	3	3	100	19.7	24.7	19.7	24.7	LogNormal+	22.233	2.5007	1.4438	27.986	24.7
Nanakuli Muliwai	cobalt	All	All	mg/kg	3	3	100	4.59	5.25	4.59	5.25	LogNormal+	4.9	0.33181	0.19157	5.3569	5.25
Nanakuli Muliwai	copper	All	All	mg/kg	3	3	100	64.9	79.9	64.9	79.9	LogNormal+	71.6	7.6269	4.4034	88.28	79.9
Nanakuli Muliwai	di-n-butylphthalate	All	All	mg/kg	3	3	100	0.012	0.018	0.012	0.018	LogNormal+	0.015333	0.003055	0.0017638	0.025314	0.018
Nanakuli Muliwai	heptachlorepoxide	All	All	mg/kg	2	2	100	0.00098	0.0011	0.00098	0.0011	LogNormal(A)	0.00104	0.000084853	0.00006	NA	0.0011
Nanakuli Muliwai	hpcdd,total	All	All	mg/kg	3	3	100	1.73E-06	2.46E-06	1.73E-06	2.46E-06	LogNormal++	2.04E-06	3.79E-07	2.19E-07	3.08E-06	2.46E-06
Nanakuli Muliwai	hpcdf,total	All	All	mg/kg	3	3	100	1.78E-07	3.71E-07	1.78E-07	3.71E-07	LogNormal+	2.52E-07	1.04E-07	6.01E-08	1.04E-06	3.71E-07
Nanakuli Muliwai	hxcdd,total	All	All	mg/kg	3	1	33.33	3.82E-08	3.69E-07	3.69E-07	3.69E-07	LogNormal+	1.51E-07	1.89E-07	1.09E-07	4.05E-01	3.69E-07
Nanakuli Muliwai	hxcdf,total	All	All	mg/kg	3	1	33.33	3.75E-08	1.67E-07	1.67E-07	1.67E-07	LogNormal+	8.11E-08	7.44E-08	4.29E-08	7.27E-05	1.67E-07
Nanakuli Muliwai	iron	All	All	mg/kg	3	3	100	5410	7010	5410	7010	LogNormal+	5996.7	881.21	508.77	8139.1	7010
Nanakuli Muliwai	lead	All	All	mg/kg	3	3	100	2.01	2.15	2.01	2.15	LogNormal+	2.06	0.078102	0.045092	2.1177	2.1177
Nanakuli Muliwai	lipids,total	All	All	percent	3	3	100	3.3	4.8	3.3	4.8	LogNormal+	3.9667	0.76376	0.44096	6.1554	4.8
Nanakuli Muliwai	manganese	All	All	mg/kg	3	3	100	501	611	501	611	LogNormal+	571.67	61.33	35.409	715.42	611
Nanakuli Muliwai	mercury	All	All	mg/kg	3	3	100	0.042	0.047	0.042	0.047	LogNormal+	0.044	0.0026458	0.0015275	0.047144	0.047
Nanakuli Muliwai	methylmercury	All	All	mg/kg	3	3	100	0.032	0.053	0.032	0.053	LogNormal+	0.039333	0.011846	0.0068394	0.087301	0.053
Nanakuli Muliwai	ocdf	All	All	mg/kg	3	3	100	6.44E-07	8.78E-07	6.44E-07	8.78E-07	LogNormal+	7.24E-07	1.34E-07	7.72E-08	1.08E-06	8.78E-07
Nanakuli Muliwai	perchlorate	All	All	mg/kg	3	1	33.33	0.0001414	0.0014	0.0014	0.0014	LogNormal(A)	0.00056095	0.00072664	0.00041953	7791.9	0.0014
Nanakuli Muliwai	selenium	All	All	mg/kg	3	3	100	2.19	2.57	2.19	2.57	LogNormal+	2.3833	0.19009	0.10975	2.7031	2.57
Nanakuli Muliwai	silver	All	All	mg/kg	3	3	100	0.527	0.703	0.527	0.703	LogNormal+	0.608	0.088831	0.051287	0.83165	0.703
Nanakuli Muliwai	solids,total	All	All	percent	3	3	100	27.3	28.7	27.3	28.7	LogNormal+	28.067	0.70946	0.40961	28.423	28.423
Nanakuli Muliwai	vanadium	All	All	mg/kg	3	3	100	19.6	23.6	19.6	23.6	LogNormal+	20.967	2.2811	1.317	25.886	23.6
Nanakuli Muliwai	zinc	All	All	mg/kg	3	3	100	108	116	108	116	LogNormal+	111.67	4.0415	2.3333	114.55	114.55
Makua North Muliwai	1,2,3,7,8-pecdd	All	All	mg/kg	5	2	40	3.96E-08	1.42E-06	4.49E-07	1.42E-06	LogNormal++	4.01E-07	5.96E-07	2.67E-07	3.00E-04	1.42E-06
Makua North Muliwai	4,4'-ddt	All	All	mg/kg	4	2	50	0.0002192	0.00074	0.0005	0.00074	LogNormal+	0.00050445	0.00021587	0.00010794	0.0016564	0.00074
Makua North Muliwai	acetone	All	All	mg/kg	5	1	20	0.1626	1.4142	0.25	0.25	LogNormal(A)	0.43184	0.5504	0.24615	3.6521	0.25
Makua North Muliwai	aluminum	All	All	mg/kg	5	5	100	48.3	4240	48.3	4240	Normal++	2415.7	1546.8	691.77	3890.4	3890.4
Makua North Muliwai	antimony	All	All	mg/kg	5	1	20	0.01414	0.04	0.04	0.04	LogNormal(A)	0.019314	0.011564	0.0051716	0.037522	0.037522
Makua North Muliwai	arsenic	All	All	mg/kg	5	5	100	2.25	3.81	2.25	3.81	LogNormal+	2.928	0.60475	0.27045	3.6797	3.6797
Makua North Muliwai	barium	All	All	mg/kg	5	5	100	5.53	26.1	5.53	26.1	LogNormal(A)	20.786	8.6639	3.8746	74.741	26.1
Makua North Muliwai	beryllium	All	All	mg/kg	5	4	80	0.0015	0.051	0.028	0.051	Normal++	0.0303	0.018178	0.0081296	0.047631	0.047631
Makua North Muliwai	bhc,delta	All	All	mg/kg	4	1	25	0.0001697	0.00048083	0.00031	0.00031	LogNormal+	0.00028256	0.0001478	0.000073902	0.00086005	0.00031
Makua North Muliwai	bhc,gamma	All	All	mg/kg	4	2	50	0.0007071	0.0013	0.00089	0.0013	LogNormal+	0.00090105	0.00027959	0.00013979	0.0014302	0.0013
Makua North Muliwai	cadmium	All	All	mg/kg	5	5	100	0.02	0.08	0.02	0.08	LogNormal+	0.054	0.021909	0.009798	0.12706	0.08
Makua North Muliwai	chromium	All	All	mg/kg	5	5	100	0.9	14.7	0.9	14.7	Normal++	9.24	5.2228	2.3357	14.219	14.219
Makua North Muliwai	cobalt	All	All	mg/kg	5	5	100	0.397	4.17	0.397	4.17	Normal++	2.6134	1.3915	0.62229	3.94	3.94
Makua North Muliwai	copper	All	All	mg/kg	5	5	100	6.39	166	6.39	166	LogNormal+	62.118	60.585	27.094	2127.7	166
Makua North Muliwai	di-n-butylphthalate	All	All	mg/kg	5	5	100	0.0098	0.015	0.0098	0.015	LogNormal+	0.01136	0.002109	0.00094319	0.013675	0.013675
Makua North Muliwai	heptachlorepoxide	All	All	mg/kg	2	1	50	0.00051	0.0012021	0.00051	0.00051	LogNormal(A)	0.00085604	0.00048938	0.00034604	NA	0.00051
Makua North Muliwai	hpcdd,total	All	All	mg/kg	5	5	100	1.40E-06	1.02E-05	1.40E-06	1.02E-05	LogNormal++	3.55E-06	3.75E-06	1.68E-06	1.87E-05	1.02E-05
Makua North Muliwai	hpcdf,total	All	All	mg/kg	5	1	20	4.81E-08	7.99E-07	7.99E-07	7.99E-07	LogNormal(A)	2.09E-07	3.30E-07	1.47E-07	5.15E-06	7.99E-07
Makua North Muliwai	iron	All	All	mg/kg	5	5	100	122	4530	122	4530	Normal++	2612.4	1647.7	736.88	4183.3	4183.3
Makua North Muliwai	lead	All	All	mg/kg	5	5	100	1.25	5.39	1.25	5.39	LogNormal+	2.636	1.7186	0.7686	7.5571	5.39
Makua North Muliwai	lipids,total	All	All	percent	5	5	100	2.1	6.4	2.1	6.4	LogNormal+	4.42	1.5675	0.701	7.9524	6.4
Makua North Muliwai	manganese	All	All	mg/kg	5	5	100	11.9	386	11.9	386	Normal++	244.78	142.6	63.772	380.73	380.73
Makua North Muliwai	mercury	All	All	mg/kg	5	5	100	0.024	0.074	0.024	0.074	LogNormal+	0.039	0.020199	0.0090333	0.071998	0.071998
Makua North Muliwai	methylmercury	All	All	mg/kg	5	5	100	0.012	0.07	0.012	0.07	LogNormal+	0.0334	0.023681	0.010591	0.12593	0.07
Makua North Muliwai	pecdd,total	All	All	mg/kg	5	1	20	3.39E-08	1.42E-06	1.42E-06	1.42E-06	LogNormal(A)	3.18E-07	6.16E-07	2.76E-07	1.14E-04	1.42E-06
Makua North Muliwai	percentmoisture	All	All	ug/l	5	5	100	0	0	0	0	LogNormal(A)	0	NA	NA	NA	NA
Makua North Muliwai	perchlorate	All	All	mg/kg	5	1	20	0.0001414	0.0019	0.0019	0.0019	LogNormal(A)	0.00049314	0.00078646	0.00035172	0.012147	0.0019

Appendix E.1-2
ERA Summary Statistics
Fish Tissue
Makua Military Reservation

Area	Riskstats_v1.19_Parameter	MinDepth	MaxDepth	Units	N	#D	%D	Min	Max	MinD	MaxD	Distribution	Mean_Arith	StdDev_Arith	StdError_Arith	UCL_95	RME
Makua North Muliwai	selenium	All	All	mg/kg	5	5	100	1.83	3.71	1.83	3.71	LogNormal++	2.382	0.75952	0.33967	3.3202	3.3202
Makua North Muliwai	silver	All	All	mg/kg	5	5	100	0.014	1.13	0.014	1.13	LogNormal+	0.3952	0.4268	0.19087	348.05	1.13
Makua North Muliwai	solids,total	All	All	percent	5	5	100	24.4	28.1	24.4	28.1	LogNormal+	26.74	1.5076	0.67424	27.667	27.667
Makua North Muliwai	vanadium	All	All	mg/kg	5	5	100	1.24	19.3	1.24	19.3	Normal++	12.808	7.1333	3.1901	19.609	19.3
Makua North Muliwai	zinc	All	All	mg/kg	5	5	100	98.8	129	98.8	129	LogNormal+	113.96	13.693	6.1239	129.2	129
Makua South Muliwai	1,2,3,4,6,7,8-hpcdd	All	All	mg/kg	7	1	14.29	1.29E-07	1.20E-06	5.31E-07	5.31E-07	LogNormal++	7.53E-07	4.02E-07	1.52E-07	2.26E-06	5.31E-07
Makua South Muliwai	1,2,3,4,6,7,8-hpcdf	All	All	mg/kg	7	1	14.29	5.80E-08	9.19E-07	2.95E-07	2.95E-07	LogNormal++	3.50E-07	3.13E-07	1.18E-07	2.08E-06	2.95E-07
Makua South Muliwai	1,2,3,7,8-pecdd	All	All	mg/kg	7	1	14.29	3.54E-08	1.76E-06	1.76E-06	1.76E-06	LogNormal++	4.64E-07	6.14E-07	2.32E-07	1.14E-05	1.76E-06
Makua South Muliwai	2,3,7,8-tcdf	All	All	mg/kg	7	1	14.29	2.26E-08	7.71E-07	5.90E-07	5.90E-07	LogNormal++	3.80E-07	2.97E-07	1.12E-07	4.69E-06	5.90E-07
Makua South Muliwai	4,4'-ddt	All	All	mg/kg	7	5	71.43	0.00067	0.0029	0.00067	0.0029	LogNormal++	0.0014757	0.000921	0.00034811	0.0027337	0.0027337
Makua South Muliwai	acetone	All	All	mg/kg	5	4	80	0.1626	0.38	0.23	0.38	LogNormal+	0.25853	0.079952	0.035756	0.37944	0.37944
Makua South Muliwai	aluminum	All	All	mg/kg	7	7	100	1150	2880	1150	2880	LogNormal+	1871.1	707.59	267.44	2647.5	2647.5
Makua South Muliwai	antimony	All	All	mg/kg	7	2	28.57	0.01414	0.0527	0.0481	0.0527	LogNormal(A)	0.024502	0.017742	0.0067058	0.049032	0.049032
Makua South Muliwai	arsenic	All	All	mg/kg	7	7	100	1.46	29.8	1.46	29.8	LogNormal(A)	5.7757	10.6	4.0064	27.693	27.693
Makua South Muliwai	barium	All	All	mg/kg	7	7	100	12.5	21.2	12.5	21.2	LogNormal+	16.643	3.3346	1.2604	19.731	19.731
Makua South Muliwai	beryllium	All	All	mg/kg	7	4	57.14	0.01	0.032	0.01	0.032	LogNormal++	0.018511	0.0086711	0.0032773	0.029403	0.029403
Makua South Muliwai	bhc,beta	All	All	mg/kg	7	2	28.57	0.0002263	0.0041	0.00081	0.0041	LogNormal+	0.0015742	0.0014845	0.00056107	0.013944	0.0041
Makua South Muliwai	bhc,gamma	All	All	mg/kg	6	2	33.33	0.0001061	0.0023335	0.0016	0.0017	LogNormal(A)	0.0014162	0.00084586	0.00034532	0.030847	0.0017
Makua South Muliwai	bis(2-ethylhexyl)phthalate	All	All	mg/kg	7	1	14.29	0.03465	3.1	3.1	3.1	LogNormal(A)	0.56862	1.144	0.4324	79.357	3.1
Makua South Muliwai	cadmium	All	All	mg/kg	7	7	100	0.02	0.147	0.02	0.147	LogNormal++	0.050886	0.043848	0.016573	0.10595	0.10595
Makua South Muliwai	chromium	All	All	mg/kg	7	7	100	8.4	31.5	8.4	31.5	LogNormal+	15.971	8.2338	3.1121	25.095	25.095
Makua South Muliwai	cobalt	All	All	mg/kg	7	7	100	1.94	2.58	1.94	2.58	LogNormal+	2.2657	0.25039	0.094639	2.4726	2.4726
Makua South Muliwai	copper	All	All	mg/kg	7	7	100	9.56	109	9.56	109	LogNormal+	43.723	37.979	14.355	182.56	109
Makua South Muliwai	di-n-butylphthalate	All	All	mg/kg	7	7	100	0.011	1.5	0.011	1.5	LogNormal(A)	0.36129	0.61358	0.23191	391.99	1.5
Makua South Muliwai	heptachlorepoxide	All	All	mg/kg	5	2	40	0.00058	0.0028991	0.00058	0.00093	LogNormal+	0.0015324	0.0011006	0.00049222	0.006758	0.00093
Makua South Muliwai	hpcdd,total	All	All	mg/kg	7	4	57.14	1.29E-07	3.02E-06	6.99E-07	3.02E-06	LogNormal++	1.41E-06	9.47E-07	3.58E-07	8.51E-06	3.02E-06
Makua South Muliwai	hpcdf,total	All	All	mg/kg	7	2	28.57	5.80E-08	1.35E-06	2.95E-07	1.35E-06	LogNormal++	4.66E-07	4.93E-07	1.86E-07	4.76E-06	1.35E-06
Makua South Muliwai	hxcdd,total	All	All	mg/kg	7	1	14.29	3.54E-08	4.45E-07	1.45E-07	1.45E-07	LogNormal+	2.11E-07	1.69E-07	6.39E-08	1.19E-06	1.45E-07
Makua South Muliwai	hxcdf,total	All	All	mg/kg	7	1	14.29	2.40E-08	3.61E-07	1.29E-07	1.29E-07	LogNormal+	1.57E-07	1.29E-07	4.87E-08	9.25E-07	1.29E-07
Makua South Muliwai	iron	All	All	mg/kg	7	7	100	1900	3460	1900	3460	LogNormal+	2775.4	547.24	206.84	3292.5	3292.5
Makua South Muliwai	lead	All	All	mg/kg	7	7	100	0.973	2.61	0.973	2.61	LogNormal+	1.709	0.74533	0.28171	2.6443	2.61
Makua South Muliwai	lipids,total	All	All	percent	5	5	100	2.5	6.4	2.5	6.4	LogNormal+	4.24	1.8174	0.81277	7.7003	6.4
Makua South Muliwai	m,p-xylenes	All	All	mg/kg	7	2	28.57	0.0016	0.017	0.0016	0.017	LogNormal(A)	0.012254	0.004882	0.0018452	0.042461	0.017
Makua South Muliwai	manganese	All	All	mg/kg	7	7	100	94.9	184	94.9	184	LogNormal+	135.41	30.446	11.508	163.65	163.65
Makua South Muliwai	mercury	All	All	mg/kg	7	7	100	0.034	0.103	0.034	0.103	LogNormal+	0.067757	0.024797	0.0093722	0.099275	0.099275
Makua South Muliwai	methylmercury	All	All	mg/kg	7	7	100	0.038	0.17	0.038	0.17	LogNormal++	0.074612	0.045358	0.017144	0.12623	0.12623
Makua South Muliwai	ocdd	All	All	mg/kg	7	2	28.57	1.41E-06	8.77E-06	6.90E-06	8.70E-06	LogNormal++	5.44E-06	2.78E-06	1.05E-06	1.19E-05	8.70E-06
Makua South Muliwai	ocdf	All	All	mg/kg	7	3	42.86	2.65E-07	1.31E-06	5.49E-07	1.31E-06	LogNormal++	8.30E-07	3.95E-07	1.49E-07	1.59E-06	1.31E-06
Makua South Muliwai	pecdd,total	All	All	mg/kg	7	1	14.29	3.54E-08	1.76E-06	1.76E-06	1.76E-06	LogNormal++	5.05E-07	6.31E-07	2.39E-07	1.63E-05	1.76E-06
Makua South Muliwai	percentlipids	All	All	percent	2	2	100	13.9	16	13.9	16	LogNormal(A)	14.95	1.4849	1.05	NA	16
Makua South Muliwai	percentmoisture	All	All	mg/kg	9	9	100	0	0	0	72.9	LogNormal(A)	0	NA	NA	NA	NA
Makua South Muliwai	perchlorate	All	All	mg/kg	7	6	85.71	0.0001414	0.16	0.0012	0.16	LogNormal+	0.04622	0.060711	0.022947	1617.6	0.16
Makua South Muliwai	selenium	All	All	mg/kg	7	7	100	1.61	3.59	1.61	3.59	LogNormal+	2.5214	0.65178	0.24635	3.1734	3.1734
Makua South Muliwai	silver	All	All	mg/kg	7	7	100	0.046	0.822	0.046	0.822	LogNormal+	0.34194	0.33983	0.12844	5.4303	0.822
Makua South Muliwai	solids,total	All	All	percent	5	5	100	25.7	30.6	25.7	30.6	LogNormal+	27.58	2.1183	0.94731	29.242	29.242
Makua South Muliwai	tcdf,total	All	All	mg/kg	7	1	14.29	2.26E-08	5.90E-07	5.90E-07	5.90E-07	LogNormal++	1.79E-07	2.01E-07	7.61E-08	2.29E-06	5.90E-07
Makua South Muliwai	thallium	All	All	mg/kg	7	2	28.57	0.00325	0.006364	0.00325	0.00586	LogNormal(A)	0.0058471	0.0011605	0.00043863	0.0072772	0.00586
Makua South Muliwai	vanadium	All	All	mg/kg	7	7	100	7.76	18.2	7.76	18.2	LogNormal+	11.326	3.4784	1.3147	14.45	14.45
Makua South Muliwai	zinc	All	All	mg/kg	7	7	100	85.2	201	85.2	201	LogNormal(A)	114.19	39.694	15.003	146.28	146.28
Nearshore at Sandy Beach	1,2,3,7,8-pecdd	All	All	mg/kg	6	1	16.67	4.60E-08	4.88E-07	1.72E-07	1.72E-07	LogNormal+	1.94E-07	1.64E-07	6.70E-08	1.17E-06	1.72E-07
Nearshore at Sandy Beach	4,4'-ddt	All	All	mg/kg	6	2	33.33	0.0001202	0.0021	0.0019	0.0021	LogNormal+	0.00098958	0.00085479	0.00034897	0.036071	0.0021
Nearshore at Sandy Beach	acetone	All	All	mg/kg	5	4	80	0.2192	0.6	0.23	0.6	LogNormal+	0.33384	0.15629	0.069894	0.58104	0.58104
Nearshore at Sandy Beach	aldrin	All	All	mg/kg	6	1	16.67	0.0007071	0.0064	0.0064	0.0064	LogNormal+	0.0026694	0.002243	0.00091569	0.017827	0.0064
Nearshore at Sandy Beach	aluminum	All	All	mg/kg	6	6	100	3.8	4720	3.8	4720	LogNormal(A)	796	1922.4	784.8	78636000	4720
Nearshore at Sandy Beach	antimony	All	All	mg/kg	6	1	16.67	0.01414	0.0259	0.0259	0.0259	LogNormal(A)	0.016102	0.0048001	0.0019596	0.020477	0.020477

Appendix E.1-2
ERA Summary Statistics
Fish Tissue
Makua Military Reservation

Area	Riskstats_v1.19_Parameter	MinDepth	MaxDepth	Units	N	#D	%D	Min	Max	MinD	MaxD	Distribution	Mean_Arith	StdDev_Arith	StdError_Arith	UCL_95	RME
Nearshore at Sandy Beach	arsenic	All	All	mg/kg	6	6	100	4.52	53	4.52	53	LogNormal(A)	18.673	20.905	8.5343	212.12	53
Nearshore at Sandy Beach	barium	All	All	mg/kg	6	6	100	0.96	14.2	0.96	14.2	LogNormal+	5.6483	5.2405	2.1394	78.53	14.2
Nearshore at Sandy Beach	beryllium	All	All	mg/kg	6	1	16.67	0.002121	0.069	0.069	0.069	LogNormal(A)	0.013503	0.027194	0.011102	0.48771	0.069
Nearshore at Sandy Beach	bhc,gamma	All	All	mg/kg	5	1	20	0.001061	0.0091924	0.0019	0.0019	LogNormal+	0.003859	0.0033197	0.0014846	0.025346	0.0019
Nearshore at Sandy Beach	bis(2-ethylhexyl)phthalate	All	All	mg/kg	6	1	16.67	0.03465	0.14849	0.049	0.049	LogNormal(A)	0.056014	0.045667	0.018644	0.1222	0.049
Nearshore at Sandy Beach	cadmium	All	All	mg/kg	6	6	100	0.04	0.2	0.04	0.2	LogNormal+	0.10867	0.053616	0.021889	0.22255	0.2
Nearshore at Sandy Beach	chromium	All	All	mg/kg	6	6	100	0.7	31.7	0.7	31.7	LogNormal++	7.2817	12.047	4.918	208.67	31.7
Nearshore at Sandy Beach	cobalt	All	All	mg/kg	6	6	100	0.109	4.31	0.109	4.31	LogNormal(A)	0.8315	1.7043	0.69577	35.231	4.31
Nearshore at Sandy Beach	copper	All	All	mg/kg	6	6	100	1.86	16.5	1.86	16.5	LogNormal(A)	4.7767	5.7599	2.3515	18.262	16.5
Nearshore at Sandy Beach	diethylphthalate	All	All	mg/kg	6	2	33.33	0.009192	0.15556	0.018	0.019	LogNormal(A)	0.03669	0.058415	0.023848	0.3774	0.019
Nearshore at Sandy Beach	di-n-butylphthalate	All	All	mg/kg	6	6	100	0.014	0.61	0.014	0.61	LogNormal++	0.13417	0.2335	0.095324	2.824	0.61
Nearshore at Sandy Beach	heptachlor	All	All	mg/kg	6	2	33.33	0.0004596	0.0057	0.0045	0.0057	LogNormal+	0.0029315	0.0020788	0.00084868	0.031586	0.0057
Nearshore at Sandy Beach	heptachlorepoxide	All	All	mg/kg	5	3	60	0.0007071	0.0076	0.0028	0.0076	LogNormal+	0.0029628	0.0028155	0.0012591	0.044703	0.0076
Nearshore at Sandy Beach	hpcdd,total	All	All	mg/kg	6	4	66.67	1.10E-07	1.62E-06	3.06E-07	1.62E-06	LogNormal++	5.77E-07	5.41E-07	2.21E-07	3.21E-06	1.62E-06
Nearshore at Sandy Beach	hpcdf,total	All	All	mg/kg	6	1	16.67	3.68E-08	3.39E-07	2.87E-07	2.87E-07	LogNormal+	1.63E-07	1.30E-07	5.29E-08	1.27E-06	2.87E-07
Nearshore at Sandy Beach	iron	All	All	mg/kg	6	6	100	68.4	6960	68.4	6960	LogNormal(A)	1229.5	2807.4	1146.1	468300	6960
Nearshore at Sandy Beach	lead	All	All	mg/kg	6	6	100	0.463	2.75	0.463	2.75	LogNormal+	1.4398	0.89938	0.36717	4.4129	2.75
Nearshore at Sandy Beach	lipids,total	All	All	percent	5	5	100	1.7	9.1	1.7	9.1	LogNormal+	4.04	2.9509	1.3197	12.353	9.1
Nearshore at Sandy Beach	m,p-xylenes	All	All	mg/kg	6	1	16.67	0.01343	0.016	0.016	0.016	LogNormal(A)	0.013863	0.0010471	0.0004275	0.014488	0.014488
Nearshore at Sandy Beach	manganese	All	All	mg/kg	6	6	100	1.4	147	1.4	147	LogNormal++	28.39	58.137	23.734	2851.3	147
Nearshore at Sandy Beach	mercury	All	All	mg/kg	6	5	83.33	0.009192	0.043	0.024	0.043	LogNormal+	0.027782	0.011355	0.0046357	0.058023	0.043
Nearshore at Sandy Beach	methylmercury	All	All	mg/kg	6	5	83.33	0.003	0.056	0.027	0.056	Normal++	0.036351	0.01911	0.0078018	0.052072	0.052072
Nearshore at Sandy Beach	percentlipids	All	All	percent	1	1	100	9.09	9.09	9.09	9.09	LogNormal(A)	9.09	NA	NA	NA	9.09
Nearshore at Sandy Beach	perchlorate	All	All	mg/kg	6	2	33.33	0.0001414	0.11	0.01	0.11	LogNormal(A)	0.020094	0.044221	0.018053	205540	0.11
Nearshore at Sandy Beach	selenium	All	All	mg/kg	6	4	66.67	0.4667	1.8	0.879	1.8	LogNormal+	0.99506	0.46565	0.1901	1.7732	1.7732
Nearshore at Sandy Beach	silver	All	All	mg/kg	6	1	16.67	0.005657	0.031	0.031	0.031	LogNormal(A)	0.010116	0.010246	0.0041831	0.02745	0.02745
Nearshore at Sandy Beach	solids,total	All	All	percent	5	5	100	26.5	31.8	26.5	31.8	LogNormal+	28.82	2.158	0.96509	30.504	30.504
Nearshore at Sandy Beach	tcdf,total	All	All	mg/kg	6	1	16.67	2.83E-08	2.47E-07	2.47E-07	2.47E-07	LogNormal+	1.32E-07	8.58E-08	3.50E-08	6.33E-07	2.47E-07
Nearshore at Sandy Beach	thallium	All	All	mg/kg	6	1	16.67	0.006364	0.0126	0.0126	0.0126	LogNormal(A)	0.007639	0.0024953	0.0010187	0.010051	0.010051
Nearshore at Sandy Beach	vanadium	All	All	mg/kg	6	6	100	0.312	20.3	0.312	20.3	LogNormal(A)	3.8153	8.0793	3.2984	414.9	20.3
Nearshore at Sandy Beach	zinc	All	All	mg/kg	6	6	100	44.7	77	44.7	77	LogNormal+	66.417	12.277	5.0122	80.967	77
Nearshore at Makua	4,4'-ddt	All	All	mg/kg	5	1	20	0.0001202	0.00084853	0.00018	0.00018	LogNormal+	0.00049138	0.00032436	0.00014506	0.0039279	0.00018
Nearshore at Makua	acetone	All	All	mg/kg	4	3	75	0.2263	0.73	0.27	0.73	LogNormal+	0.48407	0.27314	0.13657	2.4246	0.73
Nearshore at Makua	aldrin	All	All	mg/kg	5	2	40	0.0007071	0.0029698	0.0024	0.0027	LogNormal+	0.0019675	0.0010173	0.00045493	0.0062739	0.0027
Nearshore at Makua	aluminum	All	All	mg/kg	5	5	100	6.8	65	6.8	65	LogNormal+	30.64	26.161	11.699	429.86	65
Nearshore at Makua	arsenic	All	All	mg/kg	5	5	100	4.06	37.3	4.06	37.3	Normal++	23.012	11.952	5.3452	34.407	34.407
Nearshore at Makua	barium	All	All	mg/kg	5	5	100	0.46	31.6	0.46	31.6	LogNormal++	6.984	13.764	6.1556	6721	31.6
Nearshore at Makua	bhc,alpha	All	All	mg/kg	5	1	20	0.0002263	0.0082	0.0082	0.0082	LogNormal++	0.0020529	0.0034441	0.0015403	0.2087	0.0082
Nearshore at Makua	bhc,delta	All	All	mg/kg	5	1	20	0.0003	0.0023335	0.0003	0.0003	LogNormal+	0.0011065	0.00078072	0.00034915	0.0053364	0.0003
Nearshore at Makua	bhc,gamma	All	All	mg/kg	4	1	25	0.0006293	0.0063	0.0063	0.0063	LogNormal+	0.0026692	0.0024907	0.0012454	0.092115	0.0063
Nearshore at Makua	bis(2-ethylhexyl)phthalate	All	All	mg/kg	5	4	80	0.03465	3.5	0.055	3.5	LogNormal+	1.4039	1.6306	0.72925	228150	3.5
Nearshore at Makua	cadmium	All	All	mg/kg	5	5	100	0.12	0.21	0.12	0.21	LogNormal+	0.151	0.035426	0.015843	0.19307	0.19307
Nearshore at Makua	chromium	All	All	mg/kg	5	5	100	0.8	10.4	0.8	10.4	LogNormal+	5.672	4.3028	1.9243	177.58	10.4
Nearshore at Makua	cobalt	All	All	mg/kg	5	5	100	0.107	0.413	0.107	0.413	LogNormal+	0.2306	0.13208	0.059067	0.60155	0.413
Nearshore at Makua	copper	All	All	mg/kg	5	5	100	2.2	9.78	2.2	9.78	LogNormal++	4.21	3.1406	1.4045	10.833	9.78
Nearshore at Makua	di-n-butylphthalate	All	All	mg/kg	5	5	100	0.022	1.4	0.022	1.4	LogNormal(A)	0.3094	0.60976	0.27269	234.64	1.4
Nearshore at Makua	heptachlor	All	All	mg/kg	4	1	25	0.0004596	0.0056	0.0056	0.0056	LogNormal++	0.0018685	0.0024904	0.0012452	0.25577	0.0056
Nearshore at Makua	heptachlorepoxide	All	All	mg/kg	3	2	66.67	0.001131	0.014	0.0032	0.014	LogNormal+	0.0061105	0.0069104	0.0039897	21187	0.014
Nearshore at Makua	iron	All	All	mg/kg	5	5	100	62.5	302	62.5	302	LogNormal+	163	110.21	49.286	665.57	302
Nearshore at Makua	lead	All	All	mg/kg	5	5	100	0.076	2.01	0.076	2.01	LogNormal+	0.6994	0.80883	0.36172	63.616	2.01
Nearshore at Makua	lipids,total	All	All	percent	4	4	100	2.3	9.6	2.3	9.6	LogNormal+	4.725	3.3797	1.6899	26.666	9.6
Nearshore at Makua	m,p-xylenes	All	All	mg/kg	5	1	20	0.01343	0.02	0.02	0.02	LogNormal(A)	0.014748	0.0029359	0.001313	0.017909	0.017909
Nearshore at Makua	manganese	All	All	mg/kg	5	5	100	1.44	15.7	1.44	15.7	LogNormal+	7.682	6.074	2.7164	130.88	15.7
Nearshore at Makua	mercury	All	All	mg/kg	5	5	100	0.044	0.0978	0.044	0.0978	LogNormal+	0.06436	0.020855	0.0093268	0.093505	0.093505
Nearshore at Makua	methylmercury	All	All	mg/kg	5	5	100	0.034	0.20009	0.034	0.20009	LogNormal+	0.084019	0.067608	0.030235	0.30444	0.20009
Nearshore at Makua	nitroglycerin	All	All	mg/kg	5	1	20	0.1308	0.33	0.33	0.33	LogNormal(A)	0.17065	0.089078	0.039837	0.29905	0.29905

Appendix E.1-2
ERA Summary Statistics
Fish Tissue
Makua Military Reservation

Area	Riskstats_v1.19_Parameter	MinDepth	MaxDepth	Units	N	#D	%D	Min	Max	MinD	MaxD	Distribution	Mean_Arith	StdDev_Arith	StdError_Arith	UCL_95	RME
Nearshore at Makua	percentlipids	All	All	percent	1	1	100	21.3	21.3	21.3	21.3	LogNormal(A)	21.3	NA	NA	NA	21.3
Nearshore at Makua	percentmoisture	All	All	mg/kg	6	6	100	0	0	0	66.9	LogNormal(A)	0	NA	NA	NA	NA
Nearshore at Makua	perchlorate	All	All	mg/kg	6	1	16.67	0.0001414	0.0088	0.0088	0.0088	LogNormal(A)	0.0015845	0.0035348	0.0014431	0.26369	0.0088
Nearshore at Makua	rdx	All	All	mg/kg	5	1	20	0.05657	0.057	0.057	0.057	LogNormal(A)	0.056655	0.00019295	0.000086291	0.056662	0.056662
Nearshore at Makua	selenium	All	All	mg/kg	5	4	80	0.5586	1.6	1.09	1.6	LogNormal+	1.1577	0.38637	0.17279	2.0237	1.6
Nearshore at Makua	silver	All	All	mg/kg	5	4	80	0.005657	0.0132	0.008	0.0132	LogNormal+	0.0093714	0.0027896	0.0012475	0.013928	0.0132
Nearshore at Makua	solids,total	All	All	percent	5	5	100	27.6	34.2	27.6	34.2	LogNormal+	30.6	2.3569	1.054	32.485	32.485
Nearshore at Makua	vanadium	All	All	mg/kg	5	5	100	0.106	1.24	0.106	1.24	LogNormal+	0.6132	0.46367	0.20736	8.1805	1.24
Nearshore at Makua	zinc	All	All	mg/kg	5	5	100	36.8	149	36.8	149	LogNormal+	74.54	43.361	19.392	162.47	149

Appendix E.2-1
Statistical Comparison
Metals in North and South Muliwai Compared to North and South Background Areas
Makua Military Reservation

	Distribution[1]		% Detected			Test results		
Metal	**Background**	**Site**	**Background**	**Site**	**Test Used**	**Statistic[2]**	***p***	**Elevated?**
Aluminum	N	N	100	100	WRS	1.9	0.06	No
Antimony	**-**	**N**	-	**45**	**< 50% detected**	**-**	**-**	**Yes[3]**
Arsenic	N	N	50	56	WRS	-1.8	0.07	No
Barium	(Log-)Normal	N	100	100	WRS	4.2	3.1E-05	No[6]
Cadmium	**-**	**N**	**-**	**74**	**-**	**-**	**-**	**Yes[4]**
Chromium (III)	(Log-)Normal	N	100	100	WRS	2.3	0.02	No[6]
Cobalt	(Log-)Normal	N	100	100	WRS	3.6	0.0004	No[6]
Copper	Normal	N	100	100	WRS	2.5	0.01	No[6]
Lead	(Log-)Normal	**N**	**100**	**47**	**< 50% detected**	**-**	**-**	**Yes[5]**
Mercury	(Log-)Normal	N	100	94	WRS	3.0	0.002	No[6]
Selenium	**-**	**N**	**-**	**59**	**-**	**-**	**-**	**Yes[4]**
Vanadium	(Log-)Normal	N	100	100	WRS	2.8	0.005	No[6]
Zinc	(Log-)Normal	N	100	100	WRS	2.8	0.006	No[6]

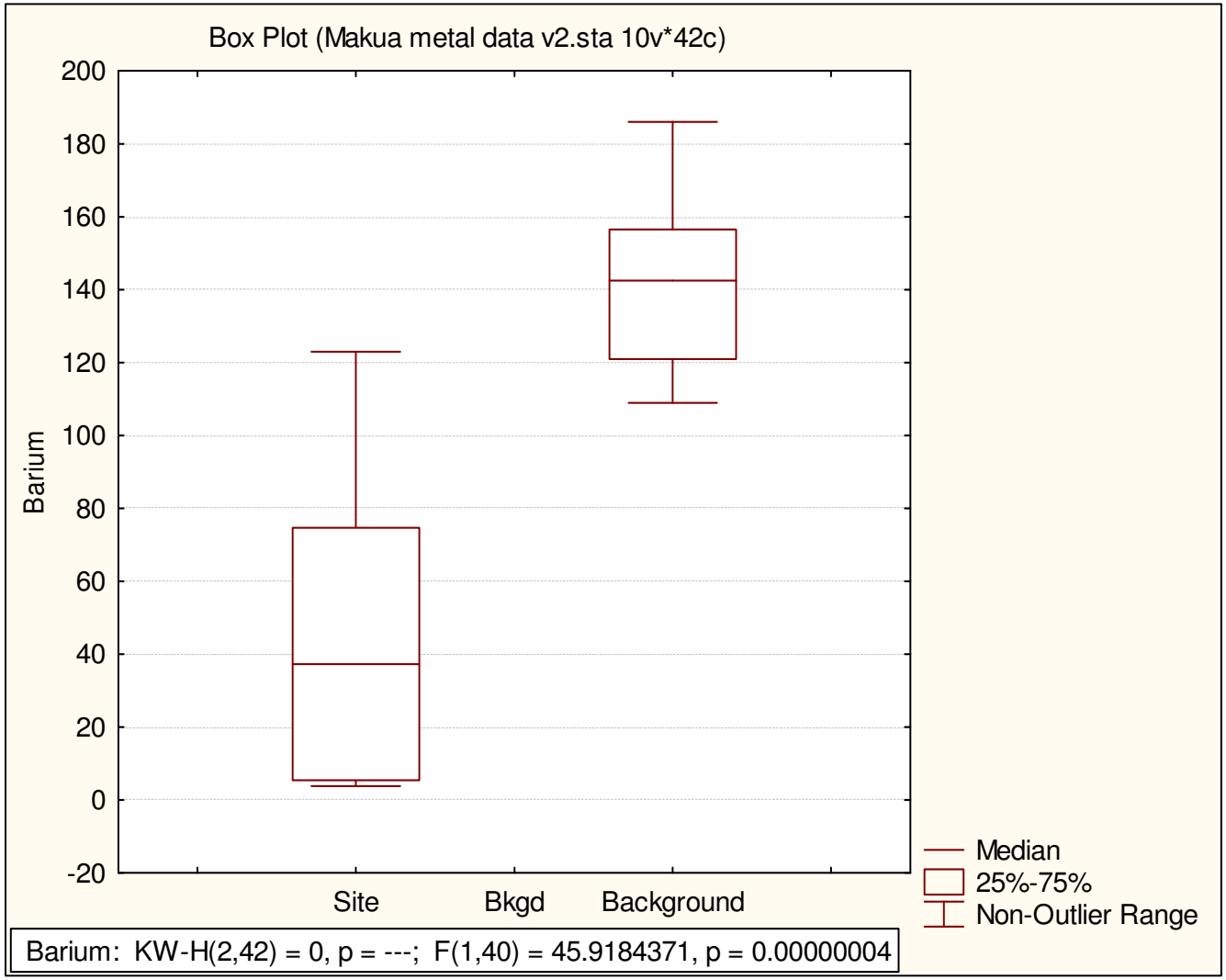
Notes:

1 - Assessed for normality and log-normality using the Shapiro-Wilks test. If the data fit neither distribution, "N" is given as the result.
2 - *U* statistic given for the WRS test.
3 - Identified as a COPEC because constituent was not in the background samples and detected at the site, although infrequently.
4 - Identified as a COPEC because constituent was not detected in the background samples and detected at the site.
5 - Identified as a COPEC because constituent was <50% detected in the site sediments.
6 - Test result indicates there is a significant difference between background and Site concentrations. However, Site concentrations are significantly lower than background concentrations.

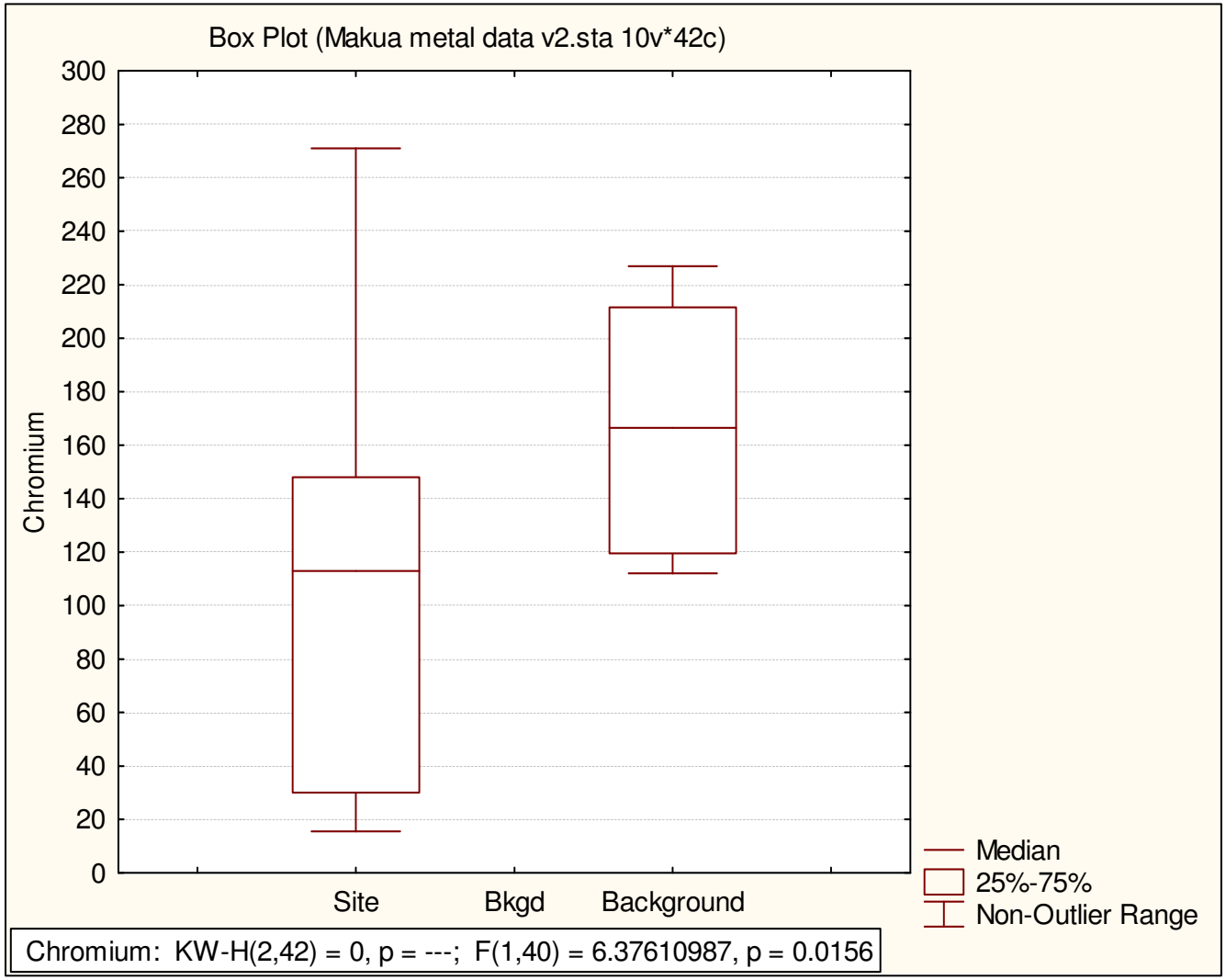
Definitions:

Log-normal - Data is log-normally distributed.
(Log-)Normal - Data fit both a log-normal and a normal distribution.
N - Data is neither log-normally or normally distributed.
Normal - Data is normally distributed.
Background - North and south background areas combined (8 samples).
Site - North and south muliwai combined (34 samples).

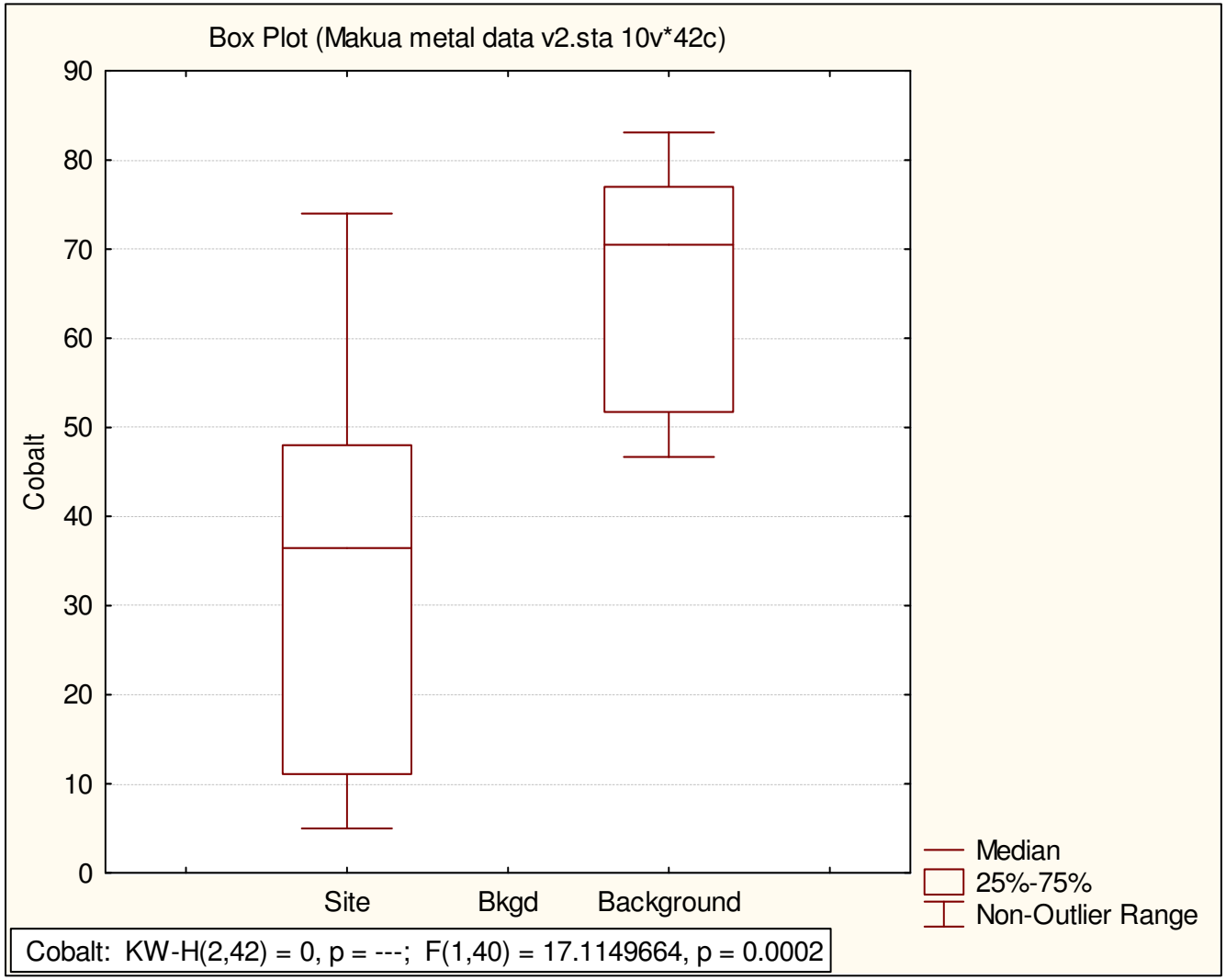
Appendix E-2.2
WRS Box Plot
Barium Sediments
Makua AFB



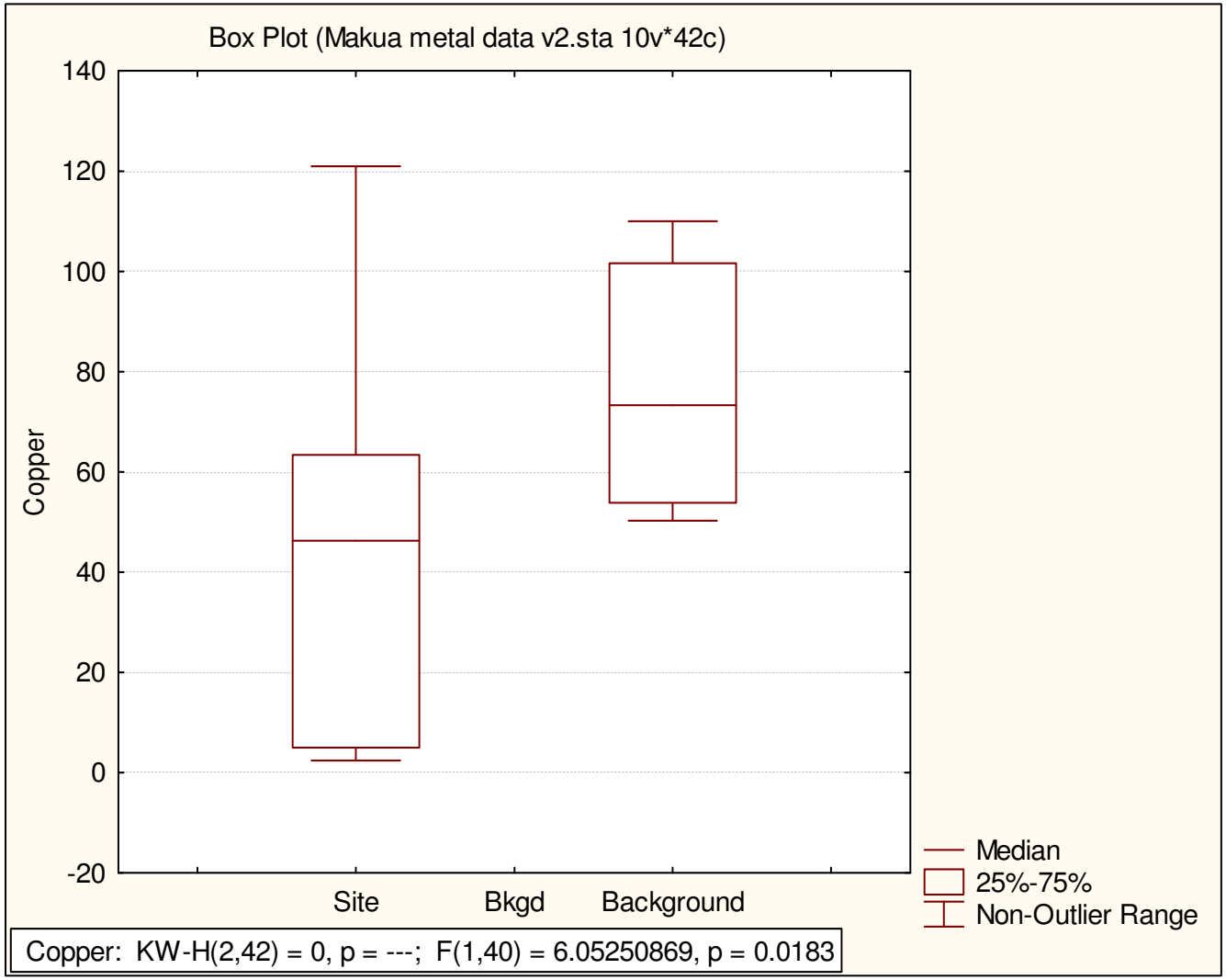
Appendix E-2.3
WRS Box Plot
Chromium Sediments
Makua AFB



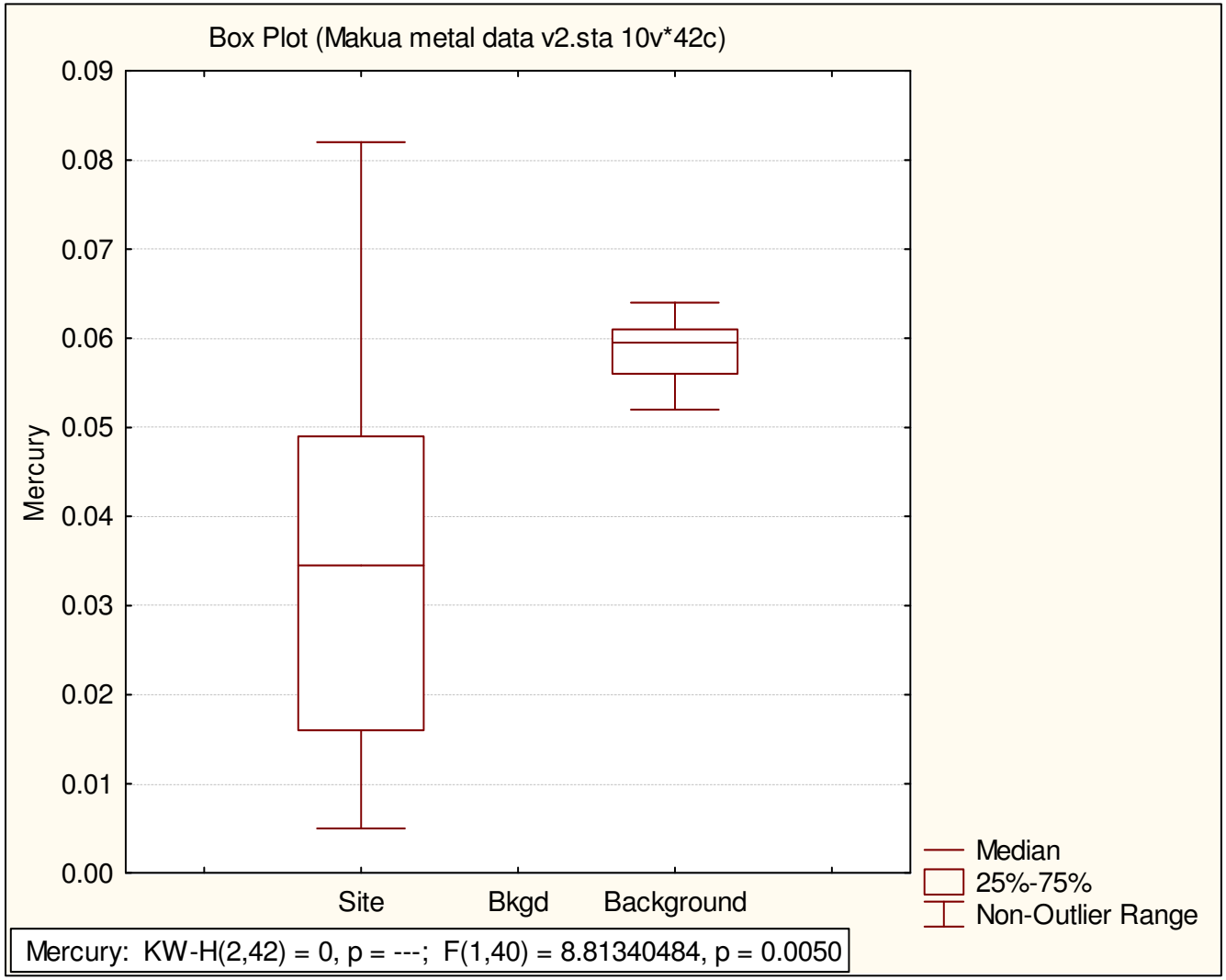
Appendix E-2.4
WRS Box Plot
Cobalt Sediments
Makua AFB



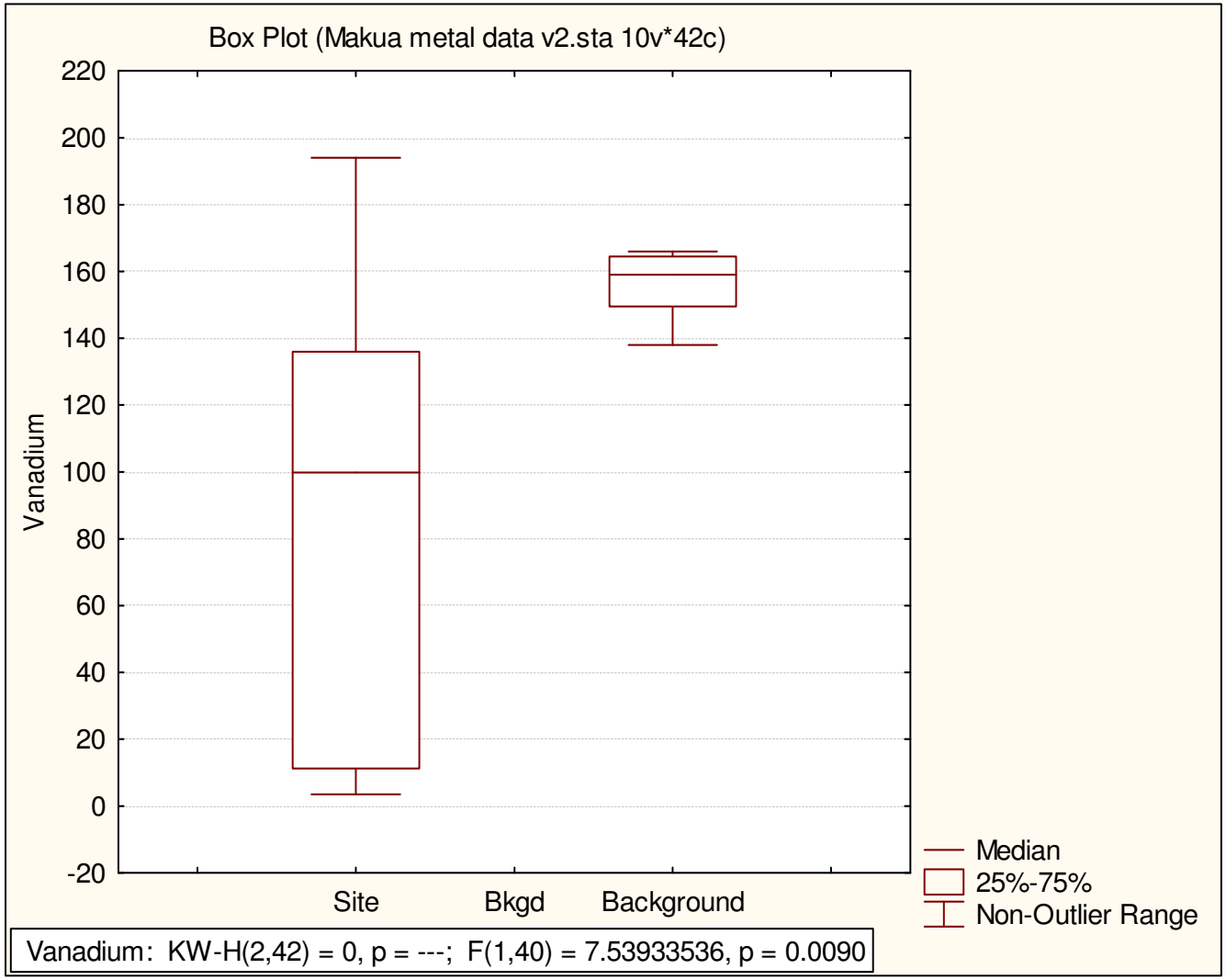
Appendix E-2.5
WRS Box Plot
Copper Sediments
Makua AFB



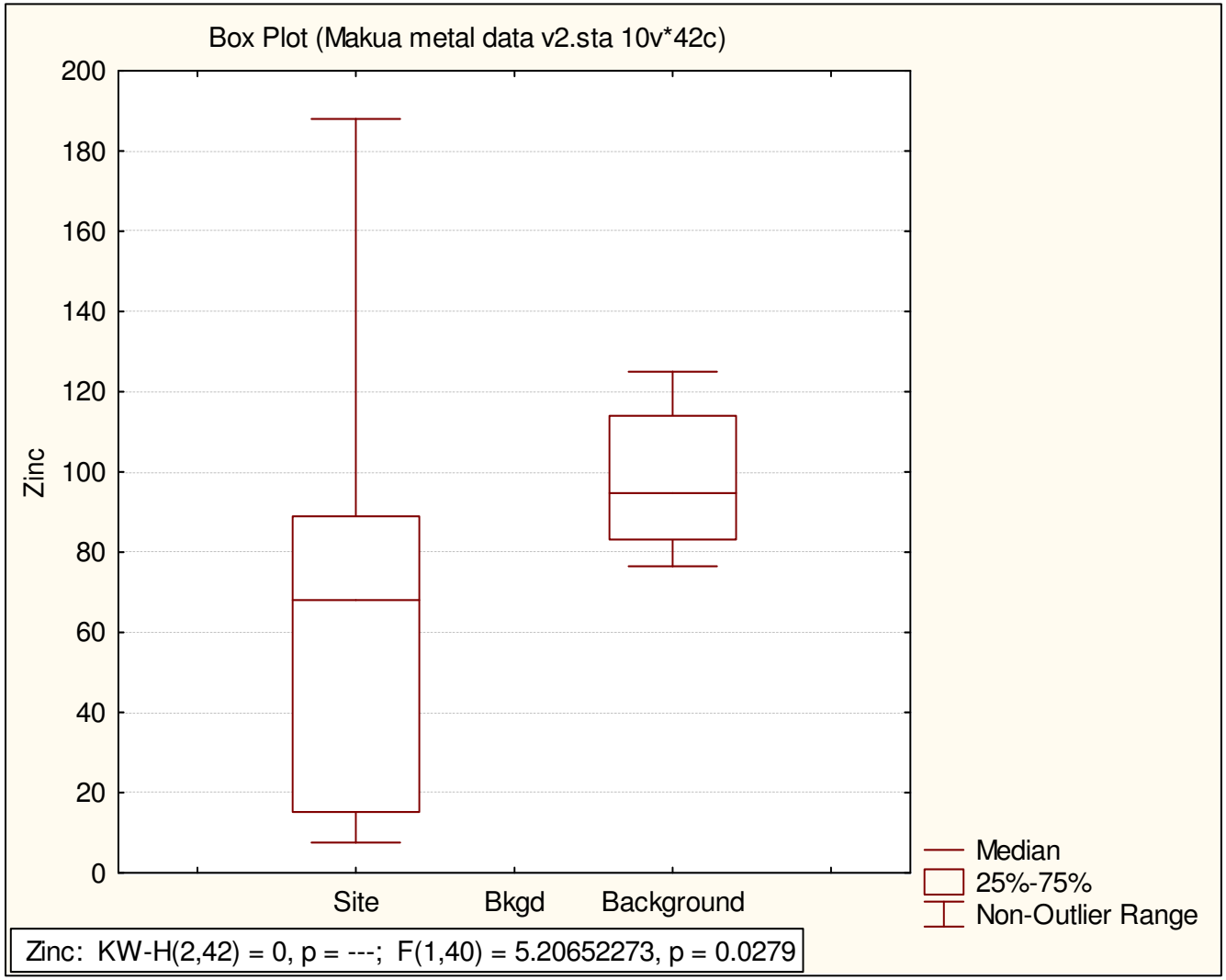
Appendix E-2.6
WRS Box Plot
Mercury Sediments
Makua AFB



Appendix E-2.7
WRS Box Plot
Vanadium Sediments
Makua AFB



Appendix E-2.8
WRS Box Plot
Zinc Sediments
Makua AFB



Appendix E.3
TCDD Equivalent Calculations
Fish Tissue
Makua AFB

Location ID	Field Sample ID	Parameter	Qualifier	Value	TEF	TCDD-Equiv
M1	1	1,2,3,4,6,7,8-HpCDD	U	7.23E-07		0
M1	1	1,2,3,4,6,7,8-HpCDF	U	6.80E-08		0
M1	1	1,2,3,4,7,8,9-HpCDF	U	9.30E-08		0
M1	1	1,2,3,4,7,8-HxCDD	U	4.30E-08		0
M1	1	1,2,3,4,7,8-HxCDF	U	5.60E-08		0
M1	1	1,2,3,6,7,8-HxCDD	U	3.70E-08		0
M1	1	1,2,3,6,7,8-HxCDF	U	5.30E-08		0
M1	1	1,2,3,7,8,9-HxCDD	U	4.00E-08		0
M1	1	1,2,3,7,8,9-HxCDF	U	7.10E-08		0
M1	1	1,2,3,7,8-PeCDD	U	6.10E-08		0
M1	1	1,2,3,7,8-PeCDF	U	4.10E-08		0
M1	1	2,3,4,6,7,8-HxCDF	U	5.90E-08		0
M1	1	2,3,4,7,8-PeCDF	U	4.00E-08		0
M1	1	2,3,7,8-TCDD	U	3.50E-08		0
M1	1	2,3,7,8-TCDF	U	5.50E-08		0
M1	1	OCDD	U	5.27E-06		0
M1	1	OCDF	U	1.51E-07		0
M1	1	**TCDD Equivalent**				0
M1	1b	1,2,3,4,6,7,8-HpCDD	U	7.74E-07		0
M1	1b	1,2,3,4,6,7,8-HpCDF	U	9.40E-08		0
M1	1b	1,2,3,4,7,8,9-HpCDF	U	1.28E-07		0
M1	1b	1,2,3,4,7,8-HxCDD	U	5.80E-08		0
M1	1b	1,2,3,4,7,8-HxCDF	U	4.20E-08		0
M1	1b	1,2,3,6,7,8-HxCDD	U	5.00E-08		0
M1	1b	1,2,3,6,7,8-HxCDF	U	4.00E-08		0
M1	1b	1,2,3,7,8,9-HxCDD	U	5.50E-08		0
M1	1b	1,2,3,7,8,9-HxCDF	U	5.30E-08		0
M1	1b	1,2,3,7,8-PeCDD	U	7.30E-08		0
M1	1b	1,2,3,7,8-PeCDF	U	4.60E-08		0
M1	1b	2,3,4,6,7,8-HxCDF	U	4.40E-08		0
M1	1b	2,3,4,7,8-PeCDF	U	4.40E-08		0
M1	1b	2,3,7,8-TCDD	U	3.60E-08		0
M1	1b	2,3,7,8-TCDF	U	4.90E-08		0
M1	1b	OCDD	U	7.48E-06		0
M1	1b	OCDF	U	6.60E-07		0
M2	1b	**TCDD Equivalent**				0
M1	3	1,2,3,4,6,7,8-HpCDD	U	5.47E-07		0
M1	3	1,2,3,4,6,7,8-HpCDF	U	8.50E-08		0
M1	3	1,2,3,4,7,8,9-HpCDF	U	1.17E-07		0
M1	3	1,2,3,4,7,8-HxCDD	U	6.80E-08		0
M1	3	1,2,3,4,7,8-HxCDF	U	5.60E-08		0
M1	3	1,2,3,6,7,8-HxCDD	U	5.80E-08		0
M1	3	1,2,3,6,7,8-HxCDF	U	5.20E-08		0
M1	3	1,2,3,7,8,9-HxCDD	U	6.40E-08		0
M1	3	1,2,3,7,8,9-HxCDF	U	7.00E-08		0
M1	3	1,2,3,7,8-PeCDD	J	1.42E-06	1	1.42E-06
M1	3	1,2,3,7,8-PeCDF	U	4.10E-08		0
M1	3	2,3,4,6,7,8-HxCDF	U	5.80E-08		0
M1	3	2,3,4,7,8-PeCDF	U	4.00E-08		0
M1	3	2,3,7,8-TCDD	U	4.20E-08		0
M1	3	2,3,7,8-TCDF	U	4.70E-08		0
M1	3	OCDD	U	4.11E-06		0
M1	3	OCDF	U	1.09E-06		0

Appendix E.3
TCDD Equivalent Calculations
Fish Tissue
Makua AFB

Location ID	Field Sample ID	Parameter	Qualifier	Value	TEF	TCDD-Equiv
M1	3	**TCDD Equivalent**				1.42E-06

Appendix E.3
TCDD Equivalent Calculations
Fish Tissue
Makua AFB

Location ID	Field Sample ID	Parameter	Qualifier	Value	TEF	TCDD-Equiv
M1	4	1,2,3,4,6,7,8-HpCDD	U	2.39E-06		0
M1	4	1,2,3,4,6,7,8-HpCDF	U	8.70E-08		0
M1	4	1,2,3,4,7,8,9-HpCDF	U	1.19E-07		0
M1	4	1,2,3,4,7,8-HxCDD	U	6.70E-08		0
M1	4	1,2,3,4,7,8-HxCDF	U	5.10E-08		0
M1	4	1,2,3,6,7,8-HxCDD	U	5.80E-08		0
M1	4	1,2,3,6,7,8-HxCDF	U	4.80E-08		0
M1	4	1,2,3,7,8,9-HxCDD	U	6.30E-08		0
M1	4	1,2,3,7,8,9-HxCDF	U	6.40E-08		0
M1	4	1,2,3,7,8-PeCDD	J	4.49E-07	1	4.49E-07
M1	4	1,2,3,7,8-PeCDF	U	6.60E-08		0
M1	4	2,3,4,6,7,8-HxCDF	U	5.30E-08		0
M1	4	2,3,4,7,8-PeCDF	U	6.40E-08		0
M1	4	2,3,7,8-TCDD	U	3.30E-08		0
M1	4	2,3,7,8-TCDF	U	5.60E-08		0
M1	4	OCDD	U	2.42E-05		0
M1	4	OCDF	U	4.16E-06		0
M1	4	**TCDD Equivalent**				4.5E-07
M1	5	1,2,3,4,6,7,8-HpCDD	U	1.05E-06		0
M1	5	1,2,3,4,6,7,8-HpCDF	U	1.03E-07		0
M1	5	1,2,3,4,7,8,9-HpCDF	U	1.42E-07		0
M1	5	1,2,3,4,7,8-HxCDD	U	6.10E-08		0
M1	5	1,2,3,4,7,8-HxCDF	U	5.90E-08		0
M1	5	1,2,3,6,7,8-HxCDD	U	5.20E-08		0
M1	5	1,2,3,6,7,8-HxCDF	U	5.50E-08		0
M1	5	1,2,3,7,8,9-HxCDD	U	5.70E-08		0
M1	5	1,2,3,7,8,9-HxCDF	U	7.40E-08		0
M1	5	1,2,3,7,8-PeCDD	U	5.60E-08		0
M1	5	1,2,3,7,8-PeCDF	U	5.50E-08		0
M1	5	2,3,4,6,7,8-HxCDF	U	6.20E-08		0
M1	5	2,3,4,7,8-PeCDF	U	5.40E-08		0
M1	5	2,3,7,8-TCDD	U	4.20E-08		0
M1	5	2,3,7,8-TCDF	U	4.70E-08		0
M1	5	OCDD	U	8.80E-06		0
M1	5	OCDF	U	6.93E-07		0
M1	5	**TCDD Equivalent**				0
M2	10	1,2,3,4,6,7,8-HpCDD	U	6.99E-07		0
M2	10	1,2,3,4,6,7,8-HpCDF	U	8.20E-08		0
M2	10	1,2,3,4,7,8,9-HpCDF	U	1.15E-07		0
M2	10	1,2,3,4,7,8-HxCDD	U	6.50E-08		0
M2	10	1,2,3,4,7,8-HxCDF	U	3.20E-08		0
M2	10	1,2,3,6,7,8-HxCDD	U	6.30E-08		0
M2	10	1,2,3,6,7,8-HxCDF	U	3.40E-08		0
M2	10	1,2,3,7,8,9-HxCDD	U	6.20E-08		0
M2	10	1,2,3,7,8,9-HxCDF	U	4.20E-08		0
M2	10	1,2,3,7,8-PeCDD	U	6.00E-08		0
M2	10	1,2,3,7,8-PeCDF	U	4.50E-08		0
M2	10	2,3,4,6,7,8-HxCDF	U	3.60E-08		0
M2	10	2,3,4,7,8-PeCDF	U	4.40E-08		0
M2	10	2,3,7,8-TCDD	U	2.70E-08		0
M2	10	2,3,7,8-TCDF	U	9.76E-07		0
M2	10	OCDD	U	5.94E-06		0
M2	10	OCDF	J	5.49E-07	0.0001	5.49E-11

Appendix E.3
TCDD Equivalent Calculations
Fish Tissue
Makua AFB

Location ID	Field Sample ID	Parameter	Qualifier	Value	TEF	TCDD-Equiv
M2	10	**TCDD Equivalent**				5.5E-11

Appendix E.3
TCDD Equivalent Calculations
Fish Tissue
Makua AFB

Location ID	Field Sample ID	Parameter	Qualifier	Value	TEF	TCDD-Equiv
M2	2fd	1,2,3,4,6,7,8-HpCDD	U	1.70E-06		0
M2	2fd	1,2,3,4,6,7,8-HpCDF	U	1.30E-06		0
M2	2fd	1,2,3,4,7,8,9-HpCDF	U	4.30E-07		0
M2	2fd	1,2,3,4,7,8-HxCDD	U	5.40E-07		0
M2	2fd	1,2,3,4,7,8-HxCDF	U	5.10E-07		0
M2	2fd	1,2,3,6,7,8-HxCDD	U	5.20E-07		0
M2	2fd	1,2,3,6,7,8-HxCDF	U	3.70E-07		0
M2	2fd	1,2,3,7,8,9-HxCDD	U	5.10E-07		0
M2	2fd	1,2,3,7,8,9-HxCDF	U	4.50E-07		0
M2	2fd	1,2,3,7,8-PeCDD	U	7.90E-07		0
M2	2fd	1,2,3,7,8-PeCDF	U	4.90E-07		0
M2	2fd	2,3,4,6,7,8-HxCDF	U	4.10E-07		0
M2	2fd	2,3,4,7,8-PeCDF	U	4.90E-07		0
M2	2fd	2,3,7,8-TCDD	U	3.30E-07		0
M2	2fd	2,3,7,8-TCDF	J	5.90E-07	0.05	2.95E-08
M2	2fd	OCDD	J	8.70E-06	0.0001	8.7E-10
M2	2fd	OCDF	U	1.10E-06		0
M2	2fd	**TCDD Equivalent**				3.0E-08
M2	6	1,2,3,4,6,7,8-HpCDD	U	1.83E-07		0
M2	6	1,2,3,4,6,7,8-HpCDF	U	1.19E-07		0
M2	6	1,2,3,4,7,8,9-HpCDF	U	1.61E-07		0
M2	6	1,2,3,4,7,8-HxCDD	U	1.54E-07		0
M2	6	1,2,3,4,7,8-HxCDF	U	9.80E-08		0
M2	6	1,2,3,6,7,8-HxCDD	U	1.46E-07		0
M2	6	1,2,3,6,7,8-HxCDF	U	1.01E-07		0
M2	6	1,2,3,7,8,9-HxCDD	U	1.53E-07		0
M2	6	1,2,3,7,8,9-HxCDF	U	1.25E-07		0
M2	6	1,2,3,7,8-PeCDD	U	1.70E-07		0
M2	6	1,2,3,7,8-PeCDF	U	1.17E-07		0
M2	6	2,3,4,6,7,8-HxCDF	U	1.07E-07		0
M2	6	2,3,4,7,8-PeCDF	U	1.11E-07		0
M2	6	2,3,7,8-TCDD	U	3.66E-07		0
M2	6	2,3,7,8-TCDF	U	3.45E-07		0
M2	6	OCDD	U	2.00E-06		0
M2	6	OCDF	U	3.75E-07		0
M2	6	**TCDD Equivalent**				0
M2	7	1,2,3,4,6,7,8-HpCDD	J	5.31E-07	0.001	5.31E-10
M2	7	1,2,3,4,6,7,8-HpCDF	U	1.53E-07		0
M2	7	1,2,3,4,7,8,9-HpCDF	U	2.07E-07		0
M2	7	1,2,3,4,7,8-HxCDD	U	4.81E-07		0
M2	7	1,2,3,4,7,8-HxCDF	U	2.68E-07		0
M2	7	1,2,3,6,7,8-HxCDD	U	4.58E-07		0
M2	7	1,2,3,6,7,8-HxCDF	U	2.74E-07		0
M2	7	1,2,3,7,8,9-HxCDD	U	4.78E-07		0
M2	7	1,2,3,7,8,9-HxCDF	U	3.41E-07		0
M2	7	1,2,3,7,8-PeCDD	U	2.43E-07		0
M2	7	1,2,3,7,8-PeCDF	U	9.80E-08		0
M2	7	2,3,4,6,7,8-HxCDF	U	2.90E-07		0
M2	7	2,3,4,7,8-PeCDF	U	9.40E-08		0
M2	7	2,3,7,8-TCDD	U	2.40E-07		0
M2	7	2,3,7,8-TCDF	U	2.21E-07		0
M2	7	OCDD	U	4.85E-06		0
M2	7	OCDF	J	1.31E-06	0.0001	1.311E-10

Appendix E.3
TCDD Equivalent Calculations
Fish Tissue
Makua AFB

Location ID	Field Sample ID	Parameter	Qualifier	Value	TEF	TCDD-Equiv
M2	7	**TCDD Equivalent**				6.6E-10

Appendix E.3
TCDD Equivalent Calculations
Fish Tissue
Makua AFB

Location ID	Field Sample ID	Parameter	Qualifier	Value	TEF	TCDD-Equiv
M2	9	1,2,3,4,6,7,8-HpCDD	U	9.82E-07		0
M2	9	1,2,3,4,6,7,8-HpCDF	J	2.95E-07	0.01	2.95E-09
M2	9	1,2,3,4,7,8,9-HpCDF	U	1.14E-07		0
M2	9	1,2,3,4,7,8-HxCDD	U	5.30E-08		0
M2	9	1,2,3,4,7,8-HxCDF	U	4.60E-08		0
M2	9	1,2,3,6,7,8-HxCDD	U	5.10E-08		0
M2	9	1,2,3,6,7,8-HxCDF	U	4.80E-08		0
M2	9	1,2,3,7,8,9-HxCDD	U	5.00E-08		0
M2	9	1,2,3,7,8,9-HxCDF	U	6.00E-08		0
M2	9	1,2,3,7,8-PeCDD	J	1.76E-06	1	1.76E-06
M2	9	1,2,3,7,8-PeCDF	U	3.00E-08		0
M2	9	2,3,4,6,7,8-HxCDF	U	5.20E-08		0
M2	9	2,3,4,7,8-PeCDF	U	2.80E-08		0
M2	9	2,3,7,8-TCDD	U	3.10E-08		0
M2	9	2,3,7,8-TCDF	U	1.09E-06		0
M2	9	OCDD	U	6.61E-06		0
M2	9	OCDF	J	1.26E-06	0.0001	1.264E-10
M2	9	**TCDD Equivalent**				1.8E-06
M2	9afd and 10a Comp	1,2,3,4,6,7,8-HpCDD	U	1.50E-06		0
M2	9afd and 10a Comp	1,2,3,4,6,7,8-HpCDF	U	6.30E-07		0
M2	9afd and 10a Comp	1,2,3,4,7,8,9-HpCDF	U	4.90E-07		0
M2	9afd and 10a Comp	1,2,3,4,7,8-HxCDD	U	6.30E-07		0
M2	9afd and 10a Comp	1,2,3,4,7,8-HxCDF	U	3.40E-07		0
M2	9afd and 10a Comp	1,2,3,6,7,8-HxCDD	U	6.10E-07		0
M2	9afd and 10a Comp	1,2,3,6,7,8-HxCDF	U	3.20E-07		0
M2	9afd and 10a Comp	1,2,3,7,8,9-HxCDD	U	5.80E-07		0
M2	9afd and 10a Comp	1,2,3,7,8,9-HxCDF	U	4.00E-07		0
M2	9afd and 10a Comp	1,2,3,7,8-PeCDD	U	7.90E-07		0
M2	9afd and 10a Comp	1,2,3,7,8-PeCDF	U	6.10E-07		0
M2	9afd and 10a Comp	2,3,4,6,7,8-HxCDF	U	3.60E-07		0
M2	9afd and 10a Comp	2,3,4,7,8-PeCDF	U	6.00E-07		0
M2	9afd and 10a Comp	2,3,7,8-TCDD	U	3.90E-07		0
M2	9afd and 10a Comp	2,3,7,8-TCDF	U	2.60E-07		0
M2	9afd and 10a Comp	OCDD	J	6.90E-06	0.0001	6.9E-10
M2	9afd and 10a Comp	OCDF	U	8.20E-07		0
M2	9afd and 10a Comp	**TCDD Equivalent**				6.9E-10
M2	Comp 8,8a	1,2,3,4,6,7,8-HpCDD	U	1.64E-06		0
M2	Comp 8,8a	1,2,3,4,6,7,8-HpCDF	U	7.66E-07		0
M2	Comp 8,8a	1,2,3,4,7,8,9-HpCDF	U	1.08E-07		0
M2	Comp 8,8a	1,2,3,4,7,8-HxCDD	U	5.20E-08		0
M2	Comp 8,8a	1,2,3,4,7,8-HxCDF	U	3.10E-08		0
M2	Comp 8,8a	1,2,3,6,7,8-HxCDD	U	5.00E-08		0
M2	Comp 8,8a	1,2,3,6,7,8-HxCDF	U	3.20E-08		0
M2	Comp 8,8a	1,2,3,7,8,9-HxCDD	U	5.00E-08		0
M2	Comp 8,8a	1,2,3,7,8,9-HxCDF	U	3.90E-08		0
M2	Comp 8,8a	1,2,3,7,8-PeCDD	U	5.00E-08		0
M2	Comp 8,8a	1,2,3,7,8-PeCDF	U	3.50E-08		0
M2	Comp 8,8a	2,3,4,6,7,8-HxCDF	U	3.40E-08		0
M2	Comp 8,8a	2,3,4,7,8-PeCDF	U	3.40E-08		0
M2	Comp 8,8a	2,3,7,8-TCDD	U	1.60E-08		0
M2	Comp 8,8a	2,3,7,8-TCDF	U	3.20E-08		0
M2	Comp 8,8a	OCDD	U	1.24E-05		0
M2	Comp 8,8a	OCDF	U	1.51E-06		0

Appendix E.3
TCDD Equivalent Calculations
Fish Tissue
Makua AFB

Location ID	Field Sample ID	Parameter	Qualifier	Value	TEF	TCDD-Equiv
M2	Comp 8,8a	**TCDD Equivalent**				0

Appendix E.3
TCDD Equivalent Calculations
Fish Tissue
Makua AFB

Location ID	Field Sample ID	Parameter	Qualifier	Value	TEF	TCDD-Equiv
M3	12	1,2,3,4,6,7,8-HpCDD	U	8.62E-07		0
M3	12	1,2,3,4,6,7,8-HpCDF	J	2.07E-07	0.01	2.07E-09
M3	12	1,2,3,4,7,8,9-HpCDF	U	1.23E-07		0
M3	12	1,2,3,4,7,8-HxCDD	U	6.80E-08		0
M3	12	1,2,3,4,7,8-HxCDF	U	5.30E-08		0
M3	12	1,2,3,6,7,8-HxCDD	U	6.60E-08		0
M3	12	1,2,3,6,7,8-HxCDF	U	5.50E-08		0
M3	12	1,2,3,7,8,9-HxCDD	U	6.50E-08		0
M3	12	1,2,3,7,8,9-HxCDF	U	6.80E-08		0
M3	12	1,2,3,7,8-PeCDD	U	6.10E-08		0
M3	12	1,2,3,7,8-PeCDF	U	4.60E-08		0
M3	12	2,3,4,6,7,8-HxCDF	U	5.90E-08		0
M3	12	2,3,4,7,8-PeCDF	U	4.40E-08		0
M3	12	2,3,7,8-TCDD	U	2.40E-08		0
M3	12	2,3,7,8-TCDF	U	4.50E-08		0
M3	12	OCDD	U	6.19E-06		0
M3	12	OCDF	J	6.49E-07	0.0001	6.49E-11
M3	12	**TCDD Equivalent**				2.1E-09
M3	13	1,2,3,4,6,7,8-HpCDD	U	8.96E-07		0
M3	13	1,2,3,4,6,7,8-HpCDF	J	1.78E-07	0.01	1.78E-09
M3	13	1,2,3,4,7,8,9-HpCDF	U	1.38E-07		0
M3	13	1,2,3,4,7,8-HxCDD	U	5.60E-08		0
M3	13	1,2,3,4,7,8-HxCDF	U	5.00E-08		0
M3	13	1,2,3,6,7,8-HxCDD	U	5.40E-08		0
M3	13	1,2,3,6,7,8-HxCDF	U	5.30E-08		0
M3	13	1,2,3,7,8,9-HxCDD	U	5.30E-08		0
M3	13	1,2,3,7,8,9-HxCDF	U	6.50E-08		0
M3	13	1,2,3,7,8-PeCDD	U	5.30E-08		0
M3	13	1,2,3,7,8-PeCDF	U	2.60E-08		0
M3	13	2,3,4,6,7,8-HxCDF	U	5.60E-08		0
M3	13	2,3,4,7,8-PeCDF	U	2.50E-08		0
M3	13	2,3,7,8-TCDD	U	3.30E-08		0
M3	13	2,3,7,8-TCDF	U	5.80E-08		0
M3	13	OCDD	U	6.76E-06		0
M3	13	OCDF	J	6.44E-07	0.0001	6.44E-11
M3	13	**TCDD Equivalent**				1.8E-09
M3	14	1,2,3,4,6,7,8-HpCDD	U	1.19E-06		0
M3	14	1,2,3,4,6,7,8-HpCDF	J	3.71E-07	0.01	3.71E-09
M3	14	1,2,3,4,7,8,9-HpCDF	U	1.26E-07		0
M3	14	1,2,3,4,7,8-HxCDD	U	5.20E-08		0
M3	14	1,2,3,4,7,8-HxCDF	U	3.80E-08		0
M3	14	1,2,3,6,7,8-HxCDD	U	5.00E-08		0
M3	14	1,2,3,6,7,8-HxCDF	U	4.00E-08		0
M3	14	1,2,3,7,8,9-HxCDD	U	4.90E-08		0
M3	14	1,2,3,7,8,9-HxCDF	U	4.90E-08		0
M3	14	1,2,3,7,8-PeCDD	U	6.10E-08		0
M3	14	1,2,3,7,8-PeCDF	U	4.00E-08		0
M3	14	2,3,4,6,7,8-HxCDF	U	4.20E-08		0
M3	14	2,3,4,7,8-PeCDF	U	3.90E-08		0
M3	14	2,3,7,8-TCDD	U	3.40E-08		0
M3	14	2,3,7,8-TCDF	U	3.80E-08		0
M3	14	OCDD	U	9.25E-06		0
M3	14	OCDF	J	8.78E-07	0.0001	8.78E-11

Appendix E.3
TCDD Equivalent Calculations
Fish Tissue
Makua AFB

Location ID	Field Sample ID	Parameter	Qualifier	Value	TEF	TCDD-Equiv
M3	14	**TCDD Equivalent**				3.8E-09

Appendix E.3
TCDD Equivalent Calculations
Fish Tissue
Makua AFB

Location ID	Field Sample ID	Parameter	Qualifier	Value	TEF	TCDD-Equiv
NW1	NW1fd	1,2,3,4,6,7,8-HpCDD	U	8.20E-07		0
NW1	NW1fd	1,2,3,4,6,7,8-HpCDF	U	1.20E-06		0
NW1	NW1fd	1,2,3,4,7,8,9-HpCDF	U	4.40E-07		0
NW1	NW1fd	1,2,3,4,7,8-HxCDD	U	4.60E-07		0
NW1	NW1fd	1,2,3,4,7,8-HxCDF	U	3.60E-07		0
NW1	NW1fd	1,2,3,6,7,8-HxCDD	U	4.40E-07		0
NW1	NW1fd	1,2,3,6,7,8-HxCDF	U	3.40E-07		0
NW1	NW1fd	1,2,3,7,8,9-HxCDD	U	4.30E-07		0
NW1	NW1fd	1,2,3,7,8,9-HxCDF	U	4.10E-07		0
NW1	NW1fd	1,2,3,7,8-PeCDD	U	7.70E-07		0
NW1	NW1fd	1,2,3,7,8-PeCDF	U	5.10E-07		0
NW1	NW1fd	2,3,4,6,7,8-HxCDF	U	3.70E-07		0
NW1	NW1fd	2,3,4,7,8-PeCDF	U	5.10E-07		0
NW1	NW1fd	2,3,7,8-TCDD	U	4.10E-07		0
NW1	NW1fd	2,3,7,8-TCDF	U	4.10E-07		0
NW1	NW1fd	OCDD	U	3.30E-06		0
NW1	NW1fd	OCDF	U	8.70E-07		0
NW1	NW1fd	**TCDD Equivalent**				0
NW1	NW2	1,2,3,4,6,7,8-HpCDD	U	1.58E-07		0
NW1	NW2	1,2,3,4,6,7,8-HpCDF	U	9.20E-08		0
NW1	NW2	1,2,3,4,7,8,9-HpCDF	U	1.29E-07		0
NW1	NW2	1,2,3,4,7,8-HxCDD	U	7.90E-08		0
NW1	NW2	1,2,3,4,7,8-HxCDF	U	4.30E-08		0
NW1	NW2	1,2,3,6,7,8-HxCDD	U	7.60E-08		0
NW1	NW2	1,2,3,6,7,8-HxCDF	U	4.50E-08		0
NW1	NW2	1,2,3,7,8,9-HxCDD	U	7.50E-08		0
NW1	NW2	1,2,3,7,8,9-HxCDF	U	5.50E-08		0
NW1	NW2	1,2,3,7,8-PeCDD	U	5.70E-08		0
NW1	NW2	1,2,3,7,8-PeCDF	U	4.50E-08		0
NW1	NW2	2,3,4,6,7,8-HxCDF	U	4.80E-08		0
NW1	NW2	2,3,4,7,8-PeCDF	U	4.30E-08		0
NW1	NW2	2,3,7,8-TCDD	U	3.00E-08		0
NW1	NW2	2,3,7,8-TCDF	U	5.70E-08		0
NW1	NW2	OCDD	U	1.20E-06		0
NW1	NW2	OCDF	U	1.96E-07		0
NW1	NW2	**TCDD Equivalent**				0
NW1	NW3	1,2,3,4,6,7,8-HpCDD	U	4.10E-08		0
NW1	NW3	1,2,3,4,6,7,8-HpCDF	U	6.70E-08		0
NW1	NW3	1,2,3,4,7,8,9-HpCDF	U	9.40E-08		0
NW1	NW3	1,2,3,4,7,8-HxCDD	U	7.80E-08		0
NW1	NW3	1,2,3,4,7,8-HxCDF	U	3.80E-08		0
NW1	NW3	1,2,3,6,7,8-HxCDD	U	7.50E-08		0
NW1	NW3	1,2,3,6,7,8-HxCDF	U	4.00E-08		0
NW1	NW3	1,2,3,7,8,9-HxCDD	U	7.40E-08		0
NW1	NW3	1,2,3,7,8,9-HxCDF	U	4.90E-08		0
NW1	NW3	1,2,3,7,8-PeCDD	U	6.90E-08		0
NW1	NW3	1,2,3,7,8-PeCDF	U	3.60E-08		0
NW1	NW3	2,3,4,6,7,8-HxCDF	U	4.30E-08		0
NW1	NW3	2,3,4,7,8-PeCDF	U	3.50E-08		0
NW1	NW3	2,3,7,8-TCDD	U	2.60E-08		0
NW1	NW3	2,3,7,8-TCDF	U	4.20E-08		0
NW1	NW3	OCDD	U	1.51E-06		0
NW1	NW3	OCDF	U	1.41E-07		0

Appendix E.3
TCDD Equivalent Calculations
Fish Tissue
Makua AFB

Location ID	Field Sample ID	Parameter	Qualifier	Value	TEF	TCDD-Equiv
NW1	NW3	**TCDD Equivalent**				0

Appendix E.3
TCDD Equivalent Calculations
Fish Tissue
Makua AFB

Location ID	Field Sample ID	Parameter	Qualifier	Value	TEF	TCDD-Equiv
NW1	NW4	1,2,3,4,6,7,8-HpCDD	U	1.43E-07		0
NW1	NW4	1,2,3,4,6,7,8-HpCDF	U	6.60E-08		0
NW1	NW4	1,2,3,4,7,8,9-HpCDF	U	9.20E-08		0
NW1	NW4	1,2,3,4,7,8-HxCDD	U	6.00E-08		0
NW1	NW4	1,2,3,4,7,8-HxCDF	U	3.60E-08		0
NW1	NW4	1,2,3,6,7,8-HxCDD	U	5.70E-08		0
NW1	NW4	1,2,3,6,7,8-HxCDF	U	3.80E-08		0
NW1	NW4	1,2,3,7,8,9-HxCDD	U	5.70E-08		0
NW1	NW4	1,2,3,7,8,9-HxCDF	U	4.60E-08		0
NW1	NW4	1,2,3,7,8-PeCDD	U	4.00E-08		0
NW1	NW4	1,2,3,7,8-PeCDF	U	3.30E-08		0
NW1	NW4	2,3,4,6,7,8-HxCDF	U	4.00E-08		0
NW1	NW4	2,3,4,7,8-PeCDF	U	3.20E-08		0
NW1	NW4	2,3,7,8-TCDD	U	2.20E-08		0
NW1	NW4	2,3,7,8-TCDF	U	3.40E-08		0
NW1	NW4	OCDD	U	1.14E-06		0
NW1	NW4	OCDF	U	1.40E-07		0
NW1	NW4	**TCDD Equivalent**				0
NW1	NW5	1,2,3,4,6,7,8-HpCDD	U	6.00E-08		0
NW1	NW5	1,2,3,4,6,7,8-HpCDF	U	7.10E-08		0
NW1	NW5	1,2,3,4,7,8,9-HpCDF	U	1.00E-07		0
NW1	NW5	1,2,3,4,7,8-HxCDD	U	9.50E-08		0
NW1	NW5	1,2,3,4,7,8-HxCDF	U	3.20E-08		0
NW1	NW5	1,2,3,6,7,8-HxCDD	U	9.10E-08		0
NW1	NW5	1,2,3,6,7,8-HxCDF	U	3.30E-08		0
NW1	NW5	1,2,3,7,8,9-HxCDD	U	9.00E-08		0
NW1	NW5	1,2,3,7,8,9-HxCDF	U	4.10E-08		0
NW1	NW5	1,2,3,7,8-PeCDD	U	6.50E-08		0
NW1	NW5	1,2,3,7,8-PeCDF	U	5.00E-08		0
NW1	NW5	2,3,4,6,7,8-HxCDF	U	3.50E-08		0
NW1	NW5	2,3,4,7,8-PeCDF	U	4.80E-08		0
NW1	NW5	2,3,7,8-TCDD	U	3.10E-08		0
NW1	NW5	2,3,7,8-TCDF	U	5.50E-08		0
NW1	NW5	OCDD	U	1.24E-06		0
NW1	NW5	OCDF	U	1.61E-07		0
NW1	NW5	**TCDD Equivalent**				0
NW2	NW10	1,2,3,4,6,7,8-HpCDD	U	2.46E-07		0
NW2	NW10	1,2,3,4,6,7,8-HpCDF	U	2.87E-07		0
NW2	NW10	1,2,3,4,7,8,9-HpCDF	U	9.30E-08		0
NW2	NW10	1,2,3,4,7,8-HxCDD	U	7.70E-08		0
NW2	NW10	1,2,3,4,7,8-HxCDF	U	2.70E-08		0
NW2	NW10	1,2,3,6,7,8-HxCDD	U	7.40E-08		0
NW2	NW10	1,2,3,6,7,8-HxCDF	U	2.80E-08		0
NW2	NW10	1,2,3,7,8,9-HxCDD	U	7.30E-08		0
NW2	NW10	1,2,3,7,8,9-HxCDF	U	3.50E-08		0
NW2	NW10	1,2,3,7,8-PeCDD	U	6.50E-08		0
NW2	NW10	1,2,3,7,8-PeCDF	U	6.60E-08		0
NW2	NW10	2,3,4,6,7,8-HxCDF	U	3.00E-08		0
NW2	NW10	2,3,4,7,8-PeCDF	U	6.40E-08		0
NW2	NW10	2,3,7,8-TCDD	U	2.30E-08		0
NW2	NW10	2,3,7,8-TCDF	U	4.00E-08		0
NW2	NW10	OCDD	U	2.20E-06		0
NW2	NW10	OCDF	U	1.08E-07		0

Appendix E.3
TCDD Equivalent Calculations
Fish Tissue
Makua AFB

Location ID	Field Sample ID	Parameter	Qualifier	Value	TEF	TCDD-Equiv
NW2	NW10	**TCDD Equivalent**				0

Appendix E.3
TCDD Equivalent Calculations
Fish Tissue
Makua AFB

Location ID	Field Sample ID	Parameter	Qualifier	Value	TEF	TCDD-Equiv
NW2	NW2fd	1,2,3,4,6,7,8-HpCDD	U	4.80E-07		0
NW2	NW2fd	1,2,3,4,6,7,8-HpCDF	U	4.80E-07		0
NW2	NW2fd	1,2,3,4,7,8,9-HpCDF	U	4.10E-07		0
NW2	NW2fd	1,2,3,4,7,8-HxCDD	U	4.90E-07		0
NW2	NW2fd	1,2,3,4,7,8-HxCDF	U	3.20E-07		0
NW2	NW2fd	1,2,3,6,7,8-HxCDD	U	4.80E-07		0
NW2	NW2fd	1,2,3,6,7,8-HxCDF	U	3.00E-07		0
NW2	NW2fd	1,2,3,7,8,9-HxCDD	U	4.60E-07		0
NW2	NW2fd	1,2,3,7,8,9-HxCDF	U	3.70E-07		0
NW2	NW2fd	1,2,3,7,8-PeCDD	U	6.90E-07		0
NW2	NW2fd	1,2,3,7,8-PeCDF	U	4.80E-07		0
NW2	NW2fd	2,3,4,6,7,8-HxCDF	U	3.40E-07		0
NW2	NW2fd	2,3,4,7,8-PeCDF	U	4.70E-07		0
NW2	NW2fd	2,3,7,8-TCDD	U	3.40E-07		0
NW2	NW2fd	2,3,7,8-TCDF	U	2.20E-07		0
NW2	NW2fd	OCDD	U	1.30E-06		0
NW2	NW2fd	OCDF	U	6.80E-07		0
NW2	NW2fd	**TCDD Equivalent**				0
NW2	NW6	1,2,3,4,6,7,8-HpCDD	U	1.55E-07		0
NW2	NW6	1,2,3,4,6,7,8-HpCDF	U	1.22E-07		0
NW2	NW6	1,2,3,4,7,8,9-HpCDF	U	1.65E-07		0
NW2	NW6	1,2,3,4,7,8-HxCDD	U	1.30E-07		0
NW2	NW6	1,2,3,4,7,8-HxCDF	U	8.40E-08		0
NW2	NW6	1,2,3,6,7,8-HxCDD	U	1.24E-07		0
NW2	NW6	1,2,3,6,7,8-HxCDF	U	8.60E-08		0
NW2	NW6	1,2,3,7,8,9-HxCDD	U	1.29E-07		0
NW2	NW6	1,2,3,7,8,9-HxCDF	U	1.07E-07		0
NW2	NW6	1,2,3,7,8-PeCDD	U	3.64E-07		0
NW2	NW6	1,2,3,7,8-PeCDF	U	2.42E-07		0
NW2	NW6	2,3,4,6,7,8-HxCDF	U	9.10E-08		0
NW2	NW6	2,3,4,7,8-PeCDF	U	2.31E-07		0
NW2	NW6	2,3,7,8-TCDD	U	3.24E-07		0
NW2	NW6	2,3,7,8-TCDF	U	2.90E-07		0
NW2	NW6	OCDD	U	1.01E-06		0
NW2	NW6	OCDF	U	5.83E-07		0
NW2	NW6	**TCDD Equivalent**				0
NW2	NW7	1,2,3,4,6,7,8-HpCDD	J	7.71E-07	0.001	7.71E-10
NW2	NW7	1,2,3,4,6,7,8-HpCDF	U	2.64E-07		0
NW2	NW7	1,2,3,4,7,8,9-HpCDF	U	3.56E-07		0
NW2	NW7	1,2,3,4,7,8-HxCDD	U	1.70E-07		0
NW2	NW7	1,2,3,4,7,8-HxCDF	U	8.90E-08		0
NW2	NW7	1,2,3,6,7,8-HxCDD	U	1.62E-07		0
NW2	NW7	1,2,3,6,7,8-HxCDF	U	9.10E-08		0
NW2	NW7	1,2,3,7,8,9-HxCDD	U	1.69E-07		0
NW2	NW7	1,2,3,7,8,9-HxCDF	U	1.13E-07		0
NW2	NW7	1,2,3,7,8-PeCDD	U	2.09E-07		0
NW2	NW7	1,2,3,7,8-PeCDF	U	1.12E-07		0
NW2	NW7	2,3,4,6,7,8-HxCDF	U	9.60E-08		0
NW2	NW7	2,3,4,7,8-PeCDF	U	1.07E-07		0
NW2	NW7	2,3,7,8-TCDD	U	1.50E-07		0
NW2	NW7	2,3,7,8-TCDF	U	1.44E-07		0
NW2	NW7	OCDD	U	5.23E-06		0
NW2	NW7	OCDF	U	4.33E-07		0

Appendix E.3
TCDD Equivalent Calculations
Fish Tissue
Makua AFB

Location ID	Field Sample ID	Parameter	Qualifier	Value	TEF	TCDD-Equiv
NW2	NW7	**TCDD Equivalent**				7.7E-10

Appendix E.3
TCDD Equivalent Calculations
Fish Tissue
Makua AFB

Location ID	Field Sample ID	Parameter	Qualifier	Value	TEF	TCDD-Equiv
NW2	NW8	1,2,3,4,6,7,8-HpCDD	J	2.05E-07	0.001	2.05E-10
NW2	NW8	1,2,3,4,6,7,8-HpCDF	U	5.70E-08		0
NW2	NW8	1,2,3,4,7,8,9-HpCDF	U	7.70E-08		0
NW2	NW8	1,2,3,4,7,8-HxCDD	U	7.30E-08		0
NW2	NW8	1,2,3,4,7,8-HxCDF	U	5.20E-08		0
NW2	NW8	1,2,3,6,7,8-HxCDD	U	7.00E-08		0
NW2	NW8	1,2,3,6,7,8-HxCDF	U	5.30E-08		0
NW2	NW8	1,2,3,7,8,9-HxCDD	U	7.30E-08		0
NW2	NW8	1,2,3,7,8,9-HxCDF	U	6.60E-08		0
NW2	NW8	1,2,3,7,8-PeCDD	U	7.60E-08		0
NW2	NW8	1,2,3,7,8-PeCDF	U	4.90E-08		0
NW2	NW8	2,3,4,6,7,8-HxCDF	U	5.60E-08		0
NW2	NW8	2,3,4,7,8-PeCDF	U	4.70E-08		0
NW2	NW8	2,3,7,8-TCDD	U	9.60E-08		0
NW2	NW8	2,3,7,8-TCDF	U	7.70E-08		0
NW2	NW8	OCDD	U	1.18E-06		0
NW2	NW8	OCDF	U	2.23E-07		0
NW2	NW8	**TCDD Equivalent**				2.1E-10
NW2	NW9	1,2,3,4,6,7,8-HpCDD	U	5.76E-07		0
NW2	NW9	1,2,3,4,6,7,8-HpCDF	U	4.98E-07		0
NW2	NW9	1,2,3,4,7,8,9-HpCDF	U	7.40E-08		0
NW2	NW9	1,2,3,4,7,8-HxCDD	U	4.90E-08		0
NW2	NW9	1,2,3,4,7,8-HxCDF	U	3.90E-08		0
NW2	NW9	1,2,3,6,7,8-HxCDD	U	4.70E-08		0
NW2	NW9	1,2,3,6,7,8-HxCDF	U	4.10E-08		0
NW2	NW9	1,2,3,7,8,9-HxCDD	U	4.70E-08		0
NW2	NW9	1,2,3,7,8,9-HxCDF	U	5.00E-08		0
NW2	NW9	1,2,3,7,8-PeCDD	J	1.72E-07	1	0.000000172
NW2	NW9	1,2,3,7,8-PeCDF	U	5.40E-08		0
NW2	NW9	2,3,4,6,7,8-HxCDF	U	4.40E-08		0
NW2	NW9	2,3,4,7,8-PeCDF	U	5.20E-08		0
NW2	NW9	2,3,7,8-TCDD	U	1.80E-08		0
NW2	NW9	2,3,7,8-TCDF	U	6.83E-07		0
NW2	NW9	OCDD	U	4.73E-06		0
NW2	NW9	OCDF	U	6.74E-07		0
NW2	NW9	**TCDD Equivalent**				1.7E-07

Appendix E.4
Fish Tissue-Based Toxicity Reference Values

	NOEC					LOEC					
Chemical	**Test Species**	**Tissue**	**NOEC (mg/kg dry wt.)[a]**	**Type**	**Notes**	**Test Species**	**Tissue**	**LOEC (mg/kg dry wt.)[a]**	**Type**	**Notes**	**Reference**
Metals											
Aluminum	Rainbow trout, *Onchorhyncus mykiss* (FW)	Whole body less gut	42.7	NOEC - Survival	Aluminum sulphate	Atlantic salmon, *Salmo salar* (FW)	Whole body	100	LOEC - Reduced survival	Aluminum chloride; alevin life stage	Jarvinen and Ankley, 1999
Antimony	Rainbow trout, *Onchorhyncus mykiss* (FW)	Whole body	25	NOEC - Survival	Antimony potassium tartrate	Rainbow trout, *Onchorhyncus mykiss* (FW)	Whole body	45	LOEC - Reduced survival 50%	Antimony potassium tartrate	Jarvinen and Ankley, 1999
Arsenic	Rainbow trout, *Onchorhyncus mykiss* (FW)	Whole body	10	NOEC - Survival	Sodium arsenate	Rainbow trout, *Onchorhyncus mykiss* (FW)	Whole body	15	LOEC - Reduced survival 50%	Sodium arsenate	Jarvinen and Ankley, 1999
Cadmium	Perch, *Perca fluviatilis (FW)*	Whole body	0.375	NOEC - Survival	Cadmium nitrate	Brook trout, *Salvelinus fontinalis* (FW)	Whole body	0.70	LOEC - Reduced survival 20%	Calcium chloride	Jarvinen and Ankley, 1999
Chromium	Rainbow trout, *Onchorhyncus mykiss* (FW)	Muscle	2.9	NOEC - Survival	Potassium dichromate	-	-	-	-	-	Jarvinen and Ankley, 1999
Copper	Stone loach, *Noemacheilus barbatulus* (FW)	Muscle	5.0	NOEC - Survival	Copper sulfate	Stone loach, *Noemacheilus barbatulus* (FW)	Muscle	8.0	LOEC - Reduced survival 80-100%	Copper sulfate	Jarvinen and Ankley, 1999
Lead	Brook trout, *Salvelinus fontinalis* (FW)	Whole body	13	NOEC - Growth	Lead nitrate	Brook trout, *Salvelinus fontinalis* (FW)	Whole body	20	LOEC - Reduced growth	Lead nitrate	Jarvinen and Ankley, 1999
Mercury	Multiple species	Whole body	15	NOEC - Behavioral, reproductive, physiological effects		Multiple species	Whole body	25	LOEC - Behavioral, reproductive, physiological effects		Weiner and Spry, 1996
Silver	Bluegill, *Lepomis macrochirus* (FW)	Whole body	0.30	NOEC - Survival, growth	Silver nitrate	-	-	-	-	-	Jarvinen and Ankley, 1999
Selenium	Bluegill, *Lepomis macrochirus* (FW)	Whole body	3.96	NOEC - Mortality (estimated)	Uncertainty factor of 10 was applied to LOEC to estimate a NOEC.	Bluegill, *Lepomis macrochirus* (FW)	Whole body	39.6	LOEC - Mortality		U.S. EPA, 2004b
Vanadium	Rainbow trout, *Onchorhyncus mykiss* (FW)	Carcass	0.10	NOEC - Growth	Sodium orthovanadate	Rainbow trout, *Onchorhyncus mykiss* (FW)	Carcass	2.1	LOEC - Reduced growth	Sodium orthovanadate	Jarvinen and Ankley, 1999
Zinc	Dogfish, *Scyliorhinus canicula* (SW)	Muscle	57.0	NOEC - Survival	Zinc sulfate	Dogfish, *Scyliorhinus canicula* (SW)	Muscle	68.0	LOEC - Reduced survival; immobilized	Zinc sulfate	Jarvinen and Ankley, 1999
Pesticides											
Aldrin	Rainbow trout, *Onchorhyncus mykiss* (FW)	Whole body	10.7	NOEC - Survival, growth	Based on surrogate TRVs for dieldrin.	Rainbow trout, *Onchorhyncus mykiss* (FW)	Whole body	28.3	LOEC - Reduced survival 50%	Based on surrogate TRVs for dieldrin.	Jarvinen and Ankley, 1999
alpha-BHC	Rainbow trout, *Onchorhyncus mykiss* (FW)	Muscle	210	NOEC - Survival, growth		Guppy, *Poecilia reticulata* (FW)	Whole body	850	LOEC - Reduced survival/ immobilization		Jarvinen and Ankley, 1999
beta-BHC	Pinfish, *Lagodon rhomboides* (SW)	Whole body	24.3	NOEC - Survival (estimated)	Based on technical grade BHC. Uncertainty factor of 10 was applied to LOEC to estimate a NOEC.	Pinfish, *Lagodon rhomboides* (SW)	Whole body	243	LOEC - Reduced survival 50%	Based on technical grade BHC.	Jarvinen and Ankley, 1999

delta-BHC	Pinfish, *Lagodon rhomboides* (SW)	Whole body	24.3	NOEC - Survival (estimated)	Based on technical grade BHC. Uncertainty factor of 10 was applied to LOEC to estimate a NOEC.	Pinfish, *Lagodon rhomboides* (SW)	Whole body	243	LOEC - Reduced survival 50%	Based on technical grade BHC.	Jarvinen and Ankley, 1999
gamma-BHC	Gudgeon, *Gobio gobio* (FW)	Muscle	0.065	NOEC - Survival		Gudgeon, *Gobio gobio* (FW)	Muscle	5.35	LOEC - Reduced survival 50%		Jarvinen and Ankley, 1999
4,4'-DDT	Mosquito fish, *Gambusia affinis* (FW)	Whole body	13.3	NOEC - Survival (estimated)	Uncertainty factor of 10 was applied to LOEC to estimate a NOEC	Mosquito fish, *Gambusia affinis* (FW)	Whole body	133	LOEC - Reduced survival 50%		Jarvinen and Ankley, 1999
Heptachlor	Spot, *Leiostomus xanthurus* (SW)	Whole body	27	NOEC - Survival	Technical grade	Spot, *Leiostomus xanthurus* (SW)	Whole body	57.5	LOEC - Reduced survival		Jarvinen and Ankley, 1999
Dioxins and Furans											
2,3,7,8-TCDD	Rainbow trout, *Onchorhyncus mykiss* (FW)	Muscle	0.00049	NOEC - Survival (estimated)	Uncertainty factor of 10 was applied to LOEC to estimate a NOEC	Rainbow trout, *Onchorhyncus mykiss* (FW)	Muscle	0.0049	LOEC - Reduced survival 45%		Jarvinen and Ankley, 1999

Definitions:

NOEC	No Observable Effect Concentration
LOEC	Lowest Observable Effect Concentration
mg/kg	Milligrams per kilogram

Notes:

[a]Tissue concentrations were converted from wet weight to dry weight assuming a moisture content of 80 percent (Stephen *et al*., 1985).
A dash indicates the absence of an applicable LOEC.