APPENDIX G

ILWD DREDGE AREA AND DEPTH DEVELOPMENT

APPENDIX G

ILWD REMOVAL APPROACH SUPPORTING INFORMATION

The Record of Decision (ROD) requires removal of an average 6.6 ft. (2 meters) in sediment management unit (SMU) 1, which constitutes the majority of the in-lake waste deposit (ILWD) area, plus up to an additional 3.3 ft. (1 meter) in areas defined as hot spots. This same removal approach is required in the portions of the ILWD that extend into SMUs 2 and 7.

A rigorous evaluation of the extensive ILWD sediment and pore water database was completed to develop the removal approach that achieves the two-meter average removal, optimizes contaminant mass removal and reduces sediment and pore water contaminant concentrations underlying the cap. The ILWD was divided into four sub-areas based on chemical concentrations and distributions. Optimal removal strategies were then developed for each of these sub-areas, as shown in plan view in Figure G-1. The primary removal strategy and basis for the removal in each sub-area is summarized below.

- SMU 1/SMU 7 ILWD Eastern Area: Removal of the top 9.9 ft. (three meters) in this area will remove the highest sediment and pore water concentrations of chlorobenzene and dichlorobenzene measured anywhere in the ILWD. This will also lower the concentration for numerous other contaminants in sediment and/or pore water in this area.
- SMU 1 ILWD Center Area: Sufficient dredging will be completed to ensure that the post-capping bathymetry is consistent with current bathymetry in areas where the current water depth is 7 ft. or less. The amended cap thickness in this area is anticipated to be 4.6 ft. assuming average over-placement, with a maximum thickness of 5.7 ft. assuming maximum over-placement of each layer. Therefore, the removal depth in this area is anticipated to be approximately 5.5 ft. out to a water depth of 7 ft.
- SMU 1 ILWD Western Area: Contaminant concentrations are generally lower in this area and patterns of concentration versus depth are less defined. However, removal of the top 9.9 ft. (3 meters) in a portion of this area will reduce the concentrations of several contaminants in sediment and/or pore water, including toluene and total semi-volatile organic compounds (SVOCs).
- SMU 2 ILWD Area: Contaminant concentrations are significantly lower in this area than elsewhere within the ILWD. Therefore, habitat considerations were the primary consideration in developing the removal approach in this area. In general, the dredge removal was selected to increase water depth near shore to enhance future shoreline fishing opportunities.

As shown in Figure G-1, there will be a transition zone between the full removal depth and shoreline in some areas and approaching the littoral area boundary based on habitat and other considerations. There will also be transition zones between the dredge areas and the edge of the profundal zone, and between the different target dredge depths themselves. The details of these transition zones are provided in Appendix F. Additional details regarding the development of the sub-areas and removal strategies are provided below.

Location-specific information within the ILWD from the Remedial Investigation (RI) and all design-related investigations through 2008 was queried from Honeywell's Locus Focus data management system in order to identify spatial contaminant distribution trends and develop the sub-areas and removal depths summarized above. This included identifying and plotting the locations of the highest sediment and pore water concentrations for each contaminant or contaminant group. Sediment data from vibracores collected for pore water analysis were also included in this evaluation. The 90^{th} and 95^{th} percentile concentrations were identified, as shown in the percentile distribution curves in Figure G-2. Percentiles were used to describe characteristics of data distributions. For example, the 90^{th} percentile concentration represents the concentration that is higher than 90 percent of all the concentrations in the database. The percentile distribution curves as shown in Figure G-2 were developed based on SMU1 data only. Exceedances of the 90^{th} and 95^{th} percentile concentrations are shown in plan view in Figures G-3 through G-11. The 90^{th} and 95^{th} percentiles are also shown for reference in the scatter plots of contaminant concentration versus depth shown in Figures G-12 through G-23. The plan view figures and scatter plots as shown in Figures G-3 through G-23 were developed based on all data from SMUs 1, 2 and 7 within the ILWD.

The removal approach optimizes removal of the highest sediment and pore water concentrations, and results in decreased sediment and pore water concentrations immediately beneath the cap. Specific benefits of the proposed ILWD removal approach based on consideration of the data presented in Figures G-3 through G-23 are detailed below.

SMU 1/SMU 7 ILWD Eastern Area: Dredging the top three meters in portions of the eastern area removes the highest concentrations measured anywhere in ILWD for:

- Chlorobenzene in sediment and pore water
- Dichlorobenzene in sediment and pore water
- PCBs in sediment (not analyzed for in pore water)

It also reduces the concentration in the eastern area for:

- Toluene in pore water
- Xylene in pore water
- Napthalene in pore water
- Benzene in pore water and sediment

- Phenol in sediment

SMU 1 ILWD Center Area: Dredging in the center area will not appreciably reduce the sediment or pore water concentrations beneath the cap. Therefore, the removal approach in this area is to remove sufficient sediment such that post-capping bathymetry is consistent with current bathymetry in water depths from 0 to 7 ft.

SMU 1 ILWD Western Area: Contaminant concentrations in the western area are generally lower than concentrations in the eastern and center areas. Nevertheless, dredging the top three meters in portions of the western area reduces the concentration in the western area for:

- Dichlorobenzene in pore water
- Benzene in pore water
- Toluene in pore water and sediment
- Mercury in sediment
- PAHs in sediment (not analyzed for in pore water)
- PCBs in sediment (not analyzed for in pore water)

SMU 2 ILWD Area: Contaminant levels within the SMU 2 ILWD are lower than the other ILWD areas. Therefore, habitat considerations were the primary consideration in developing the removal approach in this area. To meet the two meter average removal requirement for the SMU 2 ILWD removal strategy involves increasing water depth near shore along a portion of the shoreline barrier wall to enhance future shoreline fishing opportunities.

Hot Spot Removal: Following development of the removal approach described above, sediment data for the next 3.3 ft. (one meter) down were evaluated to identify exceedances of the hot spot criteria listed in the ROD and the subsequent hot spot removal approach. Details regarding hot spot identification and determination of hot spot removal areas are provided below.

To identify exceedances of hot spot criteria, contaminant concentrations within the one-meter interval immediately below the post-dredge surface were defined at each core location. Core locations are shown in Figure G-24. Identification of hot spots involved first defining the baseline post-dredging depth at each core location. The concentration within the one-meter interval immediately underlying the baseline removal depth was then conservatively defined based on the maximum concentration of the core sections within that interval, and this concentration was compared to the hot spot criteria. Samples having any portion of their sampling interval within the underlying one-meter interval were included in the analysis. Based on this analysis, chlorobenzene, dichlorobenzene and xylene were the only contaminants that exceeded their hot spot criteria in the depth interval of interest. Core locations that exceeded the hot spot criteria are included in Table G-1 and shown in Figure G-25. For co-located cores, the maximum value measured at any of the cores was considered in identification of hot spot exceedances.

Following this identification of hot spot locations, an interpolation procedure was used for the areal delineation of hot spots. The interpolation was based on the same concentrations used for identification of hot spot locations described above (i.e., maximum concentration of any core segment within the one-meter interval beneath the baseline dredge cut. In order to produce acceptable interpolation results, the data set was conservatively revised to remove the effect of non-hot spot locations that are co-located with or are near hot spot exceedances. To remove this proximity effect for each contaminant, all non-hot spot locations that fell within close proximity of a hot spot location were excluded from the interpolation, which resulted in conservatively high interpolated concentrations at such locations. Table G-2 provides a listing of the non-hot spot locations that were excluded from the interpolation due to this proximity effect for each contaminant.

The remaining sediment surface concentration data for each CPOI were then interpolated over a 10-ft. grid within the ILWD using the Inverse Distance Weighted (IDW) method. With the IDW method, the interpolated concentration at a given point is calculated as a weighted average of the nearby measured concentrations, with the weighting factors defined by the distance between the calculation point and each measurement location raised to a power (a power of 4 was used in this case). The resulting interpolated concentrations for chlorobenzene, dichlorobenzene, and xylene are shown in Figures G-26 through G-28, respectively. For each of these three contaminants, the individual hot spot areas were defined by the interpolated concentration isopleths corresponding to its hot spot criteria. The isopleths corresponding to the hot spot criteria for the three contaminants were then merged, as shown in Figure G-29. Minor revisions were made to the boundaries of the combined isopleths based on engineering judgment, such as linking of small isolated hot spots with adjacent larger hot spot areas, as shown in Figure G-30. Based on this approach, seven individual hot spot areas were delineated (referred to as Hot Spots A through G), covering a total combined area of approximately 22 acres.

DATA TREATMENT

The data queries and treatment methods used for all analyses presented in this appendix are as follows:

- Parameters of interest: benzene, chlorobenzene, total dichlorobenzenes, ethylbenzene, naphthalene, mercury, PAHs, PCBs, toluene, phenol, and total xylenes
- Removed “rejected” data (i.e., query Locus field “USE” = Y only)
- For duplicate results, both concentrations were included
- Non-detect samples were set to half of their detection limit
- Sample intervals were determined by the average of the sample start depth and sample end depth.
- Total dichlorobenzene was calculated as the sum of 1,2- 1,3- and 1,4-dichlorobenzene using half the detection limit for non-detects.

- Total xylene was calculated as the sum of m-, p-, and o-xylene using half the detection limit for non-detects.
- Total PAHs were calculated as the sum of individual PAH compounds using half the detection limit for non-detects.
- Total PCBs were calculated as the sum of individual aroclors using half the detection limit for non-detects.

TABLES

Table G-1
ILWD Sample Locations with Hot Spot Criteria Exceedances in the 1-Meter Interval Below the Base Dredge Cut

Sediment Sample Locations
OL-STA-10008-VC
OL-STA-10009-VC
OL-STA-10010-VC
OL-STA-10013-VC
OL-STA-10020-PW
OL-STA-10020-VC
OL-VC-10040
OL-VC-10042
OL-VC-10042A
OL-VC-10046
OL-VC-10046A
OL-VC-10048
OL-VC-10049A
OL-VC-10050
OL-VC-10052
OL-VC-10053
OL-VC-10053A
OL-VC-10054
OL-VC-10055
OL-VC-10057A
OL-VC-10058
OL-VC-10059
OL-VC-10064
OL-VC-10065
OL-VC-10082
OL-VC-10090
OL-VC-10091
OL-VC-10096
OL-VC-10096A
OL-VC-10097A
OL-VC-10098
OL-VC-10102
OL-VC-10103
OL-VC-10137
OL-VC-10138
OL-VC-10140
OL-VC-10141
OL-VC-10155
OL-VC-10157
P22
S312
S341
S342
S345

Table G-2
Non-Hot Spot ILWD Sample Locations Excluded from Interpolation
Due to Proximity to a Hot Spot Location

Sediment Sample Locations	Chemicals(s) for which Location was Excluded from Inteprolation
OL-STA-10008-PW	Xylene
OL-STA-10010-VC	Xylene
OL-STA-10013-PW	Xylene
OL-VC-10044	Xylene
OL-VC-10048A	Xylene
OL-VC-10049	Xylene
OL-VC-10058A	Xylene
OL-VC-10070	Xylene
OL-VC-10070A	Xylene
OL-VC-10097A	Xylene
OL-STA-10010-PW	Dichlorobenzene, Xylene
OL-VC-10064A	Dichlorobenzene, Xylene
OL-VC-10066	Dichlorobenzene, Xylene
OL-VC-10067	Dichlorobenzene, Xylene
OL-VC-10097	Dichlorobenzene, Xylene
OL-VC-10099	Dichlorobenzene, Xylene
OL-VC-10100	Dichlorobenzene, Xylene
OL-VC-10042A	Dichlorobenzene
OL-VC-10051	Dichlorobenzene
OL-VC-10098	Dichlorobenzene
OL-VC-10103A	Dichlorobenzene
OL-VC-10138	Dichlorobenzene
S312	Dichlorobenzene
OL-VC-10057	Chlorobenzene, Dichlorobenzene, Xylene
OL-VC-10096	Chlorobenzene
OL-VC-10096A	Chlorobenzene

FIGURES

SMU2 ILWD AREA

SMU1 ILWD WESTERN AREA

SMU1 ILWD CENTER AREA

SMU1 / 7 ILWD EASTERN AREA

A

B

C

D

E

F

G

LEGEND:

- 2M REMOVAL DEPTH
- 3M REMOVAL DEPTH
- 1.7M REMOVAL DEPTH
- TRANSITION ZONE
- HOT SPOT

NOTES:

1. Areas designated as hot spots will be dredged one additional meter.

FIGURE G-1

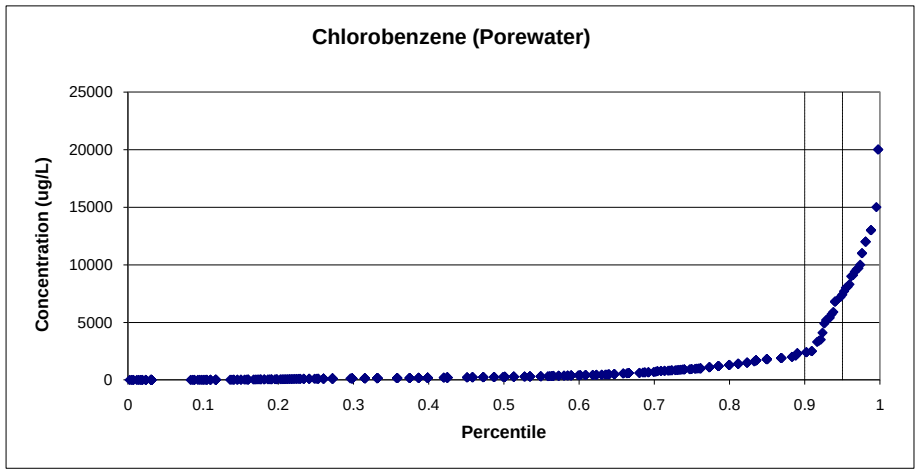
ONONDAGA LAKE
SYRACUSE, NEW YORK

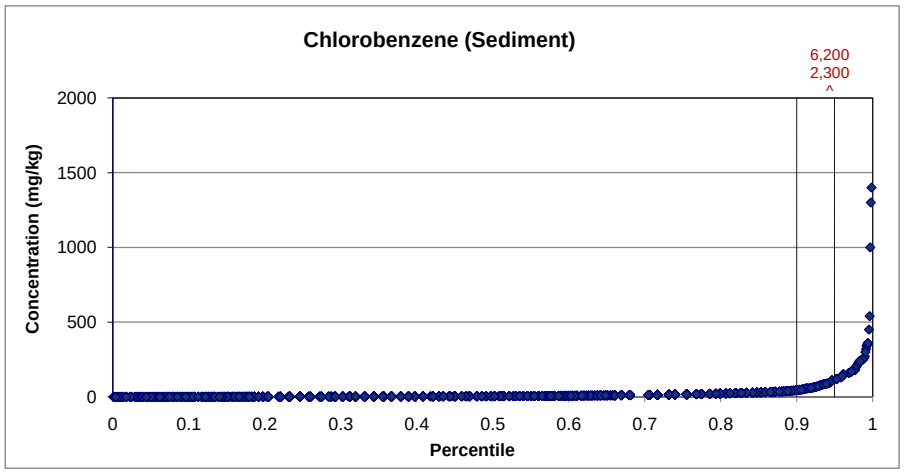
ILWD Removal Depths – 2 Meter Average Removal Plus Hot Spots

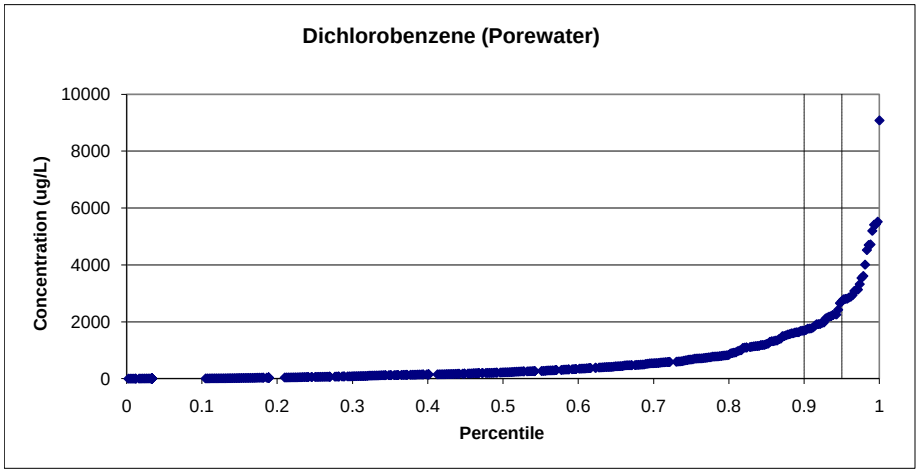
Scale 1"=300'

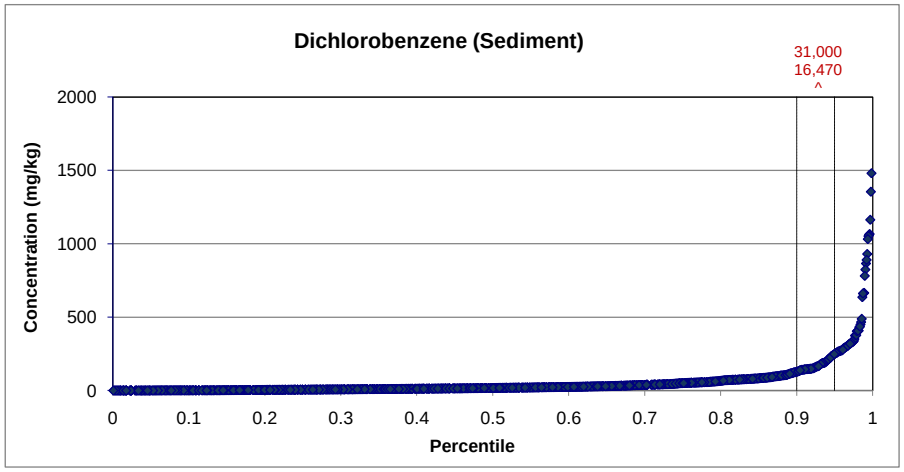
FILE NAME: P:\HONEYWELL -SYR\443582 - CAPPING\10 TECHNICAL CATEGORIES\10.1 CAD\ANCHOR\01013902-RP-02-12-4-09\HOT SPOT 12-10.DWG
PLOT DATE: 11/29/2010 9:06 AM PLOTTED BY: RUSSO, JILL

Figure G-2. Percentile Distributions Used to Develop Optimal ILWD Removal Depths









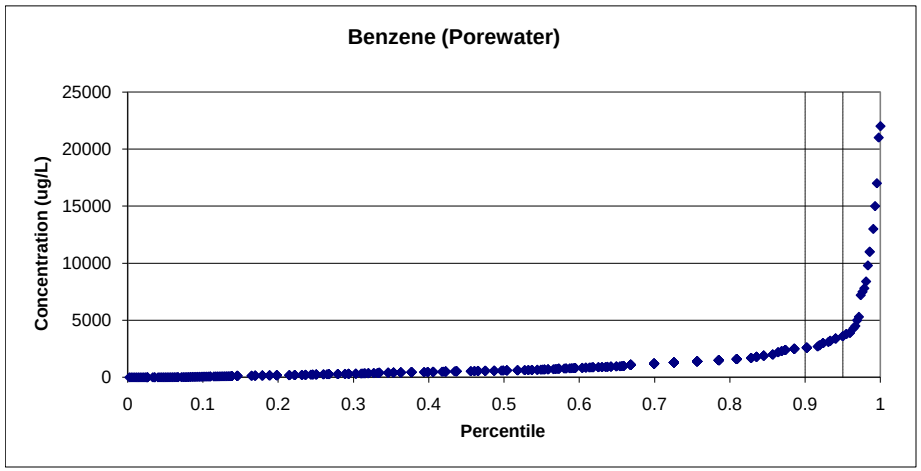
	Percentile	Porewater (ug/L)
Chloro-benzene	90th	2300
	95th	7000
Dichloro-benzene	90th	1633
	95th	2542

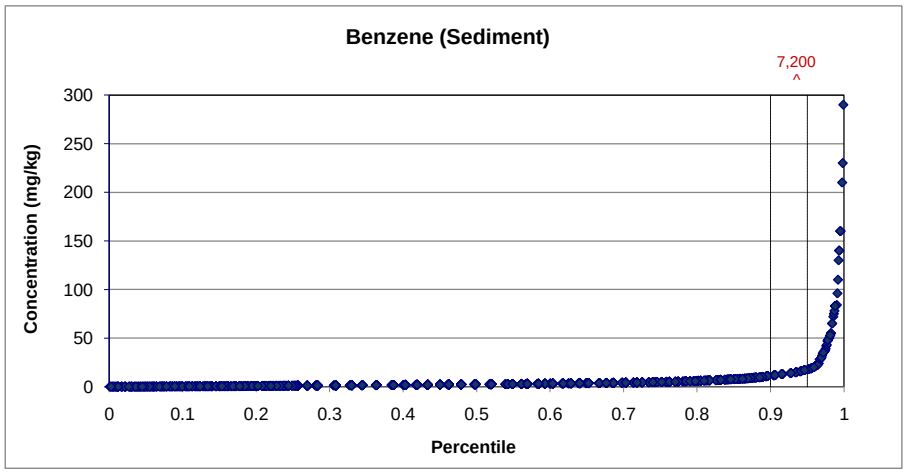
	Percentile	Sediment (mg/kg)
Chloro-benzene	90th	44
	95th	110
Dichloro-benzene	90th	128
	95th	250

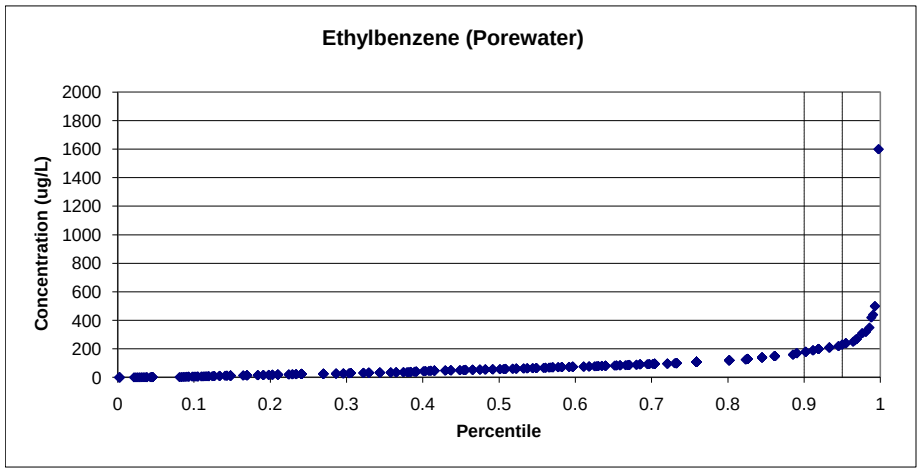
Note: Numbers in red denote concentrations beyond the range of the plots.

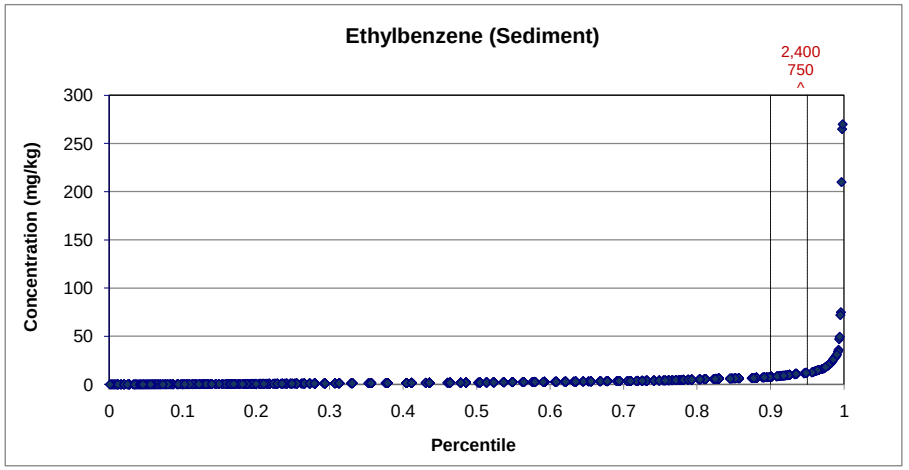
Note: Plots incorporate data from RI and PDI Phases I through V.

Figure G-2. Percentile Distributions Used to Develop Optimal ILWD Removal Depths (continued)









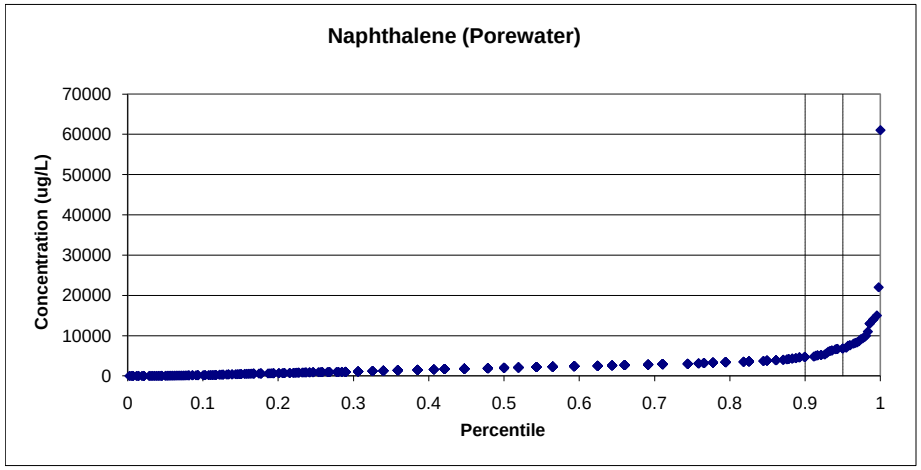
	Percentile	Porewater (ug/L)
Benzene	90th	2500
	95th	3400
Ethyl-benzene	90th	170
	95th	220

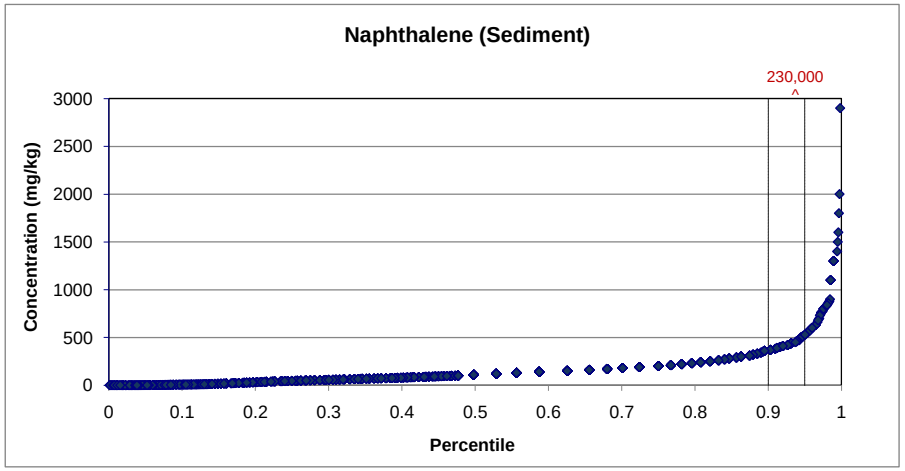
	Percentile	Sediment (mg/kg)
Benzene	90th	11
	95th	17
Ethyl-benzene	90th	8
	95th	12

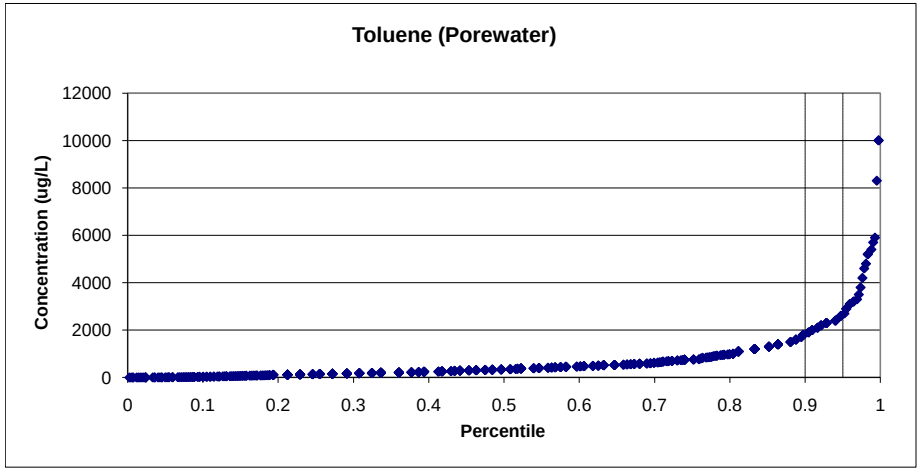
Note: Numbers in red denote concentrations beyond the range of the plots.

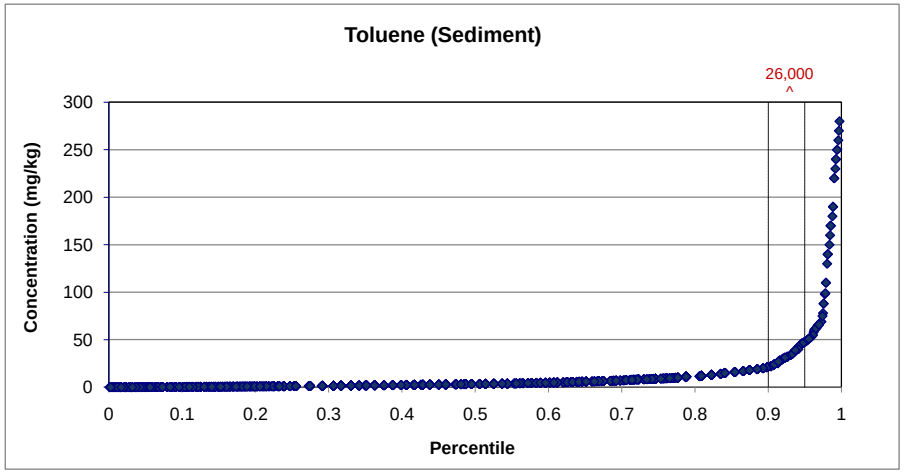
Note: Plots incorporate data from RI and PDI Phases I through V.

Figure G-2. Percentile Distributions Used to Develop Optimal ILWD Removal Depths (continued)









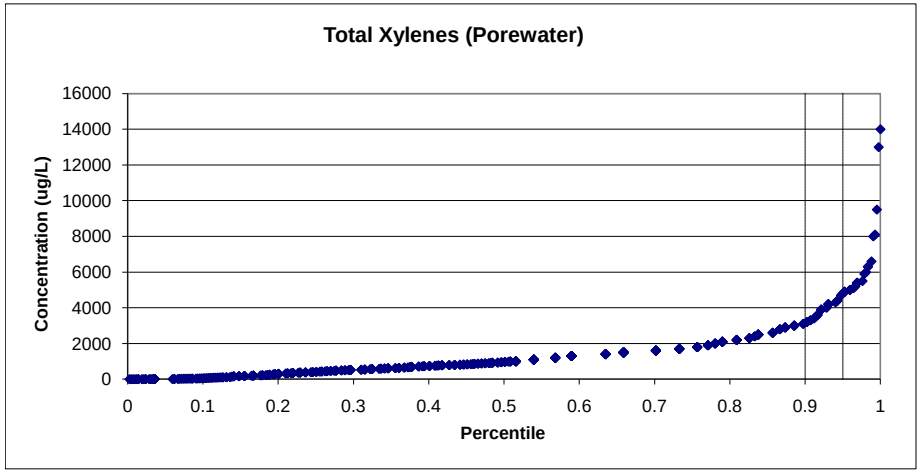
	Percentile	Porewater (ug/L)
Naphtha-lene	90th	4610
	95th	6700
Toluene	90th	1600
	95th	2500

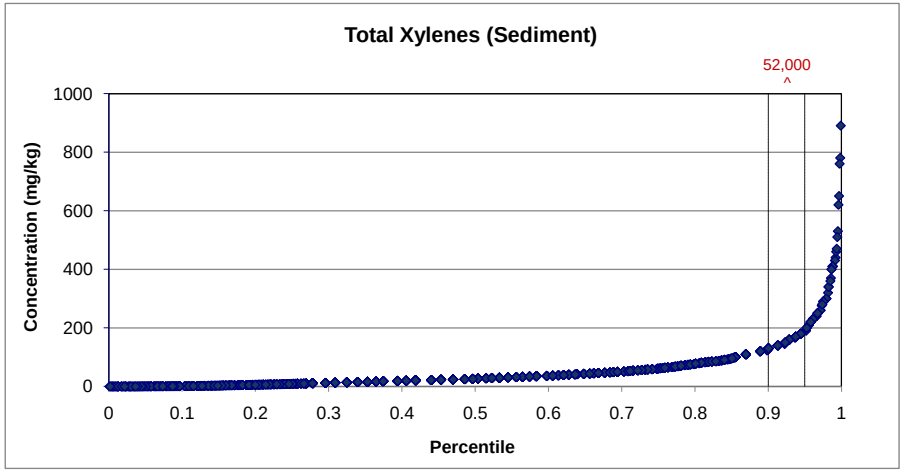
	Percentile	Sediment (mg/kg)
Naphtha-lene	90th	360
	95th	526
Toluene	90th	21
	95th	47

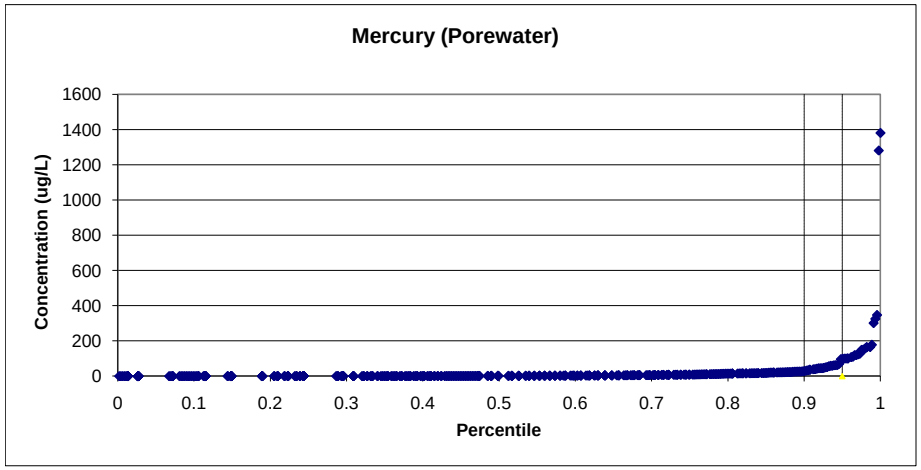
Note: Numbers in red denote concentrations beyond the range of the plots.

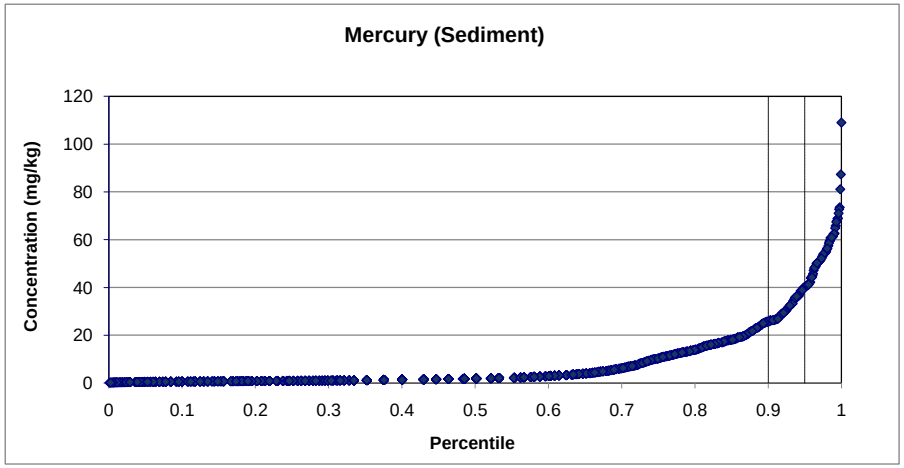
Note: Plots incorporate data from RI and PDI Phases I through V.

Figure G-2. Percentile Distributions Used to Develop Optimal ILWD Removal Depths (continued)









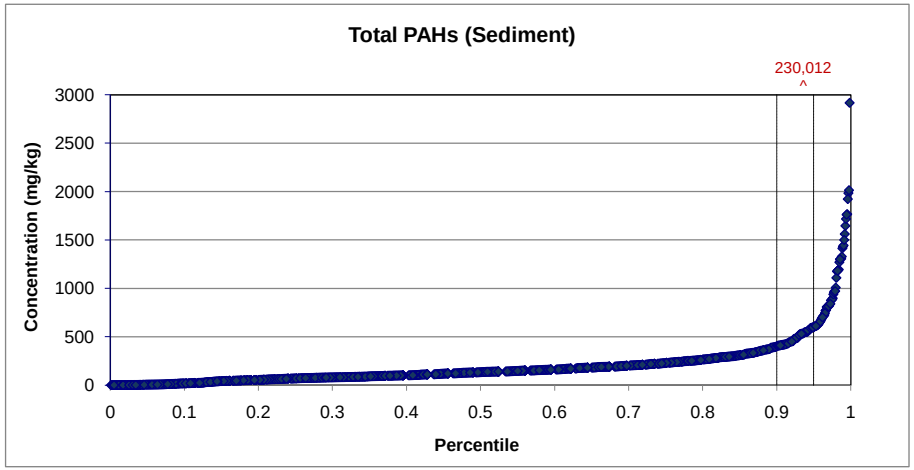
	Percentile	Porewater (ug/L)
Total Xylenes	90th	3000
	95th	4550
Mercury	90th	26
	95th	79

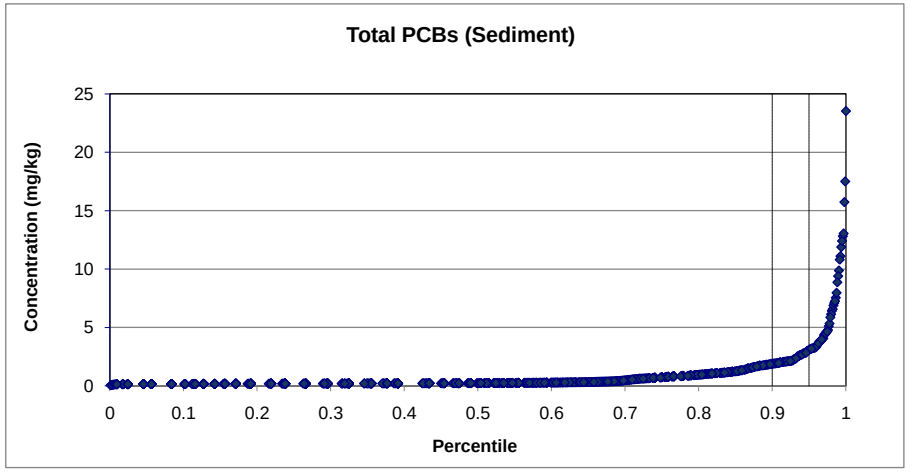
	Percentile	Sediment (mg/kg)
Total Xylenes	90th	127
	95th	180
Mercury	90th	26
	95th	40

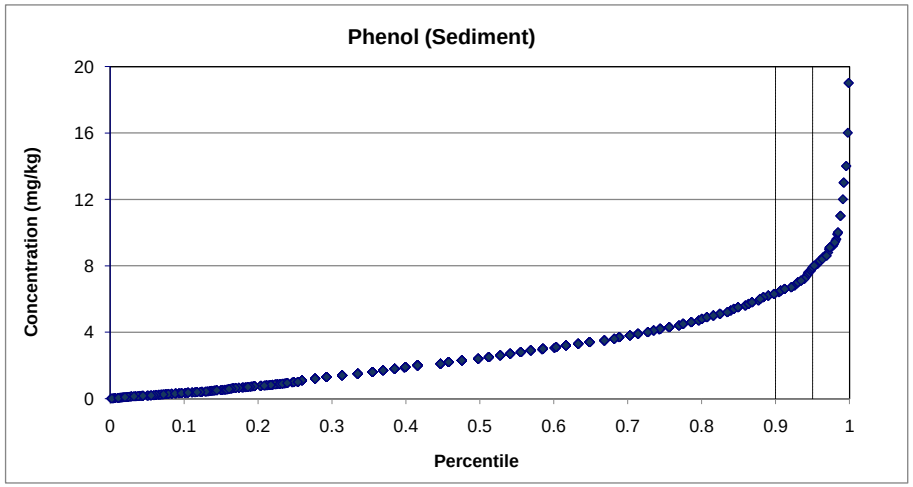
Note: Numbers in red denote concentrations beyond the range of the plots.

Note: Plots incorporate data from RI and PDI Phases I through V.

Figure G-2. Percentile Distributions Used to Develop Optimal ILWD Removal Depths (continued)



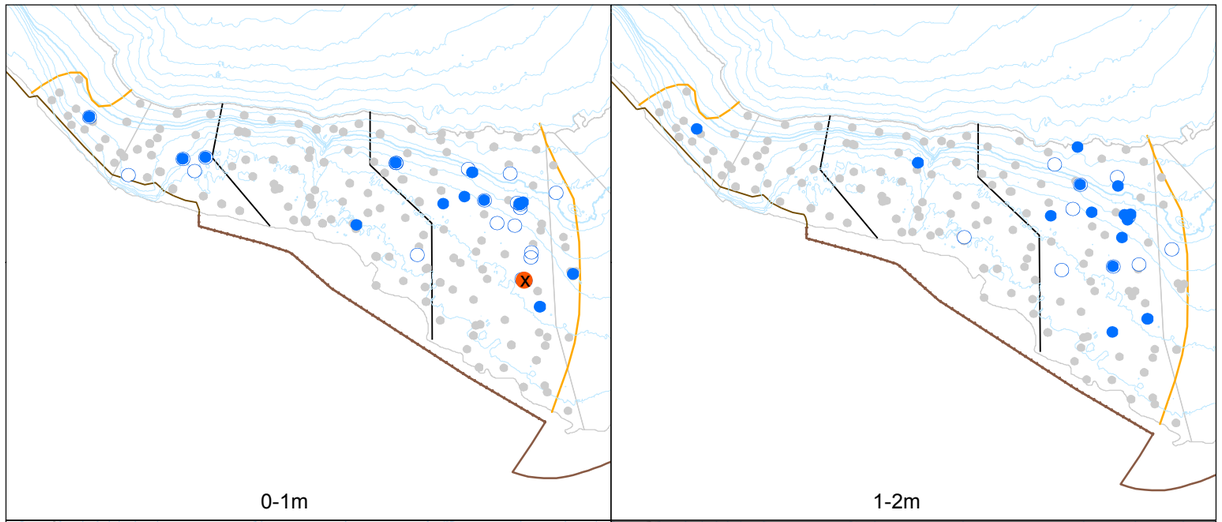


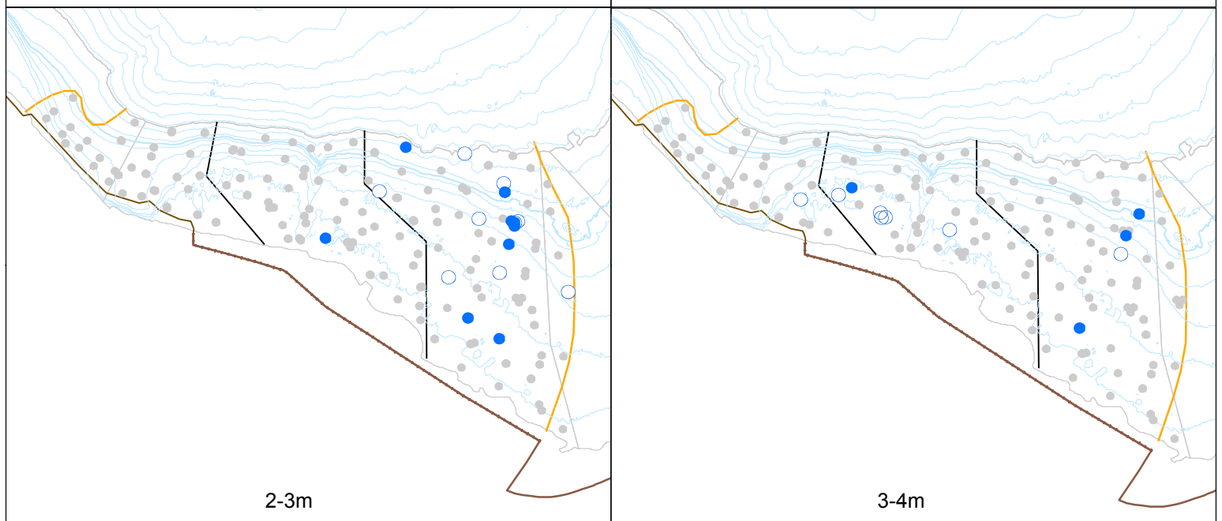


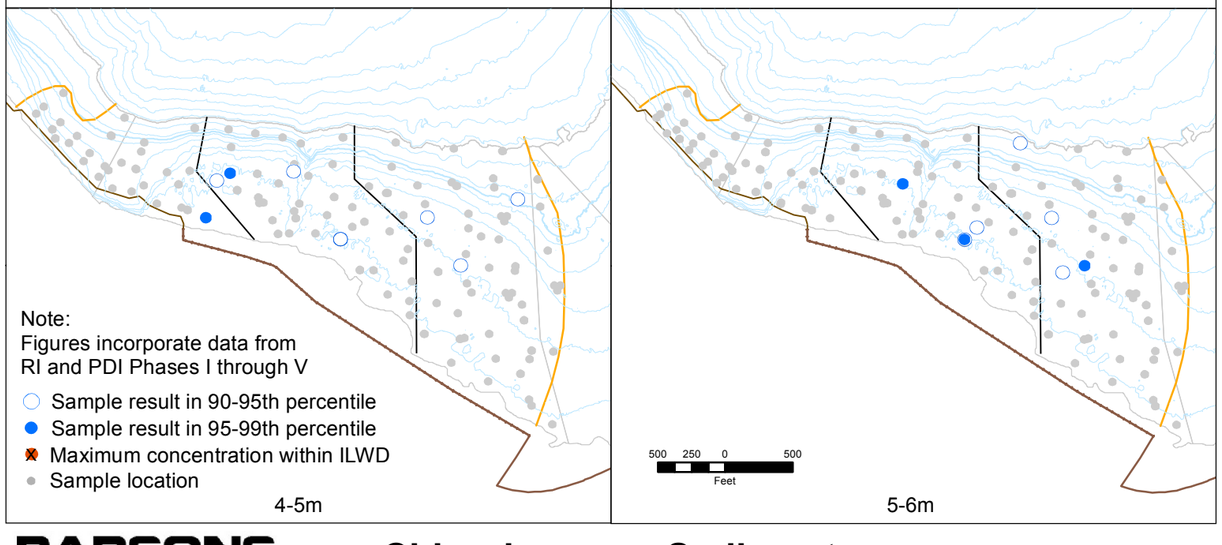
	Percentile	Sediment (mg/kg)
Total PAHs	90th	401
	95th	600
Total PCBs	90th	2
	95th	3
Phenol	90th	6
	95th	8

Note: Numbers in red denote concentrations beyond the range of the plots.

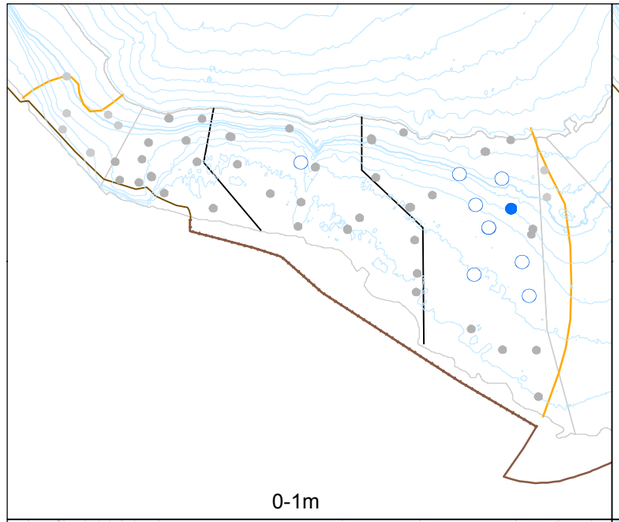
Note: Plots incorporate data from RI and PDI Phases I through V.

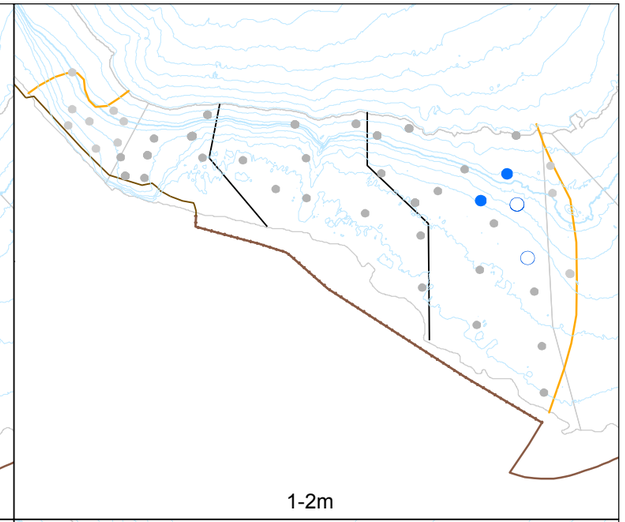


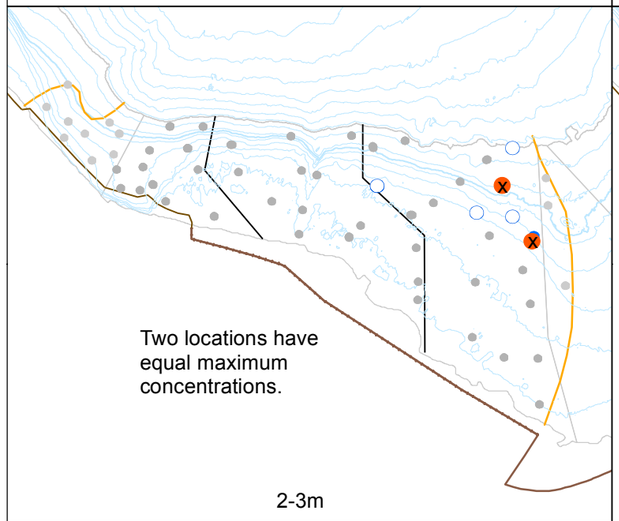


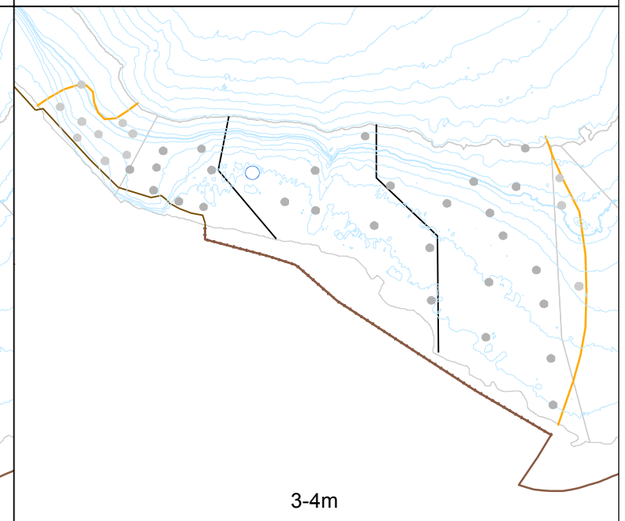


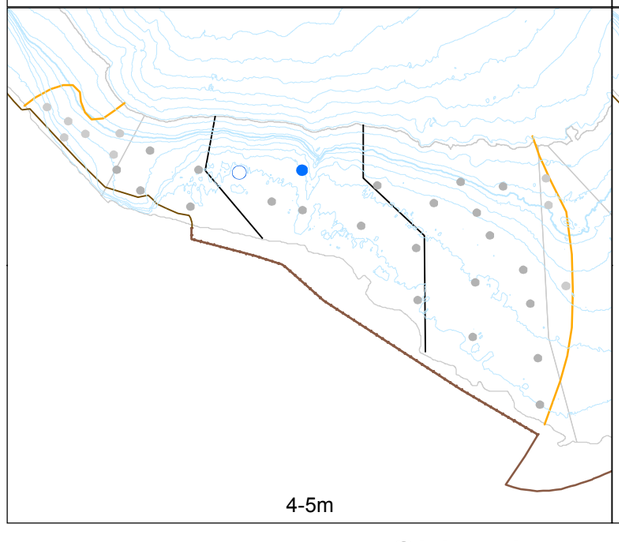
Chlorobenzene Sediment

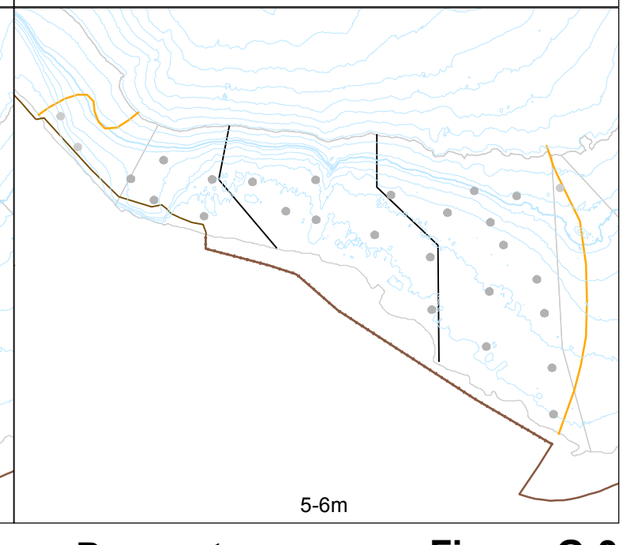












Chlorobenzene Porewater

Figure G-3

PARSONS

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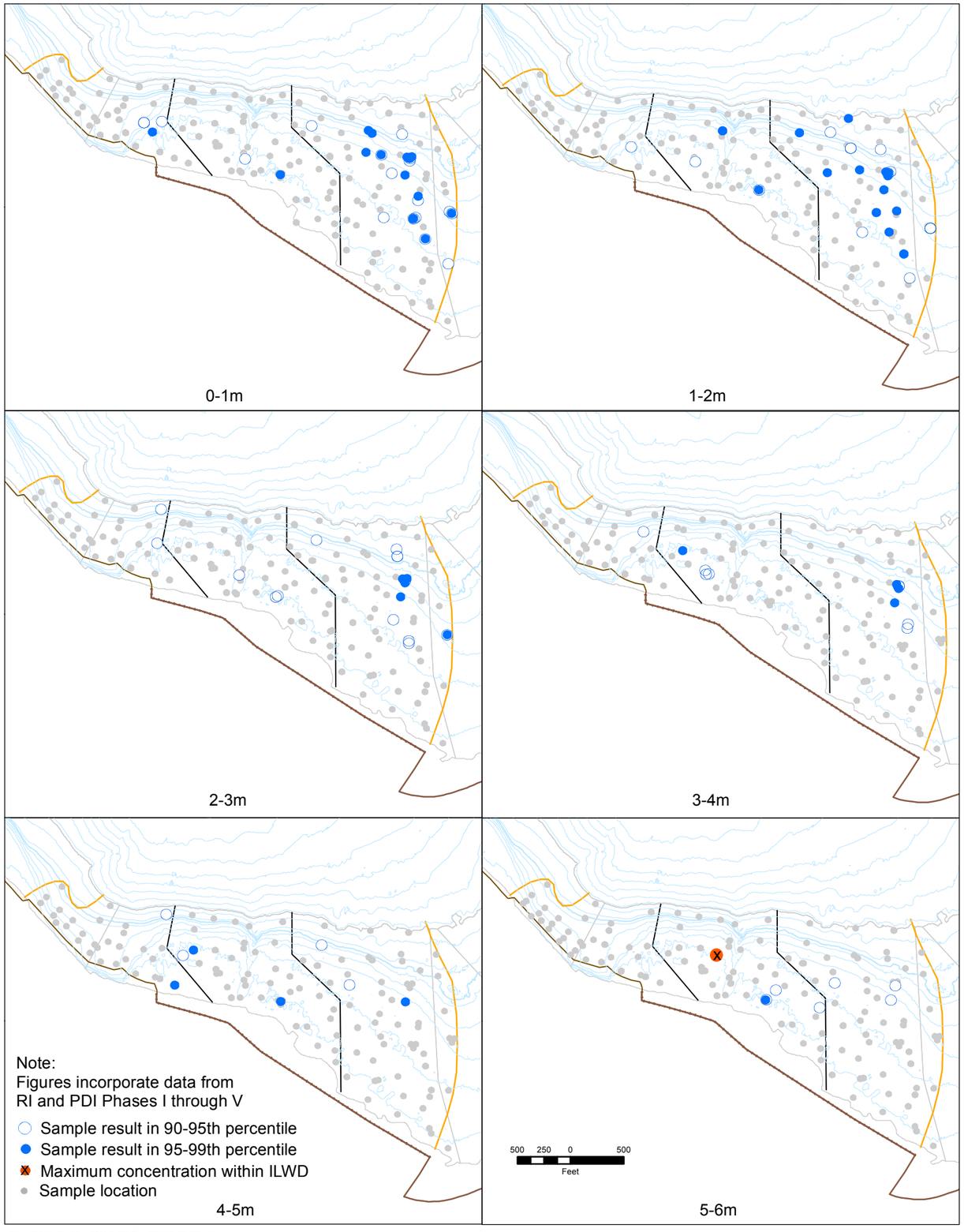

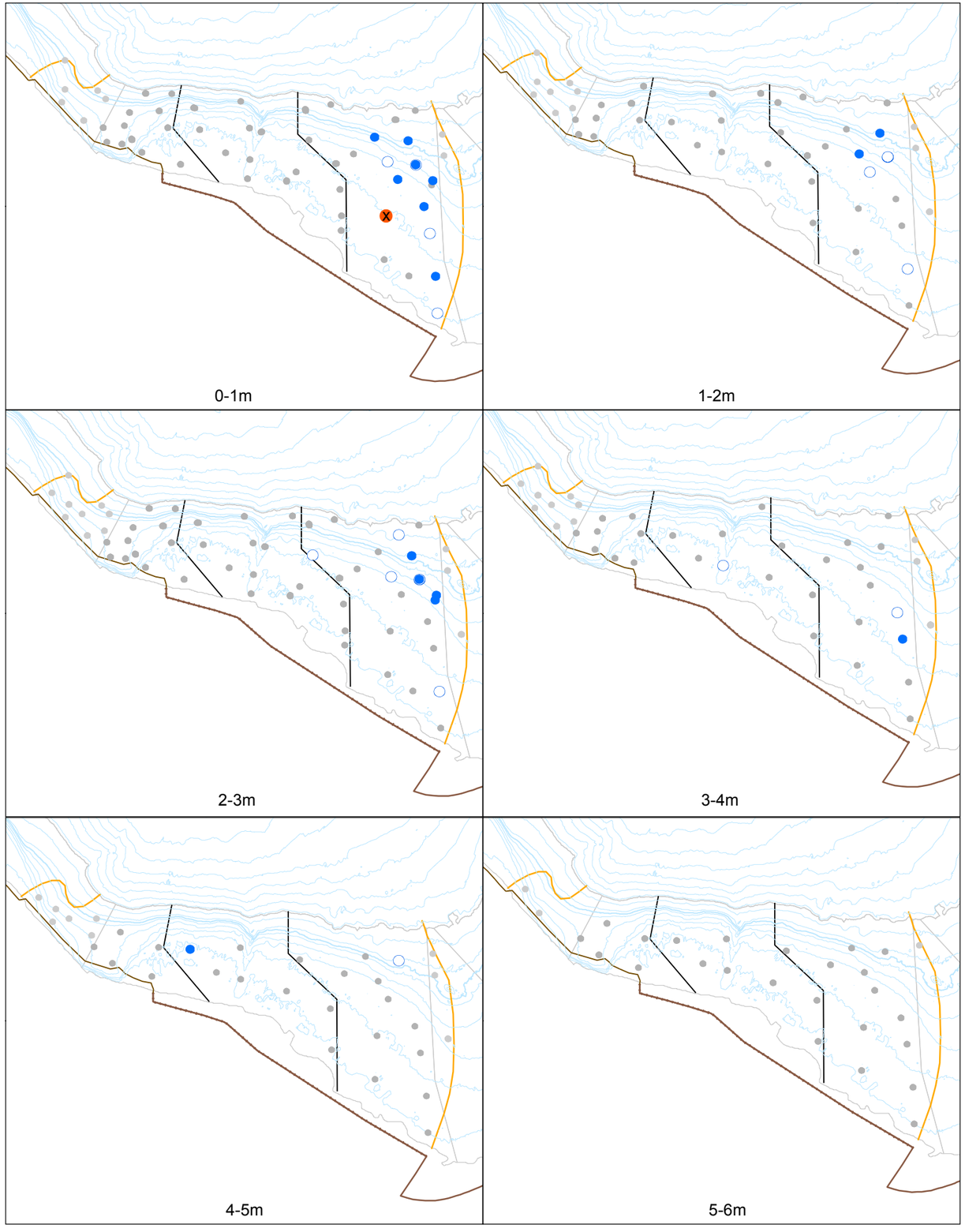

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PARSONS

Dichlorobenzene Sediment

Dichlorobenzene Porewater

Figure G-4

0-1m

1-2m

2-3m

3-4m

4-5m

5-6m

Note:
Figures incorporate data from
RI and PDI Phases I through V

- Sample result in 90-95th percentile
- Sample result in 95-99th percentile
- Maximum concentration within ILWD
- Sample location

500 250 0 500
Feet

0-1m

1-2m

2-3m

3-4m

4-5m

5-6m

Date Saved: 12/10/2010 12:02:10 PM

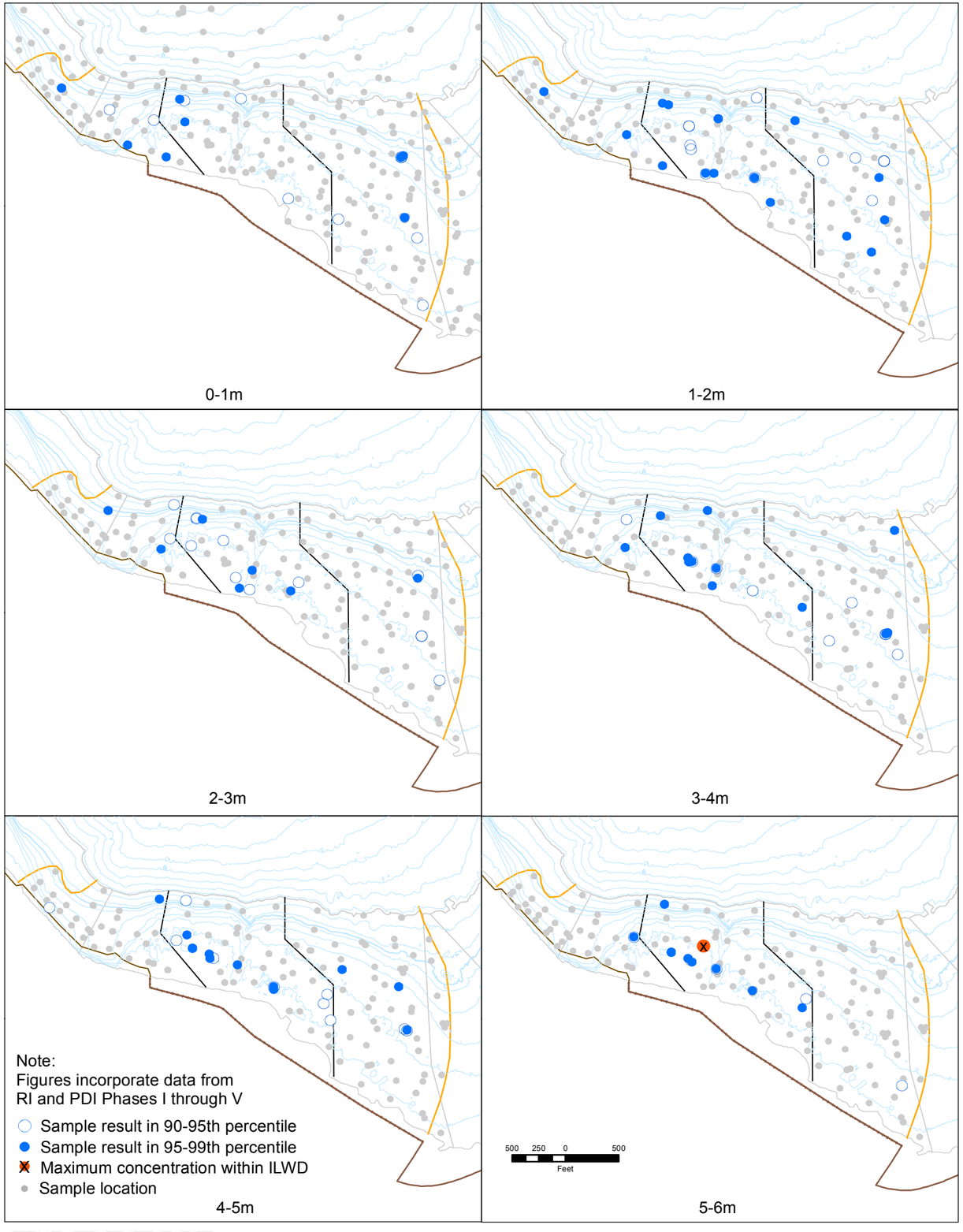
Path: Q:\GIS\GIS_Lake\CAP\MXD\Intermediate_Design\G5_SMU1_PW_Sed_Benzene.mxd

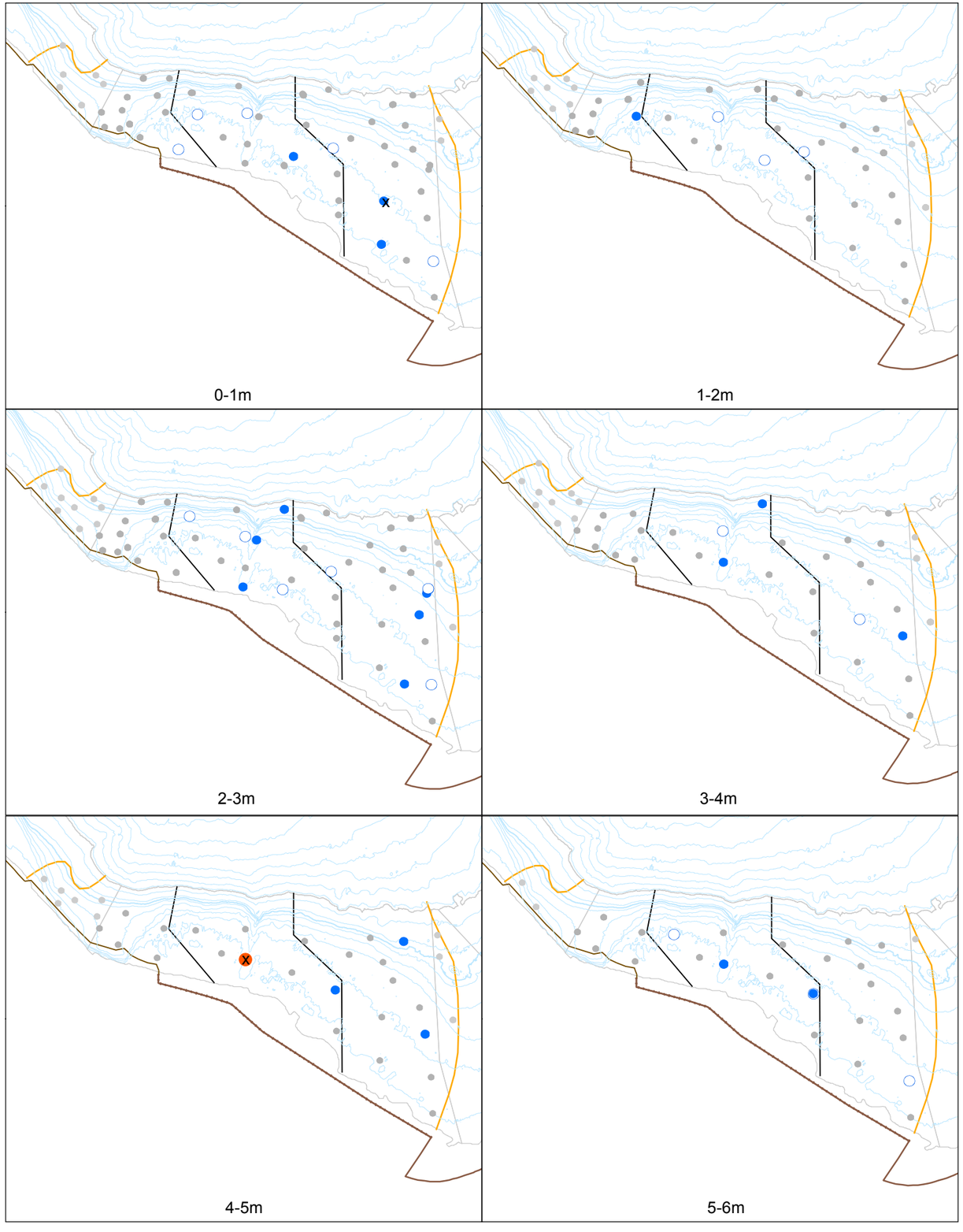
PARSONS

Benzene Sediment

Benzene Porewater

Figure G-5





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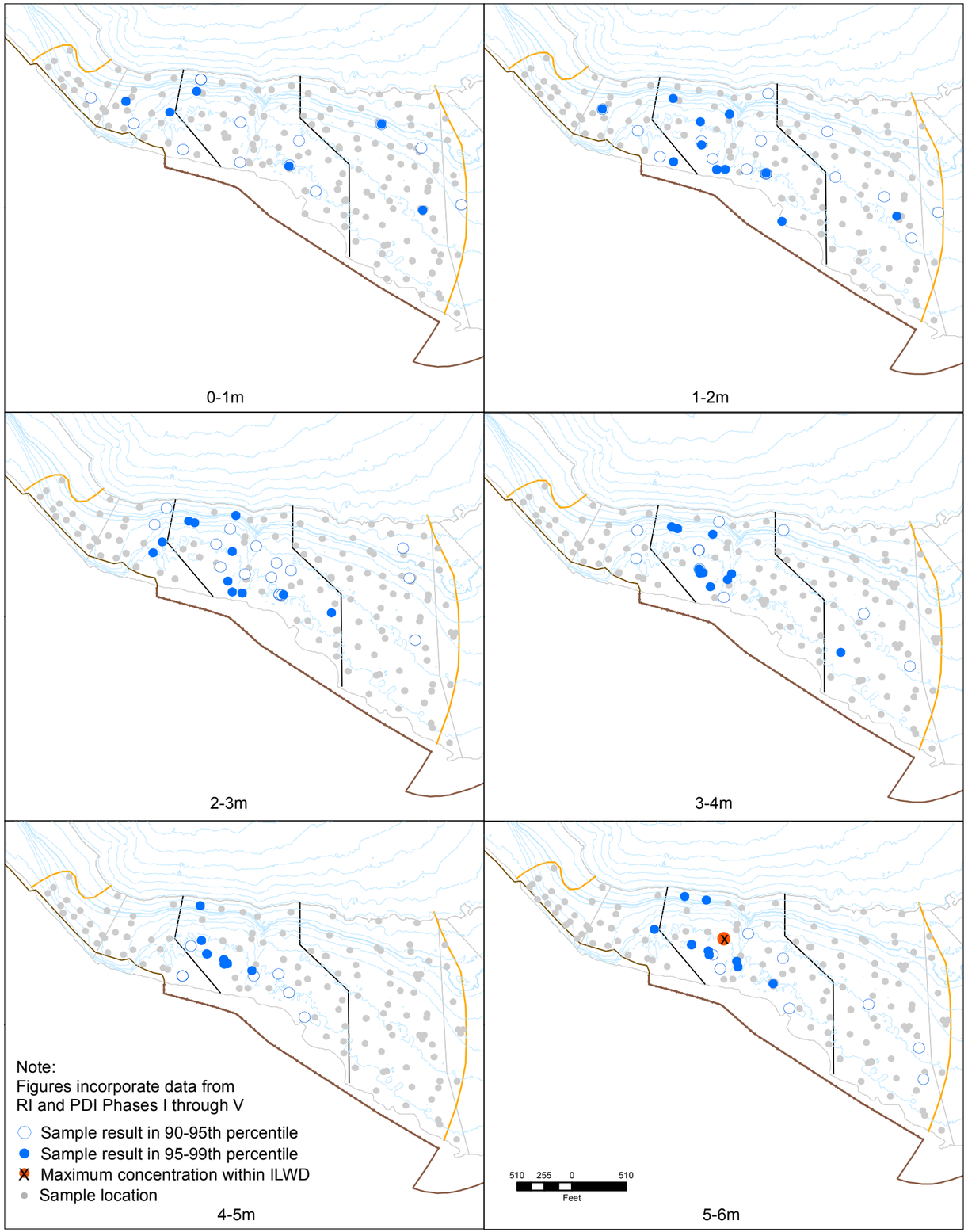
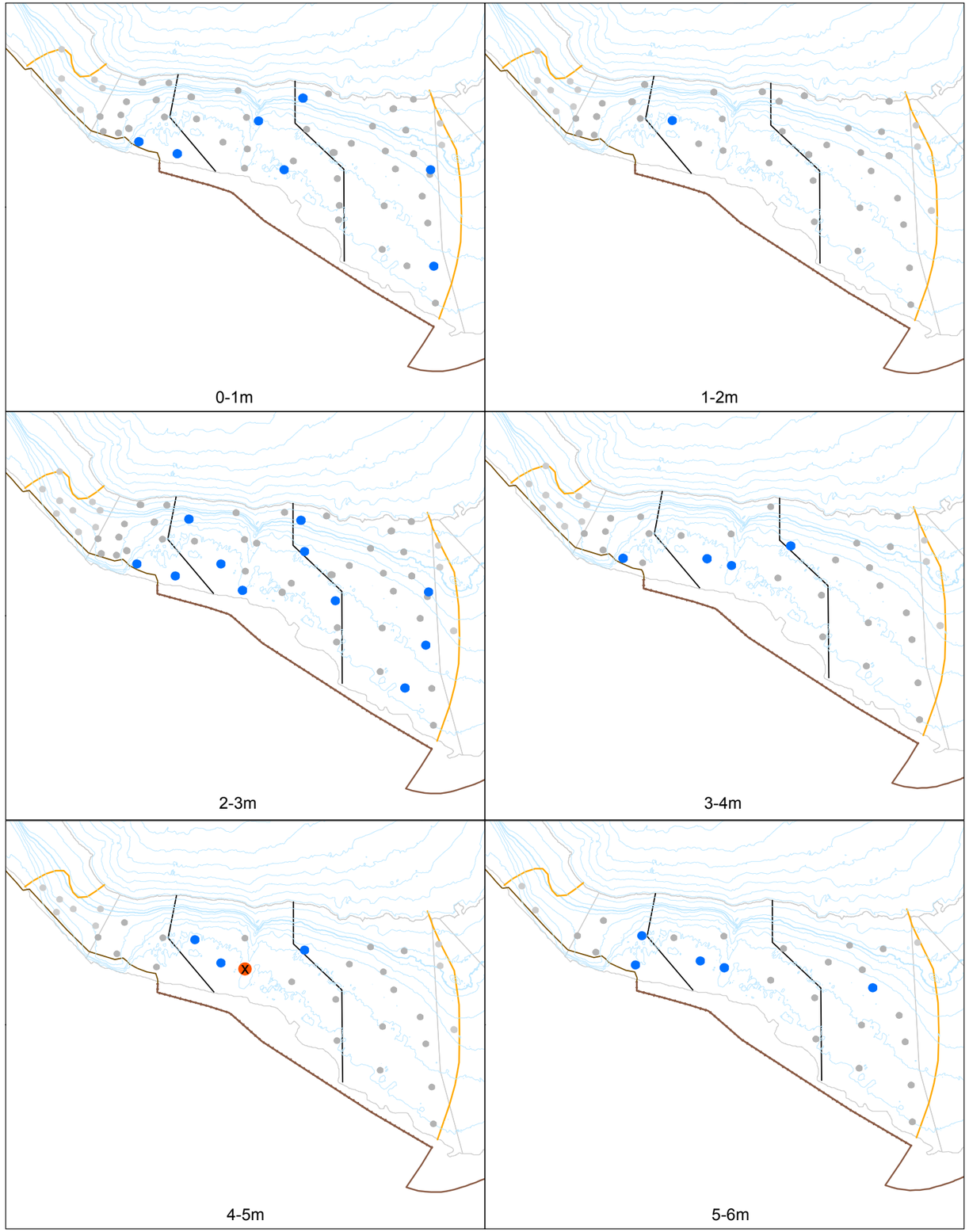
PARSONS

Ethylbenzene Sediment

Ethylbenzene Porewater

Figure G-6





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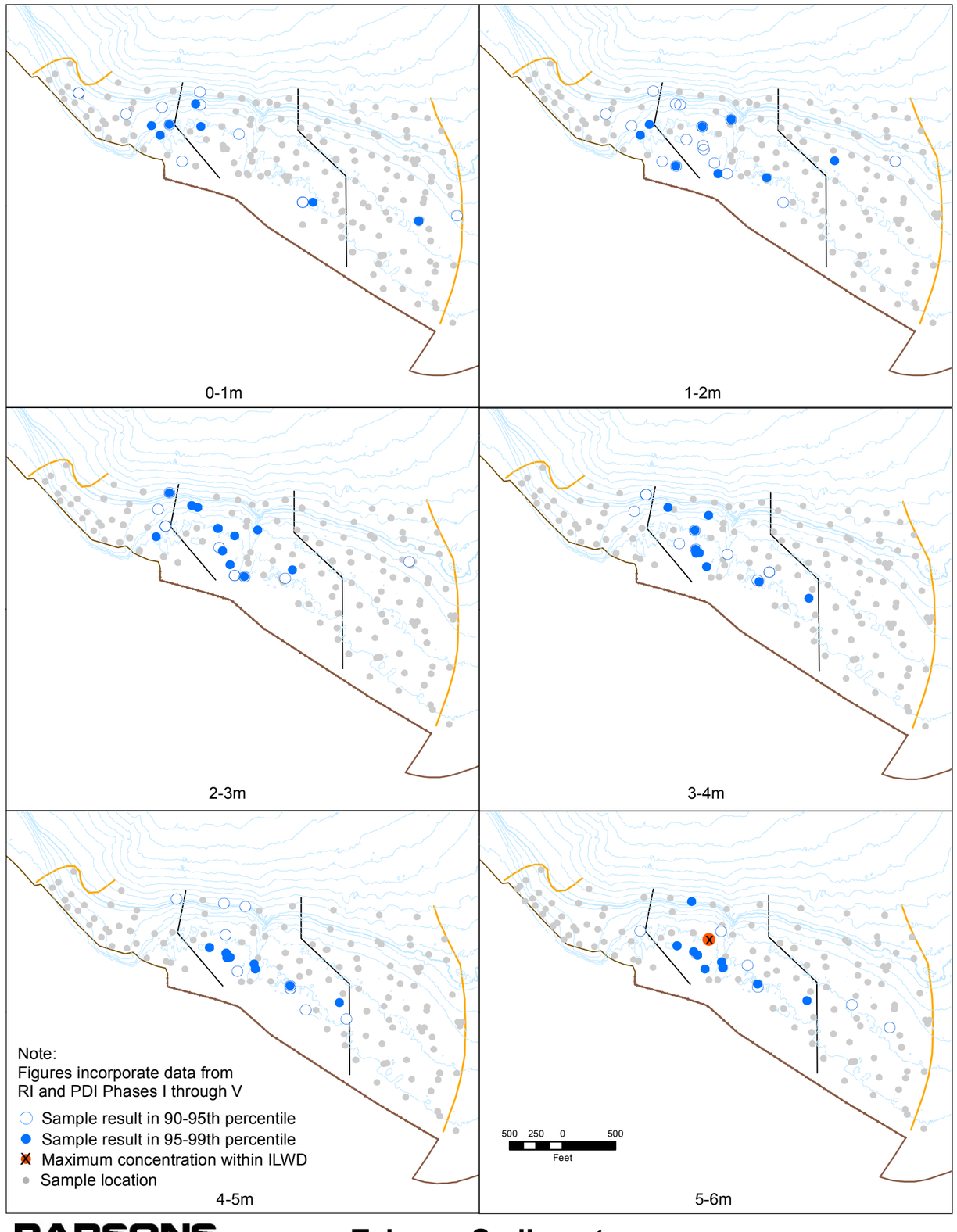
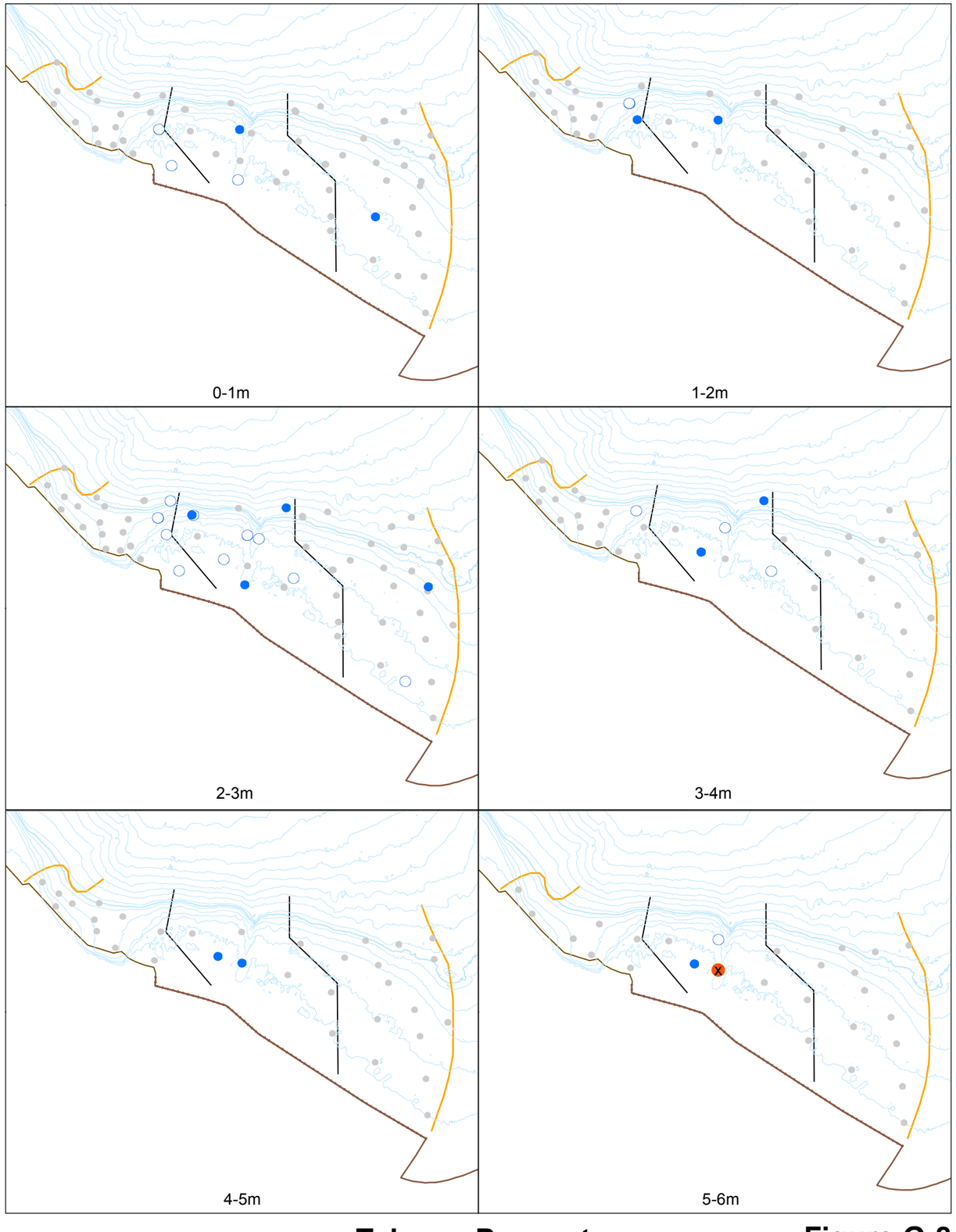
PARSONS

Napthalene Sediment

Napthalene Porewater

Figure G-7





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PARSONS

Toluene Sediment

Toluene Porewater

Figure G-8

0-1m

1-2m

2-3m

3-4m

4-5m

5-6m

Note:
Figures incorporate data from
RI and PDI Phases I through V

- Sample result in 90-95th percentile
- Sample result in 95-99th percentile
- Maximum concentration within ILWD
- Sample location

500 250 0 500
Feet

0-1m

1-2m

2-3m

3-4m

4-5m

5-6m

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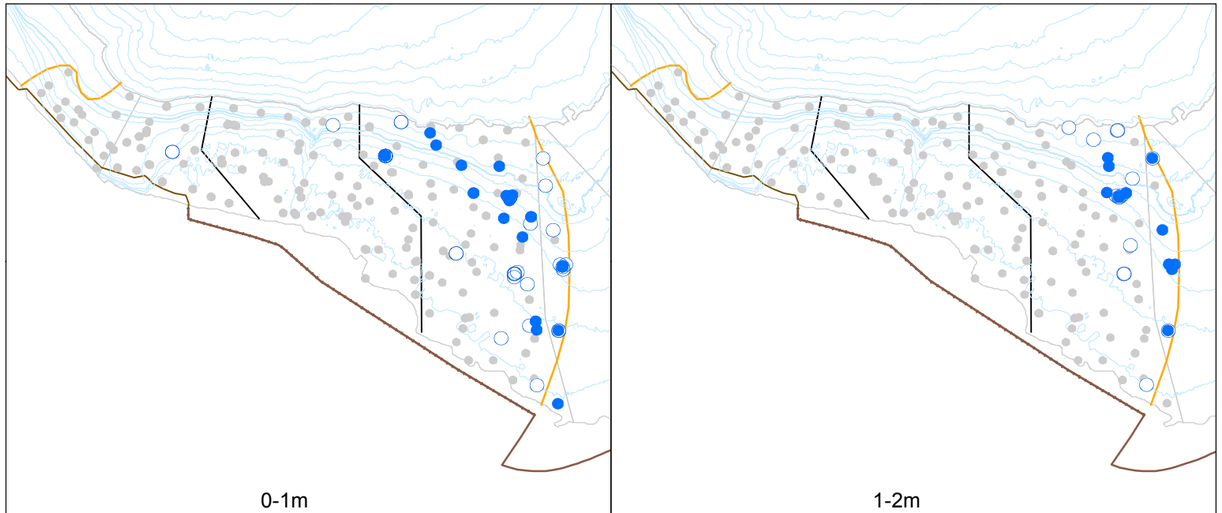
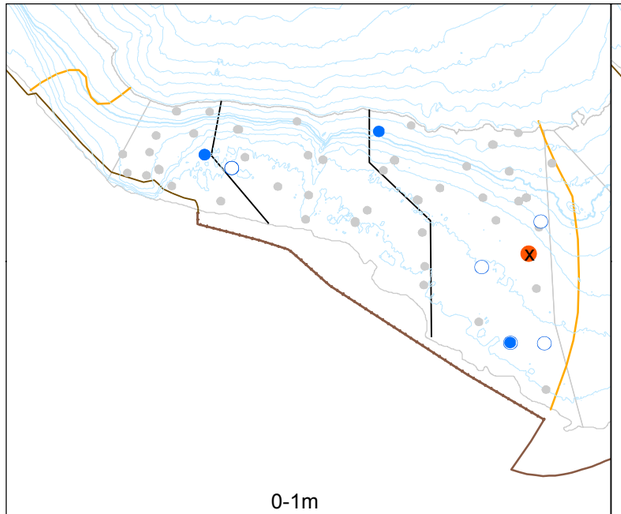
PARSONS

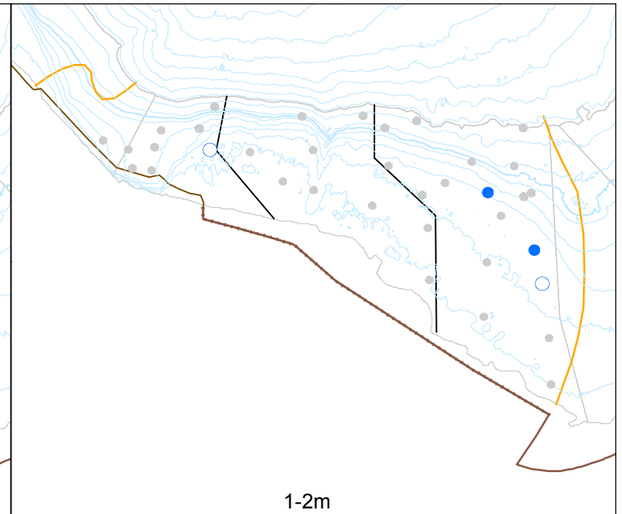
Xylene Sediment

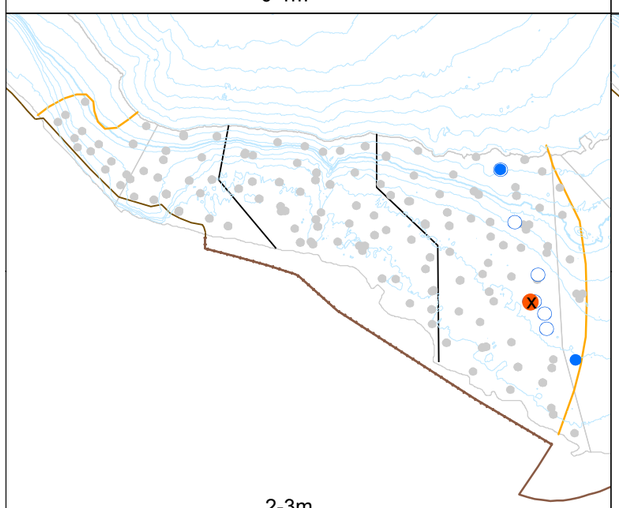
Xylene Porewater

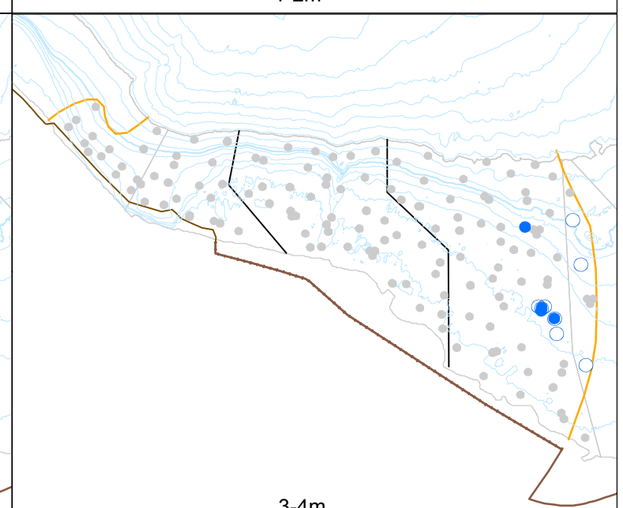
Figure G-9

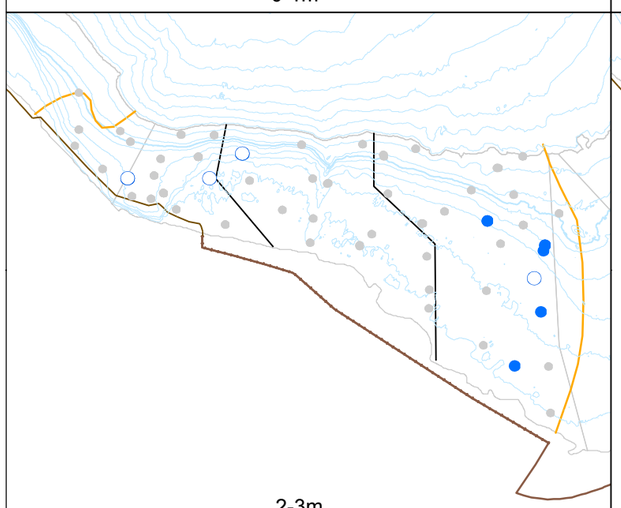


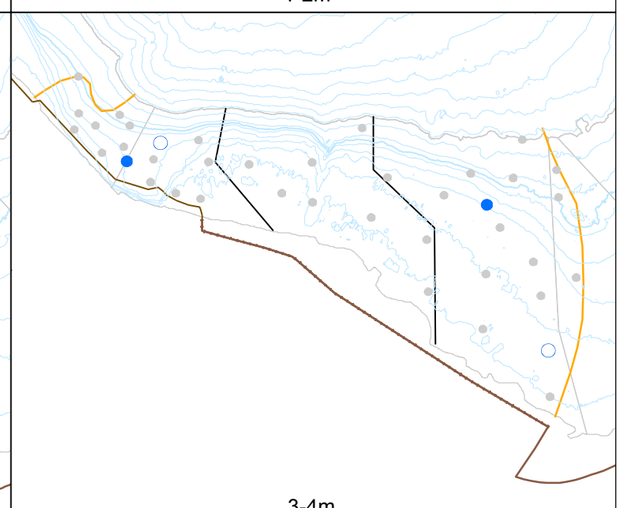


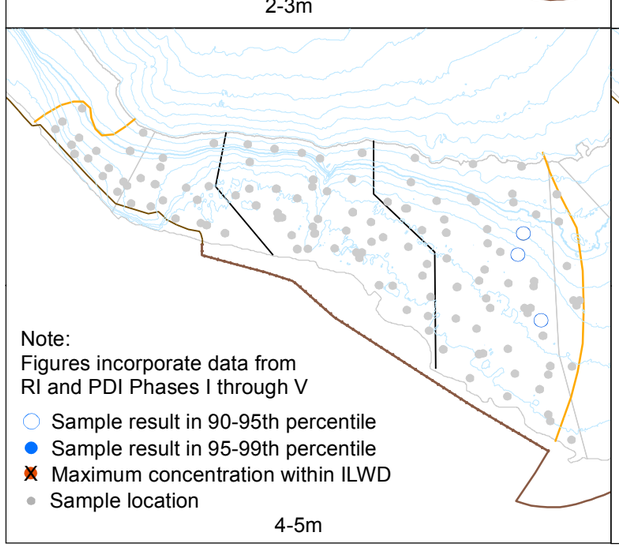


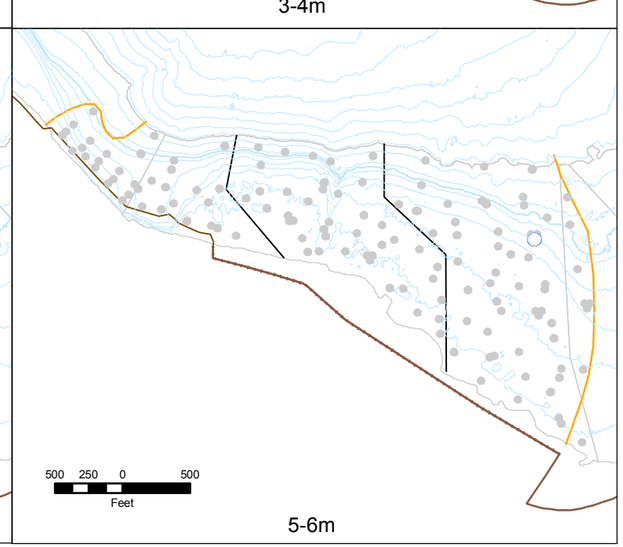


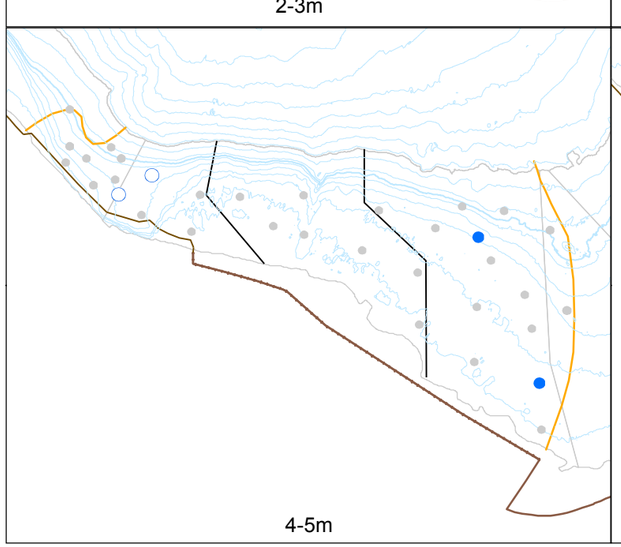


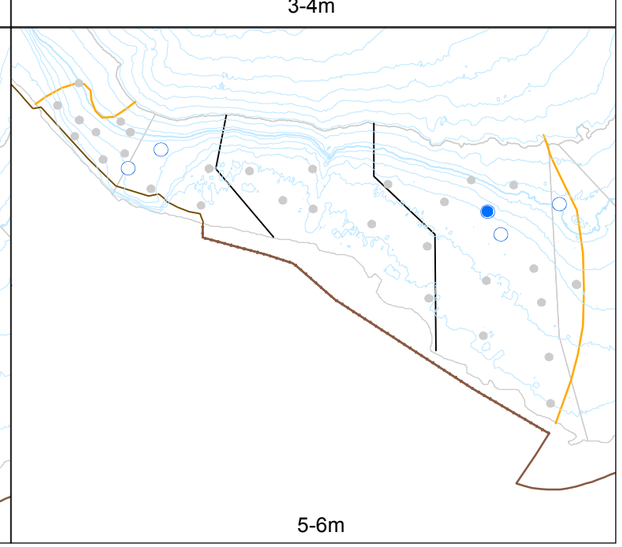












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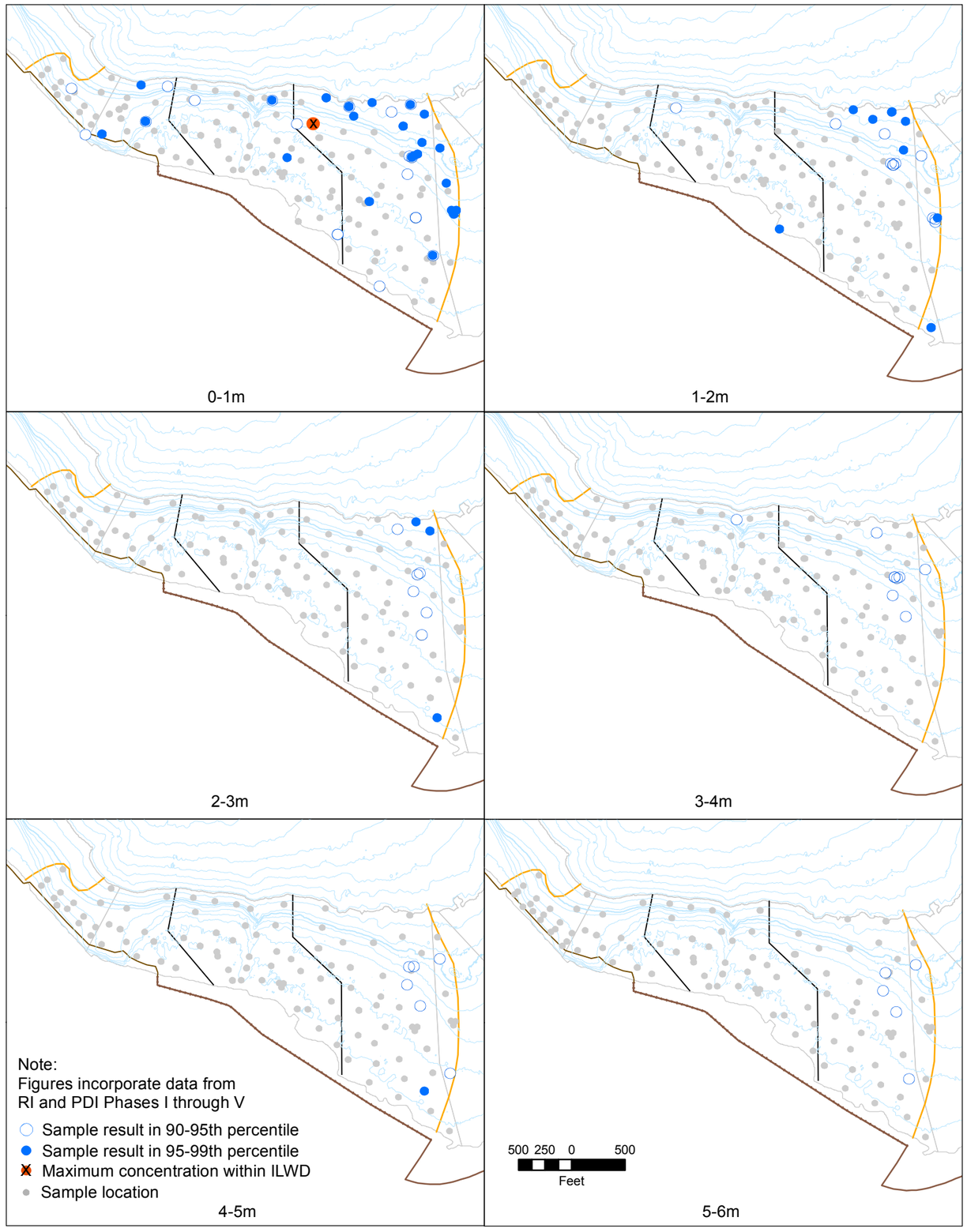
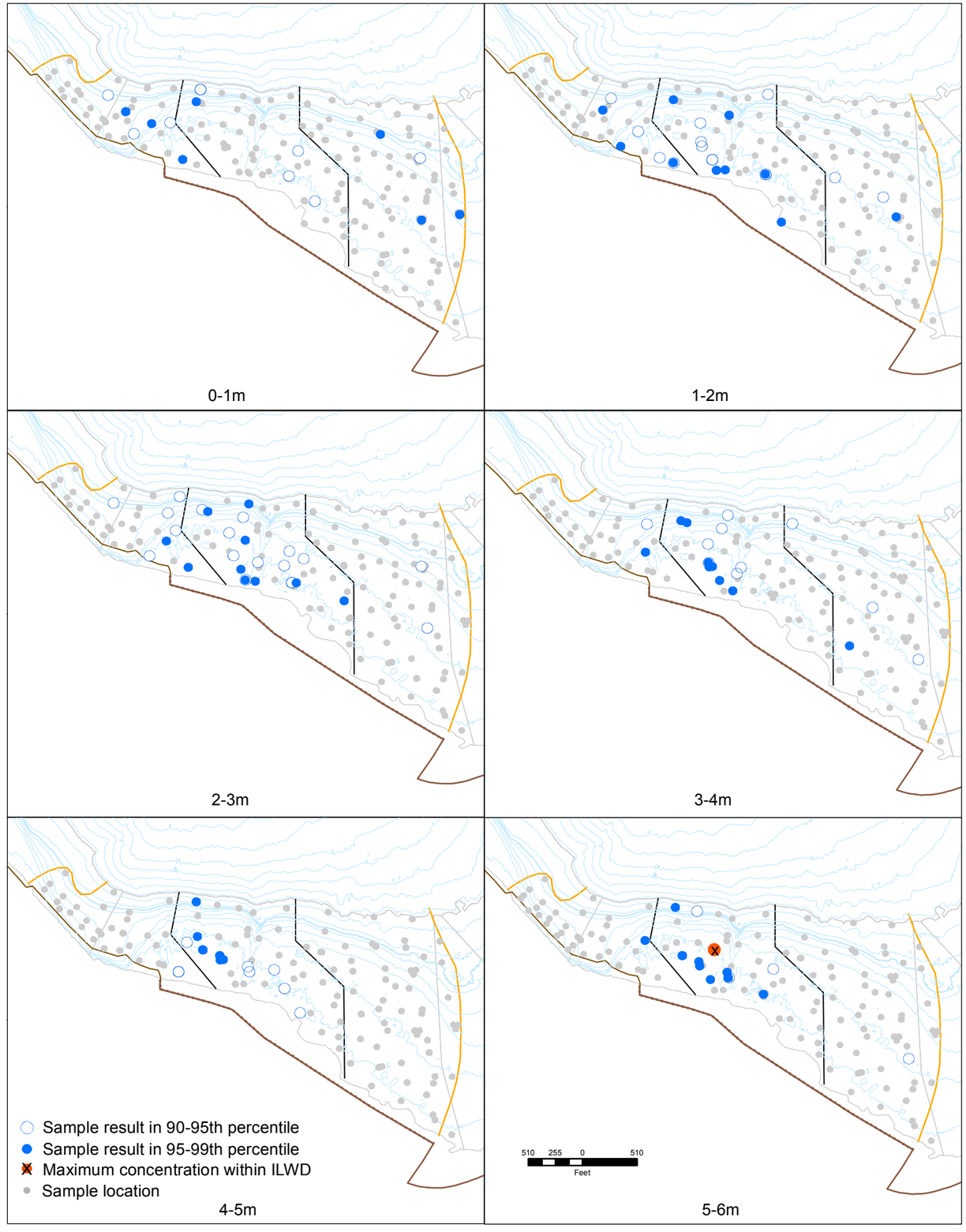
PARSONS

Mercury Sediment

Mercury Porewater

Figure G-10





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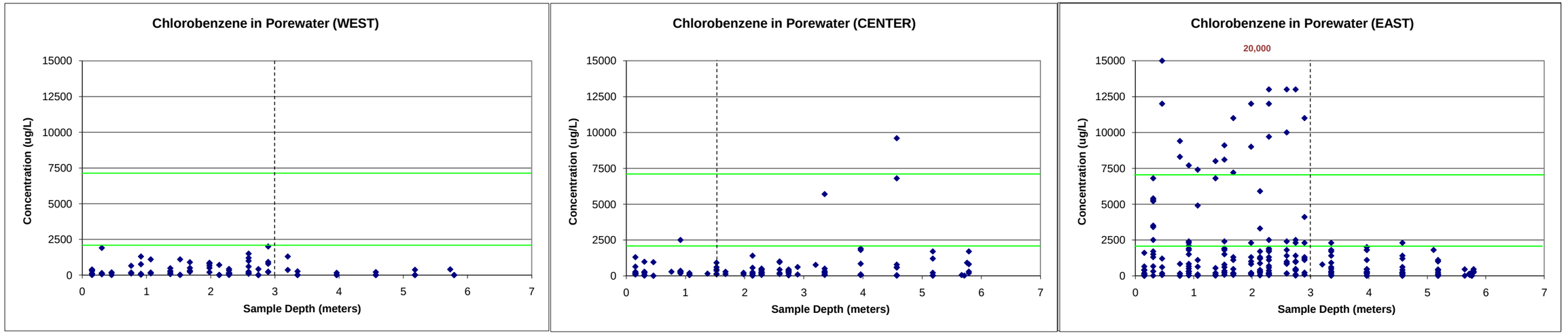
PARSONS

PCBs Sediment

PAHs Sediment

Figure G-11

Figure G - 12. Summary of Porewater and Sediment Data for Chlorobenzene within ILWD SMUs 1 & 7



Percentile	Porewater (ug/L)
90th	2300
95th	7000
Percentile	Sediment (mg/kg)
90th	44
95th	110

Hotspot Criterion (mg/kg)	114

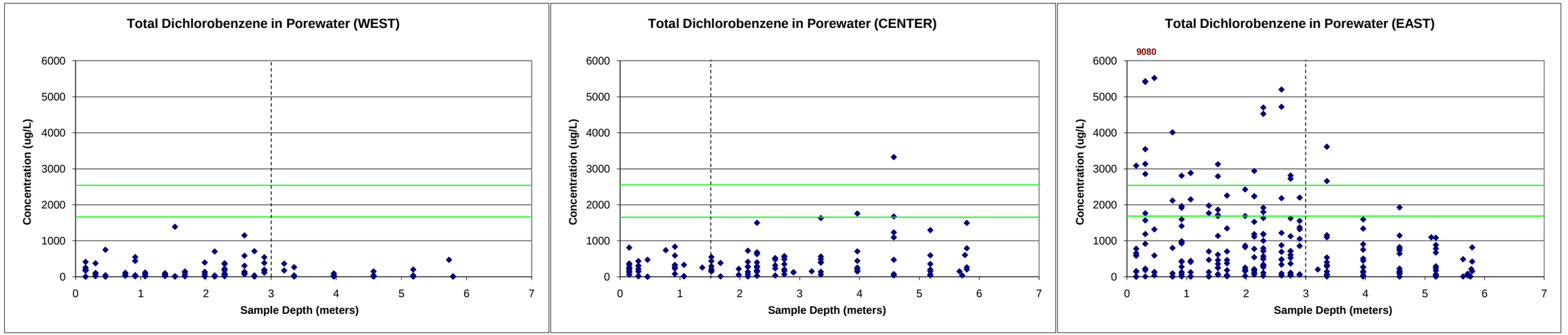
Data Presentation:

Red lines indicate hot spot criteria for sediment as listed in the ROD.
Dashed lines represent the target removal depth prior to hot spot removal.
Green lines indicate 90th and 95th percentile concentrations.
Numbers in red denote concentrations beyond the range of the scatterplots.
Figures incorporate data from RI through PDI Phase V.

Note: These figures were used to identify contaminant distribution trends, which were then used to develop target removal depths.
These removal depths will not be achieved everywhere, such as within transition zones near shore and approaching the profundal zone.
Therefore, some data points shown above the target removal depth may remain following dredging.

Notes: Non-detects are set at 1/2 the MDL.

Figure G - 13. Summary of Porewater and Sediment Data for Dichlorobenzene within ILWD SMUs 1 & 7



Percentile	Porewater (ug/L)
90th	1633
95th	2542
Percentile	Sediment (mg/kg)
90th	128
95th	250

Hotspot Criterion (mg/kg)	90

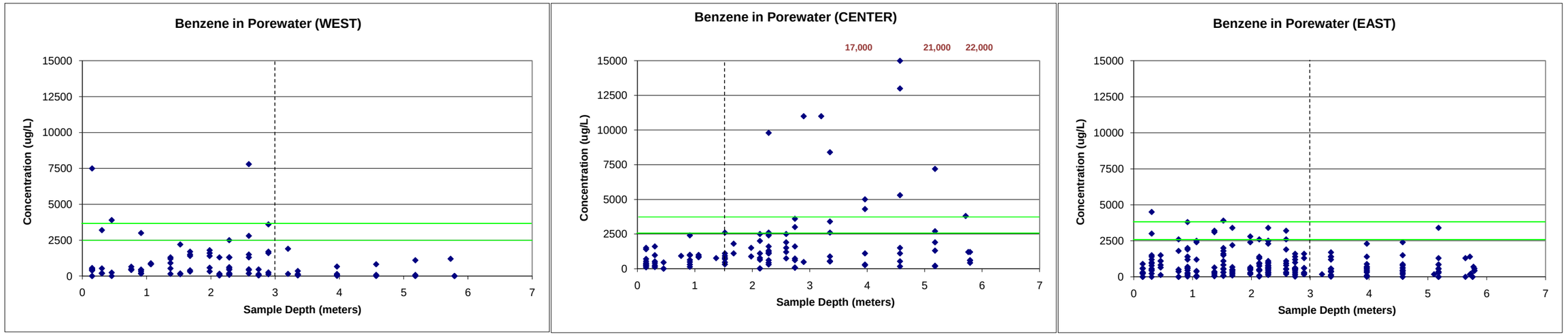
Data Presentation:

Red lines indicate hot spot criteria for sediment as listed in the ROD.
Dashed lines represent the target removal depth prior to hot spot removal.
Green lines indicate 90th and 95th percentile concentrations.
Numbers in red denote concentrations beyond the range of the scatterplots.
Figures incorporate data from RI and PDI Phases I through V.

Note: These figures were used to identify contaminant distribution trends, which were then used to develop target removal depths.
These removal depths will not be achieved everywhere, such as within transition zones near shore and approaching the profundal zone.
Therefore, some data points shown above the target removal depth may remain following dredging.

Notes: Non-detects are set at 1/2 the MDL.

Figure G - 14. Summary of Porewater and Sediment Data for Benzene within ILWD SMUs 1 & 7



Percentile	Porewater (ug/L)
90th	2500
95th	3400
Percentile	Sediment (mg/kg)
90th	11
95th	17

Hotspot Criterion (mg/kg)	208

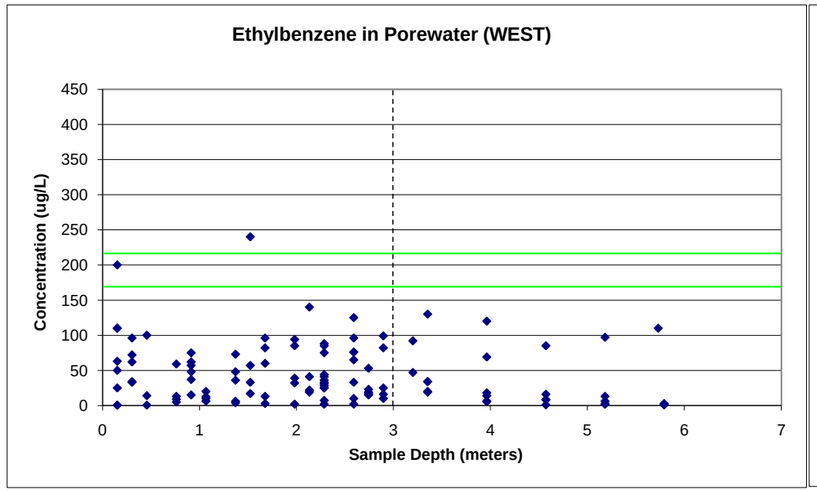
Data Presentation:

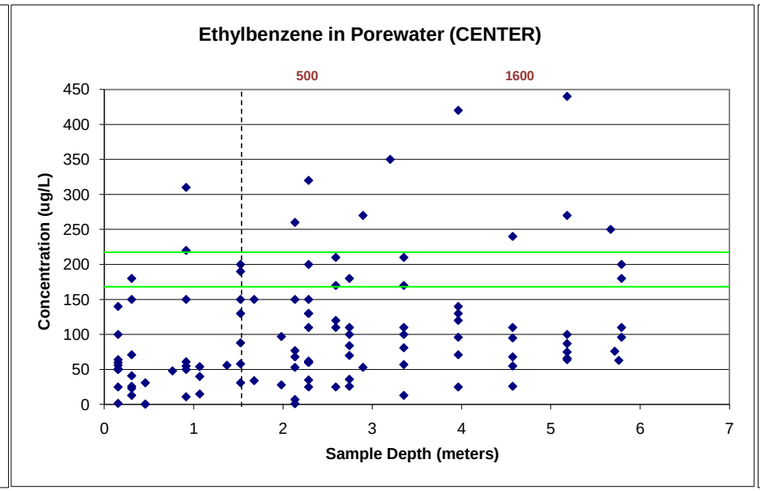
Red lines indicate hot spot criteria for sediment as listed in the ROD.
Dashed lines represent the target removal depth prior to hot spot removal.
Green lines indicate 90th and 95th percentile concentrations.
Numbers in red denote concentrations beyond the range of the scatterplots.
Figures incorporate data from RI and PDI Phases I through V.

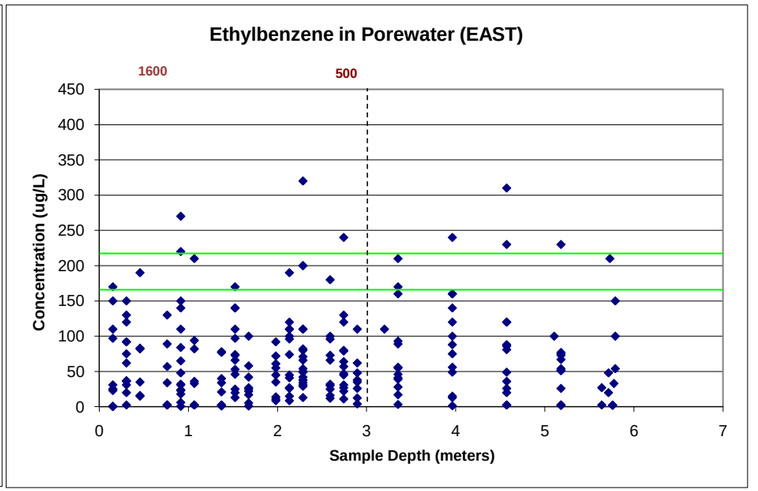
Note: These figures were used to identify contaminant distribution trends, which were then used to develop target removal depths.
These removal depths will not be achieved everywhere, such as within transition zones near shore and approaching the profundal zone.
Therefore, some data points shown above the target removal depth may remain following dredging.

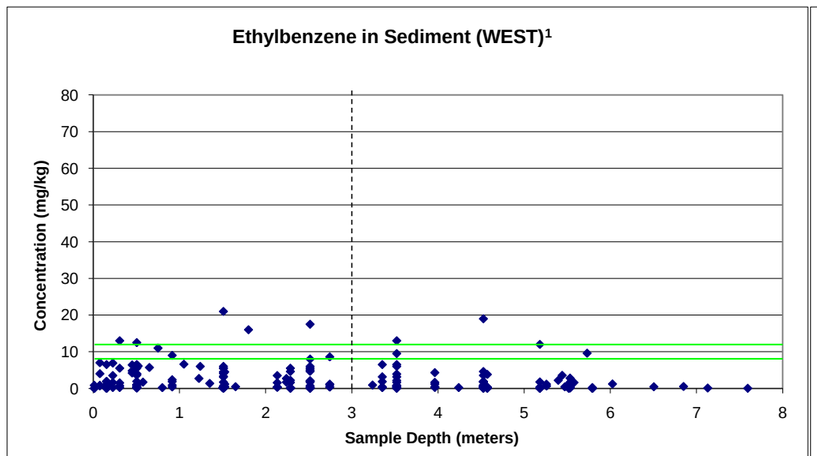
Notes: Non-detects are set at 1/2 the MDL.

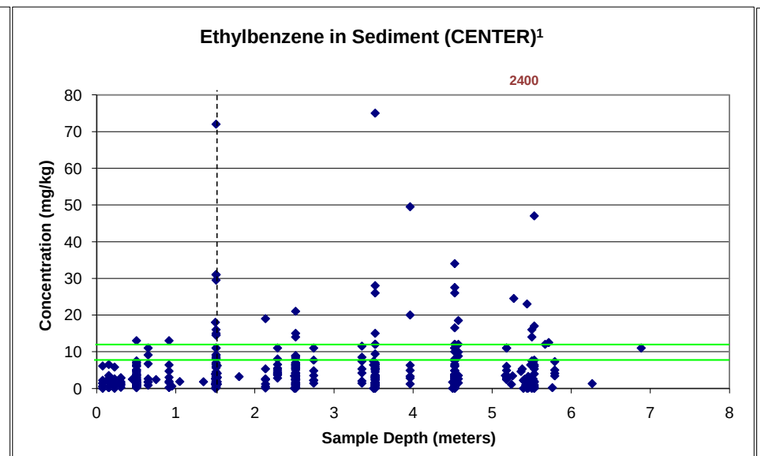
Figure G - 15. Summary of Porewater and Sediment Data for Ethylbenzene within ILWD SMUs 1 & 7

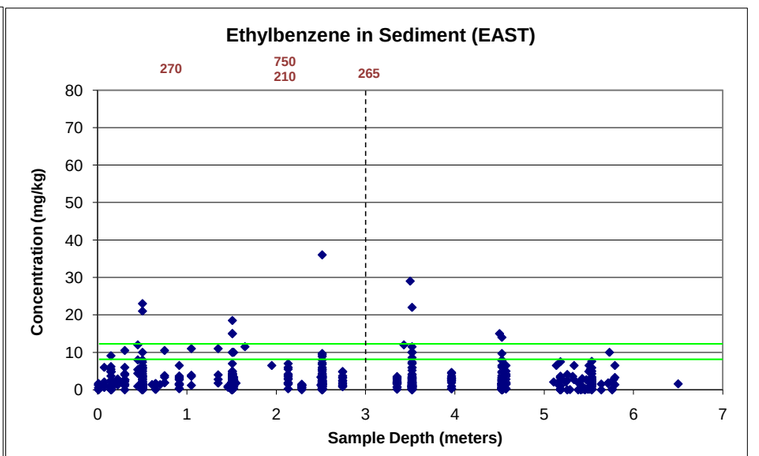












Percentile	Porewater (ug/L)
90th	170
95th	220
Percentile	Sediment (mg/kg)
90th	8
95th	12

Hotspot Criterion (mg/kg)	1,655

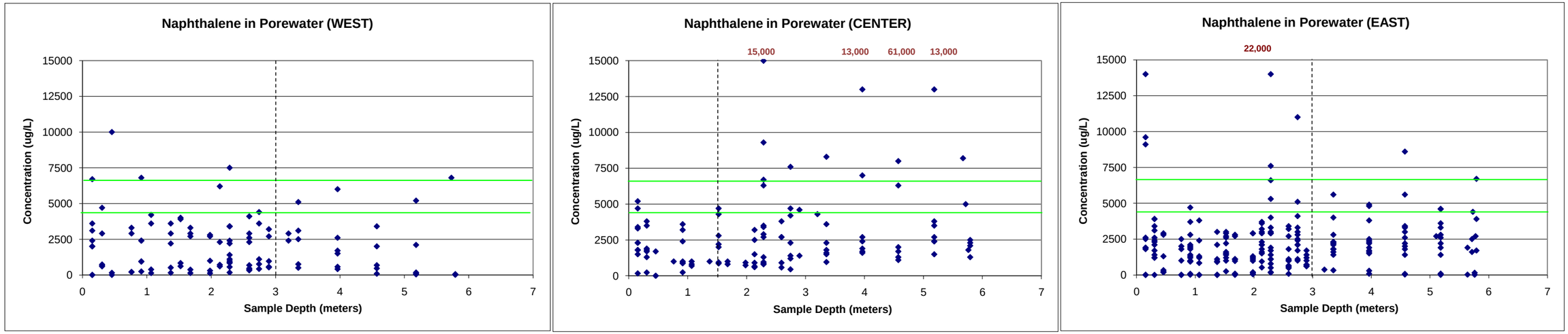
Data Presentation:

Dashed lines represent the target removal depth prior to hot spot removal.
Green lines indicate 90th and 95th percentile concentrations.
Numbers in red denote concentrations beyond the range of the scatterplots.
Notes: (1) Hot spot criteria for sediment above the range of plots.
Figures incorporate data from RI and PDI Phases I through V.

Note: These figures were used to identify contaminant distribution trends, which were then used to develop target removal depths.
These removal depths will not be achieved everywhere, such as within transition zones near shore and approaching the profundal zone.
Therefore, some data points shown above the target removal depth may remain following dredging.

Notes: Non-detects are set at 1/2 the MDL.

Figure G - 16. Summary of Porewater and Sediment Data for Naphthalene within ILWD SMUs 1 & 7



Percentile	Porewater (ug/L)
90th	4610
95th	6700
Percentile	Sediment (mg/kg)
90th	360
95th	526

Hotspot Criterion (mg/kg)	20,573

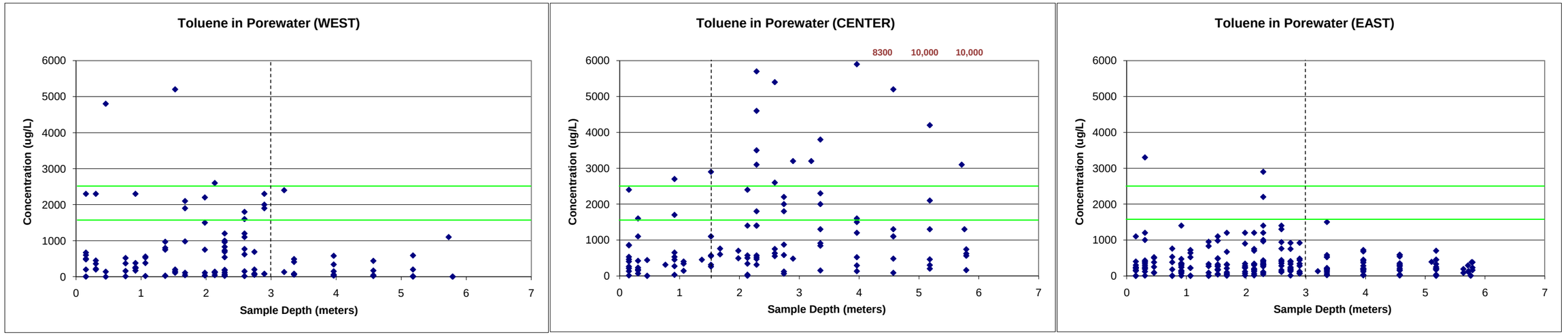
Data Presentation:

Red lines indicate hot spot criteria for sediment as listed in the ROD.
Dashed lines represent the target removal depth prior to hot spot removal.
Green lines indicate 90th and 95th percentile concentrations.
Numbers in red denote concentrations beyond the range of the scatterplots.
Notes: (1) Hot spot criteria for sediment above the range of plots.
Figures incorporate data from RI and PDI Phases I through V.

Note: These figures were used to identify contaminant distribution trends, which were then used to develop target removal depths.
These removal depths will not be achieved everywhere, such as within transition zones near shore and approaching the profundal zone.
Therefore, some data points shown above the target removal depth may remain following dredging.

Notes: Non-detects are set at 1/2 the MDL.

Figure G - 17. Summary of Porewater and Sediment Data for Toluene within ILWD SMUs 1 & 7



Percentile	Porewater
90th	1600
95th	2500
Percentile	Sediment
90th	21
95th	47

Hotspot Criterion	2,626

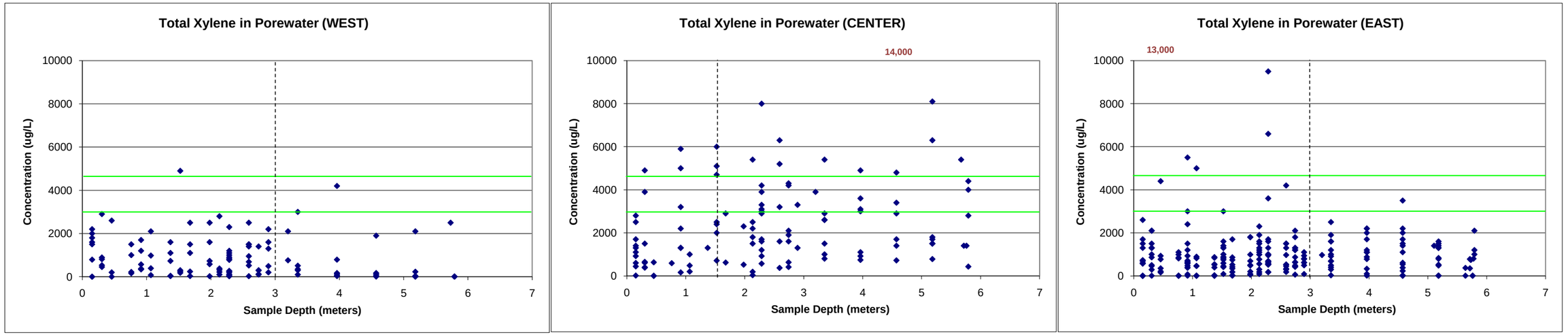
Data Presentation:

Red lines indicate hot spot criteria for sediment as listed in the ROD.
Dashed lines represent the target removal depth prior to hot spot removal.
Green lines indicate 90th and 95th percentile concentrations.
Numbers in red denote concentrations beyond the range of the scatterplots.
Notes: (1) Hot spot criteria for sediment above the range of plots.
Figures incorporate data from RI and PDI Phases I through V.

Note: These figures were used to identify contaminant distribution trends, which were then used to develop target removal depths.
These removal depths will not be achieved everywhere, such as within transition zones near shore and approaching the profundal zone.
Therefore, some data points shown above the target removal depth may remain following dredging.

Notes: Non-detects are set at 1/2 the MDL.

Figure G - 18. Summary of Porewater and Sediment Data for Xylene within ILWD SMUs 1 & 7



Percentile	Porewater (ug/L)
90th	3000
95th	4550
Percentile	Sediment (mg/kg)
90th	127
95th	180

Hotspot Criterion (mg/kg)	142

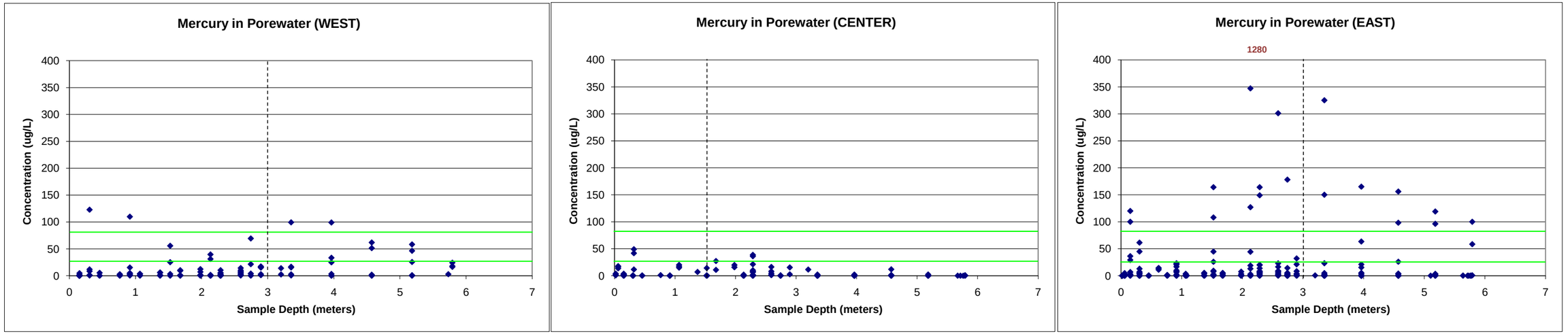
Data Presentation:

Red lines indicate hot spot criteria for sediment as listed in the ROD.
Dashed lines represent the target removal depth prior to hot spot removal.
Green lines indicate 90th and 95th percentile concentrations.
Numbers in red denote concentrations beyond the range of the scatterplots.
Figures incorporate data from RI and PDI Phases I through V.

Note: These figures were used to identify contaminant distribution trends, which were then used to develop target removal depths.
These removal depths will not be achieved everywhere, such as within transition zones near shore and approaching the profundal zone.
Therefore, some data points shown above the target removal depth may remain following dredging.

Notes: Non-detects are set at 1/2 the MDL.

Figure G - 19. Summary of Porewater and Sediment Data for Mercury within ILWD SMUs 1 & 7



Percentile	Porewater (ug/L)
90th	26
95th	79
Percentile	Sediment (mg/kg)
90th	26
95th	40

Hotspot Criterion (mg/kg)	2,924

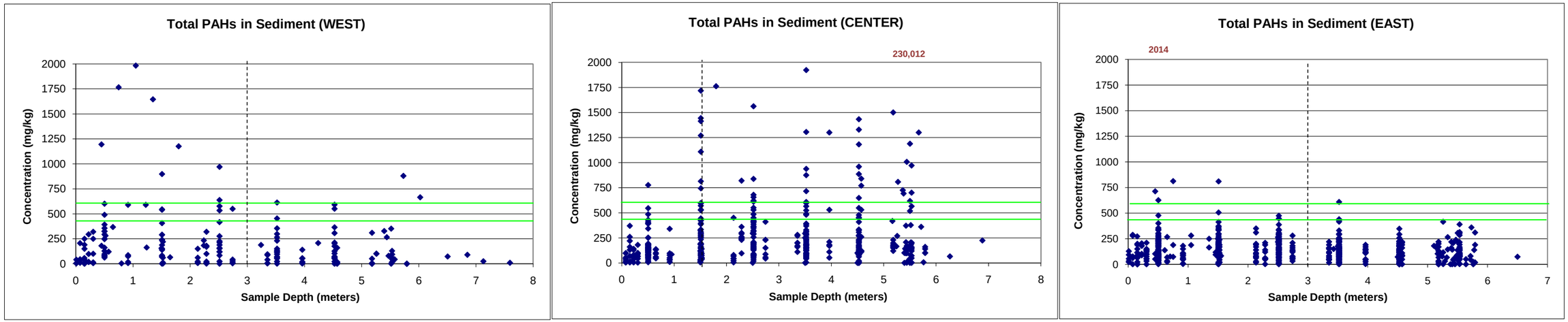
Data Presentation:

Dashed lines represent the target removal depth prior to hot spot removal.
Green lines indicate 90th and 95th percentile concentrations.
Numbers in red denote concentrations beyond the range of the scatterplots.
Notes: (1) Hot spot criteria for sediment above the range of plots.
Figures incorporate data from RI and PDI Phases I through V.

Note: These figures were used to identify contaminant distribution trends, which were then used to develop target removal depths.
These removal depths will not be achieved everywhere, such as within transition zones near shore and approaching the profundal zone.
Therefore, some data points shown above the target removal depth may remain following dredging.

Notes: Non-detects are set at 1/2 the MDL.

Figure G - 20. Summary of Sediment Data for PAHs and PCBs within ILWD SMUs 1 & 7



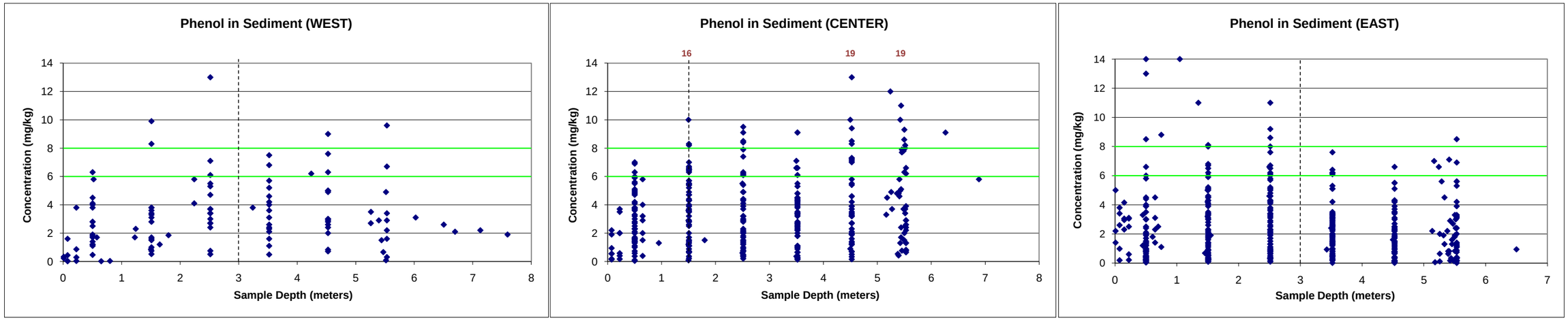
Percentile	Total PAHs in Sediment (mg/kg)
90th	401
95th	600
Percentile	**Total PCBs in Sediment (mg/kg)**
90th	2
95th	3

Data Presentation:
Dashed lines represent the target removal depth prior to hot spot removal.
Green lines indicate 90th and 95th percentile concentrations.
Numbers in red denote concentrations beyond the range of the scatterplots.
Figures incorporate data from RI and PDI Phases I through V.

Note: These figures were used to identify contaminant distribution trends, which were then used to develop target removal depths.
These removal depths will not be achieved everywhere, such as within transition zones near shore and approaching the profundal zone.
Therefore, some data points shown above the target removal depth may remain following dredging.

Notes: Non-detects are set at 1/2 the MDL.

Figure G - 21. Summary of Sediment Data for Phenol within ILWD SMUs 1 & 7



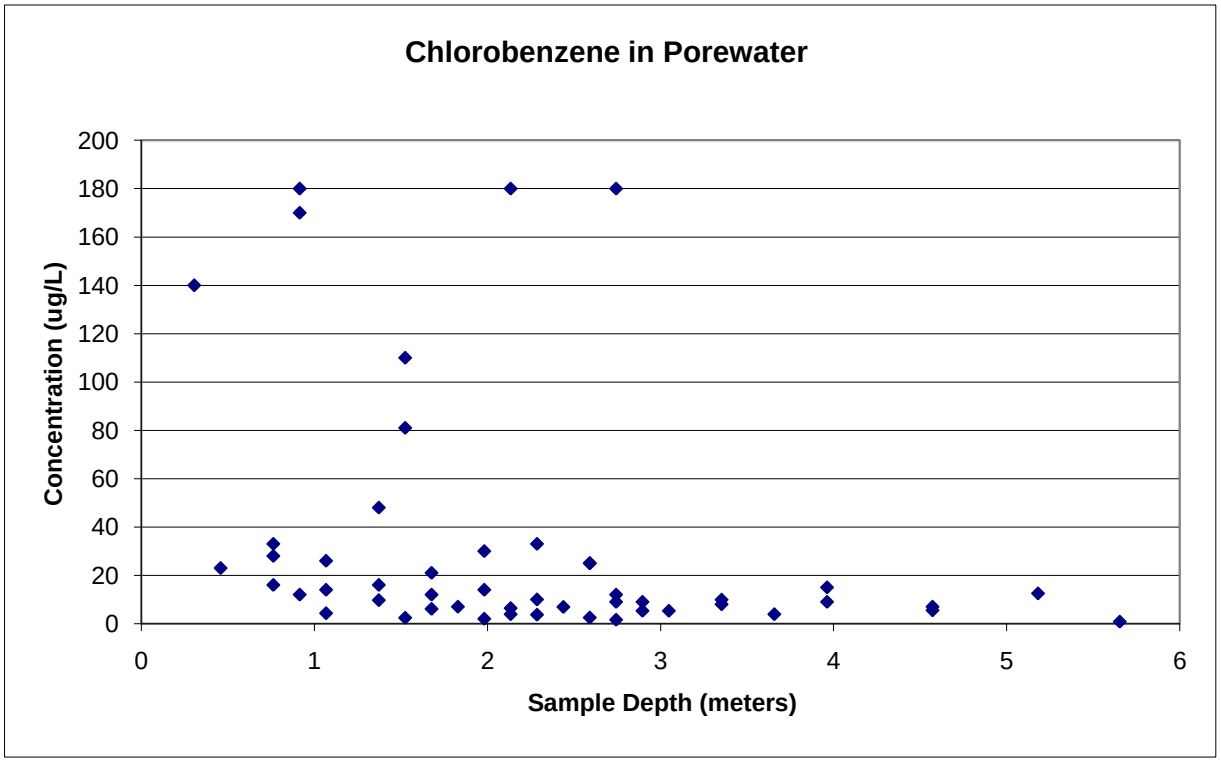
Percentile	Sediment (mg/kg)
90th	6
95th	8

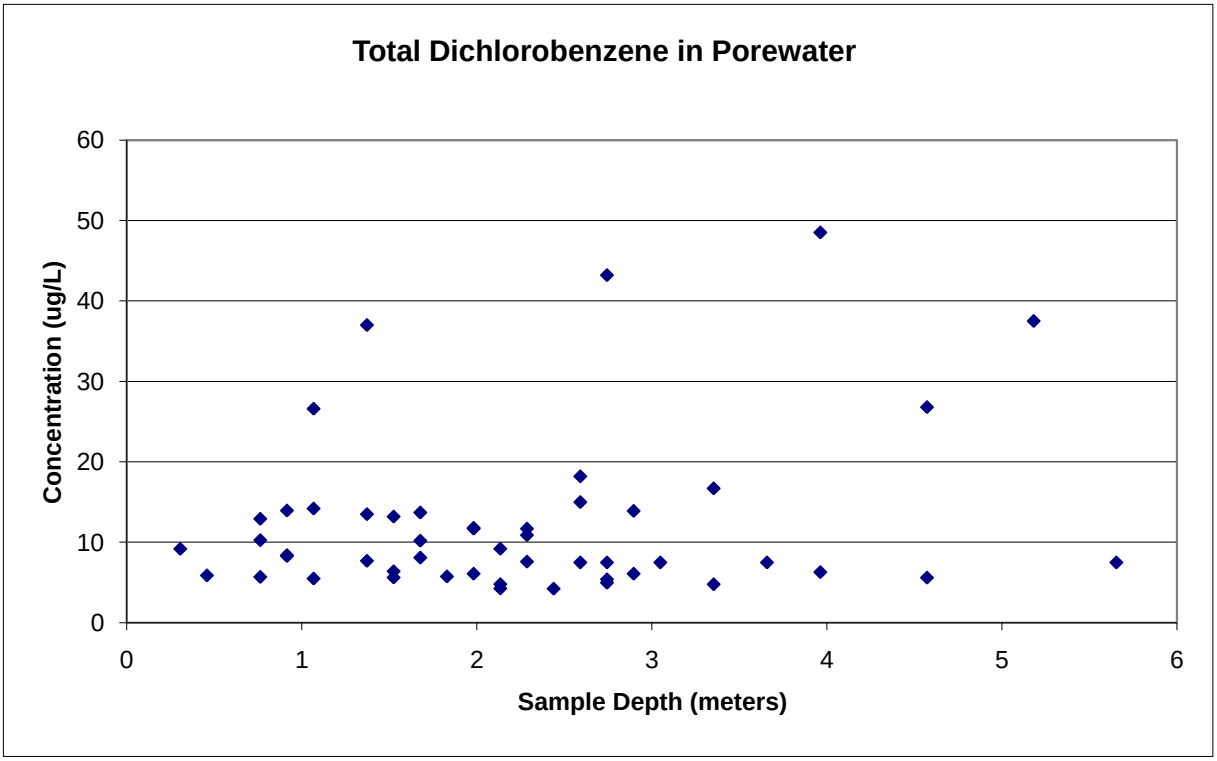
Data Presentation:
Dashed lines represent the target removal depth prior to hot spot removal.
Green lines indicate 90th and 95th percentile concentrations.
Numbers in red denote concentrations beyond the range of the scatterplots.
Figures incorporate data from RI and PDI Phases I through V.

Note: These figures were used to identify contaminant distribution trends, which were then used to develop target removal depths. These removal depths will not be achieved everywhere, such as within transition zones near shore and approaching the profundal zone. Therefore, some data points shown above the target removal depth may remain following dredging.

Notes: Non-detects are set at 1/2 the MDL.

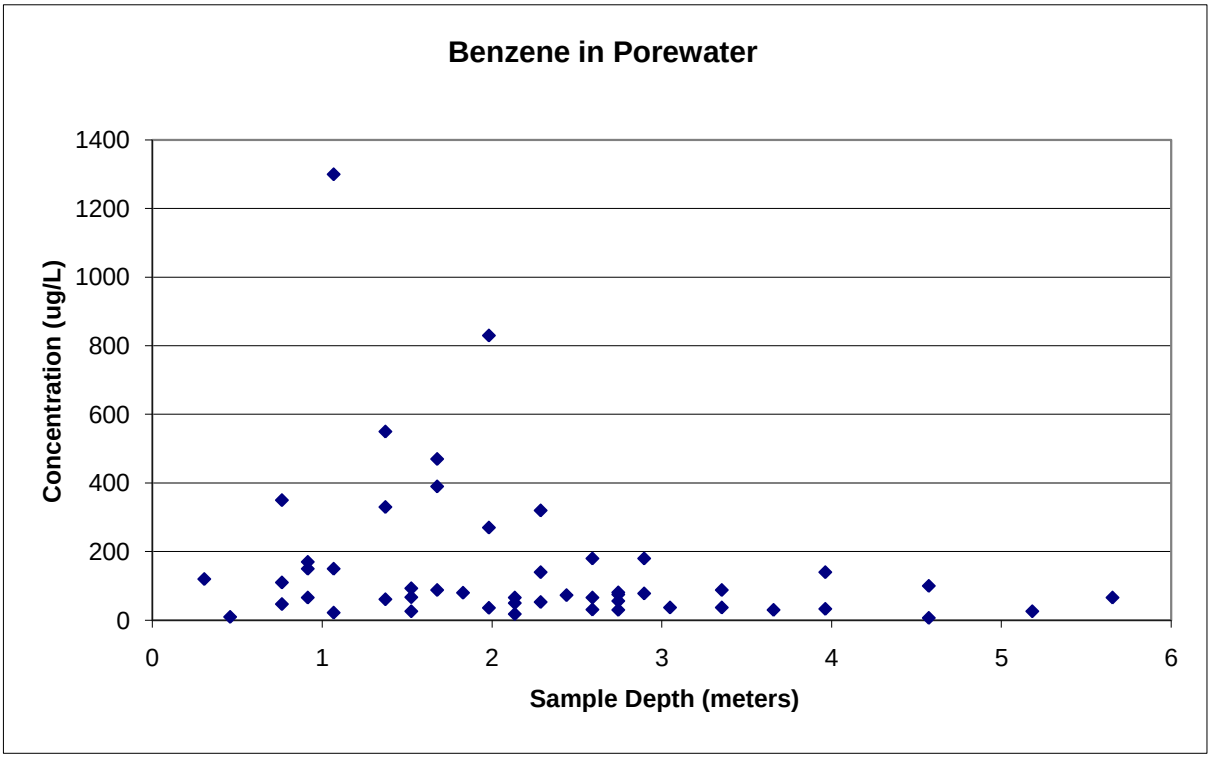
Figure G-22. SMU2 Porewater Data within ILWD

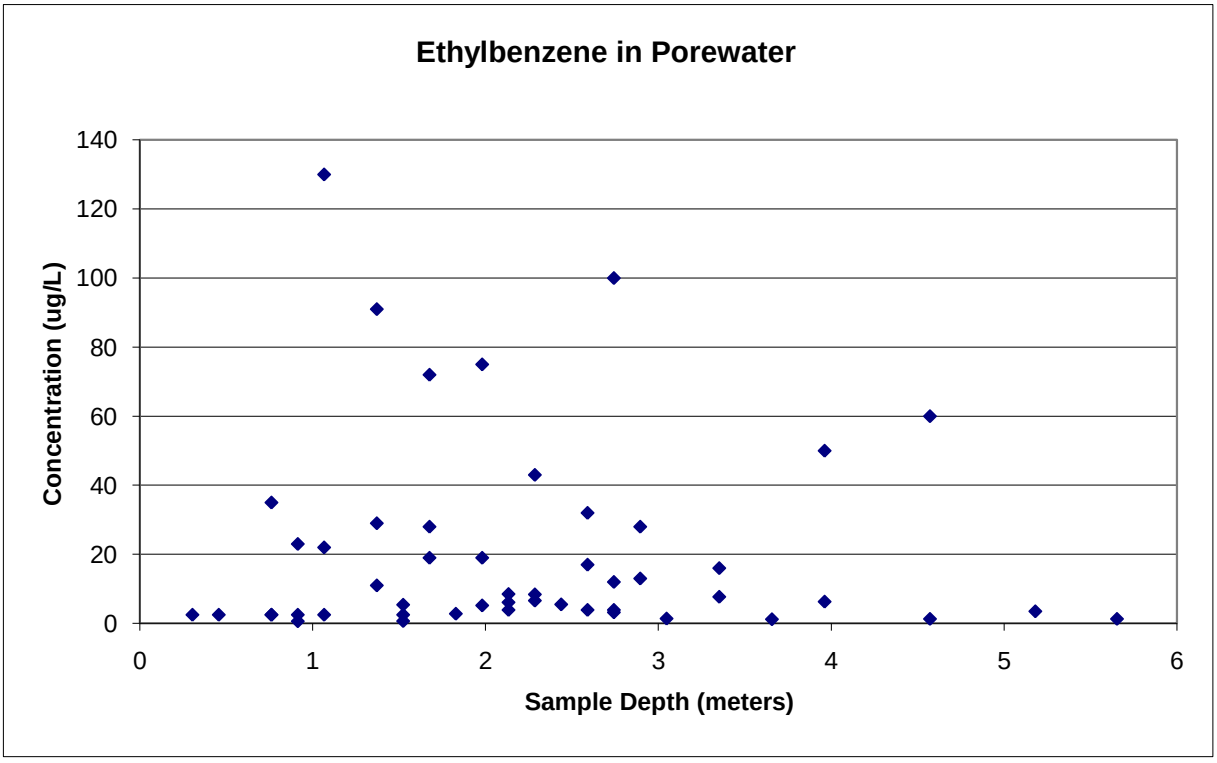




Notes: All concentrations shown on the plots are below the 90th percentile values for SMUs 1 & 7.
Non-detects were set at 1/2 the MDL. Plots incorporate data from PDI Phases I through V.

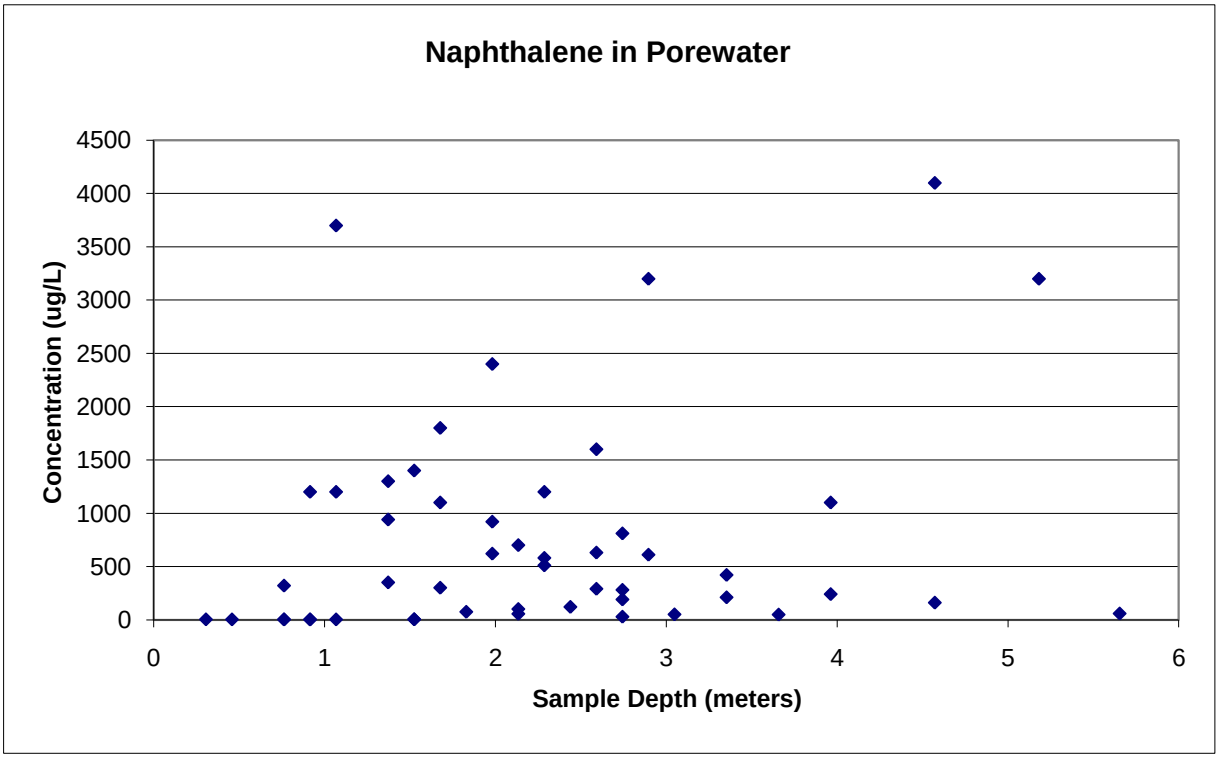
Figure G-22. SMU2 Porewater Data within ILWD (continued)

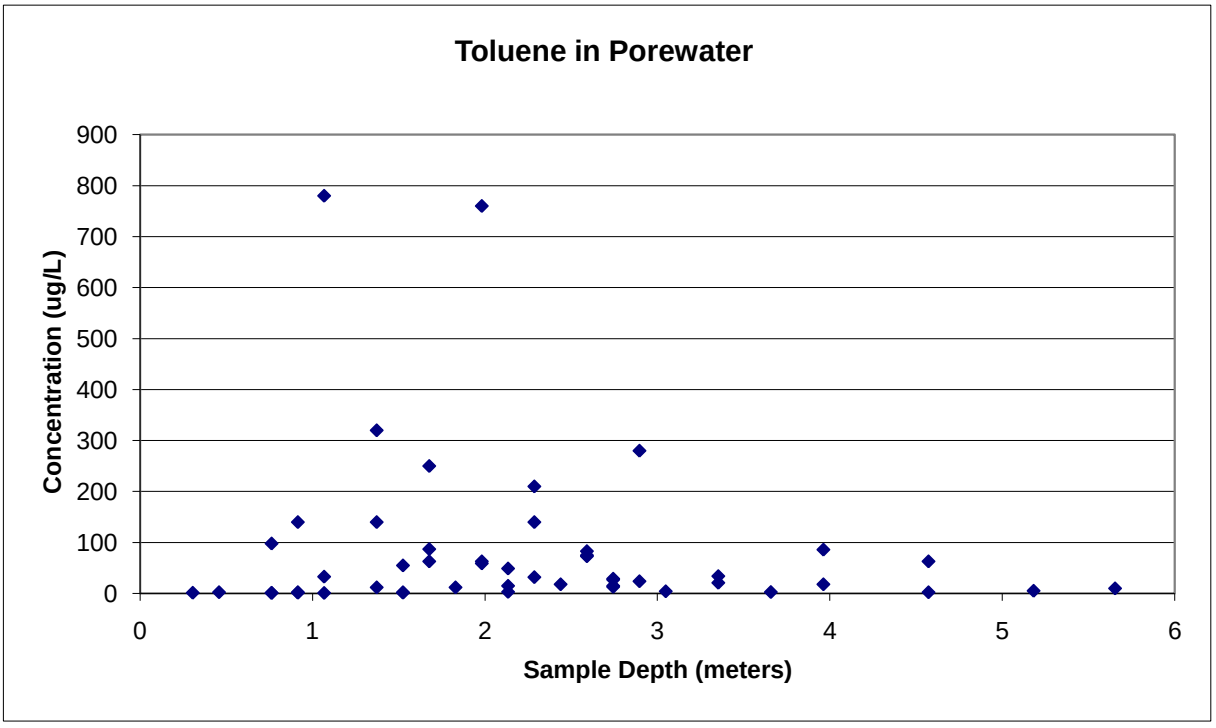




Notes: All concentrations shown on the plots are below the 90th percentile values for SMUs 1 & 7.
Non-detects were set at 1/2 the MDL. Plots incorporate data from PDI Phases I through V.

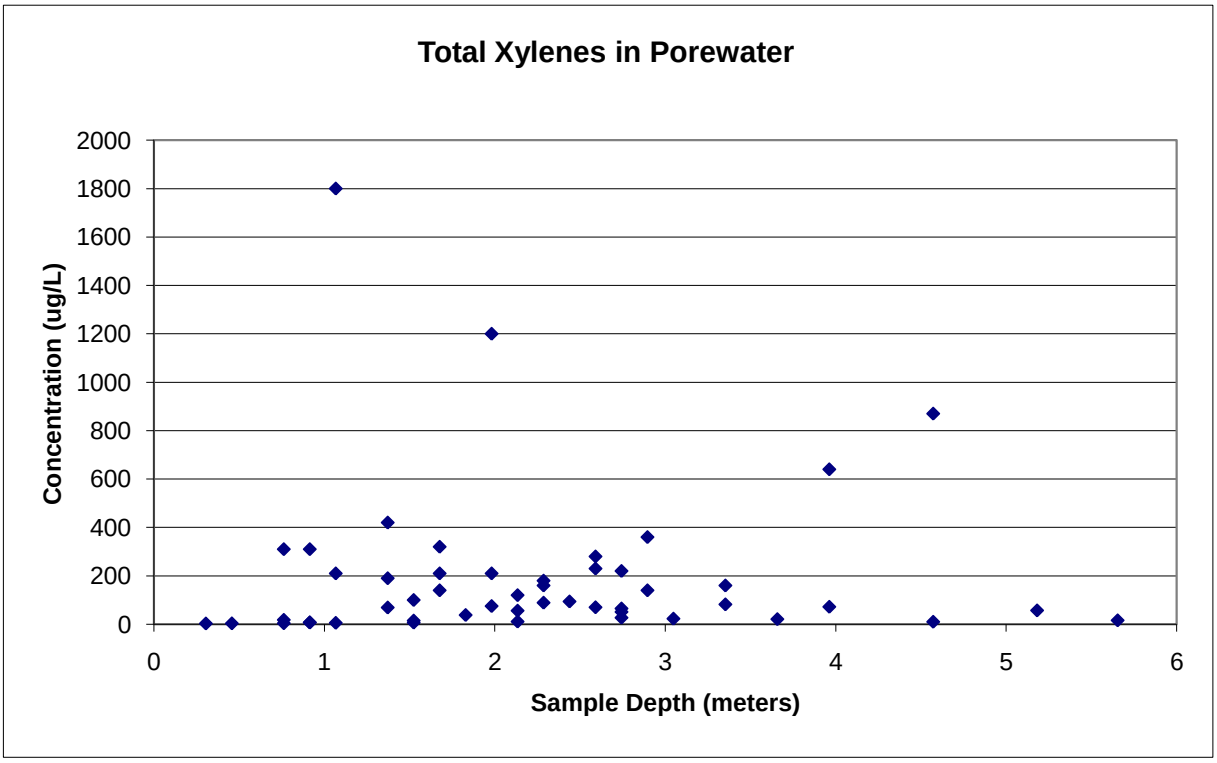
Figure G-22. SMU2 Porewater Data within ILWD (continued)

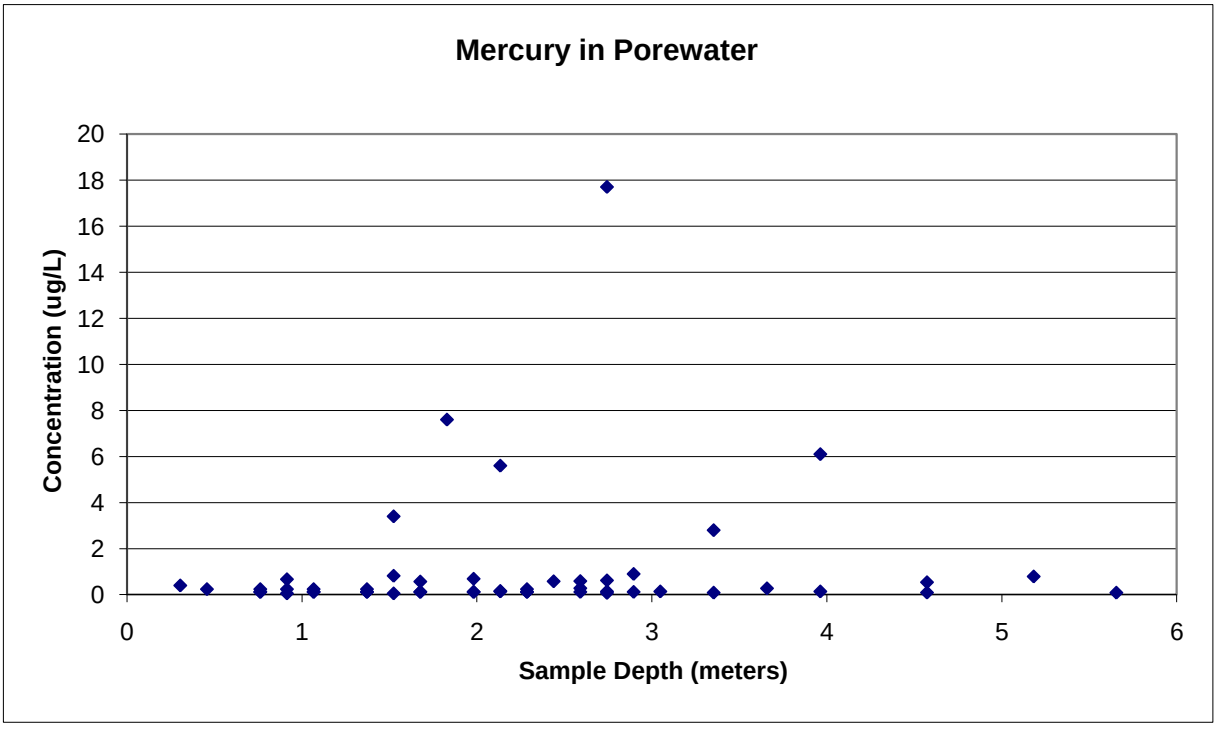




Notes: All concentrations shown on the plots are below the 90th percentile values for SMUs 1 & 7.
Non-detects were set at 1/2 the MDL. Plots incorporate data from PDI Phases I through V.

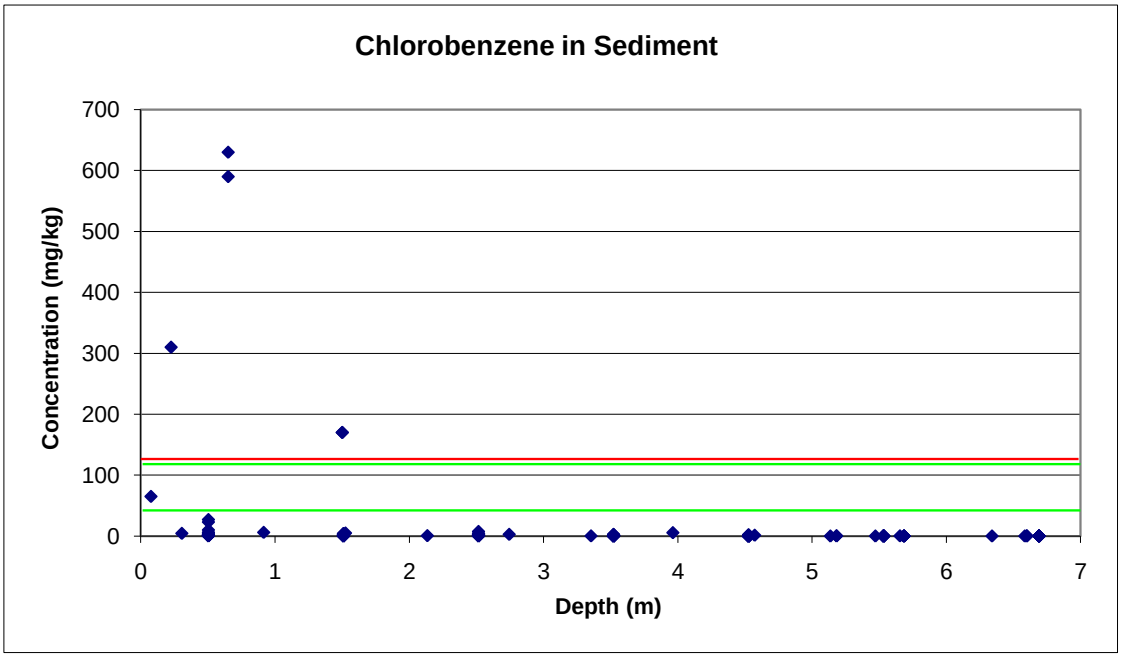
Figure G-22. SMU2 Porewater Data within ILWD (continued)



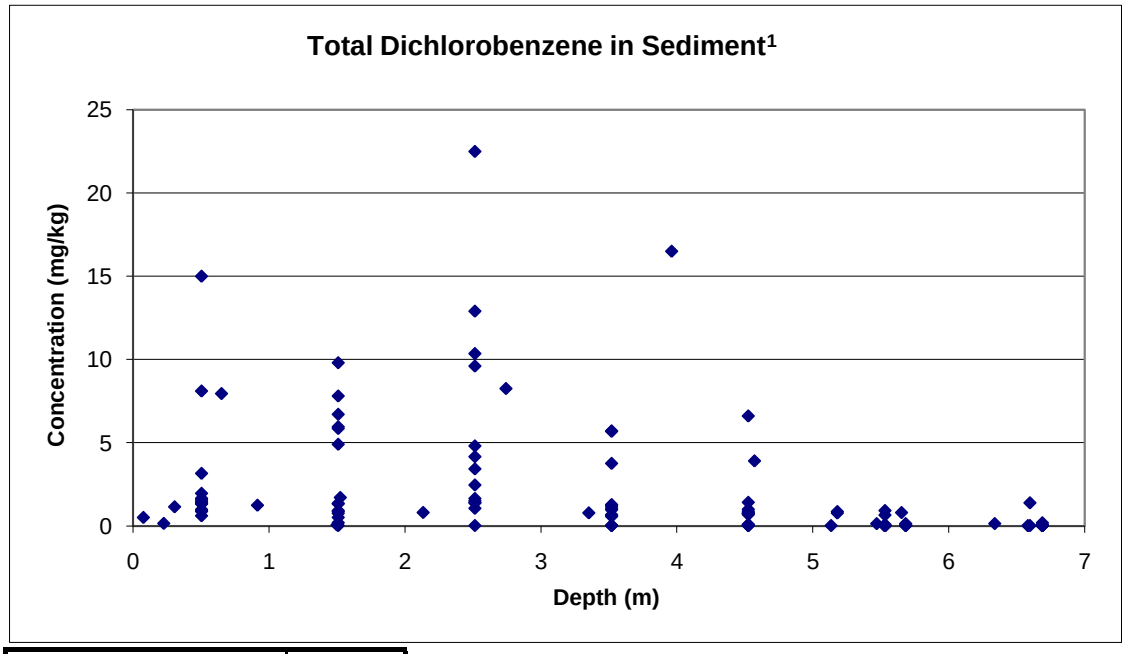


Notes: All concentrations shown on the plots are below the 90th percentile values for SMUs 1 & 7.
Non-detects were set at 1/2 the MDL. Plots incorporate data from PDI Phases I through V.

Figure G-23. SMU2 ILWD Sediment Data



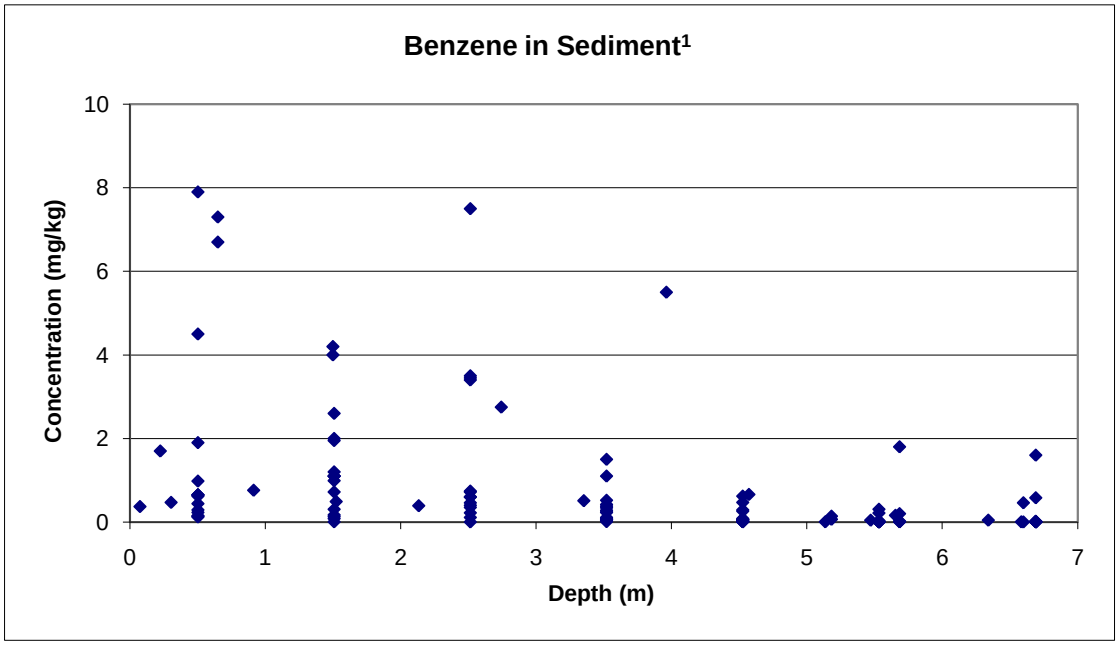
Hotspot Criterion (mg/kg)	114



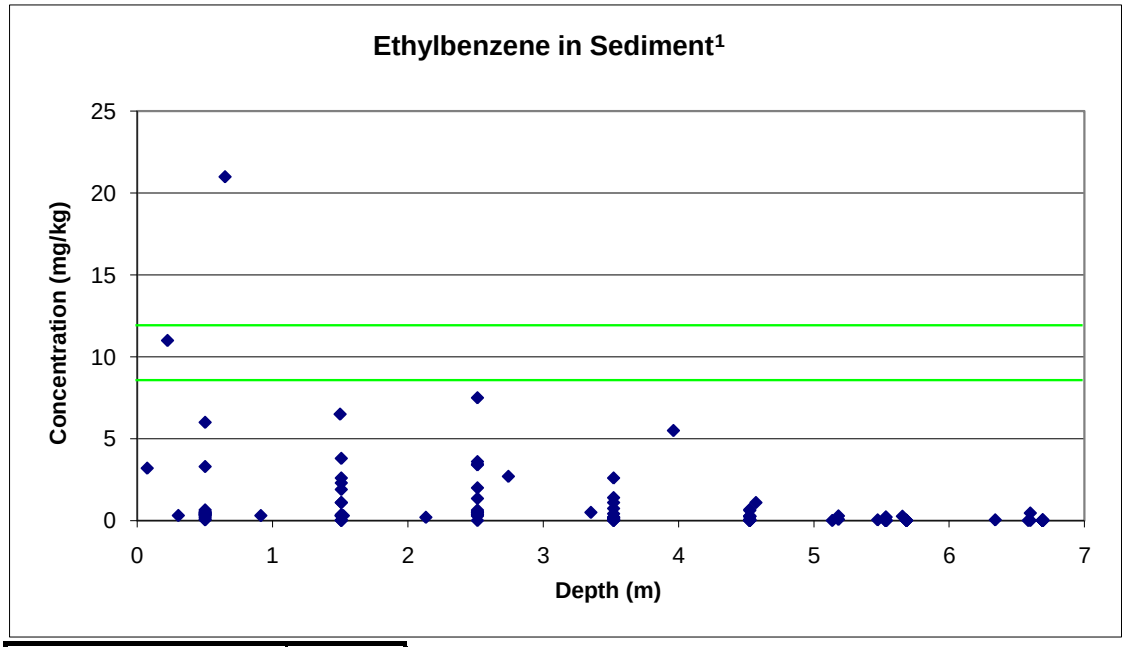
Hotspot Criterion (mg/kg)	90

Green lines indicate 90th and 95th percentile concentrations in SMUs 1 & 7 in the ILWD.
Red line indicates hotspot criterion for sediment as listed in the ROD.
Notes: (1) Hot spot criteria for sediment above the range of plots.
Non-detects were set at 1/2 the MDL.
Plots incorporate data from RI through PDI Phase V.

Figure G-23. SMU 2 ILWD Sediment Data (continued)



Hotspot Criterion (mg/kg)	208

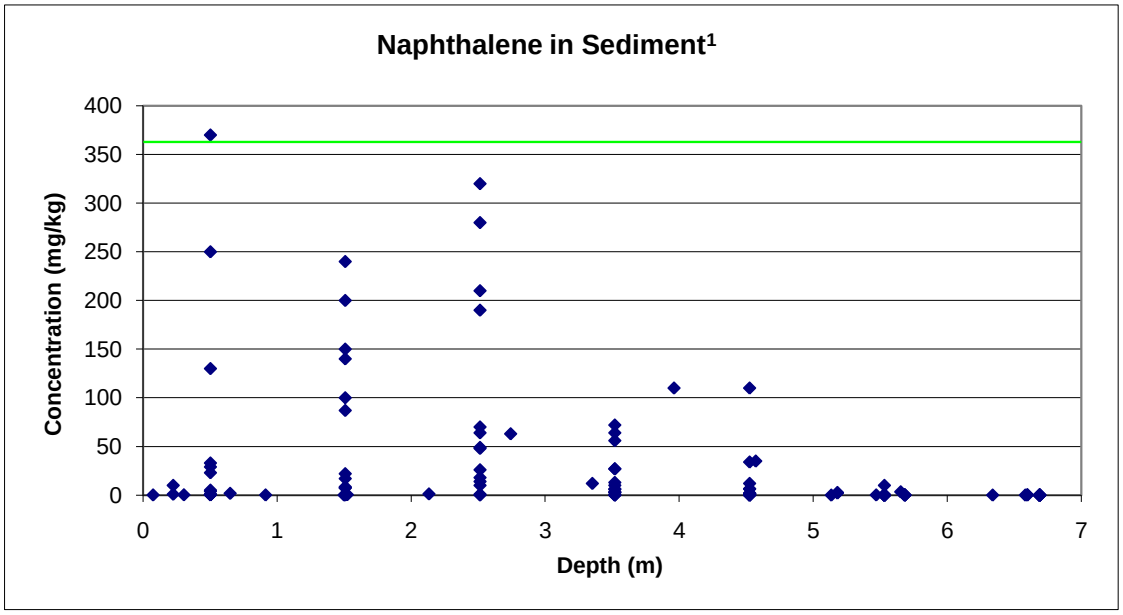


Hotspot Criterion (mg/kg)	1,655

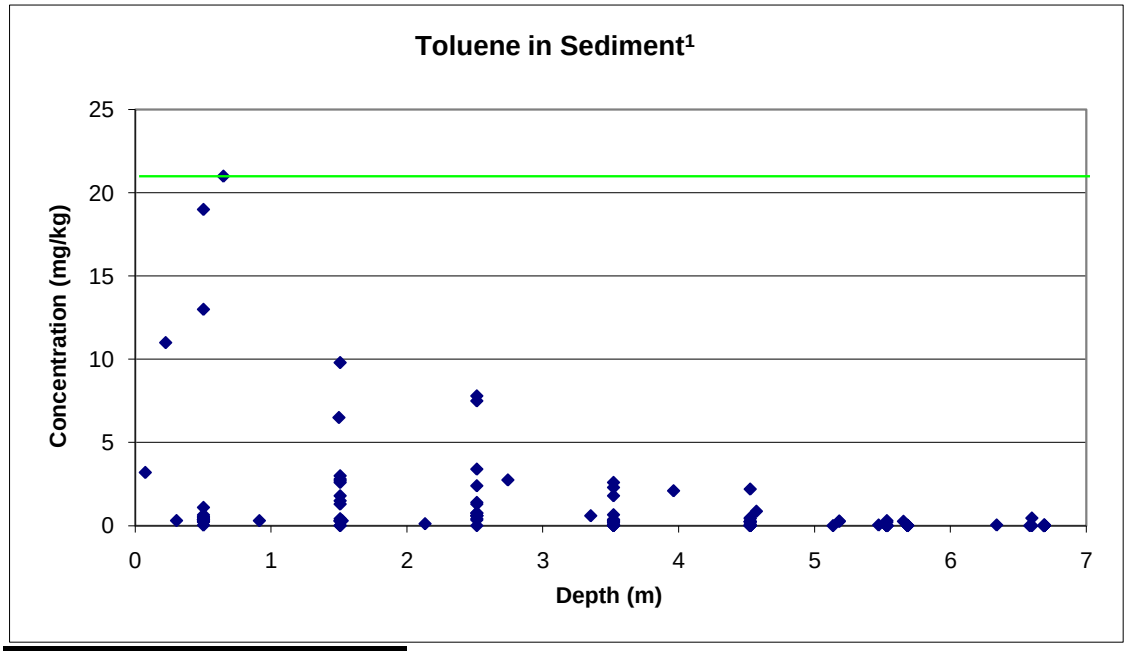
Green lines indicate 90th and 95th percentile concentrations in SMUs 1 & 7 in the ILWD.

Notes: (1) Hot spot criteria for sediment above the range of plots.
Non-detects were set at 1/2 the MDL.
Plots incorporate data from RI through PDI Phase V.

Figure G-23. SMU 2 ILWD Sediment Data (continued)



Hotspot Criterion (mg/kg)	20,573

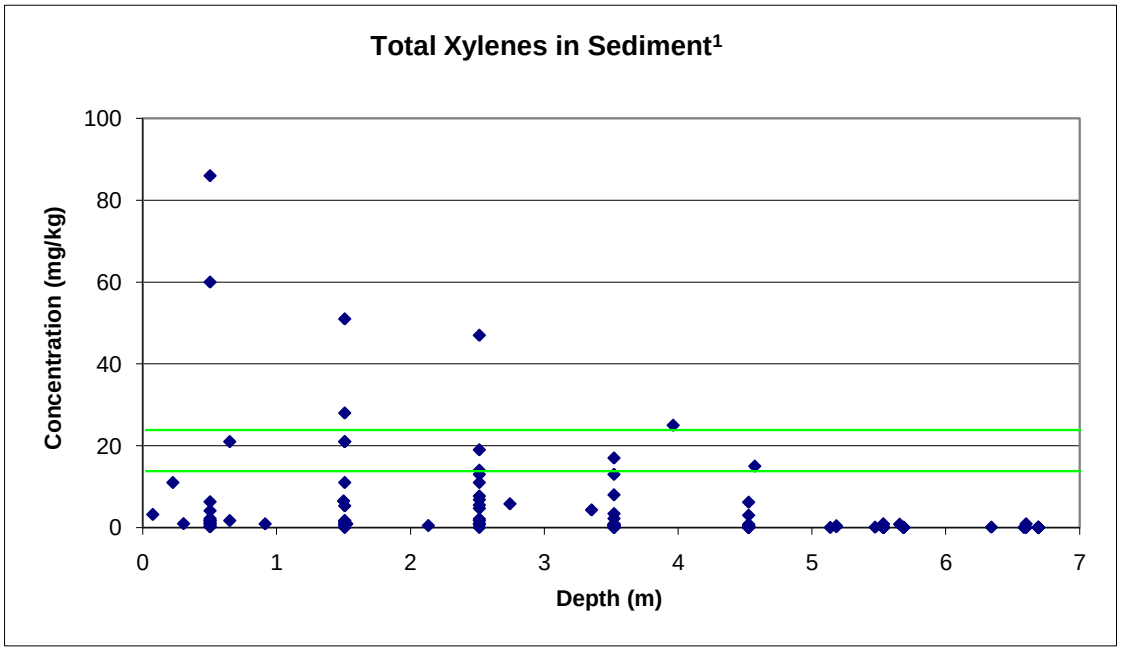


Hotspot Criterion (mg/kg)	2,626

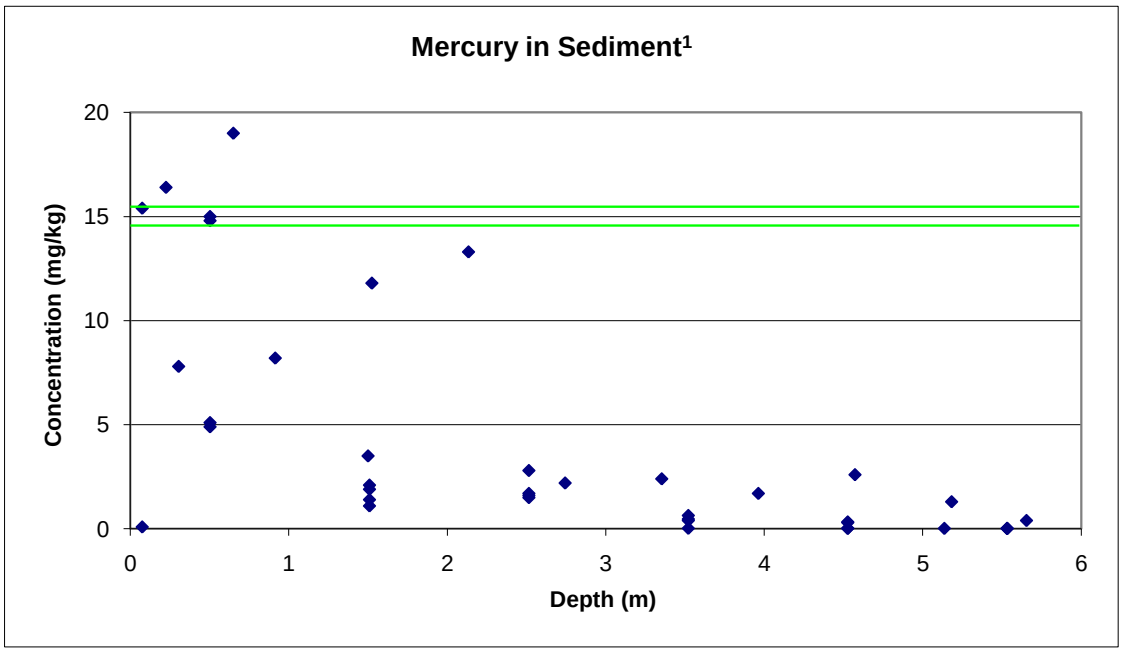
Green lines indicate 90th percentile concentration in SMUs 1 & 7 in the ILWD.

Notes: (1) Hot spot criteria for sediment above the range of plots.
Non-detects were set at 1/2 the MDL.
Plots incorporate data from RI through PDI Phase V.

Figure G-23. SMU 2 ILWD Sediment Data (continued)



Hotspot Criterion (mg/kg)	142



Hotspot Criterion (mg/kg)	2,924

Green lines indicate 90th percentile concentration in SMUs 1 & 7 in the ILWD.
Notes: (1) Hot spot criteria for sediment above the range of plots.
Non-detects were set at 1/2 the MDL.
Plots incorporate data from RI through PDI Phase V.

SMU2 ILWD Area

SMU1 ILWD Western Area

SMU1 ILWD Center Area

SMU1 /SMU7 ILWD Eastern Area

OL-VC-20075
OL-STA-20002-VC
TA-20009-VC
OL-STA-20011-VC
OL-VC-20078
OL-VC-20216
OL-PP-20107
OL-STA-20003-VC
OL-STA-20005-VC
OL-VC-20079
OL-VC-20079A
OL-PP-20079
OL-VC-20108
OL-STA-20012-VC
OL-VC-20217
OL-STA-20014-VC
OL-PP-20106
OL-PP-20006
OL-STA-20006-VC
OL-VC-10035
S29
OL-PP-10038
OL-VC-10036
OL-VC-10036A
OL-STA-20008-VC
OL-VC-10158
S309
OL-STA-20015-VC
OL-STA-10008-PW
OL-STA-10008-VC
OL-VC-10192
OL-STA-10008-PP
OL-VC-10039
OL-VC-10034
S338
OL-VC-10152
OL-VC-10038
OL-VC-10153
OL-VC-10136
OL-VC-10193
OL-VC-10041
OL-VC-10041A
OL-STA-10001-PP
OL-STA-10001-VC
OL-STA-10001-PW
OL-PP-10042
OL-VC-10042
OL-VC-10042A
OL-VC-10043
OL-VC-10047
OL-PP-10055
OL-VC-10055
OL-VC-10037
OL-STA-10013-PP
OL-STA-10013-VC
OL-STA-10013-PW
S342
OL-VC-10044
OL-VC-10159
OL-VC-10040
OL-PP-10040
OL-PP-10040A
P29
OL-VC-10160
OL-VC-10048
OL-VC-10048A
OL-VC-10137
OL-STA-10019-VC
OL-VC-10046
OL-VC-10046A
OL-STA-10009-VC
OL-VC-10049
OL-VC-10049A
OL-VC-10138
OL-STA-10018-VC
OL-STA-10018-PW
OL-STA-10018-PP
S341
OL-VC-10054
OL-VC-10053
OL-VC-10053A
OL-STA-10020-VC
OL-STA-10020-PW
S343
OL-VC-10059
OL-VC-10067
OL-STA-10010-PW
OL-STA-10010-VC
OL-VC-10064
OL-VC-10064A
OL-STA-10010-PP
OL-VC-10065
OL-VC-10066
OL-STA-10023-VC
S347
S345
OL-VC-10070
OL-VC-10070A
OL-STA-10011-PW
OL-STA-10011-VC
S346
OL-VC-10075
OL-VC-10144
OL-STA-10025-VC
S311
OL-VC-10085
OL-VC-10080
OL-VC-10080A
OL-VC-10086
OL-VC-10086A
OL-VC-10147
S348
OL-VC-10087
S349
OL-VC-10094
S350
OL-VC-10106
OL-VC-10151
OL-VC-10107
OL-VC-10140
OL-VC-10058
OL-VC-10058A
OL-VC-10060
OL-VC-10062
OL-VC-10062A
OL-VC-10073A
OL-VC-10073
OL-STA-10021-VC
OL-VC-10068
OL-VC-10069
OL-VC-10141
OL-VC-10074
OL-VC-10076
OL-VC-10081
OL-VC-10081A
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OL-VC-10103
OL-VC-10103A
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OL-VC-10157
OL-VC-10102
OL-VC-10092
OL-VC-10098
OL-PP-10097
OL-VC-10097
OL-VC-10097A
OL-PP-10097A
OL-VC-10099
OL-VC-10100
S312
P20/S20
OL-STA-10002-VC
OL-VC-10057
OL-VC-10057A
OL-VC-10061
OL-VC-10139
OL-STA-10022-VC
OL-STA-10022-PW
OL-STA-10022-PP
OL-VC-10056
OL-STA-10003-VC
S344
OL-VC-10142
OL-VC-10143
OL-VC-10063
OL-VC-10063A
OL-PP-10063
OL-STA-10014-VC
S310
P22
OL-STA-10004-VC
OL-STA-10004-PW
OL-STA-10004-PP
OL-STA-10108
OL-PP-10071
OL-VC-10071
S23
P23
OL-VC-10082
OL-VC-10072
OL-VC-10015-VC
OL-PP-10095
OL-VC-10095
OL-VC-10095A
OL-STA-10006-VC
OL-STA-10006-PW
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OL-VC-70016
OL-VC-70087
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OL-VC-10077
OL-VC-10145
OL-VC-10101
OL-PP-70017
OL-VC-70017
OL-STA-10005-VC
OL-VC-10156
OL-STA-10016-VC
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OL-VC-10050
OL-VC-10051
P15
OL-VC-10096
OL-VC-10096A
OL-PP-10096
OL-PP-10096A
OL-VC-10078
OL-VC-10078A
OL-VC-10088
OL-VC-10148
OL-VC-10091
OL-STA-10007-PW
OL-STA-10007-PP
OL-STA-10007-VC
OL-VC-70018
OL-VC-70086
OL-STA-10026-VC
S15
OL-VC-10084
OL-VC-10092
OL-VC-10102
OL-VC-70034
OL-VC-70032
OL-VC-70021
OL-VC-70021A
OL-VC-70033
OL-PP-70021
OL-PP-70021A
S14
OL-VC-70023
OL-VC-10105
OL-VC-10150
OL-STA-10012-VC
OL-STA-10012-PW
OL-VC-10104
OL-VC-10104A

Sample Locations

- Porewater Sample Location
- Sediment Sample Location

Note: Co-located porewater and sediment locations having the same location ID have been labeled using the sediment ID for map clarity.

- Remediation Area Boundary
- Isolation Cap Area
- Sediment Management Unit (SMU) Boundary
- Extent of ILWD in Littoral Zone
- Willis/Semet IRM Barrier Wall
- West Wall Portion of the WB-B/HB IRM
- Approximate location of East Wall Portion of the SB-B/HB IRM

N
W E
S

275 137.5 0 275
Feet

FIGURE G-24

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Syracuse, New York

Remediation Area D
Sediment & Porewater Locations

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301 PLAINFIELD RD, SUITE 350, SYRACUSE, NY 13212 Phone:(315) 451-9560

11/05/2010

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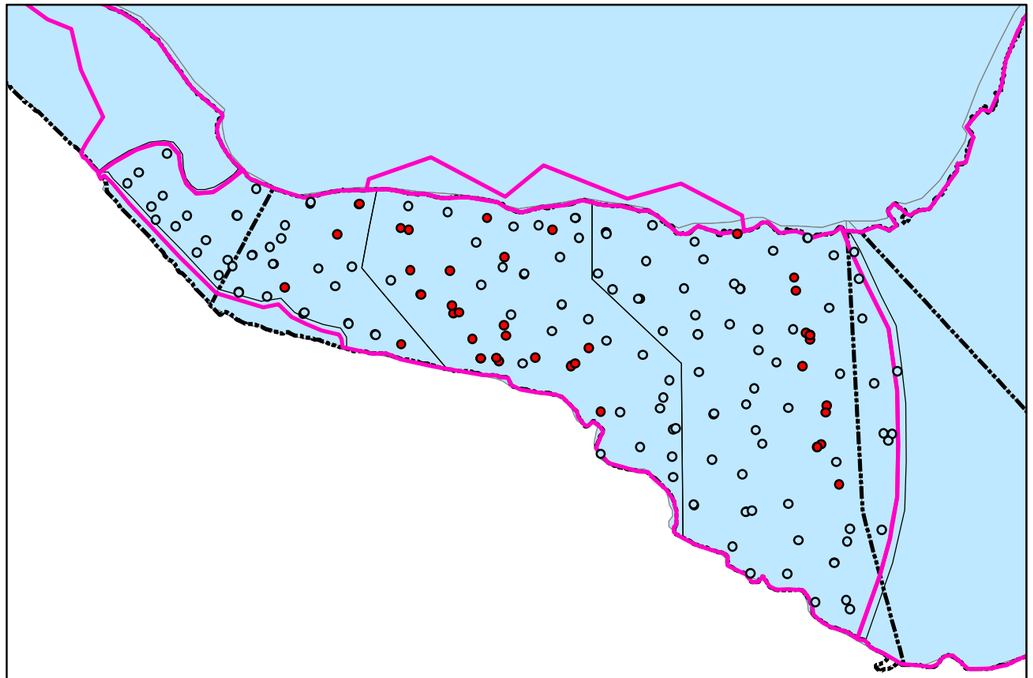
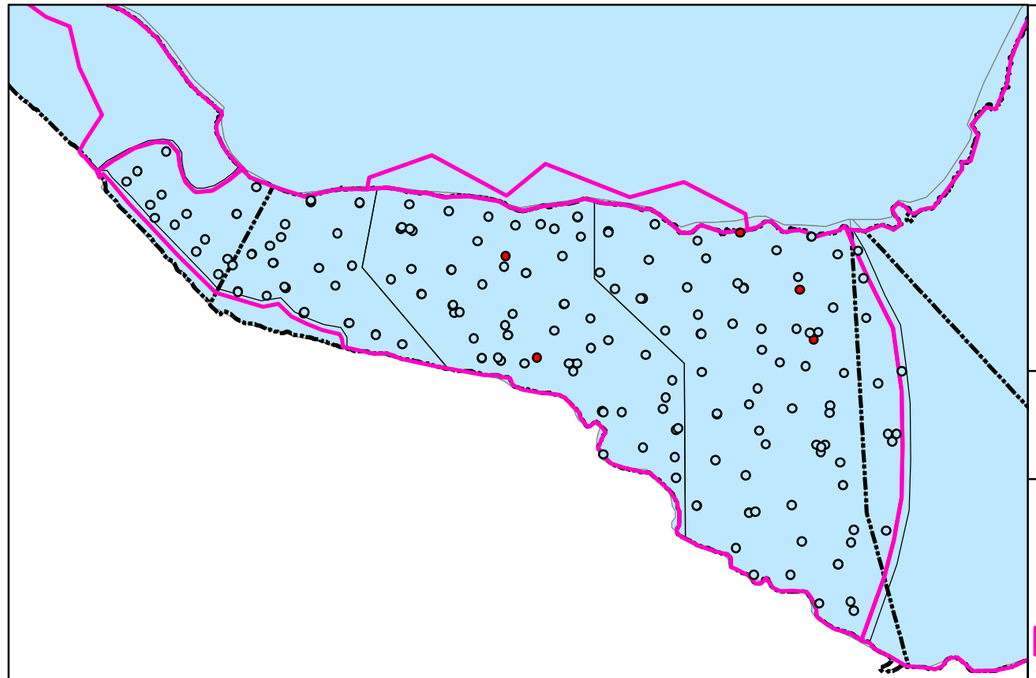
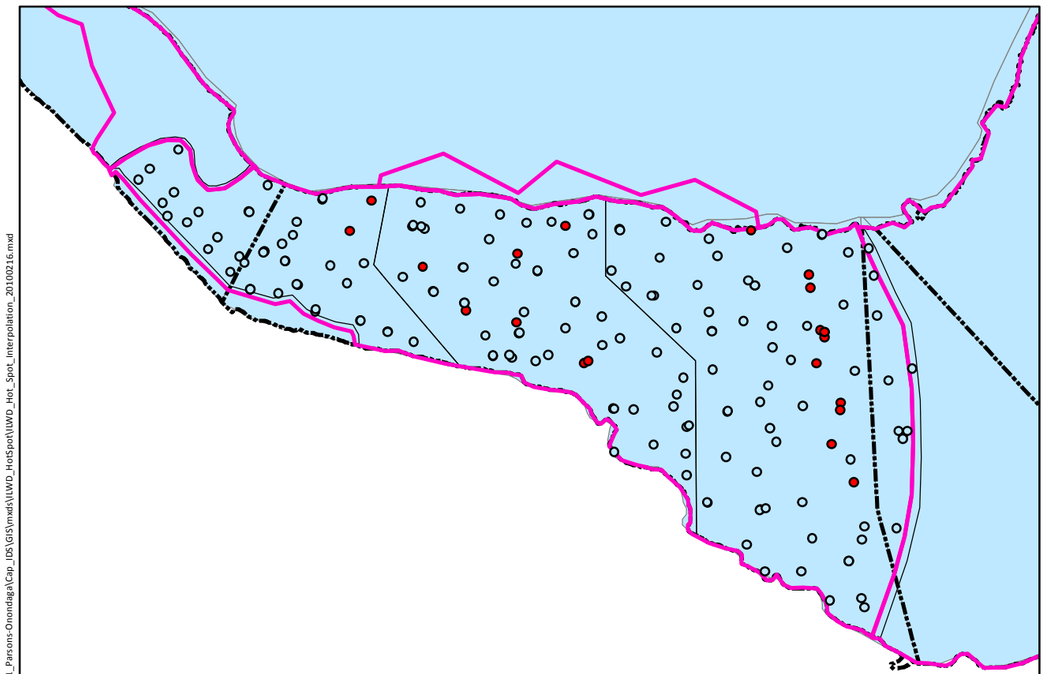


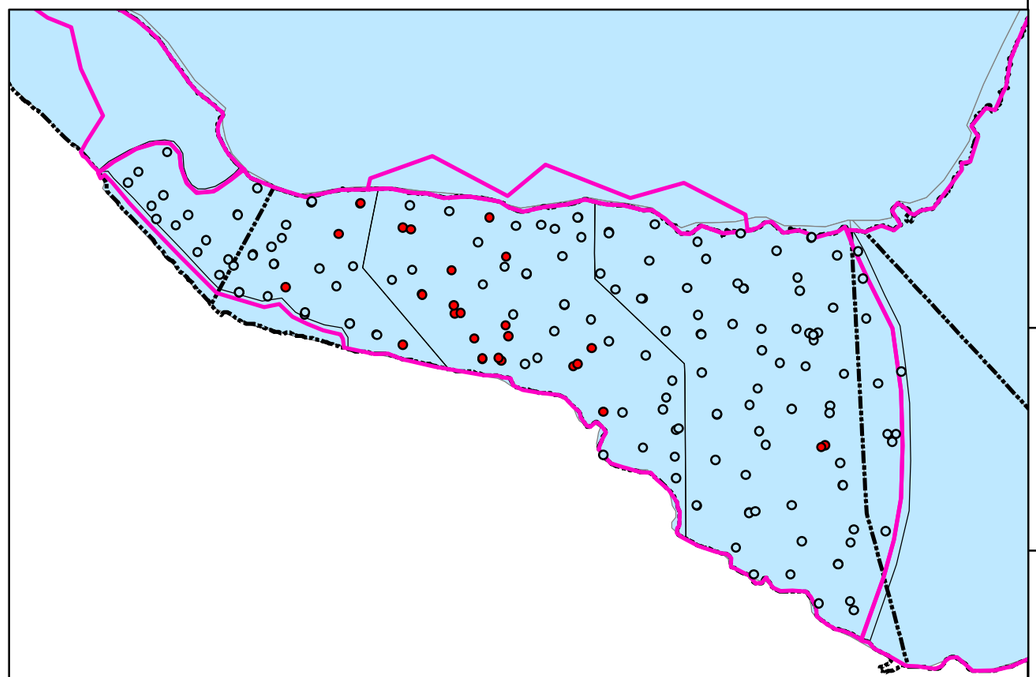
Any Exceedance



Chlorobenzene: HS criteria = 114 mg/kg



Dichlorobenzene: HS criteria = 90 mg/kg



Xylenes: HS criteria = 142 mg/kg

Scale

0 500 1,000 1,500 Feet

Legend

- Remediation Area Boundary
- SMU Boundary
- < Hot Spot Criteria
- > Hot Spot Criteria

Note: Symbols displayed depict maximum concentrations in the 1-m interval below the dredge elevation for core sections (with any portion of the section) that exceeds the hot spot criteria for a given CPOI.

Figure G-25
Hot Spot exceedance locations within the 1 meter interval below the dredge cut in the ILWD.

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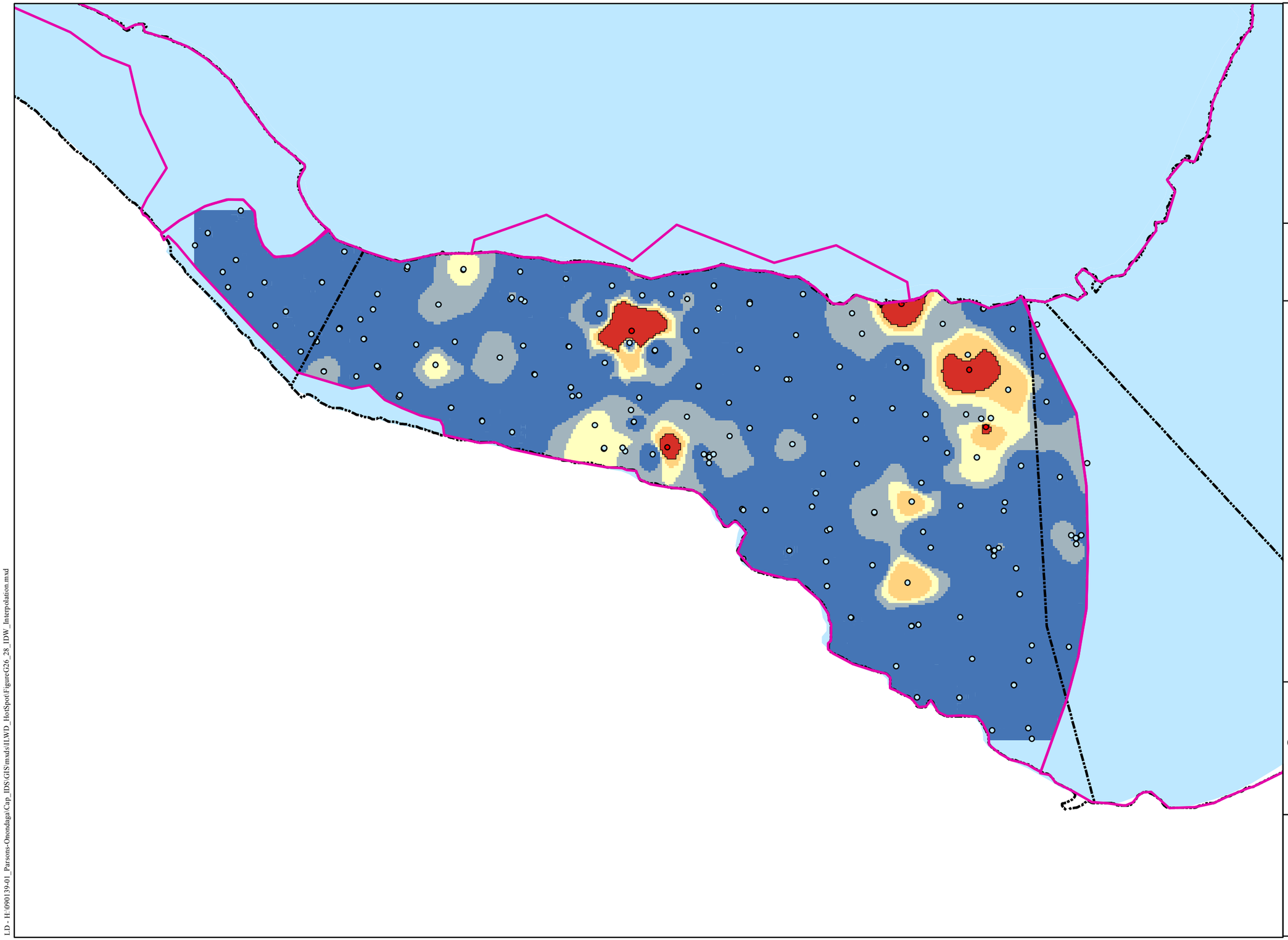

Locator

Scale

0 200 400 600 800 Feet

Legend

- Remediation Area Boundary
- SMU Boundary
- < Hot Spot Criteria
- > Hot Spot Criteria

Interpolated Concentration (mg/kg)

- 0 - 20
- 20 - 40
- 40 - 70
- 70 - 114
- > 114 (HS Criteria)

Note: Values displayed represent the maximum concentrations in the 1-m interval below the dredge elevation for core sections in that interval.
Concentrations were interpolated using the Inverse Distance Weighted (IDW) method (Power = 2).

Figure G-26
Interpolation of Chlorobenzene concentrations within the 1 meter interval below the dredge cut in the ILWD and associated Hot Spot exceedances

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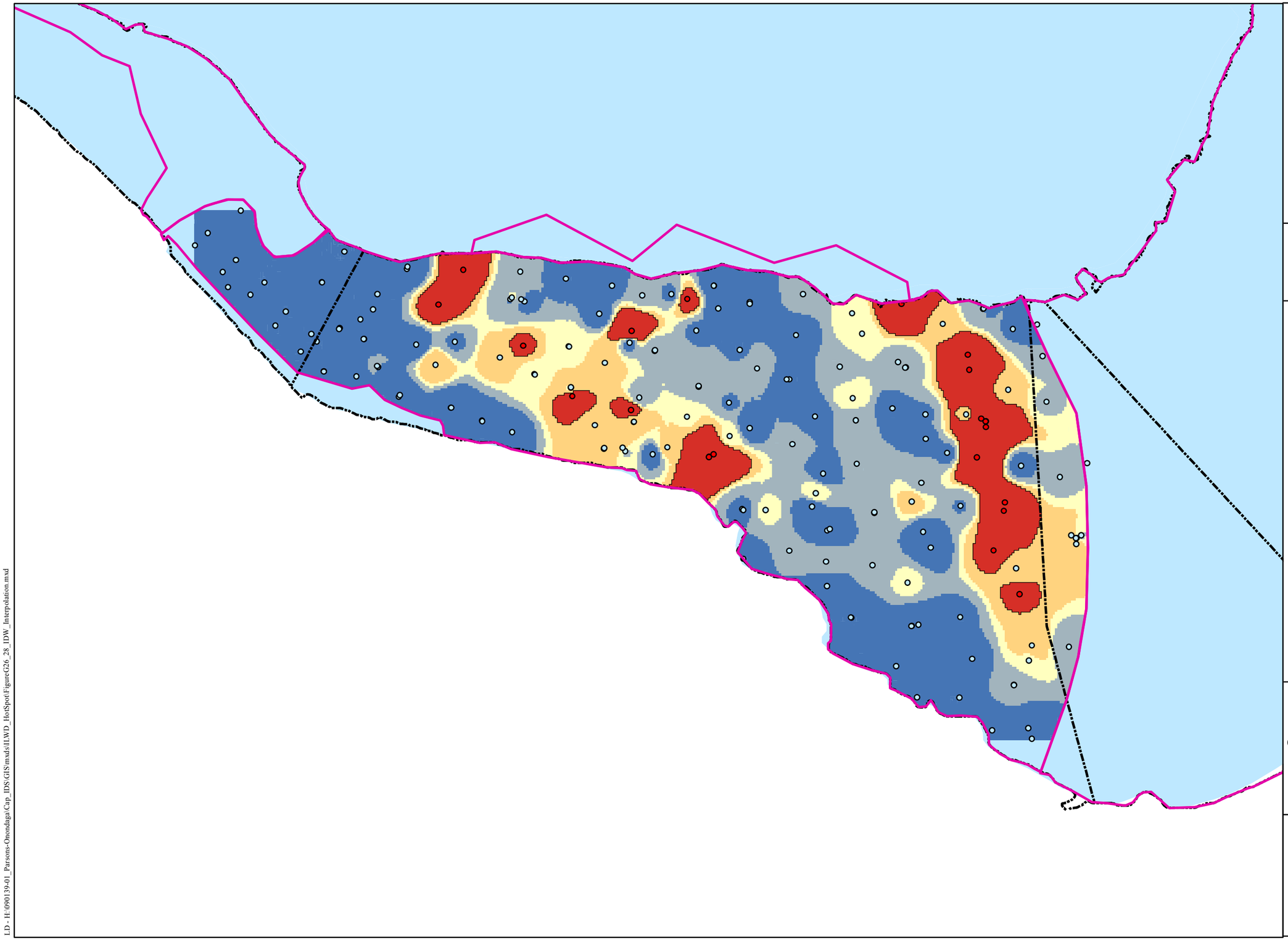

Locator

Scale

0 200 400 600 800 Feet

Legend

- Remediation Area Boundary
- SMU Boundary
- < Hot Spot Criteria
- > Hot Spot Criteria

Interpolated Concentration (mg/kg)

- 0 - 20
- 20 - 40
- 40 - 60
- 60 - 90
- > 90 (HS Criteria)

Note: Values displayed represent the maximum concentrations in the 1-m interval below the dredge elevation for core sections in that interval.
Concentrations were interpolated using the Inverse Distance Weighted (IDW) method (Power = 2).

Figure G-27
Interpolation of Dichlorobenzene concentrations within the 1 meter interval below the dredge cut in the ILWD and associated Hot Spot exceedances

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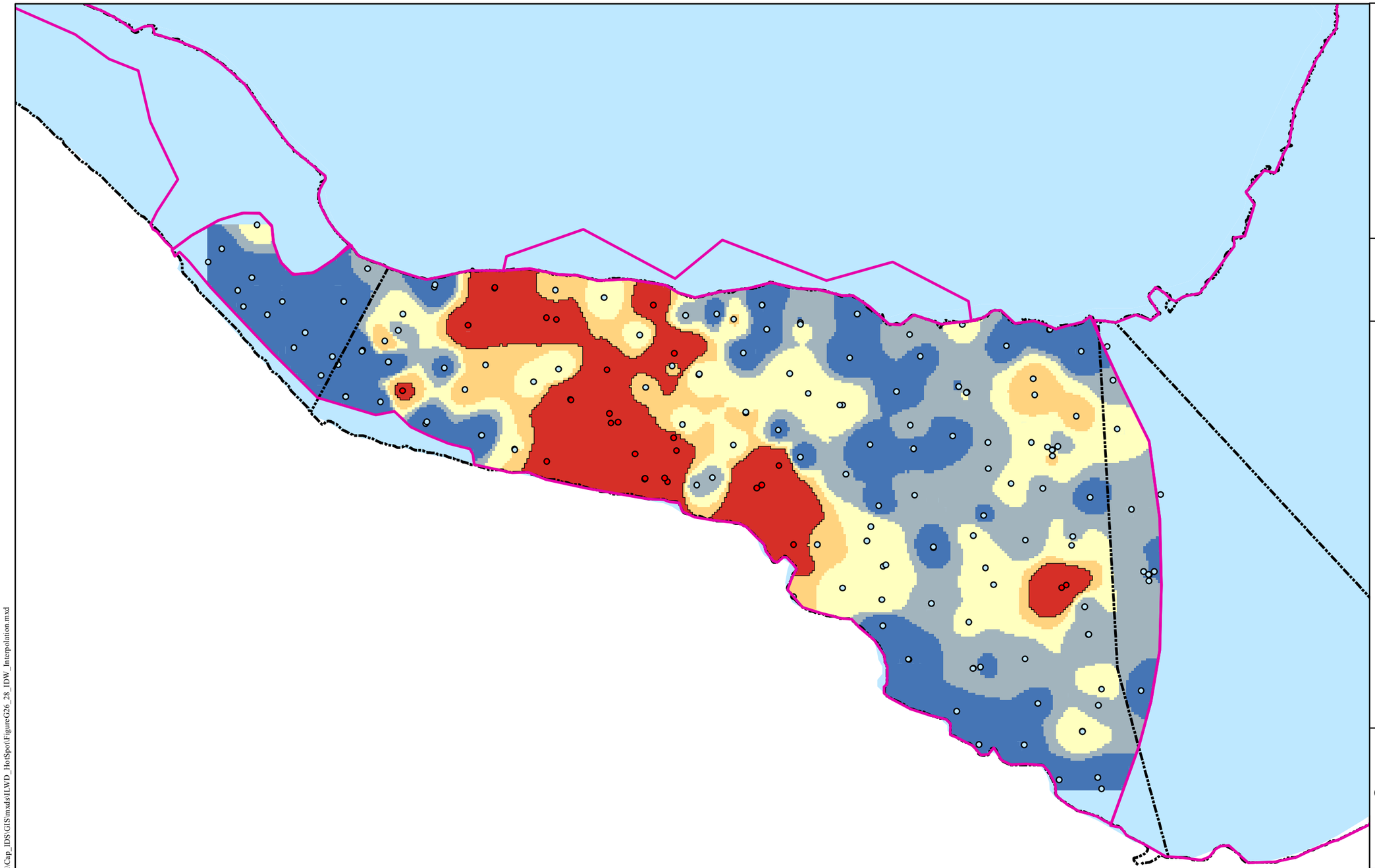

Locator

Scale

Feet

0 200 400 600 800

Legend

- Remediation Area Boundary
- SMU Boundary
- < Hot Spot Criteria
- > Hot Spot Criteria

Interpolated Concentration (mg/kg)

- 0 - 20
- 20 - 40
- 40 - 80
- 80 - 142
- > 142 (HS Criteria)

Note: Values displayed represent the maximum concentrations in the 1-m interval below the dredge elevation for core sections in that interval.
Concentrations were interpolated using the Inverse Distance Weighted (IDW) method (Power = 2).

Figure G-28
Interpolation of Xylene concentrations within the 1 meter interval below the dredge cut in the ILWD and associated Hot Spot exceedances

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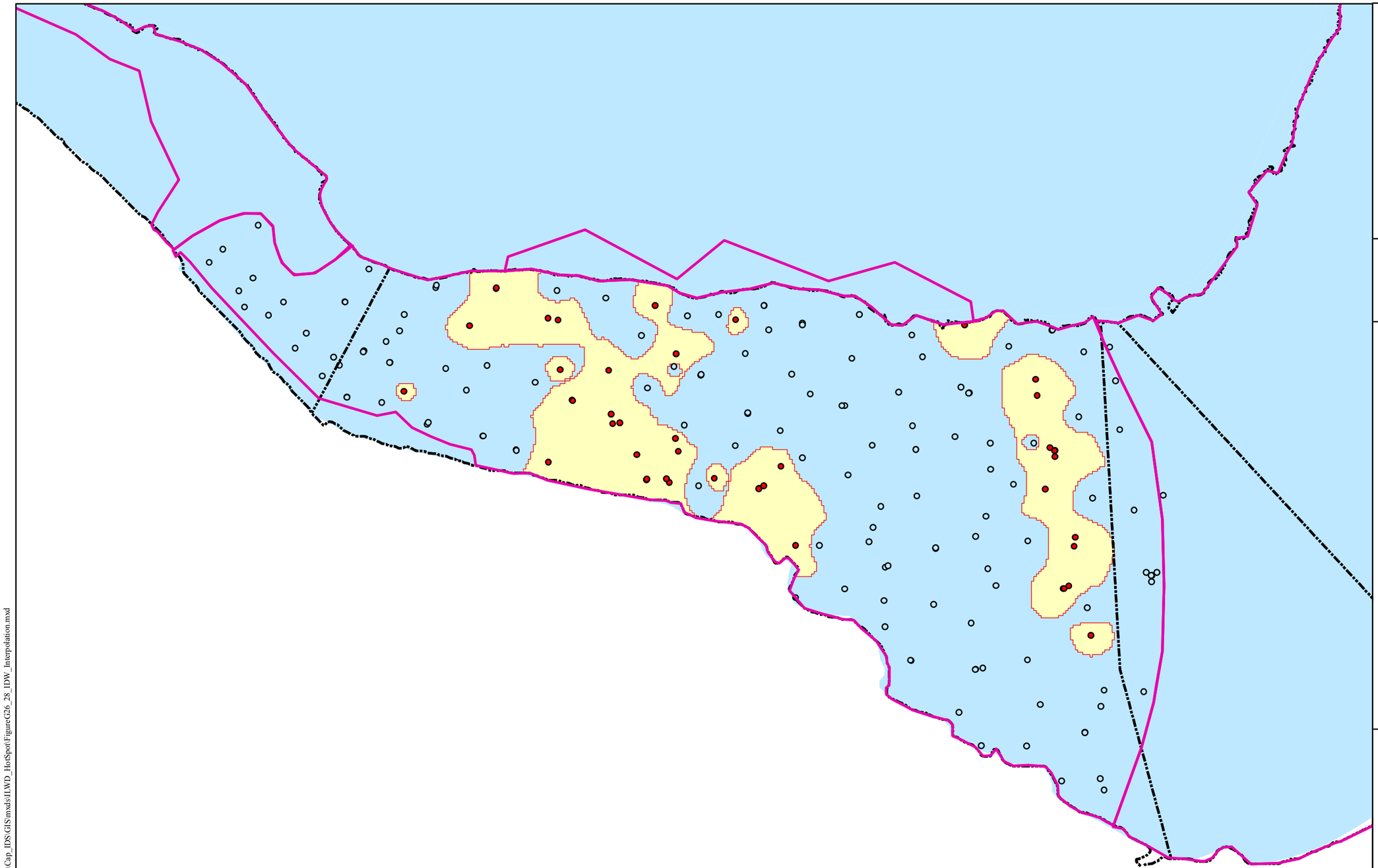

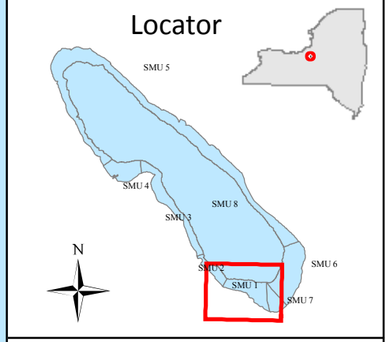

Scale

0 200 400 600 800 Feet

Legend

- Remediation Area Boundary
- SMU Boundary
- All Exceedances (mg/kg)
  - < Hot Spot Criteria
  - > Hot Spot Criteria
- Hot Spot Removal Boundary

Note: Values displayed represent the maximum concentrations in the 1-m interval below the dredge elevation for core sections in that interval.
Concentrations were interpolated using the Inverse Distance Weighted (IDW) method (Power = 2).

Figure G-29
Boundaries of combined Hot Spot exceedances within the 1 meter interval below the dredge cut in Remediation Area D

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Hotspot A
Hotspot B
Hotspot C
Hotspot D
Hotspot E
Hotspot F
Hotspot G

Locator

Scale

0 200 400 600 800 Feet

Legend

- Remediation Area Boundary
- SMU Boundary
- All Exceedances (mg/kg)
  - < Hot Spot Criteria
  - > Hot Spot Criteria
- Hot Spot Removal Boundary

Note: Values displayed represent the maximum concentrations in the 1-m interval below the dredge elevation for core sections in that interval.
Concentrations were interpolated using the Inverse Distance Weighted (IDW) method (Power = 4).

Figure G-30
Final Hot Spot removal boundaries in Remediation Area D

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