Appendix E

95% UCL Calculations for Background Sediment and Floodplain Soil

Table E-1
Background Sediment Dataset
Area 1, OU5 Kalamazoo River

Dataset	Sample ID	Sample Date	Location	Start Depth	End Depth	Depth Unit	Result	Qualifier	Result Unit
MDEQ	29	12/8/1999	Kalamazoo River just below Ceresco Dam	0	2	in	7.1554E-05		mg/kg
MDEQ	57	4/21/2000	Kalamazoo River upstream of Morrow Lake				0.00016365		mg/kg
MDEQ	BTL-1	3/28/1994	Upper Morrow Lake	0	0.5	ft	1.13	J	mg/kg
MDEQ	BTL-2	3/28/1994	Upper Morrow Lake	0	0.5	ft	0.051	J	mg/kg
MDEQ	ML1-3	7/19/2000	Upper Morrow Lake	0	2	in	0.15	J	mg/kg
MDEQ	ML1-4	7/19/2000	Upper Morrow Lake	0	2	in	0.038	J	mg/kg
MDEQ	ML1-2	7/19/2000	Upper Morrow Lake	0	2	in	0.11	J	mg/kg
MDEQ	ML1-1	7/19/2000	Upper Morrow Lake	0	2	in	0.071	J	mg/kg
MDEQ	ML1-4	9/14/2000	Upper Morrow Lake	2	6	in	0.042	J	mg/kg
MDEQ	ML1-1	9/14/2000	Upper Morrow Lake	2	6	in	0.1	J	mg/kg
MDEQ	ML1-3	9/14/2000	Upper Morrow Lake	2	6	in	0.15		mg/kg
MDEQ	ML1-2	9/14/2000	Upper Morrow Lake	2	6	in	0.11	J	mg/kg
MDEQ	31	12/8/1999	Morrow Lake	0	2	in	2.113E-05		mg/kg
MDEQ	MLG-1	3/23/2000	Morrow Lake	0	1	cm	0.21	J	mg/kg
MDEQ	MLG-1	3/23/2000	Morrow Lake	1	2	cm	0.36		mg/kg
MDEQ	MLG-1	3/23/2000	Morrow Lake	2	3	cm	0.52		mg/kg
MDEQ	MLG-1	3/23/2000	Morrow Lake	3	4	cm	0.39		mg/kg
MDEQ	MLG-1	3/23/2000	Morrow Lake	4	5	cm	0.32		mg/kg
MDEQ	MLG-1	3/23/2000	Morrow Lake	5	6	cm	0.5	J	mg/kg
MDEQ	MLG-1	3/23/2000	Morrow Lake	6	7	cm	0.31		mg/kg
MDEQ	MLG-1	3/23/2000	Morrow Lake	7	8	cm	0.5	J	mg/kg
MDEQ	MLG-1	3/23/2000	Morrow Lake	8	9	cm	0.54	J	mg/kg
MDEQ	MLG-1	3/23/2000	Morrow Lake	9	10	cm	0.39		mg/kg
MDEQ	MLG-1	3/23/2000	Morrow Lake	10	12	cm	0.61	J	mg/kg
MDEQ	MLG-1	3/23/2000	Morrow Lake	12	14	cm	0.636	J	mg/kg
MDEQ	MLG-1	3/23/2000	Morrow Lake	14	16	cm	0.41		mg/kg
MDEQ	MLG-2	3/23/2000	Morrow Lake	0	1	cm	0.21		mg/kg
MDEQ	MLG-2	3/23/2000	Morrow Lake	1	2	cm	0.28		mg/kg
MDEQ	MLG-2	3/23/2000	Morrow Lake	2	3	cm	0.34		mg/kg
MDEQ	MLG-2	3/23/2000	Morrow Lake	3	4	cm	0.16	J	mg/kg
MDEQ	MLG-2	3/23/2000	Morrow Lake	4	5	cm	0.32		mg/kg
MDEQ	MLG-2	3/23/2000	Morrow Lake	5	6	cm	0.22		mg/kg
MDEQ	MLG-2	3/23/2000	Morrow Lake	6	7	cm	0.18	U	mg/kg
MDEQ	MLG-2	3/23/2000	Morrow Lake	7	8	cm	0.22	U	mg/kg
MDEQ	MLG-2	3/23/2000	Morrow Lake	8	9	cm	0.2	U	mg/kg
MDEQ	MLG-2	3/23/2000	Morrow Lake	9	10	cm	0.33		mg/kg
MDEQ	MLG-2	3/23/2000	Morrow Lake	10	12	cm	0.78	J	mg/kg
MDEQ	MLG-2	3/23/2000	Morrow Lake	12	14	cm	0.578	J	mg/kg
MDEQ	MLG-2	3/23/2000	Morrow Lake	14	16	cm	0.91	J	mg/kg
MDEQ	57	4/21/2000	Morrow Lake				4.3462E-07		mg/kg
MDEQ	57	4/26/2000	Morrow Lake				7.2181E-05		mg/kg
MDEQ	ML2-1	7/19/2000	Morrow Lake	0	2	in	0.11		mg/kg
MDEQ	ML2-2	7/19/2000	Morrow Lake	0	2	in	0.22		mg/kg
MDEQ	ML2-3	7/19/2000	Morrow Lake	0	2	in	0.079	U	mg/kg
MDEQ	ML2-4	7/19/2000	Morrow Lake	0	2	in	0.062	U	mg/kg
MDEQ	ML3-3	7/19/2000	Morrow Lake	0	2	in	0.32		mg/kg
MDEQ	ML3-4	7/19/2000	Morrow Lake	0	2	in	0.47		mg/kg
MDEQ	ML3-1	9/11/2000	Morrow Lake	0	2	in	0.572	J	mg/kg
MDEQ	ML3-2	9/11/2000	Morrow Lake	0	2	in	0.063	U	mg/kg
MDEQ	ML4-1	9/11/2000	Morrow Lake	0	2	in	0.61	J	mg/kg
MDEQ	ML4-2	9/11/2000	Morrow Lake	0	2	in	3.87		mg/kg
MDEQ	ML4-3	9/11/2000	Morrow Lake	0	2	in	0.87	J	mg/kg
MDEQ	ML4-4	9/11/2000	Morrow Lake	0	2	in	0.52		mg/kg
MDEQ	ML3-2	9/14/2000	Morrow Lake	2	6	in	0.032	J	mg/kg
MDEQ	ML3-1	9/14/2000	Morrow Lake	2	6	in	0.78	J	mg/kg
MDEQ	ML4-1	9/14/2000	Morrow Lake	2	6	in	1.13		mg/kg

Table E-1
Background Sediment Dataset
Area 1, OU5 Kalamazoo River

MDEQ	ML4-2	9/14/2000	Morrow Lake	2	6	in	0.88	J	mg/kg
MDEQ	ML4-4	9/14/2000	Morrow Lake	2	6	in	0.79	J	mg/kg
MDEQ	ML3-4	9/14/2000	Morrow Lake	2	6	in	0.28		mg/kg
MDEQ	ML2-4	9/14/2000	Morrow Lake	2	6	in	0.068	J	mg/kg
MDEQ	ML2-1	9/14/2000	Morrow Lake	2	6	in	0.086		mg/kg
MDEQ	ML3-3	9/14/2000	Morrow Lake	2	6	in	0.32		mg/kg
MDEQ	ML2-2	9/14/2000	Morrow Lake	2	6	in	0.18		mg/kg
MDEQ	ML2-3	9/14/2000	Morrow Lake	2	6	in	0.04	J	mg/kg
MDEQ	ML4-3	9/14/2000	Morrow Lake	2	6	in	0.6		mg/kg
MDEQ	MLP-1	3/28/1994	Morrow Lake, upstream face of dam	0	0.5	ft	0.059	U	mg/kg
MDEQ	MLP-2	3/28/1994	Morrow Lake, upstream face of dam	0	0.5	ft	0.048	J	mg/kg

Prepared By/Date: MKB 6/21/2013
Checked By/Date: LSV 07/19/2013
Revised By/Date: MTP 07/26/2013

Table E-2
ProUCL Output: Background Sediment Dataset Outlier Test
Area 1, OU5 Kalamazoo River

Outlier Tests for Selected Variables

User Selected Options	
From File	ProUCL Inputs.wst
Full Precision	OFF
Test for Suspected Outliers with Dixon test	1
Test for Suspected Outliers for Rosner test	3

Rosner's Outlier Test for PCBs-Bkg Sed

Mean	0.373
Standard Deviation	0.522
Number of data	67
Number of suspected outliers	3

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	0.373	0.518	3.87	51	6.745	3.242	3.602
2	0.32	0.293	1.13	13	2.76	3.232	3.599
3	0.308	0.278	1.13	57	2.963	3.232	3.592

For 5% Significance Level, there is 1 Potential Outlier
Therefore, Observation 3.87 is a Potential Statistical Outlier

For 1% Significance Level, there is 1 Potential Outlier
Therefore, Observation 3.87 is a Potential Statistical Outlier

Prepared By/Date: LMS 07/18/2013
Checked By/Date: LWC 07/18/2013

Table E-3
Pro UCL Ouput: Background Sediment Dataset (outlier removed)
Area 1, OU5 Kalamazoo River

General Background Statistics for Data Sets with Non-Detects

User Selected Options

From File	ProUCL Inputs.wst
Full Precision	OFF
Confidence Coefficient	0.95
Coverage	0.9

Different or Future K Values
Number of Bootstrap Operations

PCBs-Bkg Sed

General Statistics			
Number of Valid Data	66	Number of Detected Data	59
Number of Distinct Detected Data			
Tolerance Factor		**Percent Non-Detects**	
Number of Missing Values	2		
Raw Statistics		Log-transformed Statistics	
Minimum Detected	4.3462E-07	Minimum Detected	-14.65
Maximum Detected	1.13	Maximum Detected	0.122
Mean of Detected	0.351	Mean of Detected	-2.115
SD of Detected	0.295	SD of Detected	2.844
Minimum Non-Detect		Minimum Non-Detect	-2.83
Maximum Non-Detect		Maximum Non-Detect	-1.514

Data with Multiple Detection Limits
Note: Data have multiple DLs - Use of KM Method is recommended

For all methods (except KM, DL/2, and ROS Methods),		**Number treated as Detected with Single DL**	
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	0.4697

Background Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Lilliefors Test Statistic		**Lilliefors Test Statistic**	
5% Lilliefors Critical Value	0.115	5% Lilliefors Critical Value	0.115
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.32	Mean (Log Scale)	-2.203
SD		SD (Log Scale)	2.705
95% UTL 90% Coverage	0.786	95% UTL 90% Coverage	8.097
95% UPL (t)	0.813	95% UPL (t)	10.44
90% Percentile (z)	0.696	90% Percentile (z)	3.542
95% Percentile (z)	0.803	95% Percentile (z)	9.464
99% Percentile (z)	1.003	99% Percentile (z)	59.81
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean		**Mean in Original Scale**	
SD		**SD in Original Scale**	
95% UTL with 90% Coverage	0.86	95% UTL with 90% Coverage	
		95% BCA UTL with 90% Coverage	
		95% Bootstrap (%) UTL with 90% Coverage	0.875
95% UPL (t)	0.896	95% UPL (t)	10.35
90% Percentile (z)	0.742	**90% Percentile (z)**	
95% Percentile (z)	0.882	95% Percentile (z)	9.345
99% Percentile (z)	1.145	99% Percentile (z)	63.8

Table E-3
Pro UCL Ouput: Background Sediment Dataset (outlier removed)
Area 1, OU5 Kalamazoo River

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.563	Data do not follow a Discernable Distribution (0.05)	
Theta Star			
nu star	66.47		
A-D Test Statistic	2.979	Nonparametric Statistics	
5% A-D Critical Value	0.808	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.17	Mean	0.318
5% K-S Critical Value	0.122	SD	0.293
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0365
		95% KM UTL with 90% Coverage	0.784
Assuming Gamma Distribution		95% KM Chebyshev UPL	
Gamma ROS Statistics with Extrapolated Data		95% KM UPL (t)	0.811
Mean	0.315	90% Percentile (z)	0.694
Median	0.25	95% Percentile (z)	0.801
SD			
k star			
Theta star			
Nu star			
95% Percentile of Chisquare (2k)			
		95% WH Approx. Gamma UTL with 90% Coverage	1.102
90% Percentile	0.9	95% HW Approx. Gamma UTL with 90% Coverage	1.355
95% Percentile	1.338		
99% Percentile	2.447		

Note: DL/2 is not a recommended method.

Prepared By/Date: LMS 7/18/2013
Checked By/Date: LWC 07/18/2013

Figure E-1
Ranked Plot of Background Surface Sediment PCB Data from Morrow Lake, Ceresco Reservoir, and Battle Creek Area

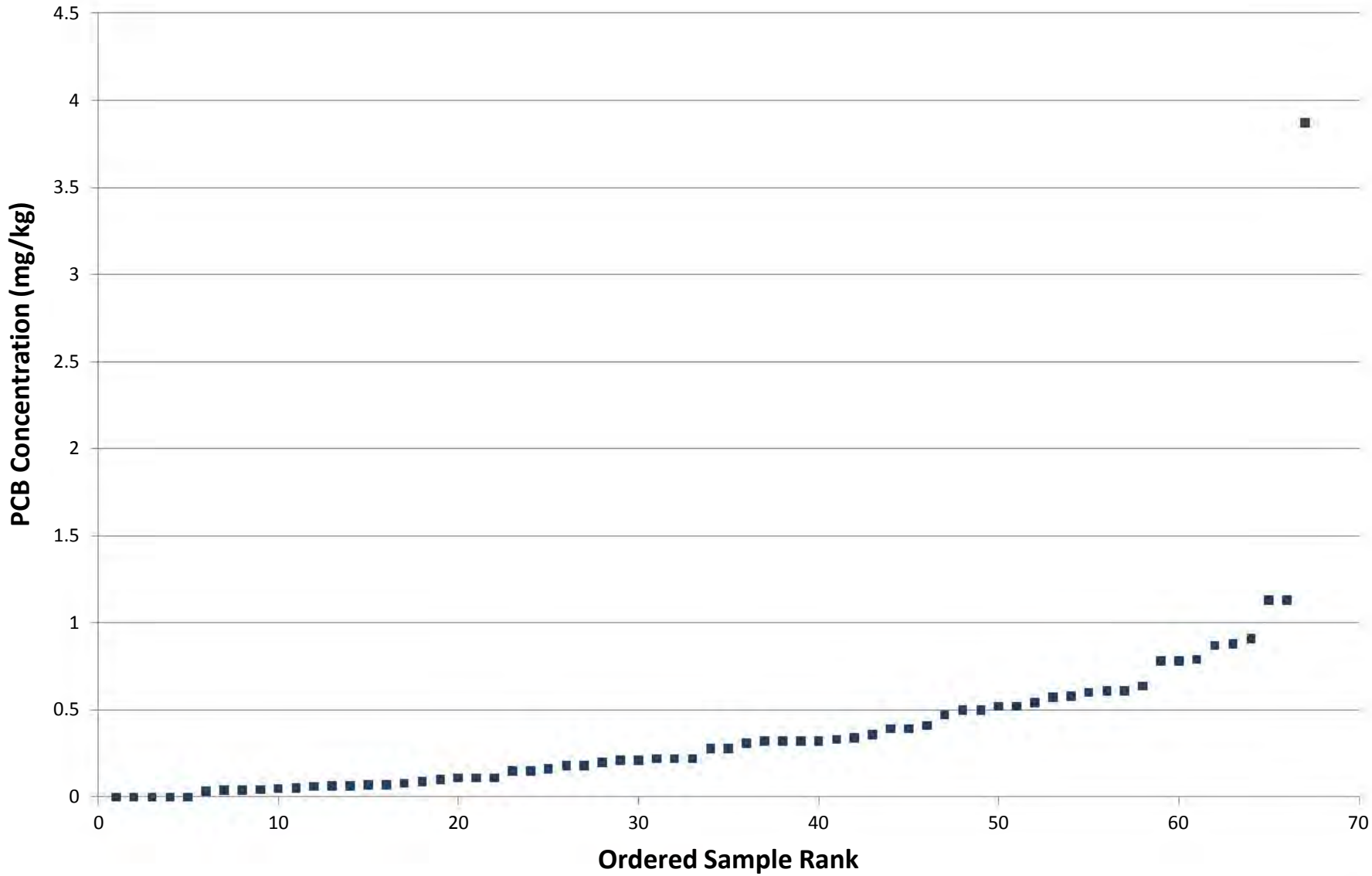

Table E-4
Floodplain Soil Dataset: Surrogates for Estimating Residential Exposure
Area 1, OU5 Kalamazoo River

Dataset ID	Matrix ID	Station ID	Sample ID	Collection Date	Sample Description	Start Depth	End Depth	Depth Unit	Parameter	Result	Result Flag	Detection Limit	Units	Easting	Northing
ARCADIS	Floodplain Soil	KF2-1	K10013	7/8/93	Kalamazoo River/Portage Creek Floodplain Soils	0	0.5	ft	Total PCBs	2.99	J	0	mg/kg	12795988.06	321113
ARCADIS	Floodplain Soil	KF2-2	K10016	7/8/93	Kalamazoo River/Portage Creek Floodplain Soils	0	0.5	ft	Total PCBs	0.039	J	0	mg/kg	12795935.61	321115
ARCADIS	Floodplain Soil	KF2-3	K10019	7/8/93	Kalamazoo River/Portage Creek Floodplain Soils	0	0.5	ft	Total PCBs	0.054	J	0	mg/kg	12795887.14	321116
ARCADIS	Floodplain Soil	KF2-4	K10021	7/8/93	Kalamazoo River/Portage Creek Floodplain Soils	0	0.5	ft	Total PCBs	0	U	0.27	mg/kg	12795832.07	321117
ARCADIS	Floodplain Soil	KF2-5	K10024	7/8/93	Kalamazoo River/Portage Creek Floodplain Soils	0	0.5	ft	Total PCBs	0	U	0.19	mg/kg	12795774.52	321118
ARCADIS	Floodplain Soil	KF2-6	K10026	7/8/93	Kalamazoo River/Portage Creek Floodplain Soils	0	0.5	ft	Total PCBs	0.13	J	0	mg/kg	12795715.99	321120
ARCADIS	Floodplain Soil	KF2-7	K10028	7/8/93	Kalamazoo River/Portage Creek Floodplain Soils	0	0.5	ft	Total PCBs	0.15	J	0	mg/kg	12795658.94	321121
ARCADIS	Floodplain Soil	KF2-8	K10030	7/8/93	Kalamazoo River/Portage Creek Floodplain Soils	0	0.5	ft	Total PCBs	0	U	0.052	mg/kg	12795599.99	321122
ARCADIS	Floodplain Soil	KF1-1	K10197	8/3/93	Kalamazoo River/Portage Creek Floodplain Soils	0	0.5	ft	Total PCBs	0.469	J	0	mg/kg	12797483.71	294800
ARCADIS	Floodplain Soil	KF1-2	K10200	8/3/93	Kalamazoo River/Portage Creek Floodplain Soils	0	0.5	ft	Total PCBs	0.026	J	0	mg/kg	12797440.87	294806
ARCADIS	Floodplain Soil	KF1-3	K10204	8/3/93	Kalamazoo River/Portage Creek Floodplain Soils	0	0.5	ft	Total PCBs	0.49	J	0	mg/kg	12797346.13	294819
ARCADIS	Floodplain Soil	KF1-4	K10207	8/3/93	Kalamazoo River/Portage Creek Floodplain Soils	0	0.5	ft	Total PCBs	0	UJ	0.052	mg/kg	12797253.24	294831
ARCADIS	Floodplain Soil	KF1-5	K10209	8/3/93	Kalamazoo River/Portage Creek Floodplain Soils	0	0.5	ft	Total PCBs	0	UJ	0.064	mg/kg	12797157.44	294844
ARCADIS	Floodplain Soil	KF1-6	K10211	8/3/93	Kalamazoo River/Portage Creek Floodplain Soils	0	0.5	ft	Total PCBs	0	UJ	0.053	mg/kg	12797027.74	294862
ARCADIS	Floodplain Soil	KF1-7	K10213	8/3/93	Kalamazoo River/Portage Creek Floodplain Soils	0	0.5	ft	Total PCBs	0	UJ	0.053	mg/kg	12796999.1	294866
ARCADIS	Floodplain Soil	KF1-8	K10216	8/3/93	Kalamazoo River/Portage Creek Floodplain Soils	0	0.5	ft	Total PCBs	0	UJ	0.052	mg/kg	12796883.64	294881
ARCADIS	Floodplain Soil	FF-31	K10631	5/22/00	Kalamazoo River/Portage Creek Floodplain Soils	0	6	in	Total PCBs	0.213	J	0	mg/kg	12795934.85	321189
ARCADIS	Floodplain Soil	FF-32	K10635	5/22/00	Kalamazoo River/Portage Creek Floodplain Soils	0	6	in	Total PCBs	2.21		0	mg/kg	12795093.04	323288
ARCADIS	Floodplain Soil	FF-12	K10669	6/1/00	Kalamazoo River/Portage Creek Floodplain Soils	0	6	in	Total PCBs	0.971	J	0	mg/kg	12800616.85	289620
ARCADIS	Floodplain Soil	FF-21	K10654	6/1/00	Kalamazoo River/Portage Creek Floodplain Soils	0	6	in	Total PCBs	0.559	J	0	mg/kg	12796860.3	302334
ARCADIS	Floodplain Soil	FF-26	K10659	6/1/00	Kalamazoo River/Portage Creek Floodplain Soils	0	6	in	Total PCBs	0	UJ	0.094	mg/kg	12794787.25	305772
ARCADIS	Floodplain Soil	FF-36	K10679	6/1/00	Kalamazoo River/Portage Creek Floodplain Soils	0	6	in	Total PCBs	1.4		0	mg/kg	12794351.18	329805
ARCADIS	Floodplain Soil	FF-37	K10676	6/1/00	Kalamazoo River/Portage Creek Floodplain Soils	0	6	in	Total PCBs	5.08		0	mg/kg	12794536.54	330452
ARCADIS	Floodplain Soil	FF-40	K10665	6/1/00	Kalamazoo River/Portage Creek Floodplain Soils	0	6	in	Total PCBs	5.79		0	mg/kg	12790174.7	337103
ARCADIS	Floodplain Soil	FF-43	K10682	6/1/00	Kalamazoo River/Portage Creek Floodplain Soils	0	6	in	Total PCBs	1.48		0	mg/kg	12788659.1	338457
ARCADIS	Floodplain Soil	FF-49	K10741	6/7/00	Kalamazoo River/Portage Creek Floodplain Soils	0	6	in	Total PCBs	0.369	J	0	mg/kg	12780977.47	342077
ARCADIS	Floodplain Soil	FF-51	K10721	6/7/00	Kalamazoo River/Portage Creek Floodplain Soils	0	6	in	Total PCBs	3.26		0	mg/kg	12780914.24	345183

Table E-4
Floodplain Soil Dataset: Surrogates for Estimating Residential Exposure
Area 1, OU5 Kalamazoo River

Dataset ID	Matrix ID	Station ID	Sample ID	Collection Date	Sample Description	Start Depth	End Depth	Depth Unit	Parameter	Result	Result Flag	Detection Limit	Units	Easting	Northing
ARCADIS	Floodplain Soil	FF-22	K10820	7/7/00	Kalamazoo River/Portage Creek Floodplain Soils	0	6	in	Total PCBs	0.47	J	0	mg/kg	12796112.37	303452
ARCADIS	Floodplain Soil	FF-30	K10822	7/7/00	Kalamazoo River/Portage Creek Floodplain Soils	0	6	in	Total PCBs	1.43	J	0	mg/kg	12796233.72	311685
ARCADIS	Floodplain Soil	FF-38	K10828	7/7/00	Kalamazoo River/Portage Creek Floodplain Soils	0	6	in	Total PCBs	1.5	J	0	mg/kg	12793522.59	332003
ARCADIS	Floodplain Soil	FF-27	K10846	7/19/00	Kalamazoo River/Portage Creek Floodplain Soils	0	6	in	Total PCBs	1.32		0	mg/kg	12794660.15	307494
MDEQ	SOIL		025RS	7/20/00	MORROW DAM TO MAIN ST BRIDGE - PLAINWELL, UP TO CORK STREET - PORTAGE CREEK	0.0	2.0	in	Total PCBs	7.42	AD,AF,DF	0	mg/kg	12789241.25	336616.7193
ARCADIS	Floodplain Soil	FF-39	K10870	7/21/00	Kalamazoo River/Portage Creek Floodplain Soils	0	6	in	Total PCBs	0	U	0.1	mg/kg	12791104.24	336100
ARCADIS	Floodplain Soil	FF-42	K10867	7/21/00	Kalamazoo River/Portage Creek Floodplain Soils	0	6	in	Total PCBs	2.7	J	0	mg/kg	12788625.26	337329
MDEQ	SOIL		LB1	7/21/00	MORROW DAM TO MAIN ST BRIDGE - PLAINWELL, UP TO CORK STREET - PORTAGE CREEK	0.0	2.0	in	Total PCBs	4.17	AD,AF,AG,DF	0	mg/kg	12788388.61	337216.0429
MDEQ	SOIL		LB2	7/21/00	MORROW DAM TO MAIN ST BRIDGE - PLAINWELL, UP TO CORK STREET - PORTAGE CREEK	0.0	2.0	in	Total PCBs	0.12		0	mg/kg	12791032.91	336051.1180
MDEQ	SOIL		LB3	7/21/00	MORROW DAM TO MAIN ST BRIDGE - PLAINWELL, UP TO CORK STREET - PORTAGE CREEK	0.0	2.0	in	Total PCBs	0.06		0	mg/kg	12793690.55	335236.0759
MDEQ	SOIL		LB4	7/21/00	MORROW DAM TO MAIN ST BRIDGE - PLAINWELL, UP TO CORK STREET - PORTAGE CREEK	0.0	2.0	in	Total PCBs	61.20	AD,AF,DF	0	mg/kg	12794850.21	325137.7877
ARCADIS	Floodplain Soil	FF-47	K10876	8/4/00	Kalamazoo River/Portage Creek Floodplain Soils	0	6	in	Total PCBs	5.85	J	0	mg/kg	12781379.68	342614
ARCADIS	Floodplain Soil	FF-50	K10873	8/4/00	Kalamazoo River/Portage Creek Floodplain Soils	0	6	in	Total PCBs	0.126	J	0	mg/kg	12780843.19	342520
MDEQ	SOIL	SL002	E30H1	5/31/01	MAIN ST BRIDGE-PLAINWELL TO PLAINWELL DAM	0.0	6.0	in	Total PCBs	5330.00		0	ug/kg	12778321.30	347890.8000
MDEQ	SOIL	SD023	E30K0	6/1/01	MAIN ST BRIDGE-PLAINWELL TO PLAINWELL DAM	0.0	6.0	in	Total PCBs	669.00		0	ug/kg	12779000.15	347178.1414
MDEQ	SOIL	SD024	E30K8	6/1/01	MAIN ST BRIDGE-PLAINWELL TO PLAINWELL DAM	0.0	4.0	in	Total PCBs	2410.00		0	ug/kg	12779056.18	347299.7026
ARCADIS	Floodplain Soil	KRT12-TB-A	K25807	1/8/08	Floodplain Soil Sampling	0	6	in	Total PCBs	9.16		0	mg/kg	12780512.8	342951
ARCADIS	Floodplain Soil	KRT12-TB-B	K25811	1/8/08	Floodplain Soil Sampling	0	6	in	Total PCBs	2.54		0	mg/kg	12780626.3	343045
ARCADIS	Floodplain Soil	KRT13-TB-B	K25814	1/8/08	Floodplain Soil Sampling	0	6	in	Total PCBs	0.594		0	mg/kg	12780299.9	346666
ARCADIS	Floodplain Soil	KRT14-TB-A	K25816	1/8/08	Floodplain Soil Sampling	0	6	in	Total PCBs	0	U	0.059	mg/kg	12780403.4	342489
ARCADIS	Floodplain Soil	KRT14-TB-B	K25820	1/8/08	Floodplain Soil Sampling	0	6	in	Total PCBs	0	U	0.059	mg/kg	12780443.7	342588
ARCADIS	Floodplain Soil	KRT15-TB-A	K25823	1/8/08	Floodplain Soil Sampling	0	6	in	Total PCBs	0.071		0	mg/kg	12778276.4	344589
ARCADIS	Floodplain Soil	KRT15-TB-B	K25826	1/8/08	Floodplain Soil Sampling	0	6	in	Total PCBs	4.8		0	mg/kg	12778341.8	344621
ARCADIS	Floodplain Soil	P2BN-03	K26341	6/23/08	Top-of-Bank Soil Sampling	0	6	in	Total PCBs	0.041	J	0	mg/kg	12780907.3	342058
ARCADIS	Floodplain Soil	P2BS-02	K26371	6/23/08	Top-of-Bank Soil Sampling	0	6	in	Total PCBs	0	U	0.056	mg/kg	12780211.5	342609
ARCADIS	Floodplain Soil	P2BN-01	K26427	6/24/08	Top-of-Bank Soil Sampling	0	6	in	Total PCBs	0	U	0.052	mg/kg	12779758.3	343094
ARCADIS	Floodplain Soil	P2BS-01	K26430	6/24/08	Top-of-Bank Soil Sampling	0	6	in	Total PCBs	0	U	0.054	mg/kg	12779706.2	343037

Table E-4
Floodplain Soil Dataset: Surrogates for Estimating Residential Exposure
Area 1, OU5 Kalamazoo River

Dataset ID	Matrix ID	Station ID	Sample ID	Collection Date	Sample Description	Start Depth	End Depth	Depth Unit	Parameter	Result	Result Flag	Detection Limit	Units	Easting	Northing
ARCADIS	Soil	CVS-01	K26440B	7/7/09	2009/2010 Crown Vantage Investigation	0	6	in	Total PCBs	0	U	0.053	mg/kg	12795140.9	305875
ARCADIS	Soil	CVS-02	K26443	7/7/09	2009/2010 Crown Vantage Investigation	0	6	in	Total PCBs	0.2		0	mg/kg	12794852.2	306189
ARCADIS	Soil	CVS-03	K26447	7/7/09	2009/2010 Crown Vantage Investigation	0	6	in	Total PCBs	0.11		0	mg/kg	12794794.5	306261
ARCADIS	Soil	CVS-04	K26451	7/7/09	2009/2010 Crown Vantage Investigation	0	6	in	Total PCBs	0.283	J	0	mg/kg	12794623.7	307200
ARCADIS	Soil	CVS-05	K26454	7/7/09	2009/2010 Crown Vantage Investigation	0	6	in	Total PCBs	0.207	J	0	mg/kg	12794607	307285
ARCADIS	Soil	CVS-06	K26456	7/7/09	2009/2010 Crown Vantage Investigation	0	6	in	Total PCBs	0	U	0.091	mg/kg	12794764.4	307360
ARCADIS	Soil	CVS-07	K26460	7/8/09	2009/2010 Crown Vantage Investigation	0	6	in	Total PCBs	0	U	0.09	mg/kg	12794754.5	307485
ARCADIS	Soil	CVS-08	K26463	7/8/09	2009/2010 Crown Vantage Investigation	0	6	in	Total PCBs	1.55		0	mg/kg	12794732.3	307676
ARCADIS	Soil	CVS-09	K26467	7/8/09	2009/2010 Crown Vantage Investigation	0	6	in	Total PCBs	0	U	0.074	mg/kg	12795126.3	307518
ARCADIS	Soil	CVS-10	K26470	7/8/09	2009/2010 Crown Vantage Investigation	0	6	in	Total PCBs	0.143	J	0	mg/kg	12795121.4	307571

Prepared By/Date: MKB 07/11/2013
Checked By/Date: LSV 07/11/2013
Revised By/Data: MTP 07/26/2013

Table E-5
ProUCL Output: Floodplain Soil Surrogate Data for Residential Exposure (all data points)
Area 1, OU5 Kalamazoo River

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	0.95
Number of Bootstrap Operations	2000

PCBs FP

General Statistics

Number of Valid Data	64	Number of Detected Data	45
Number of Distinct Detected Data	41	Number of Non-Detect Data	19
		Percent Non-Detects	0.2969

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.03	Minimum Detected	-3.507
Maximum Detected	61.2	Maximum Detected	4.114
Mean of Detected	3.114	Mean of Detected	-0.338
SD of Detected	9.133	SD of Detected	1.772
Minimum Non-Detect	0.052	Minimum Non-Detect	-2.957
Maximum Non-Detect	0.27	Maximum Non-Detect	-1.309

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	34
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	30
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	0.5313

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.323	Shapiro Wilk Test Statistic	0.966
5% Shapiro Wilk Critical Value	0.945	5% Shapiro Wilk Critical Value	0.945
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.202	Mean	-1.223
SD	7.763	SD	2.035
95% DL/2 (t) UCL	3.822	95% H-Stat (DL/2) UCL	5.148
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.239
		SD in Log Scale	2.056
		Mean in Original Scale	2.201
		SD in Original Scale	7.763
		95% t UCL	3.821
		95% Percentile Bootstrap UCL	4.02
		95% BCA Bootstrap UCL	5.109
		95% H-UCL	5.365

Table E-5
ProUCL Output: Floodplain Soil Surrogate Data for Residential Exposure (all data points)
Area 1, OU5 Kalamazoo River

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.425
Theta Star	7.325
nu star	38.27
A-D Test Statistic	1.444
5% A-D Critical Value	0.828
K-S Test Statistic	0.828
5% K-S Critical Value	0.14

Data follow Appr. Gamma Distribution at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data	
Minimum	0.000001
Maximum	61.2
Mean	2.19
Median	0.205
SD	7.766
k star	0.153
Theta star	14.27
Nu star	19.64
AppChi2	10.58
95% Gamma Approximate UCL (Use when n >= 40)	4.063
95% Adjusted Gamma UCL (Use when n < 40)	4.123

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data Follow Appr. Gamma Distribution at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method	
Mean	2.203
SD	7.702
SE of Mean	0.974
95% KM (t) UCL	3.828
95% KM (z) UCL	3.804
95% KM (jackknife) UCL	3.823
95% KM (bootstrap t) UCL	7.682
95% KM (BCA) UCL	4.139
95% KM (Percentile Bootstrap) UCL	4.106
95% KM (Chebyshev) UCL	6.447
97.5% KM (Chebyshev) UCL	8.283
99% KM (Chebyshev) UCL	11.89

Potential UCLs to Use

95% KM (Chebyshev) UCL	6.447

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, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

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Checked By/Date: LMS 07/26/2013

Table E-6
ProUCL Output: Floodplain Soil Surrogate Data for Residential Exposure (high excluded)
Area 1, OU5 Kalamazoo River

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

PCBs FP

General Statistics

Number of Valid Data	63	Number of Detected Data	44
Number of Distinct Detected Data	40	Number of Non-Detect Data	19
Number of Missing Values	1	Percent Non-Detects	30.16%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.03	Minimum Detected	-3.507
Maximum Detected	9.16	Maximum Detected	2.215
Mean of Detected	1.794	Mean of Detected	-0.439
SD of Detected	2.259	SD of Detected	1.656
Minimum Non-Detect	0.052	Minimum Non-Detect	-2.957
Maximum Non-Detect	0.27	Maximum Non-Detect	-1.309

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	34
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	29
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	53.97%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.773	Shapiro Wilk Test Statistic	0.94
5% Shapiro Wilk Critical Value	0.944	5% Shapiro Wilk Critical Value	0.944
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	1.266	Mean	-1.308
SD	2.049	SD	1.934
95% DL/2 (t) UCL	1.697	95% H-Stat (DL/2) UCL	3.665
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-1.285
		SD in Log Scale	1.913
		Mean in Original Scale	1.266
		SD in Original Scale	2.049
		95% t UCL	1.697
		95% Percentile Bootstrap UCL	1.704
		95% BCA Bootstrap UCL	1.751
		95% H-UCL	3.546

Table E-6
ProUCL Output: Floodplain Soil Surrogate Data for Residential Exposure (high excluded)
Area 1, OU5 Kalamazoo River

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	0.577
Theta Star	3.109
nu star	50.78
A-D Test Statistic	0.729
5% A-D Critical Value	0.804
K-S Test Statistic	0.804
5% K-S Critical Value	0.14

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics using Extrapolated Data

Minimum	0.000001
Maximum	9.16
Mean	1.253
Median	0.2
SD	2.056
k star	0.165
Theta star	7.612
Nu star	20.74
AppChi2	11.4
95% Gamma Approximate UCL (Use when n >= 40)	2.28
95% Adjusted Gamma UCL (Use when n < 40)	2.313

Note: DL/2 is not a recommended method.

Data Distribution Test with Detected Values Only

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method

Mean	1.266
SD	2.032
SE of Mean	0.259
95% KM (t) UCL	1.699
95% KM (z) UCL	1.692
95% KM (jackknife) UCL	1.697
95% KM (bootstrap t) UCL	1.826
95% KM (BCA) UCL	1.722
95% KM (Percentile Bootstrap) UCL	1.717
95% KM (Chebyshev) UCL	2.395
97.5% KM (Chebyshev) UCL	2.884
99% KM (Chebyshev) UCL	3.843

Potential UCLs to Use

95% KM (BCA) UCL	1.722

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, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

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