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February 1, 2013

Reference No. 012636-T09

Mr. Richard Conforti Hazardous Waste Section, Resource Management Division Michigan Department of Environmental Quality 525 W. Allegan (Constitution Hall) Lansing, Michigan U.S.A. 48933

Dear Mr. Conforti:

Re: Groundwater Quality Analysis Former Peregrine (US) Inc. (Peregrine) Coldwater Road Facility Genesee Township, Michigan

This letter, prepared by Conestoga-Rovers & Associates (CRA) on behalf of Revitalizing Auto Communities Environmental Response Trust (RACER), presents an analysis of groundwater quality based on the groundwater monitoring program implemented between November 2010 and March 2012 at the former Peregrine Coldwater Road Facility (Site) located at 1245E Coldwater Road in Genesee Township, near Flint, Michigan.

1.0 <u>INTRODUCTION</u>

The purpose of this groundwater quality analysis is to confirm the current quality of groundwater on-Site and to determine the potential for off-Site migration of impacted shallow groundwater and the potential migration of impacted shallow groundwater off-Ste through utility corridors. In addition, deep groundwater quality was assessed. The results of the groundwater quality analysis will be used to determine the need for future actions, as appropriate.

The groundwater monitoring program conducted between November 2010 and March 2012 included the following:

- Groundwater sampling in shallow and deep wells on multiple monitoring events
- Sampling shallow and deep background wells in order to develop Site-specific background values for total and dissolved organics
- Evaluate groundwater quality, using borehole water samples, at the property boundary in areas without wells
- Evaluate water quality in utility corridors, using borehole water samples at the property line





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• Analysis of groundwater and borehole water samples for volatile organic compounds (VOCs), total and dissolved metals, and amenable cyanide

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The work was conducted in consultation with and approved by the Michigan Department of Environmental Quality (MDEQ). The sample results discussed herein have been previously submitted to the MDEQ. Figure 1 presents the groundwater monitoring locations.

This letter presents the groundwater quality analysis and utilizes the Site-specific background analysis previously submitted to the MDEQ on January 18, 2013. The following are included as part of this letter:

Figure 1	Monitoring and Investigative Locations									
Figure 2	Background Locations – Shallow and Deep									
Figure 3	Groundwater Results - Shallow and Deep Background Locations									
Figure 4	Groundwater Results Summary - Historical (Prior to 2010)									
Figure 5	Groundwater Results - Shallow									
Figure 6	Groundwater Results - Deep									
Figure 7	Groundwater Results - Utility Corridor and Perimeter Investigation									
Figure 8	mmary of Shallow Groundwater Results									
Figure 9	Proposed Activities									
Table 1	Site-specific Background Values									
Table 2	Completion Details - Monitoring Well Network									
Table 3	Summary of Water Elevation and Turbidity Readings									
Table 4	Summary of OBG MW-9 and OBG MW-10 Data									
Table 5	Summary of Groundwater Exceedances									
Attachment A	Calculated Site-Specific Background Values for Inorganics in Groundwater, RACER Trust Coldwater Road Industrial Lands dated January 18, 2013									

2.0 DEVELOPMENT OF SITE-SPECIFIC BACKGROUND VALUES

Site-specific Background Values(BVs) for total and dissolved inorganics have been developed for shallow and deep groundwater in consultation with the MDEQ. BVs were initially proposed in a memorandum dated November 21, 2012. On December 13, 2012 comments were



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received, via email, from the MDEQ. The memorandum was revised in response to the comments and a revised background analysis entitled "Calculated Site-Specific Background Values for Inorganics in Groundwater - Revised" was submitted to the MDEQ on January 18, 2013 and is presented in Attachment A.

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Table 1 presents the Site-specific background values.

3.0 GROUNDWATER QUALITY ANALYSIS

Figure 4 presents the historical groundwater sample results (pre-2010). The historical groundwater results have been screened against the applicable generic Act 451 Part 201 criteria as presented in the following section.

Groundwater monitoring sample analysis included VOCs, total and dissolved metals, and amenable cyanide. Groundwater samples collected at the Site typically have high turbidity, even when sampling using low flow procedures. Since high turbidity (greater than 5 NTU) may influence the ability to obtain representative groundwater samples, groundwater samples were analyzed for both total and dissolved inorganics (if turbidity exceeded 5 NTU) to provide representative data for analysis. Future sample analysis for inorganics will be for the dissolved fraction only in accordance with MDEQ correspondence data December 13, 2012.

3.1 <u>SCREENING CRITERIA</u>

Groundwater results have been screened against the Site-specific BVs presented on Table 1. The calculated Site-specific BVs are appropriate for point by point comparisons of on-Site data as described in the S³TM. Those constituents exceeding Site-specific BVs were then screened against the following generic risk-based cleanup criteria from Part 201 of Michigan's Natural Resources and Environmental Protection Act, Public Act 451, and identified in the MDEQ RRD Operational Memorandum No. 1, updated March 25, 2011, pursuant to 1994 PA 451 as amended:

- Groundwater Contact Criteria
- Nonresidential Drinking Water Criteria
- Nonresidential Groundwater Volatilization to Indoor Air Inhalation Criteria
- Residential Drinking Water Criteria
- Residential Groundwater Volatilization to Indoor Air Inhalation Criteria



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Ground/Surface Water Interface (GSI) Criteria

Where on-Site concentrations of metals are marginally above the Site-specific BV, professional judgment will be used to determine whether or not this is a marginal exceedance of the Site-specific background value (per the footnote on page 7.85 of the S³TM).

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3.2 SHALLOW GROUNDWATER MONITORING RESULTS

Shallow groundwater monitoring was initially conducted at 12 locations (B-9, MW-1, MW-2, MW-1-02, MW-2-02, MW-3-02, MW-4-02, PFW-2, PFW-4, PFW-9, PFW-10, and PFW-11). Shallow groundwater monitoring locations MW-1-01, MW-2-02, and MW-3-02 were removed from the program following the Q4 2010 monitoring event as samples from MW-4-02 were determined to be representative of groundwater quality at all four locations. The monitoring well completion details are presented in Table 2. Table 3 presents a summary of the groundwater elevations and turbidity readings.

Figure 5 presents the shallow groundwater results. The data were first compared to Site-specific BVs and then concentrations exceeding BVs were screened against to the generic risk-based cleanup criteria for that constituent.

Three metals (arsenic [1 location/1 sample], lead [4 locations/5 samples], dissolved manganese [1 location/2 samples], and total manganese [4 locations/6 samples]) were identified at concentrations exceeding Site-specific BVs and Residential and/or Nonresidential Drinking Water Criteria. Arsenic (1 location/1 sample) was also identified at a concentration exceeding GSI Criteria.

There were no exceedances of Groundwater Contact Criteria, Residential Groundwater Volatilization to Indoor Air Inhalation Criteria, or Nonresidential Groundwater Volatilization to Indoor Air Inhalation Criteria.

3.3 DEEP GROUNDWATER MONITORING RESULTS

Deep groundwater monitoring was conducted at 4 locations (B-27D, MW-15-10, MW-16-10, and PFW-1). The monitoring well completion details are presented in Table 2. Table 3 presents a summary of the groundwater elevations and turbidity readings. Monitoring locations MW-15-10 and MW-16-10 were installed in 2010 to assist in characterization of the deep groundwater. During the Q4 2010 sampling event, samples collected from MW-15-10 and



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MW-16-10 had very high turbidity readings and as a result, these two locations were redeveloped on April 18, 2011.

Figure 6 presents the deep groundwater results. The data were first screened against Site-specific BVs then constituents exceeding BVs were compared to the generic risk-based cleanup criteria for that constituent.

Six metals [aluminum (2 location/2 sample), arsenic (1 location/ 1 sample), iron (3 location/3 samples), lead (2 locations/2 samples), total manganese (2 locations/2 samples), and vanadium (2 location/2 samples)] were identified at concentrations exceeding Site-specific BVs and Residential and/or Nonresidential Drinking Water Criteria.

Three metals [arsenic (1 location/1 sample), chromium (2 locations/3 samples), and vanadium (2 locations/2 samples) were identified at concentrations exceeding Site-specific BVs and GSI Criteria.

There were no exceedances of Groundwater Contact Criteria, Residential Groundwater Volatilization to Indoor Air Inhalation Criteria, or Nonresidential Groundwater Volatilization to Indoor Air Inhalation Criteria.

4.0 PERIMETER AND UTILITY CORRIDOR INVESTIGATION RESULTS

In addition to the shallow and deep groundwater monitoring, a perimeter investigation and utility corridor investigation were completed. The purpose of the perimeter investigation was to evaluate the potential for off-Site migration of impacted shallow groundwater. The purpose of the utility corridor investigation was to evaluate the potential for off-Site migration of impacted shallow groundwater migration along utility corridors.

The results of the additional investigations are presented in the following sections.

4.1 <u>PERIMETER INVESTIGATION RESULTS</u>

The perimeter investigation was completed between December 5 and 8, 2011. Nine boring (BH-102, BH-103, BH-104, BH-105, BH-106, BH-107, BH-108, BH-109, and BH-110) were advanced approximately 5 feet into native clay and groundwater samples were collected, if present. Of the nine locations, only one produced enough water to collect a sample (BH-103). The investigation locations and the analytical results are presented on Figure 7.



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As discussed in the September 5, 2012 conference call between MDEQ, RACER, OBG, and CRA, two additional monitoring locations were identified along the western Site perimeter associated with the adjacent property and were installed and sampled in 2011 and 2012 (OBG MW-9 and OBG MW-10). Groundwater samples from these wells were collected and analyzed for total and dissolved manganese samples on November 4, 2011 and March 5, 2012. The locations and sample results for OBG MW-9 and OBG MW-10 are presented on Figure 7. A summary of the sample results for monitoring wells OBG MW-9 and OBG MW-10 is presented in Table 4.

Total manganese (2 locations/3 samples) and dissolved manganese (3 locations/5 samples) were identified at concentrations exceeding Site-specific BVs and Residential and/or Nonresidential Drinking Water Criteria.

There were no exceedances of GSI Criteria, Groundwater Contact Criteria, Residential Groundwater Volatilization to Indoor Air Inhalation Criteria, or Nonresidential Groundwater Volatilization to Indoor Air Inhalation Criteria.

4.2 <u>UTILITY CORRIDOR INVESTIGATION RESULTS</u>

The initial utility corridor investigation was completed between December 5 and 8, 2011. Two borings (BH-101 and BH-111) were advanced though the sewer bedding material and approximately 5 feet into native clay. Only one groundwater sample was collected from BH-101 as no groundwater was present at BH-111. However, further review of the BH-111 location indicated that it was not advanced though the bedding of the utility corridor. As a result, an additional borehole (BH-112) was advanced on March 28, 2012 and a groundwater sample was collected. The analytical results are presented on Figure 7.

Seven metals [aluminum, arsenic, chromium, iron, lead, manganese (total and dissolved), and vanadium] were detected in the samples from both BH-101 and BH-112 at concentrations exceeding Site-specific BVs and Residential and/or Nonresidential Drinking Water Criteria.

Four metals (arsenic, chromium, mercury, and vanadium) were identified at both BH-101 and BH-112 at concentrations exceeding Site-specific BVs and GSI Criteria.

There were no exceedances of Groundwater Contact Criteria, Residential Groundwater Volatilization to Indoor Air Inhalation Criteria, or Nonresidential Groundwater Volatilization to Indoor Air Inhalation Criteria.

At the time of the borehole installations, the adjacent sewers were checked for dry flow. If water was present, a sample was collected. One sample was collected from the storm sewer



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adjacent to borehole BH-112. The results reported that aluminum exceeded Residential and Nonresidential Drinking Water Criteria; however, the concentration was below the Site-specific BV for aluminum.

5.0 ANALYSIS OF RESULTS

5.1 SHALLOW GROUNDWATER RESULTS

Eleven shallow groundwater monitoring locations were sampled as part of the shallow groundwater monitoring. A summary of the shallow groundwater results is presented on Figure 5. No seasonal trends were identified in the data.

Three locations (MW-2-02, PFW-9, and PFW-10) reported no exceedances of screening criteria throughout the monitoring program.

An additional four locations (MW-3-02, MW-4-02, PFW-11, and MW-1) reported only minor exceedances of screening criteria during the initial Q4 2010 round of sampling and have shown no exceedances in any of the subsequent sampling events. The groundwater samples collected during Q4 2010 are not expected to be representative of the groundwater on-Site (based on the subsequent sampling). However, additional samples were not collected from MW-3-02 as following the Q4 2010 sampling, MW-2-02 and MW-3-02 were removed from the sampling program because of their close proximity to MW-4-02 which showed a greater number of detections in the Q4 2010 results and was selected to be representative of that location.

Two locations (B-9, and PFW-2) reported one exceedance of screening criteria throughout the monitoring program. B-9 exceeded screening criteria for manganese in one sample with an estimated concentration of 6.8 milligram per litre (mg/L) (this exceedance was also J qualified during validation due to violation of ICP serial dilution control limits and as a result is not believed to be representative of groundwater on-Site). Furthermore, the three additional samples at this location (0.39 mg/L, 0.21 mg/L, and 0.31 mg/L) were below the Site-specific BV (0.963 mg/L). PFW-2 exceeded Site-specific background for manganese in one sample with a concentration of 1.4 mg/L. This exceedance was the only reported concentration (of four samples at this location) above the Site-specific BV; the three additional samples at this location (0.963 mg/L, 0.581 mg/L, and 0.54 mg/L) were at or below background (0.963 mg/L).

The remaining two locations (MW-2, and PFW-4) reported consistent exceedances of screening criteria. MW-2 exceeded criteria for both total and dissolved manganese in all but one sample collected. MW-2 also exceeded criteria for arsenic in one of four samples; arsenic only exceeded criteria (0.01 mg/L) during the Q4 2010 sampling event with a concentration of 0.0279 mg/L



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and has been at or below criteria in the subsequent samples (0.0046 mg/L, 0.01 mg/L, and 0.005U mg/L). PFW-4 exceeded criteria for lead in both samples collect; only two samples were collected from this location because during two of the events the well head was submerged under pooled surface water

In addition to the shallow groundwater results discussed above, the perimeter investigation found only one of nine borings contained enough water to collect a sample. This one sample exceeded criteria for both total and dissolved manganese. The perimeter wells identified by OBG (OBG MW-9 and OBG MW-10) also exceeded screening criteria for total manganese (1 location/ 2 samples) and dissolved manganese (2 locations/ 4 samples).

The utility corridor investigation included collection of shallow groundwater samples near the property line at the two crossing locations. The results of the utility corridors investigation reported exceedances of five metals not typically reported in the shallow groundwater on-Site (aluminum, arsenic, chromium, iron, mercury, and vanadium). Lead and manganese were also reported in the utility corridors samples above criteria. An additional utility corridor was identified north-east of BH-112 following the utility corridor investigation, as presented on Figure 7. Based on the exceedances in the other utility corridors and as discussed with the MDEQ during the September 5, 2012 conference call, the third location will be treated in the same manner as the two utility corridors investigated.

The results of the perimeter and utility corridors investigations are presented on Figure 8 along with a summary of results from PFW-4 and MW-2. Table 5 presents a summary of all groundwater exceedances.

Based on the groundwater sampling conducted, the perimeter investigation, the utility corridor investigation, and the results for OBG MW-9 and OBG MW-10, shallow groundwater at the Site is impacted by inorganics above screening criteria. Furthermore, off-Site migration of shallow groundwater is potentially occurring in the vicinity of BH-101, BH-103, BH-112, OBG MW-9, OBG MW-10, and the additional utility corridor identified above. To prevent potential groundwater migration at the utility corridors associated with locations BH-101, BH-112, and the third utility corridor identified, it is recommended that grouting of the bedding (or another isolation method) be completed to eliminate these potential pathways. Furthermore, a monitoring well should be installed at investigative location BH-103 to confirm groundwater quality at this location since only borehole water has been collected to date. Additional sampling should also be conducted at OBG MW-9 and OBG MW-10 to confirm the results of the previous sampling.



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The remaining investigative results do not support that the impacted groundwater is migrating off-Site due to the following:

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- Analytical results are below BVs
- Shallow groundwater is not present around the perimeter of the remaining portions of the Site (Figure 8), therefore, off-Site migration at these locations cannot occur
- Analytical results from utility corridors reported different constituents than in on-Site wells

To prevent the use of shallow groundwater on-Site as a potable supply, RACER will place deed restrictions on the property restricting groundwater use.

5.2 DEEP GROUNDWATER RESULTS

Four deep groundwater monitoring locations (B-27D, MW15-10, MW16-10, and PFW-1) were sampled as part of the deep groundwater monitoring program.

Monitoring well PFW-1 reported exceedances of both arsenic and iron in the Q4 2010 sample; however no exceedances of screening criteria were observed in the three subsequent samples.

Monitoring well B-27D reported exceedances of aluminum, chromium, iron, lead, manganese, and vanadium in the Q4 2010 samples but not in subsequent events with the exception of one exceedance of GSI criteria for chromium. Chromium has not been found to exceed screening criteria in the shallow groundwater throughout the monitoring program with the exception of the samples collected from the two utility corridors. Furthermore, GSI is not a relevant pathway for deep groundwater at the Site since no surface water exists on-Site or adjacent and down gradient to the Site where the deep groundwater (approximately 75 ft below ground surface) could reasonably discharge.

MW-16-10 reported exceedances of aluminum, chromium, iron, lead, manganese, and vanadium in the Q4 -2010 sampling following the installation of the monitoring well. Following the sampling it was determined that the well should be redeveloped. Since redevelopment, no exceedances of screening criteria have been observed.

No exceedances of Site-specific screening criteria have been observed at MW-15-10.

Based on the groundwater sampling conducted, deep groundwater at the Site has not been impacted by the former Site operations.



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6.0 <u>CONCLUSIONS</u>

The following is concluded with respect to the Site groundwater quality:

• The concentrations in the initial monitoring event (Q4 2010) were typically elevated compared to the three subsequent events. The results from the initial monitoring event are not considered representative of groundwater quality at the Site and the results were likely related to the long timeframe since the previous sampling event and the need for redevelopment of the wells.

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- Obtaining samples with turbidities below 5 NTU is not always possible, therefore, dissolved analysis was performed when the 5 NTU limit could not be achieved.
- Seasonal variation is not apparent in the data.
- Shallow groundwater is impacted above screening criteria (drinking water, GSI); and, shallow groundwater impacts include lead and manganese (total and dissolved).
- Impacted shallow groundwater does not appear to be migrating off-Site since groundwater is not present at the perimeter of the Site or groundwater data is below criteria with the potential exception of the three utility corridors, the BH-103 location and the area located near OBG MW-10.
- Utility corridors are a potential location of off-Site shallow groundwater migration.
- Deep groundwater has not been impacted by shallow groundwater, and therefore has not been impacted by the Site.

7.0 <u>RECOMMENDATIONS</u>

The following is recommended with respect to the Site groundwater quality:

- In order to confirm the stability of shallow groundwater quality, 2-years of annual groundwater monitoring is proposed for monitoring wells B-9, MW-1, MW-2, MW-4-02, PFW 2, PFW-4, PFW-9, PFW-10, and PFW-11. Samples will be analyzed for dissolved lead and dissolved manganese.
- All wells on-Site should be inspected for damage and maintenance should be performed or the well should be properly abandoned, if required.
- Based on the results of the utility corridor investigation, the bedding for the three utility corridors crossing the property line should be grouted or isolated with another method near the property line to prevent the potential migration of shallow groundwater onto or off Site.



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• A monitoring well (MW-17-13) should be installed at BH-103 and samples should be collected quarterly for the remainder of the monitoring program (5 quarterly events, ending in Q1 2014) to further investigate the potential for groundwater off-Site migration at this location. Samples will be analyzed for dissolved manganese.

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- Samples should be collected from OBG MW-9 and OBG MW-10 quarterly for the remainder of the monitoring program (5 quarterly events, ending in Q1 2014) to further investigate the potential for groundwater off-Site migration at this location. Samples will be analyzed for dissolved manganese.
- Deed restrictions should be placed on the property restricting property use to non-residential and restricting the use of groundwater as a potable supply.
- Abandon all deep monitoring wells and shallow monitoring wells not part of the monitoring program.

8.0 <u>NEXT STEPS</u>

The following presents description of the proposed activities at the Site.

- 1. Revise the Environmental Indicators (EI) report to reflect the proposed groundwater monitoring program.
- 2. Grout/isolate the bedding for the three utility corridors crossing the property boundary near the property line. A short work plan will be prepared and submitted to the MDEQ for approval.
- 3. Install a monitoring well at investigative location BH-103 prior to the next groundwater monitoring event (Q1 2013) and include the well as part of the monitoring network.
- 4. Perform quarterly sampling at OBG MW-9, OBG MW-10, and the new location described in 3 above for the remainder of the monitoring program (5 quarterly events, ending in Q1 2014).
- 5. Perform annual groundwater monitoring for the next 2 years (one event per year) at 13 monitoring wells (to be completed in Q1 2013 and Q1 2014).
- 6. Place a deed restrictions on the property restricting property use to non-residential and restricting the use of groundwater as a potable supply
- 7. Abandon all wells not being monitored.

Figure 9 presents a summary of the proposed activities including the proposed groundwater monitoring locations, utility corridor bedding locations to be grouted/isolated, and proposed monitoring well installation location.



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A draft Complete with Controls report will be submitted to the MDEQ following receipt of the Q1 2013 monitoring results and prior to the Q1 2014 sampling. A Draft Restrictive Covenant will be submitted to the MDEQ in 2013. The controls will include industrial (non residential) land use, restrictions on groundwater use, and utility corridor isolation. Following receipt of the Q1 2014 sample results, the report will be finalized.

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Should you have any questions on the above, please do not hesitate to contact David Favero with RACER or the undersigned.

Yours truly,

CONESTOGA-ROVERS & ASSOCIATES

Michael R. Tomka, P.E.

RC/kf/14 Encl.

cc: David Favero/Grant Trigger, RACER Trust (PDF) Jack Schinderle/John McCabe/Joe Rogers, MDEQ William Yocum, MDEQ



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figure 6

GROUNDWATER RESULTS - DEEP Genesee Township, Michigan



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SITE-SPECIFIC BACKGROUND CONCENTRATIONS FORMER PEREGRINE (US) INC. COLDWATER ROAD FACILITY GENESEE TOWNSHIP, MICHIGAN

Monitoring		Shallow Water Bearing	Unit	Deep Aquifer				
Well	Units	Method	Value	Method	Value			
Aluminum	mg/L	95%KM UTL	10.5	95% WH Approx. Gamma UTL	5.3			
Aluminum (dissolved)	mg/L	95%KM UTL	3.5	95% UTL	0.133			
Antimony	mg/L	NP UTL	0.002 U	95%KM UTL	0.002 U			
Antimony (dissolved)	mg/L	95%KM UTL	0.002 U	NP UTL	0.002 U			
Arsenic	mg/L	95%KM UTL	0.01	MLE 95% UTL	0.102			
Arsenic (dissolved)	mg/L	95%KM UTL	0.01	MLE 95% UTL	0.089			
Barium	mg/L	95% UTL	0.152	95% WH Approx. Gamma UTL	0.47			
Barium (dissolved)	mg/L	95% UTL	0.1	95% WH Approx. Gamma UTL	0.553			
Beryllium	mg/L	NP UTL	0.001 U	NP UTL	0.001 U			
Beryllium (dissolved)	mg/L	NP UTL	0.001 U	NP UTL	0.001 U			
Cadmium	mg/L	NP UTL	0.001 U	NP UTL	0.001 U			
Cadmium (dissolved)	mg/L	NP UTL	0.001 U	NP UTL	0.001 U			
Chromium	mg/L	95%KM UTL	0.031	95%KM UTL	0.007			
Chromium (dissolved)	mg/L	95%KM UTL	0.01	95%KM UTL	0.01			
Cobalt	mg/L	95%KM UTL	0.00765	95%KM UTL	0.007 U			
Cobalt (dissolved)	mg/L	NP UTL	0.007 U	NP UTL	0.007 U			
Copper	mg/L	95%KM UTL	0.01	MLE 95% UTL	0.015			
Copper (dissolved)	mg/L	95%KM UTL	0.007	95%KM UTL	0.04			
Iron	mg/L	95% WH Approx. Gamma UTL	32.58	95% UTL	7.9			
Iron (dissolved)	mg/L	95%KM UTL	4	95% WH Approx. Gamma UTL	3.62			
Lead	mg/L	95%KM UTL	0.0035	NP UTL	0.003 U			
Lead (dissolved)	mg/L	NP UTL	0.003	NP UTL	0.003 U			
Manganese	mg/L	95% WH Approx. Gamma UTL	0.963	95% UTL	0.252			
Manganese (dissolved)	mg/L	95% WH Approx. Gamma UTL	0.547	Log ROS 95% UTL	0.292			
Mercury	mg/L	NP UTL	0.0002 U	NP UTL	0.0002 U			
Mercury (dissolved)	mg/L	NP UTL	0.0002U	NP UTL	0.0002 U			
Nickel	mg/L	95%KM UTL	0.0258	95%KM UTL	0.02 U			
Nickel (dissolved)	mg/L	95%KM UTL	0.0185	95%KM UTL	0.022			
Selenium	mg/L	NP UTL	0.005 U	NP UTL	0.005 U			
Selenium (dissolved)	mg/L	NP UTL	0.005 U	NP UTL	0.005 U			
Silver	mg/L	NP UTL	0.00053	NP UTL	0.0002 U			
Silver (dissolved)	mg/L	NP UTL	0.0002 U	NP UTL	0.0002 U			
Thallium	mg/L	NP UTL	0.001 U	95%KM UTL	0.001 U			
Thallium (dissolved)	mg/L	95%KM UTL	0.00118	95% UTL	0.001 U			
Vanadium	mg/L	95%KM UTL	0.026	95% WH Approx. Gamma UTL	0.015			
Vanadium (dissolved)	mg/L	NP UTL	0.0089	NP UTL	0.004 U			
Zinc	mg/L	NP UTL	0.039 U	NP UTL	0.04			
Zinc (dissolved)	mg/L	95%KM UTL	0.0505	95%KM UTL	0.052			

Notes:

U - Not present at or above the associated value.

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MONITORING WELL NETWORK FORMER PEREGRINE (US) INC. COLDWATER ROAD FACILITY GENESEE TOWNSHIP, MICHIGAN

Monitoring Well	Screened Interval (ft bgs)	Ground Surface Elevation ⁽¹⁾ (ft AMSL)	Top of Casing Elevation ⁽¹⁾ (ft AMSL)	Reference Elevation (Top of Riser) (ft AMSL)		Monitoring Event Sampling Parameters
Shallow Water Be	aring Unit					
Background W	/ell					
B-7 ⁽⁶⁾	23 to 28	812.07	815.20	N/A	(2)	VOCs, Metals, Cyanide
B-18A ⁽⁶⁾	36 to 41	809.53	812.25	N/A	(2)	VOCs, Metals, Cyanide
B-19A ⁽⁶⁾	8.5 to 13.5	810.03	813.13	812.81	(5)	VOCs, Metals, Cyanide
B-19AR ⁽⁶⁾	34 to 44	810.48	813.15	N/A	(2)	VOCs, Metals, Cyanide
Monitoring W	ell					
B-9	19 to 24	806.77	808.32	807.67	(3)	VOCs, Metals, Cyanide
MW-1	15 to 25	806.29	806.35	806.08	(3)	VOCs, Metals, Cyanide
MW-2	15 to 25	807.22	806.90	806.90		VOCs, Metals, Cyanide
MW-1-02	10 to 15	808.14	811.13	810.64	(2)	VOCs, Metals, Cyanide
MW-2-02	10 to 15	808.13	811.09	811.03	(3)	VOCs, Metals, Cyanide
MW-3-02	10 to 15	808.06	811.02	811.00	(3)	VOCs, Metals, Cyanide
MW-4-02	10 to 15	807.93	810.77	810.76	(4)	VOCs, Metals, Cyanide
PFW-2	11.9 to 14.4	807.04	809.94	809.43	(3)	VOCs, Metals, Cyanide
PFW-4	8.4 to 13.4	808.17	807.72	807.72		VOCs, Metals, Cyanide
PFW-9	6.7 to 9.2	807.41	810.49	810.05	(3)	VOCs, Metals, Cyanide
PFW-10	14.2 to 16.7	808.85	808.48	808.48		VOCs, Metals, Cyanide
PFW-11	8.1 to 10.6	809.63	809.40	809.40		VOCs, Metals, Cyanide
<u>Deep Aquifer</u>						
Background W	ell					
B-2D ⁽⁶⁾	62 to 72	800.61	804.32	803.97	(5)	VOCs, Metals, Cyanide
B-20D ⁽⁶⁾	83 to 88	813.37	816.61	N/A	(2)	VOCs, Metals, Cyanide
B-21D ⁽⁶⁾	91 to 96	820.06	822.60	N/A	(2)	VOCs, Metals, Cyanide
Monitoring W	ell					
B-27D	77 to 87	810.27	813.15	813.00	(3)	VOCs, Metals, Cyanide
MW-15-10	88 to 93	804.89	808.75	808.41	(3)	VOCs, Metals, Cyanide
MW-16-10	79 to 84	795.99	799.23	798.90	(3)	VOCs, Metals, Cyanide
PFW-1	81.3 to 86.3	807.83	809.78	809.77	(4)	VOCs, Metals, Cyanide

Notes:

Metals - Total metals (Dissolved Metals also if NTU is greater than 5)

Cyanide - Amenable cyanide

(1) Surveyed March 25, 2004, unless otherwise noted

(2) Surveyed December 2010/January 2010

(3) Surveyed December 2010/January 2011

(4) Surveyed December 2010/January 2011 for top of riser elevation only

(5) Surveyed April 2011

(6) Site-specific background well

SUMMARY OF WATER ELEVATION AND TURBIDITY READINGS FORMER PEREGRINE (US) INC. COLDWATER ROAD FACILITY GENESEE TOWNSHIP, MICHIGAN

Monitoring	Q	4 2010	Q2 2011		Q3	2011	Q	4 2011	Q1 2012		
_		Groundwater									
Well	Turbidity (NTU)	Elevation (ft AMSL)									
Shallow Water Be	earing Unit										
Background W	ell										
B-7 ⁽¹⁾	(2)	(2)	(2)	(2)	1.29	791.49	16.1	793.15			
B-18A ⁽¹⁾	(2)	(2)	(2)	(2)	3.77	787.36	2.32	786.82	1.88	789.14	
B-19A ⁽¹⁾	(2)	(2)	4.18	806.38	0.96	802.91	0.72	807.41			
B-19AR ⁽¹⁾	(2)	(2)	(2)	(2)	16.2	774.13	461	773.26	153	775.39	
Monitoring We	-11										
B-9	21.63	801.92	8.72	803.39	4.48	799.37	2.48	805.32			
MW-1	3.26	803.43	25.80	803.46	5.24	801.67	3.34	805.27			
MW-2	15	801.60	22.00	803.29	17	802.36	18.5	801.12			
MW-1-02	15.35	795.02	(4)	(4)							
MW-2-02	13.8	799.03	(4)	(4)							
MW-3-02	14.57	797.75	(4)	(4)							
MW-4-02	15.89	796.62	3.42	799.67	2.39	798.77	2.54	797.66			
PFW-2	7.19	803.75	3.95	803.04	2.09	801.24	1.16	805.11			
PFW-4	(3)	(3)	308.00	805.36	19.1	803.21	(3)	(3)			
PFW-9	6.6	803.15	2.90	802.82	2.37	801.29	1.52	804.37			
PFW-10	14.31	804.48	4.57	805.11	1.42	804.63	0.67	804.13			
PFW-11	1.85	803.20	7.61	807.62	2.63	807.52	4.28	808.22			
<u>Deep Aquifer</u>											
Background W	ell										
B-2D ⁽¹⁾	(2)	(2)	33.50	750.29	23.1	748.58	67.3	747.57	27.1	750.55	
B-20D ⁽¹⁾	(2)	(2)	(2)	(2)	61.9	744.98	27.7	744.54	23.5	746.83	
B-21D ⁽¹⁾	(2)	(2)	(2)	(2)	187	740.39	209	740.10	34.3	741.82	
Monitoring We	-11										
B-27D	79.3	734.05	41.00	735.60	40	735.12	7.51	734.80			
MW-15-10	82.74	729.36	181.00	730.26	10.9	730.07	15.3	729.74			
MW-16-10	72.9	730.42	16.40	730.86	12	730.70	3.31	730.37			
PFW-1	80.05	729.72	9.50	730.92	14.1	730.51	14.5	730.14			

Notes:

(1) Site-specific background location

(2) Location not yet part of monitoring program

(3) Location submegered under water and not sampled

(4) Location removed from monitoring program

SUMMARY OF OBG MW-9 AND OBG MW-10 DATA FORMER PEREGRINE (US) INC. COLDWATER ROAD FACILITY GENESEE TOWNSHIP, MICHIGAN

Monitoring	Ground Surface	Top of Casing		Water	Water	Managanese Analytica Results			
Well	Elevation (ft AMSL)	Elevation (ft AMSL)	Date	Level (ft BTOC)	Elevation (ft AMSL)	Total (mg/L) BV= 0.963	Dissolved (mg/L) BV=0.547		
OBG MW-9	806.94	809.97	11/4/2011	5.25	804.72	0.565	0.57		
			3/5/2012			0.591	0.562		
			4/5/2012	5.24	804.73				
OBG MW-10	808.70	811.54	11/4/2011	5.58	805.96	3.56	3.69		
			3/5/2012			2.62	2.57		
			4/5/2012	6.2	805.34				

<u>Notes</u>

All data presented in this table was collected and provided by OBG. BV - Former Peregrine Coldwater Road Facility Background Values ft AMSL - feet Above Mean Sea Level ft BTOC - feet Below Top Of Casing

SUMMARY OF GROUNDWATER RESULTS FORMER PEREGRINE (US) INC. COLDWATER ROAD FACILITY GENESEE TOWNSHIP, MICHIGAN

Monitoring Well Date		Constituent	Observed Concentration	Background Criteria	Screening Criteria Exceeded *	Most Stringent Criteria Exceeded	0	bsera	vatio	n	Recon A	nmena ction	led
			(<i>mg/L</i>) (<i>mg/L</i>) (<i>t</i>		(<i>mg/</i> L)	\boldsymbol{A}	В	С	D	1 2	3	4	
Shallow Wate	r Bearing Un	it - Monitoring Well Exc	ceedances										
B-9	9/14/2011	Manganese	6.8J	0.963	RDWC, NRDWC	0.05		х		Х	X	2	
MW-1	12/2/2010	Lead	0.0142	0.0035	RDWC, NRDWC	0.004	х	х		х	Х	2	
MW-2	12/3/2010	Arsenic	0.0279	0.01	RDWC, NRDWC, GSI	0.01	х	х			х		
MW-2	12/3/2010	Manganese	2.12	0.963	RDWC, NRDWC	0.05	х			х	2	2	
MW-2	9/12/2011	Manganese	2.5	0.963	RDWC, NRDWC	0.05				х	X	2	
MW-2	12/6/2011	Manganese	2.6	0.963	RDWC, NRDWC	0.05				х	X	2	
MW-2	9/12/2011	Manganese, Dissolved	2.7	0.547	RDWC, NRDWC	0.05				х	Х	2	
MW-2	12/6/2011	Manganese, Dissolved	2.6	0.547	RDWC, NRDWC	0.05				х	Х	2	
MW-3-02	12/2/2010	Manganese	1.95	0.963	RDWC, NRDWC	0.05	х	х		х	Σ	2	
MW-4-02	11/29/2010	Lead	0.0063	0.0035	RDWC, NRDWC	0.004	х	х		х	X	2	
PFW-2	9/12/2011	Manganese	1.4	0.963	RDWC, NRDWC	0.05				х	Х	2	
PFW-4	5/11/2011	Lead	0.0356	0.0035	RDWC, NRDWC	0.004				х	Σ	2	
PFW-4	9/12/2011	Lead	0.013	0.0035	RDWC, NRDWC	0.004				х	X	2	
PFW-11	12/2/2010	Lead	0.0125	0.0035	RDWC, NRDWC	0.004	х	х		х	Х	2	

Notes:

A - Sample from Q4 2010: well believed to have required additional purging prior to sampling due to lengthy duration between events.

B - Results is not believed to be representative. Prior and/or subsequent samples do not show similar concentrations.

C - Constituent not reported in on-Site shallow water bearing unit.

D - Constituent reported in on-Site shallow water bearing unit: source unknown.

1 - No further action warranted.

2 - Additional sampling recommended to confirm stability (2 years of annual).

3 - Monitoring well to be installed and sampled (5 rounds of quarterly).

4 - A work plan will be presented to prevent migration at this location.

* - Most stringent criteria shown in **bold**; criteria provided in adjacent column.

U - Background not present at or above the associated value.

J - Estimated Concentration

RDWC - Residential Drinking Water Criteria (2011)

NRDWC - Non Residential Drinking Water Criteria (2011)

GSI - Groundwater Surface Water Interface Criteria (2011)

SUMMARY OF GROUNDWATER RESULTS FORMER PEREGRINE (US) INC. COLDWATER ROAD FACILITY GENESEE TOWNSHIP, MICHIGAN

Monitoring Well Date		Constituent	Observed Concentration	Background Criteria	Screening Criteria Exceeded *	Most Stringent Criteria Exceeded	(Obser	vatio	n	R	ecom Act	nend ion	ed
			(<i>mg/</i> L)	(mg/L)		(<i>mg/</i> L)	A	В	С	D	1	2	3	4
Shallow Wate	<u>r Bearing Un</u>	it - Perimeter and Utility	Corridor Excee	<u>dances</u>										
BH-101	12/5/2011	Aluminum	53	10.5	RDWC, NRDWC	0.05			Х					Х
BH-101	12/5/2011	Arsenic	0.028	0.01	RDWC, NRDWC, GSI	0.01			х					Х
BH-101	12/5/2011	Chromium	0.11	0.031	RDWC, NRDWC, GSI	0.011			х					х
BH-101	12/5/2011	Iron	74	32.58	RDWC, NRDWC	0.3			х					х
BH-101	12/5/2011	Lead	0.068	0.0035	RDWC, NRDWC	0.004				х				х
BH-101	12/5/2011	Manganese	3.8	0.963	RDWC, NRDWC	0.05				х				х
BH-101	12/5/2011	Manganese, Dissolved	1.5	0.547	RDWC, NRDWC	0.05				х				х
BH-101	12/5/2011	Mercurv	0.00032	0.0002U	GSI	0.0000013			x					x
BH-101	12/5/2011	Vanadium	0.14	0.026	RDWC, NRDWC, GSI	0.0045			x					x
PII 102	12/5/2011	Managanaga	1.0	0.062		0.05				v			v	
DFI-105	12/5/2011	Manganese	1.5	0.965	RDWC, NRDWC	0.05				A W			A	
BH-103	12/5/2011	Manganese, Dissolved	1.4	0.547	KDWC, NKDWC	0.05				х			х	
BH-112	3/28/2011	Aluminum	140	10.5	RDWC, NRDWC	0.05			Х					Х
BH-112	3/28/2011	Arsenic	0.33	0.01	RDWC, NRDWC, GSI	0.01			х					х
BH-112	3/28/2011	Chromium	0.35	0.031	RDWC, NRDWC, GSI	0.011			х					х
BH-112	3/28/2011	Iron	540	32.58	RDWC, NRDWC	0.3			х					х
BH-112	3/28/2011	Lead	0.35	0.0035	RDWC, NRDWC	0.004				х				х
BH-112	3/28/2011	Manganese	14	0.963	RDWC, NRDWC	0.05				x				x
BH-112	3/28/2011	Manganese, Dissolved	1.2	0.547	RDWC, NRDWC	0.05				x				x
BH-112	3/28/2011	Mercurv	0.0011	0.0002U	GSI	0.0000013			x					x
BH-112	3/28/2011	Vanadium	0.49	0.026	RDWC, NRDWC, GSI	0.0045			x					x

Notes:

A - Sample from Q4 2010: well believed to have required additional purging prior to sampling due to lengthy duration between events.

B - Results is not believed to be representative. Prior and/or subsequent samples do not show similar concentrations.

C - Constituent not reported in on-Site shallow water bearing unit.

D - Constituent reported in on-Site shallow water bearing unit: source unknown.

1 - No further action warranted.

2 - Additional sampling recommended to confirm stability (2 years of annual).

3 - Monitoring well to be installed and sampled (5 rounds of quarterly).

4 - A work plan will be presented to prevent migration at this location.

* - Most stringent criteria shown in **bold**; criteria provided in adjacent column.

U - Background not present at or above the associated value.

J - Estimated Concentration

RDWC - Residential Drinking Water Criteria (2011)

NRDWC - Non Residential Drinking Water Criteria (2011)

GSI - Groundwater Surface Water Interface Criteria (2011)

ATTACHMENT A

SITE-SPECIFIC BACKGROUND DEVELOPMENT MEMORANDUM



651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2 Telephone: (519) 884-0510 Fax: (519) 884-0525 www.CRAworld.com

MEMORANDUM

To:	Richard Conforti (MDEQ)	Ref. No.:	012636
	m		
From:	Mike Tomka/Wesley Dyck/Daniela Araujo/kf/84	DATE:	January 18, 2013
CC:	Jack Schinderle/John McCabe/Joe Rogers/		
	William Yocum (MDEQ)/		
	Grant Trigger/Dave Favero (RACER)/		
	Anthony Finch/John O'Neill (OBG)		
RE:	Calculated Site-Specific Background Values for Inorga	nics in Groundw	ater - Revised
	RACER Trust Coldwater Road Industrial Land (former	Peregrine Plant)	
	Genesee Township, Michigan		

1.0 INTRODUCTION

On behalf of the Revitalizing Auto Communities Environmental Response (RACER) Trust, Conestoga-Rovers & Associates (CRA) has calculated Site-specific Background Values (BVs), also referred to as Background Threshold Values, for inorganics in groundwater for the Coldwater Road Industrial Land (Former Peregrine Plant) in Genesee Township, Michigan.

The evaluation was undertaken to develop BVs for inorganics in groundwater for use at the Coldwater Road Industrial Land (13270). Appropriate background groundwater data from the Coldwater Road Industrial Land and Coldwater Road Landfill Site were utilized to calculate the BVs. The remainder of this memorandum presents the details on the calculation of the BVs for inorganics in groundwater.

The calculation of BVs is discussed in the Michigan Department of Environmental Quality (MDEQ) document *Sampling Strategies and Statistics Training Materials for Part 201 Cleanup Criteria* (Michigan, 2002, referred to as the "S³TM"). However, in an email dated December 13, 2012 (see Attachment A), the MDEQ requested that the BVs be developed using an upper tolerance limit (UTL) with 95% confidence and 95% coverage. Site-specific BVs have been developed consistent with the MDEQ request including utilizing the ProUCL Technical Guide (USEPA, 2010), and using the current version (4.1.01) of the ProUCL software package.

2.0 <u>SCOPE OF BACKGROUND DATA</u>

Samples suitable for generating Site-specific BVs for inorganics in groundwater were collected from five shallow wells and three drift (deep) aquifer wells (Figure 1).

A total of nine background samples were collected from the shallow wells between May 2011 and March 2012.



A total of ten background samples were collected from the deep wells between May 2011 and March 2012.

Both total and dissolved concentrations of inorganics (metals) were reported and Site-specific BVs were calculated separately for each. For six dissolved metals (chromium, copper, iron, manganese, nickel and zinc), additional samples were available for calculating background values. The additional samples were collected between 1995 and 2012, resulting in a sample populations ranging from 59 to 124 samples.

The background data collected by CRA and O'Brien & Gere (OBG) which was utilized for the generation of Site-specific BVs are provided in Tables 1 and 2, respectively. The S³TM recommends a minimum of nine background samples for establishing Site-specific BVs ("Statistical Guidesheet 10" in Michigan, 2002). The number of background samples collected therefore meets or exceeds the requirements of the guidance.

3.0 STATISTICAL METHODS

Guidance for collecting and analyzing groundwater background samples in order to calculate Facility-Specific Background Concentrations (Site-specific BVs) for assessing compliance with Part 201 requirements is detailed in Chapter 4 of "Statistical Methods" (Tab 7, Section 4.3) of the S³TM. This guidance is also referred to in "Statistical Guidesheets 10, 1, 2 and 6" of the S³TM. Site-specific BVs are suitable for background comparisons performed on a point-by-point basis. However, as noted above in the introduction, more current statistical methods are recommended and implemented in USEPA's ProUCL software. Nonetheless, the requirements of the Michigan Part 201 guidance need to be considered in the Site-specific background calculations.

The general approach of USEPA (2010) in determining Site-specific BVs is to estimate an upper bound on the background population using a method appropriate for the observed data distribution (i.e., normal, gamma-distributed, lognormal or none of these). Statistical limits such as upper tolerance limits (UTLs) or upper prediction limit (UPLs) may be used. Such values take into consideration sampling variability (both in background sampling and in on-site sampling), and provide Site-specific BVs which are expected to rarely be exceeded in samples collected from groundwater consistent with background conditions (e.g., no more frequently than 1 in 20 samples, if a 95 percent value is selected).

As directed in the December 13, 2012 email, an upper tolerance limit with a 95 percent confidence and 95 percent coverage has been used in the Site-specific background calculations.

Statistical calculations were computed using USEPA's statistical software ProUCL (version 4.1.01). Chapter 3 of USEPA (2010) describes statistical methodologies for calculating Site-specific BVs. The selection of an appropriate method varies by characteristics of individual data, in particular (i) the observed data distribution, (ii) the percentage of non-detect values present, and (iii) the presence of statistical outliers.

ProUCL tests data distributions and the presence of non-detects in calculating Site-specific BVs. Based on the characteristics of each individual data set, a specific Site-specific background statistical method must be selected. For the background data sets considered in the evaluation, the following methods for calculating Site-specific BVs were identified by ProUCL (as indicated in the tabulated results):

• 95 percent UTL with 95 percent Coverage: a 95 percent Student's-t upper tolerance limit, used when a normal data distribution is present with few or no non-detects (see Section 3.4.1 of USEPA, 2010).

- 95 percent Wilson Hilferty (WH) Approximate Gamma UTL with 95% Coverage: a 95 percent approximate gamma upper tolerance limit, used when a gamma distribution (somewhat skewed, compared to a normal distribution) is encountered (see Section 3.4.5.3 of USEPA, 2010).
- 95 percent KM UTL with 95 percent Coverage: a 95 percent Student's-t upper tolerance limit using the Kaplan-Meier (KM) method to accommodate non-detect results, used when non-detects are present and/or non-normal data distributions are present (see Section 5.4.2.1 of USEPA, 2010).

For further discussion of specific BV calculation methodologies, please refer to Chapter 3 of the USEPA (2010).

A number of assumptions for background data set must be statistically assessed before the comparisons are performed. The following memorandum sections provide the required details for the statistical calculations.

3.1 <u>NON-DETECTS IN THE BACKGROUND DATA SET</u>

The calculation of BVs when non-detect data are present is considered in Chapter 5 of USEPA (2010). In particular, the Kaplan-Meier (KM) method for estimation of sample means and standard deviations when single or multiple detection limits are present is recommended (USEPA, 2010; Helsel, 2005). The KM method is described in Section 4.6 of USEPA (2010).

3.2 ASSESSMENT OF DATA CHARACTERISTICS AND ASSUMPTIONS

The selection of appropriate background value calculation methods varies with the characteristics of each data set (Michigan, 2002; USEPA, 2010). In selecting a BTV method, one must assess: (i) the observed data distribution, (ii) the percentage of non-detect values present, and (iii) the presence of statistical outliers. Methods for assessing these characteristics are provided in ProUCL.

ProUCL assesses each data set for the following distribution patterns (in priority order): normal, gamma-distributed, then lognormal. If a data set is found to be described by one of these distributions, then a BV calculation method for the observed data distribution is used. If, however, a particular data set does not follow one of these distributions, it is identified as not having an identifiable distribution and non-parametric (rank-based) statistical methods are used for subsequent calculations.

Once a data distribution has been established for a data set, an assessment of statistical outliers (extreme low or high values appearing atypical of the remaining data) is carried out considering the observed data distribution. In the current evaluation, any suspected statistical outliers were tested using Dixon's test (for up to 25 data points) or Rosner's test (for greater than 25 observations), both methods being included in ProUCL. Details of these methods are found in Section 4.4 of USEPA (2006). The appropriate treatment of outliers in background data sets is discussed in Section 2.2 of Tab 7 in the S³TM (Michigan, 2002). In the current assessment, the few outliers identified in the background data sets are considered to be "Facility-Specific Background samples collected off of the property of interest", and since no additional evidence was available to indicate that these observations were not representative of background conditions (e.g., demonstrable sample contamination or laboratory errors), they were retained in the development of BVs.

In the case that ProUCL and Dixon's test detect a possible presence of outliers, no data will be eliminated from the BV calculations, since the samples were collected from background areas and the data therefore believed to be associated with "local" conditions.

3.3 CALCULATION OF SITE-SPECIFIC BACKGROUND CONCENTRATIONS

As noted previously, BVs were calculated using the methods available in ProUCL. Specifically, 95% UTLs were utilized as the BVs, considering the observed data distributions and percentage of non-detect data present.

4.0 <u>RESULTS AND CONCLUSIONS</u>

Background threshold values (BVs) used as screening criteria for the Sites have been established for 19 metals (for both total and dissolved), as presented on Table 3. The calculated Site-specific BVs are representative of background conditions at the Coldwater Road Site. The BVs consist of the following:

- Shallow Water-Bearing Unit:
 - BVs were calculated in ProUCL for 11 total metal analytes and 11 dissolved metals using distribution-specific or non-parametric methods.
 - However, eight total metal analytes and eight dissolved metals were infrequently detected (i.e., in fewer than 20 percent of the samples obtained), and could not be subjected to statistical analysis using ProUCL. In these cases, BVs were established based on the maximum detected value or target detection limit (for data sets containing no detected values), which is considered a non-parametric statistical tolerance limit with less than 95 percent confidence (due to the number of background samples available).
- Deep Aquifer:
 - BVs were calculated using ProUCL for 12 total metal analytes and 10 dissolved metals.
 - Non-parametric UTLs were used as BVs for Seven total metal analytes and nine dissolved metals due to high percentages of non-detect results.

The calculated BVs are appropriate for point-by-point comparisons of on-Site data. Where on-Site concentrations of metals are above both the BV and the applicable generic industrial criterion, follow-up assessment may be necessary. In such cases, professional judgment is to be used to determine whether or not this is a *marginal* exceedance of the BV (per the footnote on page 7.85 of the S³TM).

The MDEQ email dated December 13, 2012 stated that for this Site, dissolved inorganics are most appropriate. Future sample collection at the Site for inorganic analysis will be for the dissolved fraction only. However, sample results to date include both total and dissolved, therefore, the BVs developed, both for total and dissolved inorganics will be used to evaluate existing data.

It is noted that the non-parametric tolerance limits (used when the background data set contained few or no detected values) do not achieve full 95th percentile coverage (due to the number of samples available) and therefore Site data at or slightly above such values may still be consistent with background conditions.

5.0 <u>REFERENCES</u>

- Helsel, D. R. 2005. Nondetects and Data Analysis. Statistics for Censored Environmental Data. John Wiley and Sons, N.Y.
- Michigan, 2002. Sampling Strategies and Statistics Training Materials for Part 201 Cleanup Criteria. Michigan Department of Environmental Quality, Environmental Response Division
- USEPA, 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance. Office of Resource Conservation and Recovery, Program Implementation and Information Division, United States Environmental Protection Agency Washington DC. EPA 530-R-09-007.
- USEPA, May 2010. ProUCL Version 4.1.00 Technical Guide (Draft). United States Environmental Protection Agency, Office of Research and Development, Washington DC. EPA/600/R-07/041.



12636-T09(MEMO084)GN-WA001 JAN 18/2013

CONCENTRATIONS OF TOTAL INORGANICS IN BACKGROUND GROUNDWATER RACER TRUST COLDWATER ROAD INDUSTRIAL LANDS GENESEE TOWNSHIP, MICHIGAN

					Total Meta	als in Shallow Wa	ter Bearing Unit			
	Sample Location: Sample ID:	B-7 GW-12636- 0915-SSH-022	B-7 GW-12636- 120511-JY-405	B-18A GW-12636- 091411-JY-020	B-18A GW-12636- 120511-JY-406	B-19A GW-12636- 051211-SSH-106	B-19A GW-12636-091411- JY-016/017	B-19A GW-12636- 120611-JY-412	B-19AR GW-12636- 0915-SSH-023	B-19AR GW-12636- 120811-JY-420
	Sample Date:	9/15/2011	12/5/2011	9/14/2011	12/5/2011	5/12/2011	9/14/2011	12/6/2011	9/15/2011	12/8/2011
Analyte	Units						orig,/dupl.			
Aluminum	mg/L	0.26	0.71	0.05 U	0.05 U	0.2 U	0.05 U/0.05 U	0.05 U	4	9.2
Antimony	mg/L	0.002 U	0.0002 J	0.002 U	0.002 U	0.002 U	0.002 U/0.002 U	0.002 U	0.002 U	0.002 U
Arsenic	mg/L	0.005 U	0.005 U	0.0038 J	0.0066	0.005 U	0.005 U/0.005 U	0.005 U	0.0035 J	0.0086
Barium	mg/L	0.054 J	0.057 J	0.033 J	0.034 J	0.0671 J	0.068 J/0.067 J	0.072 J	0.072 J	0.13
Beryllium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U/0.001 U	0.001 U	0.001 U	0.001 U
Cadmium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U/0.001 U	0.001 U	0.001 U	0.001 U
Chromium	mg/L	0.005 U	0.008	0.005 U	0.005 U	0.005 U	0.005 U/0.005 U	0.005 U	0.0078	0.03
Cobalt	mg/L	0.007 U	0.007 U	0.007 U	0.0034 J	0.007 U	0.007 U/0.007 U	0.007 U	0.0027 J	0.0056 J
Copper	mg/L	0.0025 U	0.0039	0.002 U	0.002 U	0.002 U	0.002 U/0.002 U	0.002 U	0.0045 U	0.0096
Iron	mg/L	0.3	0.84	0.1 U	0.65	0.0927 J	0.1 U/0.1 U	0.1 U	5.1	12
Lead	mg/L	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U/0.003 U	0.003 U	0.0029 J	0.0023 J
Manganese	mg/L	0.03	0.016	0.015	0.26	0.0065 J	0.0057 J/0.0032 J	0.015 U	0.12	0.26
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U/0.0002 U	0.0002 U	0.0002 U	0.0002 U
Nickel	mg/L	0.0044 J	0.0043 J	0.02 U	0.02 U	0.02 U	0.02 U/0.02 U	0.02 U	0.01 J	0.023
Selenium	mg/L	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U/0.005 U	0.005 U	0.005 U	0.005 U
Silver	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U/0.0002 U	0.0002 U	0.00053	0.0002 U
Thallium	mg/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U/0.001 U	0.00058 J	0.001 U	0.001 U
Vanadium	mg/L	0.004 U	0.0014 J	0.004 U	0.004 U	0.004 U	0.004 U/0.004 U	0.004 U	0.0096	0.023
Zinc	mg/L	0.02 U	0.01 J	0.02 U	0.02 U	0.02 U	0.02 U/0.02 U	0.02 U	0.035 U	0.039 U

Notes:

J - Estimated concentration. U - Not present at or above the associated value. 0.05 U/0.05 U - field duplicate.

CONCENTRATIONS OF TOTAL INORGANICS IN BACKGROUND GROUNDWATER RACER TRUST COLDWATER ROAD INDUSTRIAL LANDS GENESEE TOWNSHIP, MICHIGAN

						Total Metals in	n Deep Aquifer				
	Sample Location: Sample ID:	B-2D GW-12636- 051211-SSH-107	B-2D GW-12636- 091411-JY-019	B-2D GW-12636-120711- JY-418/419	B-2D GW-12636- 032812-JY-004	B-20D GW-12636- 0915-SSH-025	B-20D GW-12636- 120811-JY-421	B-20D GW-12636- 032812-JY-005	B-21D GW-12636- 0915-SSH-024	B-21D GW-12636- 120811-JY-422	B-21D GW-12636-032812- JY-006/007
	Sample Date:	5/12/2011	9/14/2011	12/7/2011 orig./dupl.	3/28/2012	9/15/2011	12/8/2011	3/28/2012	9/15/2011	12/8/2011	3/28/2012 orig./dupl.
Analyte	Units										
Aluminum	mg/L	0.498	0.26	1.6/1.7	0.67	1.1	0.52	0.53	0.17	3.7	0.79/0.87
Antimony	mg/L	0.002 U	0.002 U	0.002 U/0.002 U	0.002 U	0.002 U	0.002 U	0.00025 J	0.002 U	0.002 U	0.00013 J/0.00014 J
Arsenic	mg/L	0.004 J	0.013	0.0038 J/0.005 U	0.005 U	0.04	0.039	0.038	0.054	0.045	0.052/0.054
Barium	mg/L	0.0833 J	0.31	0.084 J/0.093 J	0.082 J	0.05 J	0.053 J	0.05 J	0.16	0.18	0.17/0.17
Beryllium	mg/L	0.001 U	0.001 U	0.001 U/0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U/0.001 U
Cadmium	mg/L	0.001 U	0.001 U	0.001 U/0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U/0.001 U
Chromium	mg/L	0.005 U	0.005 U	0.0031 J/0.003 J	0.005 U	0.005 U	0.005 U	0.005 U	0.0025 J	0.0067	0.005 U/0.0029 J
Cobalt	mg/L	0.007 U	0.007 U	0.007 U/0.007 U	0.007 U	0.007 U	0.007 U	0.007 U	0.0018 J	0.003 J	0.007 U/0.007 U
Copper	mg/L	0.0091	0.0021 U	0.004/0.0043	0.0032	0.0037 U	0.0026 U	0.0025	0.002 U	0.0073	0.0024/0.0029
Iron	mg/L	3.23	2.2	1.9/2.2	0.99	3.4	2.5	2.7	4.4	7	2.1/2.1
Lead	mg/L	0.003 U	0.003 U	0.003 U/0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.0022 J	0.003 U	0.003 U/0.003 U
Manganese	mg/L	0.167	0.13	0.052/0.057	0.039	0.08	0.064	0.064	0.15	0.18	0.052/0.053
Mercury	mg/L	0.0002 U	0.0002 U	0.0002 U/0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U/0.0002 U
Nickel	mg/L	0.02 U	0.02 U	0.02 U/0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.0055 J	0.0065 J	0.02 U/0.0035 J
Selenium	mg/L	0.005 U	0.005 U	0.005 U/0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U/0.005 U
Silver	mg/L	0.0002 U	0.0002 U	0.0002 U/0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U/0.000094 J
Thallium	mg/L	0.001 U	0.0021 U	0.001 U/0.001 U	0.00019 J	0.001 U	0.001 U	0.00028 J	0.001 U	0.001 U	0.00018 J/0.001 U
Vanadium	mg/L	0.004 U	0.004 U	0.0041/0.0032 J	0.0013 J	0.004 U	0.0025 J	0.0013 J	0.0047	0.01	0.0018 J/0.0025 J
Zinc	mg/L	0.02 U	0.02 U	0.02 U/0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.039 U	0.039	0.02 U/0.02 U

Notes:

J - Estimated concentration.

U - Not present at or above the associated value. 1.6/1.7 - field duplicate.
i) Challery Mater Ba						CON	CENT	RATIC R	ONS OF	F DISSC FRUST GEI	OLVED COLD NESEE	INORO WATEI TOWN	GANICS IN B R ROAD IND SHIP, MICHI	ACKG USTRI IGAN	ROUN AL LAI	D GROUNDW. NDS	ATER						
1) Shallow Water Be Sample	location:	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7
Dissolved metal	Date:	5/21/1995	3/31/1995	2/9/1996	5/19/1996	3/21/1996	11/13/1996	5/6/1997	5/4/1998	11/5/1998	4/26/1999	11/5/1999	1/26/2000	12/8/2000	5/16/2001	10/18/2001	5/16/2002	11/7/2002	5/4/2003	11/13/2003	5/30/2004	12/9/2004	5/8/2005
Aluminum	(mg/L)																						
Antimony	(mg/L)																						
Arsenic	(mg/L)																						
Barium	(mg/L)																						
Beryllium Cadmium	(mg/L) (mg/L)																						
Chromium	(<i>mg/L</i>)	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.01/<0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.005
Cobalt	(mg/L)																						
Copper	(mg/L)	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.01/<0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Iron	(mg/L)									0.01		0.26		0.05		0.33		0.25		0.19		0.18	0.17
Lead	(<i>mg/L</i>)																						
Manganese Mercury	(mg/L) (mg/L)									0.424		0.313 						<0.005		<0.005		0.074	0.031
Nickel	(<i>mg/</i> L)	< 0.03	< 0.04	$<\!0.04$	< 0.02	< 0.02	< 0.02	0.014	< 0.005	0.008	0.01	0.008	< 0.005/0.006	0.02	0.007	0.005	< 0.005	0.005	< 0.005	< 0.005	0.009	0.007	0.009
Selenium	(mg/L)																						
Silver	(<i>mg/</i> L)																						
Thallium	(<i>mg/</i> L)																						
Vanadium	(<i>mg/</i> L)																						
Zinc	(mg/L)	< 0.02	< 0.02	0.022	0.02	0.06	0.05	0.01	0.02	0.03	< 0.01	0.03	<0.01/0.01	0.01	< 0.01	< 0.01	0.01	0.005	< 0.005	0.005	0.007	0.014	0.013
ii) Deep Aquifer																							
Sample	location:	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D
	Date:	,21/1995	,31/1995	,19/1996	,21/1996	./13/1996	,6/1997	/6/1997	,4/1998	/5/1998	,26/1999	/5/1999	<i>,</i> 26/2000	2/8/2000	,15/2001	0/18/2001	16/2002	/7/2002	'3/2003	/13/2003	/30/2004	2/10/2004	8/2005
Dissolved metal		6/	8/	6/	8	11	5/	11	5/	11	4/	11	4/	11	5/	10	5/	11	6/	11	6/	12	6/
Aluminum	(mg/L)																						
Antimony	(mg/L)																						
Arsenic	(mg/L)																						
Barium	(mg/L)																						
Geryllium Certuium	(mg/L)																						
Caamium	(mg/L)		<0.02		<0.02																		
Calvalt	(mg/L)	N0.02	< 0.02	<0.02	< 0.02	< 0.02	0.01	<0.01	<0.01	<0.01	<0.01	N0.01	<0.01	<0.01	N0.01	<0.01/<0.01	N0.01	<0.005/<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt	(mg/L)		<0.02		<0.02																		
Copper	(mg/L)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	< 0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01/<0.01	<0.01	<0.005/<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Iron	(mg/L)							0.28		<0.01		0.07		0.04		0.23/ 0.21		0.14/0.14		0.11		0.76	0.66
<i>Lеии</i>	(mg/L)									0.017		0.001											
Manganese	(mg/L)							0.577		0.017		0.021						0.006/0.006		0.007		0.145	0.199
Niercury	(mg/L)						0.020			 <0.00E		 <0.00E			 -0.00E	 -0.00E / -0.00E							
Nickei Salanium	(mg/L)	<0.03	\0.04	~0.02	\0.02	∼ 0.02	0.028	0.039	~0.005	~0.005	~0.005	~0.005	NU.005	0.009	~0.005	~0.005/ ~0.005	~0.005	~0.005/ ~0.005	~0.005	~0.005	~0.005	~0.005	~0.005
Selenium	(mg/L)																						
511ver Th~11:	(mg/L) (mg/L)																						
I nutitum Vanadiana	(mg/L) (mg/L)																						
v unuunum Zine	(mg/L)																						
Linc	(mg/L)	NU.U2	∼ 0.02	∼ 0.02	0.05	0.03	0.03	NU.U1	NU.U1	0.01	N0.01	0.04	NU.U1	\U.U1	NU.U1	<u>\0.01/\0.01</u>	NU.01	~0.005/ <0.005	~0.005	~0.005	0.007	0.01	~0.005

CONCENTRATIONS OF DISSOLVED INORGANICS IN BACKGROUND GROUNDWATER RACER TRUST COLDWATER ROAD INDUSTRIAL LANDS GENESEE TOWNSHIP, MICHIGAN

i) Shallow Water Be	aring Unit	<u>+</u>							GENES	DEE IU	WIN5HI	r, wit	піgar	N									
Sample	location:	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-7	B-18A	B-18A	B-18A	B-18A	B-18A	B-18A
	Date:	/7/2005	29/2006	/29/2006	7/2007	/14/2007	25/2008	/17/2008	24/2009	/17/2009	17/2010	/8/2010	22/2011	15/2011	/16/2011	/5/2011	27/2012	21/1995	31/1995	9/1996	19/1996	21/1996	/13/1996
Dissolved metal		12,	(9)	11	(9	11	()	11,	()	11	(9	11,	(9)	6/6	11,	12,	6/3	9	8	2/3	9	8	11,
Aluminum	(mg/L)													0.05 U		0.05 U							
Antimony	(mg/L)													0.002 U		0.00014 J							
Arsenic	(mg/L)													0.005 U		0.005 U							
Barium	(mg/L)													0.051 J		0.053 J							
Beryllium	(mg/L)													0.001 Ú		0.001 Ú							
Cadmium	(mg/L)													0.001 U		0.001 U							
Chromium Cobalt	(mg/L) (mg/L)	0.01	0.005	<0.005	0.011	0.014	<0.005	< 0.005	< 0.005	<0.005	<0.005	0.017	0.01	0.005 U 0.007 U	<0.005	0.0035 J 0.007 U	<0.005	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	<0.02
Conner	(mg/L)	<0.004	<0.004	<0.004	0.027	0.006	0.003	0.003	0.003	<0.004	<0.004	<0.004	<0.004	0.0027 U	0.006	0.0031	<0.004	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Iron	(mg/L)	0.15	0.19		0.13		0.35		0.067		<0.02		0.22	01U		01U	<0.02						
Lead	(mg/L)													0.003 U		0.003 U							
Manganese	(mg/L)	0.05	0.15		0.042		0.01		0.036		0.047		0.006	0.0036 I		0.0085 I	0.058						
Mercuru	(mg/L)	0.00	0.15		0.042		0.01		0.050		0.047		0.000	0.0002 II		0.0002 II	0.000						
Nickel	(mg/L)	0.006	0.009	0.009	0.005	0.016	0.006	0.005	<0.005	<0.005	<0.005	<0.005	0.005	0.0002 C	0.008	0.021	<0.005	<0.03	<0.04	<0.04	<0.02	<0.02	<0.02
Selenium	(mg/L)		0.007			0.010			-0.000	-0.000		-0.000		0.005 U		0.005 U	-0.000	-0.00	-0.01	-0.01	-0.02	-0.02	-0.02
Silver	(mg/L)													0.0002 U		0.0002 U							
Thallium	(mg/L)													0.0002 C		0.0002 C							
Vanadium	(mg/L)													0.001 U		0.004 U							
Zinc	(<i>mg/L</i>) (<i>mg/L</i>)	0.02	0.018	0.011	0.014	0.02	< 0.005	0.017	0.014	< 0.005	< 0.005	< 0.005	0.006	0.02 U	0.011	0.02 U	< 0.005	0.15	< 0.02	< 0.02	< 0.02	0.06	0.07
ii) Deen Aquifer																							
Sample	location:	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D	B-2D	B-20D	B-20D	B-20D	B-20D	B-20D
	Data	2005	2006	/2006	007	/2007	2008	/2008	2009	/2009	2010	/2010	2011	2011	/2011	2011	2012	2012	1995	1995	966	1996	1996
D: 1 1 / 1	Dute.	2/8/	/28/	1/30	/8/2	1/14	/25/	1/20	/25/	1/16	/16/	1/10	/21/	/14/	1/15,	5/2/	/28/	/27/	/21/	/31/	1/6/	/19/	/21/
Dissolvea metal		1	6	÷	6	÷	6	÷	6,	÷	6	÷	6,	6	÷		n n n	6,	6	8	3	9	°,
Aluminum	(mg/L)													0.05 U		0.044 J/ 0.055	0.05 U						
Antimony	(mg/L)													0.002 U		0.002 U/0.002 U	0.002 U						
Arsenic	(mg/L)													0.014		0.005 U/0.005 U	0.005 U						
Durium Damilliou	(mg/L)													0.001 II		0.075 J/ 0.079 J	0.00 J						
Бегушит Соличіння	(mg/L)													0.001 U		0.001 U/0.001 U	0.001 U						
Clumium	(mg/L)		 -0.00E / -0.00E	 <0.00E										0.001 U		0.001 U/0.001 U	0.001 U				0.022		
Cabalt	(mg/L)	0.009	<0.003/<0.003	~0.005	0.008	0.001	<0.005	\0.005	\0.005	\0.005	\0.005	0.011	0.009	0.005 U	\0.005	0.005 U/ 0.0022 J	0.005 U	\0.005	N0.02	N0.02	0.032	N0.02	\0.02
Coball	(mg/L)				0.002				0 202					0.007 U		0.007 U/0.007 U	0.007 U				0.029		
Copper	(mg/L)	<0.004 0.14	<pre><0.004/<0.004 0.11/0.12</pre>	<0.004	0.002	0.001	0.001	<0.001	0.205	\0.004	<0.004 0.04	< 0.004	\0.004	0.002 0	<0.004	0.002 0/0.002 0	0.002 0	<0.004	N0.02	0.02	0.028	N0.02	N0.02
Iron	(mg/L)	0.14	0.11/ 0.12		0.11		0.35		0.022		0.04		0.25	1.4		0.1 U/0.091 J	0.1 0	N0.02					
Leau Манализа	(mg/L)	0.12					0.022						 0.0EE	0.005 U		0.005 U / 0.005 U	0.005 U	0.025					
Mangunese	(mg/L)	0.12	0.07/0.07		0.104		0.032		0.077		0.085		0.055	0.00		0.0004 J/ 0.0074 J	0.0000 J	0.025					
Niercury	(mg/L)	 -0.00E	 -0.00E / -0.00E	 <0.00E			0.005							0.0002 U		0.0002 U/0.0002 U	0.0002 U				0.054		
INICKEI Salauiuuu	(mg/L)	~0.005	~0.005/~0.005	~0.005	0.001	0.004	0.005	~0.005	~0.005	~0.005	~0.005	~0.005	~0.005	0.02 U	~0.005	0.02 0/0.02 0	0.02 U	~0.005	\0.03	\0.04	0.054	∼0.0 ∠	<u>∼0.02</u>
Selenium	(mg/L)													0.000 U		0.000 U/0.000 U	0.000 U						
Thellium	(mg/L)													0.0002 U		0.0002 0/0.0002 U	0.0002 0						
1 nutitum Var a diam	(mg/L)													0.001 U		0.00014 J/ 0.0004 J	0.00017 J						
v unuutum Zinc	(mg/L)		 0 000 /0 000			0.000								0.004 0			0.004 U				0.12	<0.02	
Linc	(mg/L)	~0.01	0.000/0.008	0.018	0.006	0.009	0.007	~0.005	0.113	0.006	~0.005	~0.005	~0.005	0.02 U	~0.005	0.02 U/ 0.02 U	0.02 U	~0.005	~0.02	~0.02	0.12	~0.02	0.04

CONCENTRATIONS OF DISSOLVED INORGANICS IN BACKGROUND GROUNDWATER RACER TRUST COLDWATER ROAD INDUSTRIAL LANDS GENESEE TOWNSHIP, MICHIGAN

i) Shallow Water Bearing Unit

Samule	location	B-18A	B-18A	B-18A	B-18A	B-18A	B-18A	B-18A	B-18A	B-18A	B-18A	B-18A	B-18A	B-18A	B-18A	B-18A	B-18A	B-18A	B-18A	B-18A	B-18A	B-18A	B-18A	B-18A
Sumple	100001010	D 10/1	D 1011	0 10/1	D 10/1	D 1011	D 10/1	0 10/1	DION	D 10/1	-	<i>D</i> 1011	D 10/1	0 10/1	- 1011 	0 10/1	D 1011	D 1011	<i>D</i> 10/1	0 10/1	1011 \0	<i>D</i> 10/1	N 1011	D 1011
		5	67	œ	98	66	66	00	00	01	500	02	02	3	000	04	04	ß	05	90	000	⊵	200	08
	Date:	661	/19	661	/19	/19	/19	/20	/20	/20	/2	/20	/20	200	3/2	/20	/20	200	/20	/20)/2	200	ľ/2	/20
		()	/9/	4/2	/5/	26/	/5/	26/	/8/	16/	/17	16/	17	4/:	/13	29/	6/	8/2	/8/	27/	/3(4/2	/14	25/
Dissolved metal		5/	11	5/	11	4/	11	4/	12	5/	10,	5/	11	6/.	11	6/	12,	6/	12	6/	11	6/.	11	6/
Aluminum	(mg/L)																							
Antimony	(mg/L)																							
Arsenic	(mg/L)																							
Barium	(<i>mg/</i> L)																							
Beryllium	(mg/L)																							
Cadmium	(mg/L)																							
Chromium	(mg/L)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.01/<0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.011	0.005	0.005	0.009	0.001	< 0.005
Cobalt	(mg/L)																							
Copper	(mg/L)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.01/<0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.004	0.004	< 0.004	0.003	0.002	0.002
Iron	(mg/L)		0.38		0.24		0.18		< 0.01/0.04		0.35		0.19		0.16		0.9	0.17	0.39	0.17		0.11		0.31
Lead	(mg/L)																							
Manganese	(mg/L)		0.062		0.128		0.155						0.026		< 0.005		0.363	0.08	0.17	0.05		0.022		< 0.005
Mercury	(mg/L)																							
Nickel	(mg/L)	0.013	0.062	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.015/0.013	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.007	0.009	0.006	< 0.005	< 0.005	< 0.005	0.003	0.006	< 0.005
Selenium	(mg/L)																							
Silver	(mg/L)																							
Thallium	(mg/L)																							
Vanadium	(mg/L)																							
Zinc	(mg/L)	0.01	0.01	0.02	0.01	0.02	0.06	0.03	< 0.01/< 0.01	0.01	< 0.01	0.01	< 0.005	0.005	< 0.005	0.01	0.012	0.016	0.01	0.046	0.009	0.014	0.011	0.011
									,															
ii) Deen Aauifer																								
ii) Deep Aquifer Sample	location	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D
ii) Deep Aquifer Sample	location:	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D
ii) Deep Aquifer Sample	location:	B-20D 966	B-20D	B-20D	B-20D ∞	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D පු	B-20D පු	B-20D භ	B-20D	B-20D	B-20D	B-20D ഗ	B-20D	B-20D	B-20D	B-20D	B-20D
ii) Deep Aquifer Sample	location: Date:	B-20D 9661/{	B-20D	B-20D 2661,	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D	B-20D 2007,	B-20D	B-20D	B-20D 8/2003	B-20D	B-20D	B-20D	B-20D	B-20D 9007,	B-20D 9007/(B-20D	B-20D 2007/
ii) Deep Aquifer Sample	location: Date:	B-20D 9661/E1/	B-20D	B-20D	B-20D	B-20D 8661/2/	B-20D 6661/97	B-20D	B-20D 0007/97	B-20D	B-20D 1007/51	B-20D	B-20D 2007/91	B-20D	B-20D	P-20D B-20D	B-20D 767	B-20D	B-20D	B-20D 5007/8/	B-20D 9007/87	B-20D 9007/0£/	B-20D	B-20D 2002/E1/
ii) Deep Aquifer Sample Dissolved metal	location: Date:	B-20D B-201/01/11/13/1096	B-20D 26/1/9/2	B-20D 2661/9/11	B-20D 8-61/4/1	B-20D	B-20D 6661/97/7	B-20D 6661/2/11	B-20D 00007/97/7	B-20D 0002/8/21	B-20D 1002/21/2	B-20D 100/81/01	B-20D 2002/91/2	B-20D 2002/2/11	B-20D £002/£/9	11/13/2003 B-20D	B-20D #002/67/9	B-20D B-2004 B-20D	B-20D 5002/2/9	B-20D 5002/8/21	B-20D 9007/87/9	B-20D 8-2006 B-20D	B-20D 2/8/9	B-20D 2002/E1/11
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum	location: Date: (mg/L)	B-20D 9661/21/11 +	B-20D //9/2 +	B-20D 2661/9/11 +	B-20D	B-20D 8661/2/11	B-20D	B-20D 6661/2/11 1	B-20D007/57/7	B-20D 12/8/200	B-20D 102/21/2	B-20D 1007/81/01 +	B-20D - 2002 - 1	B-20D 2002/2/11 +	B-20D 8-2003 1	B-20D B-2003 B-2	B-20D F002/62/9	B-20D 12/10/2004 B-20D	B-20D 5005/7/2 1	B-20D 5005/8/21 +	B-20D 9007/87/9 +	B-20D 900/2006 -	B-20D 2007/8/9	B-20D 11/13/2007
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum Antimony	location: Date: (mg/L) (mg/L)	B-20D 9661/11/11 1	B-20D 1 1 2/6/1997	B-20D 2661/9/11 + +	B-20D 8-61/4/1 1	B-20D 8661/2/11 + +	B-20D 6661/97/F I I	B-20D 6661/2/11 1 1	B-20D 	B-20D 12/8/2000	B-20D 1007/51/5 + +	B-20D 1007/81/01 + +	B-20D 2007/91/2 1	B-20D 2007/2/11 + +	B-20D £007/£/9 + +	B-20D 8-2003 11/11 1 1	B-20D #007/67/9 1 1	B-20D B-2004 I I	B-20D <u>\$007/2/9</u> ; ;	B-20D 5002/8/21 + +	B-20D 9007/87/9 : :	B-20D 9002/08/11 + +	B-20D 2007/8/9 : -	B-20D 2002/E1/11 + +
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum Antimony Arsenic	location: Date: (mg/L) (mg/L) (mg/L)	B-20D 9661/21/11 ! ! !	B-20D 2661/9/2 ! ! !	B-20D 2661/9/11 + + +	B-20D 8661/ 1 /5 1 1	B-20D 8661/2/11	B-20D 6661/97/7 1 1	B-20D 6661/2/11 1 1	B-20D 0007/5/4 	B-20D 0007/8/21	B-20D 1007/21/2	B-20D 1007/81/01 1 1 1	B-20D 2002/91/2 : : :	B-20D 2007/2/11 + + +	B-20D E002/2/9 + + +	B-20D 11/13/2003	B-20D #007/67/9 ! ! !	B-20D B-2004 I I I I I I I I I I I I I I I I I I	B-20D 2002/2/9 + + +	B-20D 5002/8/211	B-20D 9007/87/9	B-20D 9002/02/11	B-20D 2007/8/9	B-20D 2002/21/11 + + +
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum Antimony Arsenic Barium	location: Date: (mg/L) (mg/L) (mg/L) (mg/L)	B-20D 9661/E1/11	B-20D 2661/9/2	B-20D 2661/9/11	B-20D 8661/7/2 1 1 1	B-20D 8661/2/11	B-20D 	B-20D 6661/2/11	B-20D 0007/5/7 	B-20D 0007/8/21	B-20D 1007/21/2	B-20D 1002/81/01	B-20D	B-20D 2007/2/11	B-20D £002/£/9 + + + +	B-20D 111/13/2003	B-20D * 007/67/9 *	B-20D	B-20D2 	B-20D 	B-20D 9007/87/9 + + + +	B-20D 9002/02/11	B-20D 2007/8/9 	B-20D 2002/21/11
ii) Deep Aquifer Sample <u>Dissolved metal</u> <u>Aluminum</u> Antimony Arsenic Barium Beryllium	location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-20D 9661/11 1 1	B-20D 2661/9/2	B-20D 2661/9/11	B-20D	B-20D 8661/2/11	B-20D	B-20D 6661/2/11 + + + + +	B-20D 00007/97/ 7 	B-20D 0007/8/21	B-20D 1002/21/2 + + + + + + + + + + + + + + + + + + +	B-20D 1002/81/01 + + + + + + +	B-20D 2002/91/2	B-20D 2002/2/11	B-20D - 2003 		B-20D 	B-5004 12/10/2004	B-20D2 - 6/7/2005 	B-20D2 	B-20D 	B-20D 9002/02/11	B-20D 2007/8/9 	B-20D 2002/21/11
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum Antimony Arsenic Barium Beryllium Cadmium	location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-20D 9661/11/11 + + + + + + + + + + + + + + + +	B-20D 266/16/2	B-20D 2661/9/11	B-20D	B-20D 8661/2/11	B-20D	B-20D 6661/2/11 + + + + + + + + + + + + + + + + + +	B-20D 00007/97/7 	B-20D 0007/8/21	B-20D 1007/21/2	B-20D 1002/81/01 + + + + + + + + + + + + + + + + + + +	B-20D 2005/16/2005	B-20D 2002/2/11	B-20D 6002/2/9	B-20D	B-20D +005/5004 	B-5004 12/10/2004	B-20D 	B-2005 	B-20D 9007/87/9	B-20D 9002/02/11	B-20D 2007/8/9	B-20D 2007/81/11
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium	location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-20D 9661/11/11	B-20D 266(1) 	B-20D 2661/9/11	B-20D 8661/7 <0.01	B-20D 8661/2/11 <0.01/<0.01	B-20D 6661/97/7 	B-20D 6661/2/11 -	B-20D 0007/92/7 	B-20D0 	B-20D 1007/21/2 	B-20D 1007/18/2001	B-20D 2005/91/2 	B-20D 2007/111	B-20D 6007/6/9 -	B-20D E0007/E1/11 	B-20D f002/62/9 <0.005	B-20D For the second s	B-20D \$007 \$007	B-20D 9002/8/2002 0.011	B-20D 9002/82/9 0.007	B-20D 9002/009 	B-20D 2007/8/9 0.01	B-20D 2007/E1/11
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt	location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-20D 9661/11/11	B-20D 2661/9/2	B-20D 2661/9/11	B-20D 8661/4/1 	B-20D 8661/2/11 <0.01/<0.01	B-20D 6661/92/4 	B-20D 6661/2/11 -	B-20D 0007/92/4 <0.01 	B-20D0 12/8/2000 	B-20D 1007/21/2 	B-20D 1007/81/01	B-20D 2005/16/2005 	B-20D 2007/2/11 	B-20D 6007/6/9 -	B-20D E0007/E1/11 	B-20D 7007/67/9 -	B-20D For the second s	B-20D \$007 \$007 \$0,007 \$0,007 \$0,007	B-20D 9002/8/2002 0.011 	B-20D 9007/82/9 	B-20D 9007/00/11	B-20D 2007/8/9 0.01 	B-20D 2007/E1/11
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper	location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-20D 9661/E1/11 <0.02 <0.02	B-20D 2661/9/2 <0.01 <0.01	B-20D 2661/9/11	B-20D 8661/4/1 <0.01 <0.01	B-20D 8661/5/11 <0.01/<0.01 <0.01/<0.01	B-20D 6661/92/4 	B-20D 66661/2/11 - <0.01 - <0.01	B-20D 0007/92/7 <0.01 <0.01	B-20D 0007/8/21 <0.01 <0.01	B-20D 1007/21/2 	B-20D 1007/81/01 	B-20D 2005 2/16/2005 -	B-20D C007/2/11 <0.005 <0.005	B-20D 6007/6/9 -	B-20D 6007/61/11 	B-20D F007/67/9 <0.005 <0.005	B-20D 4002/01/20 -	B-20D 50002/2/9 0.0007 <0.0005	B-20D 5002/8/201 0.011 <0.004	B-20D 9007/82/9 0.007 <0.004	B-20D 9007/08/11 0.006 <0.004	B-20D 2007/8/9 0.01 0.022	B-20D 2007/E1/11
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Iron	location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-20D 9661/21/11	B-20D 2661/9/2	B-20D 2661/9/11 <0.01 0.02 0.26	B-20D 8661/1908 <0.01 <0.01 	B-20D 8661/2/11 <0.01/<0.01 <0.01/<0.01	B-20D 6661/97/7 	B-20D 66661/2/11 <0.01 0.13	B-20D 0007/97/7 <0.01 <0.01 	B-20D 0007/8/71 <0.01 0.02	B-20D 1007/21/2 <0.01 <0.01	B-20D 1007/81/01 <0.01 0.3	B-20D 2005 2/16/2005 <0.01 <0.01	B-20D C007/2/11 <0.005 0.25	B-20D E0007/E/9 <0.005 <0.005 	B-20D 6007/61/11 <0.005 0.2	B-20D F007/67/9 <0.005 <0.005 	B-20D 4007/01/21 <0.005 2.11	B-20D <u>5007</u> /2/9 0.007 <0.005 2.14	B-20D 5007/8/21 0.011 <0.004 0.12	B-20D 9007/87/9 0.007 <0.004 2.12	B-20D 9007/08/ 0.006 <0.004 	B-20D 2007/8/9 0.01 0.022 0.61	B-20D 2007/81/11 0.003 0.001
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Iron Lead	location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-20D 9661/21/11 <0.02 <0.02 	B-20D 2661/9/2	B-20D 2661/9/11 <0.01 0.02 0.26 	B-20D 8661/1908 <0.01 <0.01 	B-20D 8661/5/11 <0.01/<0.01 <0.01/<0.01 <0.01/0.17	B-20D 6661/97/7 	B-20D 66661/2/11 <0.01 0.13 	B-20D 0007/97/7 <0.01 <0.01 	B-20D 0007/8/21 <0.01 0.02 	B-20D 1007/51/2 <0.01 <0.01 	B-20D 1007/81/01 <0.01 0.3 	B-20D 2005 2/16/2005 <0.01 <0.01 -	B-20D C007/2/11 	B-20D 6007/6/9 <0.005 <0.005 	B-20D 6007/61/11 <0.005 0.2 	B-20D F0007/67/9 <0.005 <0.005 	B-20D * 0007/01/71 <0.005 2.11 	B-20D <u>5007</u> /2/9 0.007 <0.005 2.14 	B-20D 5007/8/21 0.011 <0.004 0.12 	B-20D 9007/87/9 0.007 <0.004 2.12 	B-20D 9007/08/11/ 0.006 <0.004 	B-20D 2007/8/9 0.01 0.022 0.61 	B-20D 2007/81/11 0.003 0.001
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Iron Lead Manganese	location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-20D 9661/E1/11 <0.02 <0.02 	B-20D 2661/9/2	B-20D 2661/9/11 	B-20D 8661/17 	B-20D 8661/5/11 <0.01/<0.01 <0.01/<0.01 <0.01/0.17 0.018/0.008	B-20D 6661/97/1 	B-20D 66661/2/11 <0.01 0.13 0.06	B-20D 0007/97/4 <0.01 <0.01 <0.01 	B-20D 0007/8/71 <0.01 0.02 	B-20D 1007/51/2 <0.01 <0.01 	B-20D 1007/81/01 <0.01 0.3 	B-20D 2007/91/2 -	B-20D C007/L/11 	B-20D 60007/6/9 -	B-20D 6007/E1/11 	B-20D F0007/67/9 <0.005 <0.005 -	B-20D 4007/01/21 <0.005 2.11 0.092	B-20D <u>5007</u> /2/9 -	B-20D 5007/8/21 0.011 <0.004 0.12 0.12	B-20D 9007/87/9 0.007 <0.004 2.12 0.06	B-20D 9005/08/ 	B-20D 2007/8/9 0.01 0.022 0.61 0.16	B-20D 2007/81/11 0.003 0.001
ii) Deep Aquifer Sample Dissolved metal Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Iron Lead Manganese Mercury	location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-20D 9661/21/11 <0.02 <0.02 	B-20D 2661/9/2	B-20D 2661/9/11 	B-20D 8661/17/1008 	B-20D 8661/5/11 <0.01/<0.01 <0.01/<0.01 <0.01/0.17 0.018/0.008 	B-20D 66611/92/7 	B-20D 6661/2/11 <0.01 0.13 0.06 	B-20D 00007/97/4 	B-20D 0007/8/21 <0.01 <0.01 0.02 <0.01 	B-20D 1007/21/2 	B-20D 1007/81/01 	B-20D 2007/91/2 -	B-20D C0007/2//11 	B-20D 6007/6/9 -	B-20D 6007/E1/11 	B-20D F0007/67/9 -	B-20D 6007/01/21 -	B-20D 5007/2/9 -	B-20D 50007/8/20 -	B-20D 9007/87/9 	B-20D 9007/08/111 	B-20D 2007/8/9 0.01 0.022 0.61 0.16 	B-20D 2007/81/11 0.003 0.001
ii) Deep Aquifer Sample Dissolved metal Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Iron Lead Manganese Mercury Nickel	location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-20D 9661/01/11 	B-20D 2661/9/2	B-20D 2661/9/11 	B-20D 8661/7/1008 	B-20D 8661/5/111 	B-20D 6661/92/ F <0.01 <0.01 <0.01 <0.01	B-20D 6661/2/11 <0.01 0.13 <0.001 0.13 <0.005	B-20D 0007/97/7 <0.01 <0.01 <0.005	B-20D 0007/8/21 <0.01 <0.01 0.02 0.015	B-20D 1007/21/2 	B-20D 1007/81/01 	B-20D 2007/91/2 -	B-20D C007/2//11 	B-20D 6007/6/9 -	B-20D 6007/EI/II 	B-20D F0007/67/9 -	B-20D 6007/01/21 -	B-20D 5007/2/9 -	B-20D 50007/8/21 0.011 (0.004 0.12 0.026	B-20D 9007/87/9 	B-20D 9007/08/111 	B-20D 2007/8/9 	B-20D 2007/E1/11 0.003 0.001 0.013
ii) Deep Aquifer Sample <u>Dissolved metal</u> <u>Aluminum</u> Antimony Arsenic Barium Cadmium Chromium Cobalt Copper Iron Lead Manganese Mercury Nickel Selenium	location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-20D 9661/111	B-20D 2661/9/5 	B-20D /66[/9/11 	B-20D 8661/4/2 <0.01 <0.01 <0.001 <0.005 	B-20D 8661/5/111 	B-20D 66611/92/F <0.01 <0.001 <0.001 <0.001 <0.001	B-20D 6661/2/11 <0.01 <0.01 0.13 <0.005 <0.005	B-20D 00007/97/ * <0.01 <0.001 <0.005 	B-20D 0007/8/21 <0.01 0.02 0.015 	B-20D 1007/21/2 	B-20D 1007/81/01 	B-20D 2007/91/2 -	B-20D C0007/2//11 	B-20D 6007/6/9 -	B-20D 6007/81/11 	B-20D 1007/67/9 -	B-20D 6007/01/10/ 	B-20D 9007/L/9 0.007 2.14 0.005 0.005 0.005 	B-20D 50007/8/201 0.011 0.021 0.026 	B-20D 9007/87/9 	B-20D 9007/08/11 0.006 0.006 	B-20D 2007/8/9 0.01 0.022 0.61 0.16 0.019 	B-20D 1007/E1/11 0.003 0.001 0.013 0.013
ii) Deep Aquifer Sample <u>Dissolved metal</u> <u>Aluminum</u> Antimony Arsenic Barium Cadmium Chromium Cobalt Copper Iron Lead Manganese Mercury Nickel Selenium Silver	location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-20D 9661/21/11 	B-20D 2661/9/2	B-20D /66[/9/11 	B-20D 8661/F/2 <0.01 <0.001 <0.005 	B-20D 8661/5/111 	B-20D 66611/92/F 	B-20D 6661/5/11 -	B-20D 00007/97/4 <0.01 <0.001 <0.005 	B-20D 0007/8/71 <0.01 0.02 0.015 	B-20D 1007/21/2 	B-20D 1007/81/01 	B-20D C007/91/2 -	B-20D C0007/2//11 	B-20D 6007/6/9 -	B-20D 6007/EL/III 	B-20D 1007/67/9 -	B-20D 6007/01/10/5005 	B-20D 9007/2/9 0.007 0.005 2.14 0.005 0.005 -	B-20D 5007/8/201 0.011 0.026 0.026 	B-20D 9007/82/9 0.007 0.004 2.12 0.004 2.12 0.004 2.12 	B-20D 9007/08/11 0.004 0.006 0.006 	B-20D 2007/8/9 	B-20D 2007/81/11
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Iron Lead Manganese Mercury Nickel Selenium Silver Thallium	location: Date: (mg/L)	B-20D 9661/21/11 	B-20D 2661/9/2	B-20D /66[/9/11 0.02 0.26 0.041 0.041	B-20D 8661/F/5 <0.01 <0.01 <0.005 <0.005 	B-20D 8661/5/111 	B-20D 66611/92/F 	B-20D 6661/5/11 	B-20D 0007/97/7 <0.01 <0.01 <0.001 <0.005 	B-20D 0007/8/71 <0.01 0.02 0.015 0.015 	B-20D 1007/21/2 	B-20D 1007/81/01 	B-20D C007/91/2 <0.01 <0.001 <0.001 <0.01 <0.01 <0.01 <0.01 <0.001 <0.001 -	B-20D C0007/2//11 	B-20D 6007/6/9 <0.005 <0.005 <0.005 -	B-20D 6007/11/11 	B-20D 1007/67/9 -	B-20D 6007/01/10/2005 	B-20D 9007/2/9 0.007 0.005 2.14 0.005 0.005 -	B-20D 5007/8/21 0.011 0.026 0.026 0.026	B-20D 9007/87/9 0.007 0.004 2.12 0.004 2.12 0.004 2.12 	B-20D 9007/08/11 	B-20D 2007/8/9 0.01 0.022 0.61 0.019 0.019 	B-20D 2007/E1/11
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Iron Lead Manganese Mercury Nickel Selenium Silver Thallium Vanadium	location: Date: (mg/L)	B-20D 9661/E1/II 	B-20D 2661/9/5 	B-20D 6661/9/11 	B-20D 8661//f/2 <0.01 <0.001 <0.005 <0.005 	B-20D 8661/5/111 <0.01/<0.01 <0.01/<0.01 <0.01/<0.01 <0.01/<0.01 <0.01/<0.03 <0.005/<0.005 -	B-20D 666119374 	B-20D 6661/5/11 	B-20D 0007/97/7 <0.001 <0.001 <0.005 	B-20D 0007/8/71 <0.01 <0.01 0.02 0.015 0.015 	B-20D 1007/21/2 	B-20D 1007/81/01 	B-20D C007/91/2 <0.01 <0.001 <0.005 <0.005 <0.005 -	B-20D C0007/2//11 	B-20D 6007/6/9 -	B-20D 6007/E1/I1 	B-20D F007/67/9 -	B-20D 4005 	B-20D 9007/2/9 0.007 <0.005 2.14 0.005 0.005 -	B-20D 5007/8/21 0.011 0.026 0.026 0.026 -	B-20D 9007/87/9 0.004 2.12 0.004 2.12 0.004 2.12 0.004 2.12 	B-20D 9007/08/11 	B-20D 2007/8/9 0.01 0.022 0.61 0.019 	B-20D 1007/E1/11 0.003 0.001 0.013 0.013 -

CONCENTRATIONS OF DISSOLVED INORGANICS IN BACKGROUND GROUNDWATER RACER TRUST COLDWATER ROAD INDUSTRIAL LANDS GENESEE TOWNSHIP, MICHIGAN

i) Shallow	Water	Bearing	Unit
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Date Set Set <th>Sample</th> <th>location:</th> <th>B-18A</th> <th>B-19A</th> <th>B-19A</th> <th>B-19A</th> <th>B-19A</th> <th>B-19A</th> <th>B-19A</th> <th>B-19A</th> <th>B-19A</th>	Sample	location:	B-18A	B-18A	B-18A	B-18A	B-18A	B-18A	B-18A	B-18A	B-18A	B-18A	B-18A	B-19A	B-19A	B-19A	B-19A	B-19A	B-19A	B-19A	B-19A
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $			2008	600	2009	010	2010	011	011	2011	011	012	012	98	001	002	03	2003	004	004	011
$ \text{Distribution of math interval in the second of the $		Date:	8/	/2	8/	/2	/0	/2	/2	5/:	/2	/5	//2	19	/2	/2	20	3/:	/2	/2	/2
$ \begin{array}{c} \underline{Dissource introl } \\ \underline{Alomitron } \\$	D: 1 1 / 1		١/1	/24	1/1	/17	1/1	/21	/14	1/1	2/5	/28	/27	/4/	/16	/16	(4/	1/1	/29	6/3	2/7
$ \begin{array}{c} Autimmum (mgU) & - & - & - & - & - & - & - & - & - & $	Dissolved metal		11	6/	1	6/	1	6/	6	11		6	6/	5	5	5	6/	1	6/	1	1
$ \begin{array}{c} \text{Antening} & (mgU) & - & - & - & - & - & - & - & - & - & $	Aluminum	(mg/L)							0.05 U		0.05 U	0.05 U									0.05 U
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Antimony	(mg/L)							0.002 U		0.002 U	0.002 U									0.002 U
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Arsenic	(mg/L)							0.005 U		0.0066	0.0072									0.005 U
$ \begin{array}{c} \begin{tabular}{c c c c c c c c c c c c c c c c c c c $	Barium	(mg/L)							0.033 J		0.035 J	0.035 J									0.071 J
$ \begin{array}{c} \mbox{Laminum} & \mbox{trans} \\ \mbox{trans} & \mbox{trans} \\ trans$	Beryllium	(mg/L)							0.001 U		0.001 U	0.001 U									0.001 U
$ \begin{array}{c} Carbonic m(myl) & co.05 + co.005 + co.00$	Cadmium	(mg/L)							0.001 U		0.001 U	0.001 U									0.001 U
$ \begin{array}{c} \mbox{Const} & (mgL) & (-0.001 \ 0.001 \ -0.004 \$	Chromium	(mg/L)	< 0.005	< 0.005	<0.005	< 0.005	0.012	0.01	0.005 U	< 0.005	0.005 U	0.005 U	<0.005/<0.005	<0.01	<0.01	<0.01	< 0.005	< 0.005	< 0.005	<0.005/<0.005	
$ \begin{array}{c} copyer & (myfl) & (0.001 0.001 - (0.004 - (0.004 0.004 0.002 - 0.004 0.002 - 0.004 0.002 - 0.004 0.001 - (0.01 - 0.001 - 0.001 0.000 0.005, 0.006 0.005, 0.005 - 0.001 - 0.003 0.001 - 0.003 0.001 - 0.003 0.001 - 0.003 0.001 - 0.003 0.001 - 0.003 0.001 - 0.003 0.001 - 0.003 0.001 - 0.003 0.001 - 0.003 0.001 - 0.003 0.001 - 0.003 0.001 - 0.003 0.001 - 0.003 0.001 - 0.001 - 0.003 0.001 - 0.001 - 0.003 0.001 - 0.001 - 0.001 - 0.001 - 0.001 - 0.001 0.001 -$	Cobalt	(mg/L)							0.007 U		0.003 J	0.007 U									0.007 U
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Copper	(mg/L)	< 0.001	0.001	< 0.004	< 0.004	< 0.004	< 0.004	0.002 U	< 0.004	0.002 U	0.002 U	<0.004/<0.004	<0.01	<0.01	<0.01	< 0.005	< 0.005	<0.005	<0.005/<0.005	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Iron	(mg/L)		< 0.02		<0.02		0.24	0.1 U		0.61	0.4	0.03/0.04					0.02		0.24/0.17	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Lead	(mg/L)							0.003 U		0.003 U	0.003 U									0.003 U
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Manganese	(mg/L)		< 0.005		< 0.005		< 0.005	0.025		0.26	0.098	0.026/0.027					< 0.005		0.011/<0.005	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Mercury	(mg/L)							0.00019 J		0.0002 U	0.0002 U									0.0002 U
	Nickel	(mg/L)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.005	0.0042 J	< 0.005	0.02 U	0.02 U	<0.005/<0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.005/<0.005	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Selenium	(mg/L)							0.005 U		0.005 U	0.005 U									0.005 U
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Silver	(mg/L)							0.0002 U		0.0002 U	0.0002 U									0.0002 U
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Thallium	(mg/L)							0.001 U		0.001 U	0.00021 J									0.00027 J
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Vanadium	(mg/L)							0.004 U		0.004 U	0.004 U									0.004 U
Deep Aquifer Sample location: B-200 B-200 B-200 B-200 B-200 B-200 B-200 B-200 B-210 B-	Zinc	(mg/L)	< 0.005	0.015	0.045	0.008	< 0.005	0.012	0.02 U	< 0.005	0.02 U	0.02 U	<0.005/0.005	0.03	< 0.01	0.01	< 0.005	< 0.005	0.008	0.009/0.007	
Solution Sample location: B-20D B-20D B-20D B-20D B-20D B-20D B-20D B-20D B-20D B-21D B-21D <td>ii) Deen Aquifer</td> <td></td>	ii) Deen Aquifer																				
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	u) Deep Aquijer Saumla	location	B 20D	B 20D	B 20D	B 20D	B 20D	B 20D	B 20D	B 20D	R 20D	B 20D	R 20D	B 20D	R 21D	B 21D	R 21D	P 21D	R 21D	P 21D	R 21D
Date: 0000 (900) 0000 (900) 0000 (900) 110 (900) 1100 (900) 1100 (900) 1100 (900) 1100 (900) 1100 (900) 1100 (900) 1100 (900)	Sumple	100011011.	D-20D	D-20D	D-20D	D-20D	D-20D	D-20D	D-20D	D-20D	D-20D	D-20D	D-20D	D-20D	D-21D	D-21D	D-21D	D-21D	D-21D	D-21D	D-21D
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $			38	300	60	500	10	10	11	11	011	11	12	12	95	95	<u>`0</u>	96	96	966	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		Date:	20	/5	50	/5	20	20	20	20	/2	20	20	20	19	19	66	19	19	/1	66
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		2000	22/	'18	24/	'18	191	/6,	27	[5/	'16	/8/	58/	25/	11/	31/	9/1	/61	11/	'13	5/1
Aluminum (mg/L) - - - - - - 0.085 - 0.034 J 0.019 J - <t< td=""><td>Dissolved metal</td><td></td><td>/9</td><td>11/</td><td>(9</td><td>11/</td><td>()</td><td>11</td><td>/9</td><td>2/6</td><td>11</td><td>12/</td><td>3/2</td><td>9/3</td><td>9/2</td><td>8/3</td><td>5/6</td><td>()</td><td>8/2</td><td>11</td><td>2/6</td></t<>	Dissolved metal		/9	11/	(9	11/	()	11	/9	2/6	11	12/	3/2	9/3	9/2	8/3	5/6	()	8/2	11	2/6
Antimony (mg/L) 0.002 U 0.0017 J 0.036 0.036 0.035 <td>Aluminum</td> <td>(mg/L)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0.085</td> <td></td> <td>0.034 J</td> <td>0.019 J</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Aluminum	(mg/L)								0.085		0.034 J	0.019 J								
Arsenic (mg/L) 0.036 0.035	Antimony	(mg/L)								0.002 U		0.002 U	0.00017 J								
Barium (mg/L) 0.042 J 0.049 J 0.048 J 0.001 U 0.001 U 0.001 U <	Arsenic	(mg/L)								0.036		0.036	0.035								
Beryllium (mg/L) 0.001 U 0.001 U 0.001 U 0.001 U 0.001 U 0.001 U 0.001 U <td>Barium</td> <td>(mg/L)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0.042 J</td> <td></td> <td>0.049 J</td> <td>0.048 J</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Barium	(mg/L)								0.042 J		0.049 J	0.048 J								
Cadmium (mg/L) 0.001 U 0.001 U 0.001 U 0.001 U 0.007 U 0.007 U 0.005 U 0.005 U 0.005 U 0.007 U 0.007 U 0.007 U 0.007 U 0.002 U 0.001 U 0.002 U 0.001 U 0.001 U	Beryllium	(mg/L)								0.001 U		0.001 U	0.001 U								
Chromium (mg/L) <0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.005 < 0.000 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 < 0.001 <	Cadmium	(mg/L)								0.001 U		0.001 U	0.001 U								
Cobalt (mg/L) 0.007 U 0.007 U 0.007 U 0.007 U <td>Chromium</td> <td>(mg/L)</td> <td>< 0.005</td> <td>< 0.005</td> <td><0.005/<0.005</td> <td>< 0.005</td> <td>< 0.005</td> <td>0.011</td> <td>0.009</td> <td>0.005 U</td> <td><0.005/<0.005</td> <td>0.005 U</td> <td>0.005 U</td> <td>< 0.005</td> <td>< 0.02</td> <td>< 0.02</td> <td>< 0.02</td> <td>< 0.02</td> <td>< 0.02</td> <td>< 0.02</td> <td>< 0.01</td>	Chromium	(mg/L)	< 0.005	< 0.005	<0.005/<0.005	< 0.005	< 0.005	0.011	0.009	0.005 U	<0.005/<0.005	0.005 U	0.005 U	< 0.005	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01
Copper (mg/L) 0.002 0.004 <0.001/<0.001 <0.004 <0.004 <0.004 <0.002 <0.004 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.002 <0.003 <0.003 <0.003 <0.003 <0.003 <0.003 <0.003 <0.003 <0.003 <0.003 <0.003 <0.003 <0.003 <0.003 <0.003 <0.003 <0.003 <0.003 <0.003 <0.003 <0.003 <0.003 <0.003 <0.003 <0.003 <0.003 <0.003 <0.003 </td <td>Cobalt</td> <td>(mg/L)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0.007 U</td> <td></td> <td>0.007 U</td> <td>0.007 U</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Cobalt	(mg/L)								0.007 U		0.007 U	0.007 U								
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Copper	(mg/L)	0.002	0.004	<0.001/<0.001	< 0.004	< 0.004	< 0.004	< 0.004	0.002 U	<0.004/<0.004	0.002 U	0.002 U	< 0.004	< 0.02	0.021	< 0.02	< 0.02	< 0.02	< 0.02	< 0.01
Lead (mg/L) 0.003 U 0.003 U 0.003 U 0.003 U 0.003 U 0.003 U 0.003 U 0.003 U 0.003 U 0.002 U 0.0047 0.053 U 0.0002 U 0.002 U 0.002 U 0.005 U 0.002 U 0.001 U	Iron	(mg/L)	2.4		1.72/1.64		1.93		2.55	1.8		1.5	1.6	1.7							
Manganese (mg/L) 0.055 0.056/0.056 0.049 0.049 0.047 0.053 0.002 U 0.002 U 0.003 0.002 U 0.002 U 0.002 U 0.002 U 0.002 U 0.002 U 0.002 U 0.002 U 0.002 U 0.001 U	Lead	(mg/L)								0.003 U		0.003 U	0.003 U								
Mercury (mg/L) 0.0002 U 0.0002 U 0.0002 U 0.0002 U	Manganese	(mg/L)	0.055		0.056/0.056		0.049		0.054	0.047		0.049	0.047	0.053							
Nickel (mg/L) <0.005 0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.002 <0.002 <0.002 <0.003 <0.004 <0.002 <0.002 <0.003 <0.004 <0.002 <0.002 <0.003 <0.004 <0.002 <0.002 <0.003 <0.004 <0.002 <0.002 <0.005 <0.002 <0.003 <0.004 <0.002 <0.002 <0.005 <0.002 <0.003 <0.004 <0.002 <0.003 <0.004 <0.002 <0.003 <0.004 <0.002 <0.005 <0.004 <0.002 <0.005 <0.004 <0.002 <0.005 <0.004 <0.002 <0.005 <0.004 <0.002 <0.0012 <0.0012 <0.0012 <0.0012 <0.0012 <0.0012 <0.0012 <0.0012 <0.0012 <0.0012 <0.0012 <0.0012 <0.0012 <0.0012 <0.0012 <0.0012 <0.0012 <0.0012 <0.0012 <0.0012 <0.0012 <0.0012 <0.0012 <0.0012	Mercury	(mg/L)								0.0002 U		0.0002 U	0.0002 U								
Selenium (mg/L) 0.005 U 0.005 U 0.005 U	Nickel				40.00F / 40.00F		<0.005	<0.005	< 0.005	0.02 U	<0.005/<0.005	0.02 U	0.02 U	< 0.005	< 0.03	<0.04	<0.04	<0.02	<0.02	<0.02	0.008
Silver (mg/L) 0.0002 U 0.0002 U <	Selenium	(mg/L)	< 0.005	0.006	<0.005/<0.005	< 0.005	\0.005	-0.000			0.0007 0.000	···				0.01	0.01	0.04	0.04	0.04	
Thallium (mg/L) 0.001 U 0.00015 J 0.00022 J <td></td> <td>(mg/L) (mg/L)</td> <td><0.005</td> <td>0.006</td> <td><0.005/<0.005</td> <td><0.005</td> <td><0.005</td> <td></td> <td></td> <td>0.005 U</td> <td></td> <td>0.005 U</td> <td>0.005 U</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>		(mg/L) (mg/L)	<0.005	0.006	<0.005/<0.005	<0.005	<0.005			0.005 U		0.005 U	0.005 U								
Vanadium (mg/L) 0.004 U 0.00072 J 0.004 U	Silver	(mg/L) (mg/L) (mg/L)	<0.005	0.006 	<0.005/<0.005	<0.005				0.005 U 0.0002 U		0.005 U 0.0002 U	0.005 U 0.0002 U								
Zinc (mg/L) 0.007 0.022 <0.005/<0.005 0.005 <0.005 <0.005 0.013 0.02 U 0.005/0.006 0.02 U 0.02 U <0.005 0.061 <0.02 <0.02 <0.02 <0.02 0.05 0.04 <0.01	Silver Thallium	(mg/L) (mg/L) (mg/L) (mg/L)	<0.005 	0.006 	<0.005/<0.005 	<0.005 			 	0.005 U 0.0002 U 0.001 U		0.005 U 0.0002 U 0.00015 I	0.005 U 0.0002 U 0.00022 J	 						 	
	Silver Thallium Vanadium	(mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	<0.005 	0.006 	<0.005/<0.005 	<0.005 	 		 	0.005 U 0.0002 U 0.001 U 0.004 U		0.005 U 0.0002 U 0.00015 J 0.00072 I	0.005 U 0.0002 U 0.00022 J 0.004 U	 	 				 	 	

CONCENTRATIONS OF DISSOLVED INORGANICS IN BACKGROUND GROUNDWATER RACER TRUST COLDWATER ROAD INDUSTRIAL LANDS GENESEE TOWNSHIP, MICHIGAN

i) Shallow Water Bearing Unit

Sample	location:	B-19AR	B-19AR	B-19AR	B-19AR	B-19AR	B-19AR	B-19AR	B-19AR	B-19AR	B-19AR	B-19AR	B-19AR	B-19AR	B-19AR	B-19AR	B-19AR	B-19AR	B-19AR	B-19AR	B-24
	Date:	/2005	8/2005	9/2006	30/2006	/2007	13/2007	5/2008	18/2008	4/2009	19/2009	5/2010	10/2010	2/2011	5/2011	16/2011	7/2011	8/2011	8/2012	7/2012	1/1996
Dissolved metal		/1/	2/8	/5	1/	/1/	1/	/5	1/	/5	1/2	/1	1/	/5	/1	1/	5/.	2/8	/38	/5	/2
Aluminum	(ma/I)	9		9		9		9		9		9		9	ი 16			31	0.05 11	9	8
Antimony	(mg/L) (mg/L)														0.002 11			0.002.11	0.00 C		
Arconic	(mg/L)														0.002.0			0.002.0	0.00511		
Barium	(mg/L)														0.005 0			0.000 C	0.000 0		
Borullium	(mg/L) (mg/L)														0.045 J			0.001 II	0.027 J		
Cadmium	(mg/L) (mg/L)														0.001 U			0.001 U	0.001 U		
Chromium	(mg/L)	<0.005	0.01/0.01	<0.005	0.005	0.006	0.003	<0.005	<0.005	<0.005	<0.005	<0.005	0.012	0.005	0.001 U	<0.005	0.005 U	0.001 0	0.001 U	<0.005	<0.02
Cohalt	(mg/L) (mg/L)	<0.005	0.01/ 0.01	<0.005	0.005	0.000	0.005	<0.000	<0.005	<0.005	<0.005	<0.005	0.012	0.005	0.005 U	<0.005	0.005 0	0.00711	0.005 U	<0.005	<0.02
Count	(mg/L) (mg/L)	<0.005	<0.004/<0.004	<0.004	<0.004	0.004	0.007	0.003	0.001	0.002	<0.004	<0.004	<0.004	<0.004	0.007 0	<0.004	0.002 11	0.007 0	0.007 U	<0.004	<0.02
Iron	(mg/L) (mg/L)	1 32	0.16/0.15	0.004	<0.004	0.004	0.007	0.005	0.001	0.002	<0.00 1	<0.004	<0.004	0.24	0.0052	<0.004	0.002.0	4.4	0.002.0	<0.004	<0.02
Load	(mg/L)	1.52	0.10/ 0.15	0.24		0.07		0.50		0.050		N0.02		0.24	0.003 II		0.1 0	0.003.11	0.003 U	\$0.02	
Manganasa	(mg/L)	0 228	<0.02/<0.02	0.21		0.021		0.009		<0.005		<0.005		<0.005	0.005 U		0.015.11	0.003 0	0.003 U	<0.005	
Marcuru	(mg/L) (mg/L)	0.228	<0.02/ <0.02	0.21		0.021		0.009		<0.005		<0.005		<0.005	0.0071		0.015 0	0.094	0.0010 J	<0.005	
Nickal	(mg/L) (mg/L)	0.007	<0.005/<0.005	0.012	<0.005	0.004	0.026	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	0.0002 U	<0.005	0.0211	0.0002 0	0.0002 U	<0.005	<0.02
Salanium	(mg/L)	0.007	-0.0007 -0.000	0.012	-0.000	0.004	0.020	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	0.000	0.02.0	-0.005	0.02 0	0.005 11	0.02.0	-0.000	40.02
Silzior	(mg/L) (mg/L)														0.0002 U			0.0002 II	0.0002 U		
Thallium	(mg/L) (mg/L)														0.0002 C			0.0002 C	0.0002 C		
Vanadium	(mg/L)														0.001 U			0.00020 J	0.00004 J		
Vunuunum Zinc	(mg/L) (mg/L)	<0.005	0.02/<0.01	0.021	<0.005	0.009	0.011	0.016	0.014	<0.005	0.007	<0.005	<0.005	<0.005	0.0040	0.005	0.0211	0.0007	0.0040	<0.005	0.09
Linc	(1112)	-0.000	0.02/ 40.01	0.021	-0.005	0.007	0.011	0.010	0.014	-0.005	0.007	-0.005	-0.005	-0.005	0.02 0	0.000	0.02 0	0.02 0	0.02 0	-0.000	0.07
ii) Deen Aquifer																					
ii) Deep Aquifer Samnle	location	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D
ii) Deep Aquifer Sample	location:	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D
ii) Deep Aquifer Sample	location:	B-21D	B-21D ∞	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D හ	B-21D	B-21D	B-21D	B-21D ഹ	B-21D	B-21D	B-21D 900	B-21D	B-21D 600	B-21D
ii) Deep Aquifer Sample	location: Date:	B-21D 2661/	B-21D	B-21D 8661/	B-21D 6661/	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D 6007	B-21D 8-2003/8	B-21D	B-21D	B-21D	B-21D 5007/	B-21D 9007/	B-21D 9007/0	B-21D	B-21D 2007/ 1	B-21D 8007/
ii) Deep Aquifer Sample	location: Date:	B-21D 2661/9/	B-21D	B-21D 8661/2/	B-21D 6661/92	B-21D 0007/97	B-21D 0007/8/	B-21D	B-21D 1007/81/	B-21D 2002/91	B-21D 8007/E	B-21D B-21D/2003/21/	B-21D 4002/06	B-21D 4007/01/	B-21D 2002/8	B-21D 5007/8/	B-21D 9007/87	B-21D 9007/0E/	B-21D 2007/8	B-21D	B-21D 8007/97
ii) Deep Aquifer Sample <u>Dissolved metal</u>	location: Date:	B-21D 2661/9/11	B-21D 8661/7/2	B-21D 8661/2/11	B-21D B-21D	B-21D B-21D	B-21D 0002/8/21	B-21D 1007/51/5	B-21D 10/18/2001	B-21D 2002/91/2	B-21D 6/3/2003	11/13/2003 P-21D	B-21D 6/30/2004	12/10/2004 P-31 D	B-21D 5007/8/9	B-21D B-2005	B-21D 9002/82/9	B-21D 9002/08/11	B-21D 2007/8/9	11/14/2007 B-31D	B-21D 8002/92/9
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum	location: Date: (mg/L)	B-21D 1661/9/11 +	B-21D 8661/4/1	B-21D 8661/2/11 1	B-21D 6661/92/ቶ 1	B-21D 0002/92/ F +	B-21D 0007/8/21 +	B-21D	B-21D 100/28/01	B-21D 2007/91/2 1	B-21D 8002/8/9 1	B-21D B-21D H-2003 H-21D	B-21D 700/2007 1	B-21D 4002/01/21 1	B-21D 5007/8/9	B-21D 5002/8/21	B-21D 9007/87/9	B-21D 9002/08/11	B-21D 2007/8/9	B-21D 4002/41/11	B-21D 8002/92/9
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum Antimony	location: Date: (mg/L) (mg/L)	B-21D 2661/9/11 + +	B-21D 8661/4/1 1	B-21D 8-661/2/11 + +	B-21D 6661/97/+ 1	B-21D 0002/92/4	B-21D 0007/8/21	B-21D	B-21D 1002/81/01 + +	B-21D 2002/91/2 1	B-21D 6002/8/9	B-21D 8-2103 - 11/13/2003	B-21D +002/08/9	B-21D B-2004 I I	B-21D 5002/8/9	B-21D 5002/8/21	B-21D 9005/82/9	B-21D 9002/02/11 + +	B-21D 2002/8/9	B-21D 2002/41/11 1	B-21D 8002/92/9 : 1
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum Antimony Arsenic	location: Date: (mg/L) (mg/L) (mg/L)	B-21D 2661/9/11 + + +	B-21D 8661/ 1 /5 + + +	B-21D 8661/2/11 + + +	B-21D 1000 - 11000 - 11000	B-21D 1 - 1 - 4/26/2000	B-21D 0002/8/21 + + +	B-21D	B-21D 1002/81/01 + + +	B-21D	B-21D	B-21D 13/2003	B-21D F007/06/9 + + +	B-51 12/10/2004 1 1	B-21D 2002/8/9	B-21D 12/8/2005	B-21D 9007/87/9 : : :	B-21D 9002/08/11 + + +	B-21D 2002/8/9	B-21D 11/14/2007	B-21D 8007/97/9 1 1 1
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum Antimony Arsenic Barium	location: Date: (mg/L) (mg/L) (mg/L) (mg/L)	B-21D 2661/9/11 + + + +	B-21D 8661/ 1 /5	B-21D 8-61/2/11 + + + +	B-21D 6661/92/7 1 1 1	B-21D 1	B-21D 00007/8/21	B-21D 1007/21/2	B-21D 1002/81/01 + + + +	B-21D 5/16/2002	B-21D 8002/8/9 1 1 1	B-21D 8-2102/003/11/11/13/2003	B-21D F007/06/9 + + + +	B-21D 4002/01/21 + + + +	B-21D 5007/8/9 	B-21D 12/8/2005	B-21D 9007/87/9 + + +	B-21D 9002/02/11	B-21D 2007/8/9 	B-21D P-2007 11/14/2007	B-21D 8007/97/9
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum Antimony Arsenic Barium Beryllium	location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-21D 2661/9/11	B-21D 8661/7/2	B-21D 8661/2/11	B-21D 6661/97/7 1 1 1 1	B-21D 00007/92/7 	B-21D 0007/8/71	B-21D 1002/21/2	B-21D 1002/81/01	B-21D 2002/91/2	B-21D	B-21D 13/2003 - 11/13/2003	B-21D F007 /06/9 - - - - - -	B-21D F00/2004	B-21D 5007/8/9 	B-21D 5002/8/201	B-21D 9007/87/9	B-21D 9002/02/11	B-21D 2007/8/9 	B-21D 2007/71/11	B-21D 8002/92/9
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum Antimony Arsenic Barium Beryllium Cadmium	location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-21D 2661/9/11	B-21D 8661/7/2	B-21D 8661/2/11	B-21D 6661/92/+	B-21D	B-21D 0007/8/21 	B-21D 1002/51/5	B-21D 1007/81/01	B-21D 7007/91/2	B-21D 6002/8/9 	B-21D	B-21D +0007/00/9	B-21D	B-21D <u>\$007/8/9</u>	B-21D 2002/8/2002	B-21D 9007/87/9	B-21D 9007/02/11	B-21D 2007/8/9	B-21D 2007/71/11	B-21D 8007/97/9
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium	Docation: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-21D 2661/9/11	B-21D 8661/4/2 - <0.01	B-21D 8661/2/11 	B-21D 6661/92/4 	B-21D 0000/97/7 	B-21D 00007/8/2000 	B-21D 1007/51/5 - - - - - - - - - - - - - - - - - - -	B-21D 1002/81/01 	B-21D 2005/91/2 	B-21D €007/€/9 <0.005	B-21D 6007/11/11	B-21D F007/0E/9 	B-21D 4002/01/20 	B-21D <u>\$007/8/9</u> \$0.005	B-21D 9002/8/2002 	B-21D 9002/87/9 	B-21D 9007/06/11 	B-21D 2007/8/9 0.01	B-21D 2007/41/11 	B-21D 8002/92/9
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt	Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-21D 2661/9/11	B-21D 8661/4/2 	B-21D 8661/5/11	B-21D 6661/92/4 	B-21D 00007/92/4 	B-21D 0007/8/2000 	B-21D 1007/51/2 - - - - <0.01/<0.01	B-21D 1007/81/01 	B-21D C007/91/2 	B-21D 6007/6/9 	B-21D 6007/11/11 	B-21D F0007/0E/9 	B-21D +0002/01/20 	B-21D <u>\$0007/8/9</u> <0.005 	B-21D 2002/8/2002 	B-21D 9007/87/9 	B-21D 9007/02/11	B-21D 2007/8/9 0.01	B-21D 2007/11/11 	B-21D 8002/92/9
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper	Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-21D 2661/9/11	B-21D 8661/4/2 <0.01 <0.01	B-21D 8661/5/11	B-21D 6661/92/4 	B-21D 0000 792/4 <0.01 <0.01	B-21D 0007/8/2000 	B-21D 1007/51/2 - - - - <0.01/<0.01 - <0.01/<0.01	B-21D 1007/81/01 	B-21D C007/91/2 	B-21D 6007/6/9 <0.005 <0.005	B-21D 6007/11/11	B-21D F0007/0E/9 	B-21D 	B-21D <u>\$0007/8/9</u> <0.005 <0.005 1.05	B-21D 9002/8/2002 	B-21D 9007/87/9 	B-21D 9007/02/11 <0.005 <0.004	B-21D 2007/8/9 	B-21D 2007/ 1 1/11 	B-21D 8007/97/9
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Iron	location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-21D 2661/9/11 	B-21D 8661/4/2 <0.01 <0.01 	B-21D 8661/2/11 - - - - - - - - - - - - - - - - - -	B-21D 6661/92/4 	B-21D 0000 7/92/4 <0.01 <0.01 	B-21D 0007/8/2000 	B-21D 1007/51/5 <0.01/<0.01 <0.01/<0.01	B-21D 1007/81/01 	B-21D C007/91/2 <0.01 <0.01 	B-21D 6007/6/9 -	B-21D 6007/11/11 	B-21D F0007/08/9 -	B-21D 	B-21D <u>\$007/8/9</u> <0.005 1.35	B-21D 9007/8/20 	B-21D 9007/87/9 0.005 0.006 0.43	B-21D 9007/06/11 <0.005 <0.004 	B-21D 2007/8/9 0.01 0.002 1.2	B-21D 2007/#1/11 	B-21D 8007/97/9 0.005 1.39
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum Antimony Arsenic Barium Earyllium Cadmium Chromium Cobalt Copper Iron Lead	location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-21D 26661/9/11 <0.01 0.24 	B-21D 8661//F/2 <0.01 <0.01 	B-21D 8661/5/111 <0.01 0.24 	B-21D 66661/92/4 	B-21D 0000 	B-21D 0007/8/2000 	B-21D 1007/21/2 <0.01/<0.01 <0.01/<0.01 -	B-21D 1007/81/01 <0.01 0.2 	B-21D C007/91/2 	B-21D 6007/6/9 <0.005 <0.005 	B-21D 6007/E1//11 	B-21D F0007/08/9 <0.0005 <0.005 	B-21D 	B-21D <u>\$0007/8/9</u> <0.005 1.35 	B-21D 9007/8/21 0.008 <0.004 1.07 	B-21D 9007/87/9 0.005 0.43 	B-21D 9007/06/11 <0.005 <0.004 	B-21D 2007/8/9 0.01 0.002 1.2 	B-21D 2007/41/11 	B-21D 8007/97/9 0.005 0.001 1.39
ii) Deep Aquifer Sample <u>Dissolved metal</u> <u>Aluminum</u> Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Iron Lead Manganese	location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-21D 	B-21D 8661/4/2 <0.01 <0.01 	B-21D 8661/5/11 <0.01 0.24 0.043	B-21D 666119204 	B-21D 0000 74/56/2000 	B-21D 0007/8/21 <0.01 <0.01 <0.01 	B-21D 1007/51/5 <0.01/<0.01 <0.01/<0.01 <0.01/<0.01	B-21D 1007/81/01 <0.01 0.2 	B-21D 2007/91/2 <0.01 <0.01 -	B-21D 6007/6/9 <0.005 <0.005 -	B-21D 6007/11/11 <0.005 0.1 <0.005	B-21D F0007/08/9 <0.0005 <0.005 -	B-21D 	B-21D 5007/8/9 <0.005 1.35 0.072	B-21D 9007/8/21 0.008 <0.004 1.07 0.06	B-21D 9007/87/9 0.006 0.43 0.06	B-21D 9007/06/11 <0.005 <0.004 	B-21D 2007/8/9 0.01 0.002 1.2 0.049	B-21D 2007/41/11 0.002 0.001 	B-21D 8007/97/9 0.001 1.39 0.04
ii) Deep Aquifer Sample <u>Dissolved metal</u> <u>Aluminum</u> Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Iron Lead Manganese Mercury	location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-21D 	B-21D 8661//F/2 <0.01 <0.01 	B-21D 8661/5/11 <0.01 0.24 0.043	B-21D 66661 	B-21D 0000 74/5 	B-21D 0007/8/21 <0.01 <0.01 <0.01 	B-21D 1007/51/5 	B-21D 1007/81/01 	B-21D C007/91/2 	B-21D 6007/6/9 -	B-21D 6007/E1/11 	B-21D F0007/08/9 -	B-21D 	B-21D 5007/8/9 <0.005 1.35 0.072 0.072	B-21D 5007/8/21 0.008 <0.004 1.07 0.06 	B-21D 9007/87/9 0.006 0.43 0.06 0.06	B-21D 9007/06/11 <0.005 <0.004 	B-21D 2007/8/9 0.01 0.002 1.2 0.049 	B-21D 2007/41/11 	B-21D 8007/97/9 0.001 1.39 0.04 0.04
ii) Deep Aquifer Sample <u>Dissolved metal</u> <u>Aluminum</u> Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Iron Lead Manganese Mercury Nickel	location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-21D 	B-21D 8661//F/2 <0.01 <0.01 <0.01 <0.01	B-21D 8661/2/11 <0.01 0.24 0.043 <0.005	B-21D 66661/97/7 <0.01 <0.01 <0.005	B-21D 0007/92/4 <0.011 <0.011 <0.015	B-21D 0007/8/21 <0.01 <0.01 <0.01 0.011	B-21D 1007/51/5 <0.01/<0.01 <0.01/<0.01 <0.01/<0.01	B-21D 1007/81/01 <0.01 0.2 <0.005	B-21D C007/91/2 <0.01 <0.01 <0.01 <- <0.005	B-21D 6007/6/9 <0.005 <0.005 <0.005	B-21D 6007/E1/11 <0.005 0.1 <0.005 0.1 <0.005 <0.005	B-21D F0007/08/9 <0.0005 -	B-21D 	B-21D 5007/8/9 <0.005 1.35 0.072 0.012	B-21D 9007/8/21 0.008 <0.004 1.07 0.06 0.008	B-21D 9007/87/9 0.005 0.006 0.005	B-21D 9007/06/11 <0.005 <0.004 <0.005	B-21D 2007/8/9 0.01 0.002 1.2 0.049 0.005	B-21D 2007/41/11 0.002 0.001 0.005	B-21D 8007/97/9 0.005 0.04 <0.005
ii) Deep Aquifer Sample <u>Dissolved metal</u> <u>Aluminum</u> Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Iron Lead Manganese Mercury Nickel Selenium	location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-21D 	B-21D 8661//F/5 <0.01 <0.01 - <0.01 <0.01 - <0.01 - - <0.005 	B-21D 8661/2/11 <0.01 0.24 0.043 <0.005 	B-21D 6661/97/7 <0.01 <0.01 <0.01 <0.005 	B-21D 0007/92/7 <0.01 <0.01 <0.005 	B-21D 0007/8/21 <0.01 <0.01 <0.01 - 0.011 0.011 	B-21D 1007/51/5 <0.01/<0.01 <0.01/<0.01 <0.01/<0.01 <0.005/<0.005 	B-21D 1007/81/01 <0.01 0.2 <0.005 	B-21D 2007 -	B-21D 6007/6/9 -	B-21D 6007/E1/11 <0.005 0.1 <0.005 0.1 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 <0.005 -	B-21D F0007/06/9 -	B-21D 	B-21D 5007/8/9 <0.005 1.35 0.072 0.012 	B-21D 5007/8/21 0.008 <0.004 1.07 0.06 0.008 0.008 	B-21D 90007/87/9 0.0005 0.005 0.005 	B-21D 9007/08/ <0.005 <0.004 <0.005 <0.005 <0.005	B-21D 2007/8/9 0.01 0.002 1.2 0.049 0.005 	B-21D 2007/41/11 0.002 0.001 0.005 	B-21D 8007/97/9 0.001 1.39 0.04 <0.005
ii) Deep Aquifer Sample Dissolved metal Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Iron Lead Manganese Mercury Nickel Selenium Silver	Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-21D 	B-21D 8661//F/5 <0.01 <0.01 - <0.01 - <0.01 - <0.01 - - <0.005 -	B-21D 8661/5/11 <0.01 0.24 0.043 <0.005 -	B-21D 6661/97/7 <0.01 <0.01 <0.01 <0.005 	B-21D 0007/92/7 <0.001 <0.001 <0.005 	B-21D 0007/8/21 <0.01 <0.01 <0.011 0.011 0.011 	B-21D 1007/51/5 -	B-21D 1007/81/01 <0.01 0.2 <0.005 <0.005 	B-21D 2007 -	B-21D 6007/E/9 -	B-21D 6007/61/11 	B-21D F0007/0E/9 -	B-21D F007/01/21 -	B-21D 9007/8/9 <0.005 1.35 0.072 0.012 -	B-21D 5007/8/21 -	B-21D 90007/87/9 0.0005 0.005 0.005 	B-21D 9007/08/11 <0.005 <0.004 <0.005 <- <0.005	B-21D 2007/8/9 0.01 0.002 1.2 0.049 0.005 	B-21D 2007/41/11 0.002 0.001 0.005 	B-21D 8007/97/9 0.001 1.39 0.04 <0.005
ii) Deep Aquifer Sample Dissolved metal Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Iron Lead Manganese Mercury Nickel Selenium Silver Thallium	Date: (mg/L)	B-21D 2661/9/11 	B-21D 8661/4/2 <0.01 <0.01 <0.01 <0.01 	B-21D 8661/2/11 <0.01 0.24 <0.043 <0.005 <-	B-21D 6661/92/F <0.01 <0.01 - <0.01 - <0.001 - <0.001 - - <0.001 - - - - - - - - - - - - - - - - -	B-21D 0007/92/4 <0.011 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 	B-21D 0007/8/21 0.011 0.011 0.011 -	B-21D 1007/51/5 -	B-21D 1007/81/01 <0.01 0.2 <0.005 <0.005 <0.005 	B-21D 2007/91/2 -	B-21D 6007/E/9 -	B-21D 0007/EI/II 	B-21D F0007/06/9 -	B-21D F007/01/21 -	B-21D 9007/8/9 <0.005 1.35 0.072 0.012 -	B-21D 5007/8/71 0.008 0.006 0.008 0.008 0.008 0.008 0.008 -	B-21D 9007/87/9 0.005 0.005 0.005 	B-21D 9007/08/ 11/30/2007 <0.005 <0.004 <0.005 <0.005 <0.005	B-21D 2007/8/9 0.01 0.002 1.2 0.049 0.005 -	B-21D 2007/41/11 	B-21D 8007/97/9 0.005 0.04 <0.005 <0.005
ii) Deep Aquifer Sample Dissolved metal Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Iron Lead Manganese Mercury Nickel Selenium Silver Thallium Vanadium	Date: (mg/L)	B-21D 2661/9/11 	B-21D 8661/4/2 	B-21D 8661/2/11 <0.01 0.043 <0.005 <0.005 	B-21D 6661/92/F 	B-21D 0007/92/4 <0.011 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 	B-21D 0007/8/21 	B-21D 1007/5[1/5 	B-21D 1007/81/01 	B-21D 2007/91/2 	B-21D 6007/6/9 -	B-21D 0007/EI/II 	B-21D F0007/0E/9 -	B-21D F007/01/21 -	B-21D 9007/8/9 	B-21D 5007/8/71 	B-21D 9007/87/9 0.005 0.006 0.005 0.005 0.005	B-21D 9007/00/ 11/30/2005 <0.005 <0.004 <0.005 <0.005 <0.005	B-21D 2007/8/9 	B-21D 2007/41/11 	B-21D 8007/97/9 0.005 0.04 <0.005 0.04 <0.005 -

CONCENTRATIONS OF DISSOLVED INORGANICS IN BACKGROUND GROUNDWATER RACER TRUST COLDWATER ROAD INDUSTRIAL LANDS GENESEE TOWNSHIP, MICHIGAN

i) Shallow	Water	Bearing	Unit
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Sample	location:	B-24	B-24	B-24	B-24	B-24R	B-24R	B-24R	B-24R	B-24R	B-24R	B-24R	B-24R	B-24R	B-24R	B-24R	B-24R	B-24R	B-24R	B-24R
	Date:	/13/1996	6/1997	4/1998	/5/1998	7/2005	/8/2005	28/2006	/30/2006	4/2007	/13/2007	26/2008	/18/2008	24/2009	/18/2009	16/2010	/9/2010	21/2011	/16/2011	26/2012
Dissolved metal		11	5/	5/	11	6/	12	6/	11	6/	11	6/	11	6/	11	6/	11	6/	11	6/
Aluminum	(mg/L)																			
Antimony	(mg/L)																			
Arsenic	(mg/L)																			
Barium	(mg/L)																			
Beryllium	(mg/L)																			
Cadmium	(mg/L)																			
Chromium	(mg/L)	< 0.02	< 0.01	< 0.01	< 0.01	0.008	0.011	0.006	0.006	0.009	0.003	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.011	0.01/0.008	< 0.005	< 0.005
Cobalt	(mg/L)																			
Copper	(mg/L)	<0.02	<0.01	<0.01	<0.01	< 0.005	< 0.004	< 0.004	< 0.004	0.002	0.001	0.001	<0.001	<0.001	< 0.004	< 0.004	< 0.004	<0.004/<0.004	< 0.004	< 0.004
Iron	(mg/L)				0.06	10.6	3.18	3.76		2.4		3.49		4		1.88		1.13/1.07		1.2
Lead	(mg/L)																			
Manganese	(mg/L)				0.12	0.448	0.21	0.21		0.194		0.175		0.155		0.222		0.255/0.255		0.242
Mercury	(mg/L)																			
Nickei Calanian	(mg/L)	<0.02	0.031	0.008	0.009	<0.005	<0.005	<0.005	<0.005	0.002	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006/0.006	<0.005	<0.005
Selenium	(mg/L)																			
Silver Thallium	(mg/L)																			
I natitum	(mg/L)																			
vanaaium	(mg/L)	0.05																		
Zinc	(myL)	0.05	0.01	0.02	0.02	< 0.005	0.01	<u><u></u> <u></u> </u>	<0.005	0.019	0.007	0.008	<0.005	< 0.005	<0.005	<0.005	<0.005	<0.005/ <0.005	<0.005	NU.005
ii) Deev Aquifer																				
ii) Deep Aquifer Sample	location:	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D								
ii) Deep Aquifer Sample	location:	B-21D ∞	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D	B-21D								
ii) Deep Aquifer Sample	location:	B-21D 8002	B-21D	B-21D	B-21D 010	B-21D 0102	B-21D	B-21D	B-21D 1107	B-21D	B-21D	B-21D 210								
ii) Deep Aquifer Sample	location: Date:	B-21D 8007/6	B-21D 6007/	B-21D 6007/6	B-21D 0107/	B-21D 0107/0	B-21D	B-21D	B-21D 1102/9	B-21D	B-21D 7107/	B-21D								
ii) Deep Aquifer Sample	location: Date:	B-21D 8007/61/	B-21D 6007/27,	B-21D 6002/61/	B-21D 0107/21,	B-21D 0102/01/	B-21D 1107/27,	B-21D	B-21D 1102/91/	B-21D 1102/8/j	B-21D 7107/87,	B-21D 792,								
ii) Deep Aquifer Sample Dissolved metal	location: Date:	B-21D B-2008	B-21D 6002/22/9	B-21D 6002/61/11	B-21D 0102/21/9	B-21D	B-21D 1102/22/9	B-21D 1102/21/6	B-21D 1107/91/11	B-21D 1107/8/21	B-21D 7102/82/8	B-21D B-2012 (9/26/2012								
ii) Deep Aquifer Sample <u>Dissolved metal</u> <u>Aluminum</u>	Date:	B-21D B-21D - 11/19/2008	B-21D 6002/22/9 1	B-21D 6002/61/11	B-21D 0107/21/9 +	B-21D B-21D II/11	B-21D 1102/22/9 +	B-21D 1107/51/6 0.05 U	B-21D D1/16/2011	B-21D 1107/8/21 0.1	B-21D CLO 7 8 8 7 8 7 8 8 8 8 8 8 8 8 8 8 8 8 8	B-21D 7102/92/9								
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum Antimony	Date: (mg/L) (mg/L)	B-21D 8002/61/11 + +	B-21D 6002/22/9 : :	B-21D 6002/61/11 + +	B-21D B-21D I I I	B-21D D 10/2010 + +	B-21D D D III02/22/9 I I	B-21D 1107/21/6 0.05 U 0.002 U	B-21D 1102/91/11 + +	B-21D 1107/8/21 0.1 0.002 U	B-21D CLO RC RC C 0.05 U/0.05 U 0.002 U/0.002 U 0.002 U/0.002 U	B-21D D D D D D D D D D D D D D D D D D D								
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum Antimony Arsenic Barium	location: Date: (mg/L) (mg/L) (mg/L)	B-21D 8002/61/11 + + +	B-21D 6007/52/9	B-21D 6002/61/11 + + +	B-21D 0102/21/9	B-21D 0107/01/11 + + +	B-21D 1102/22/9	B-21D 1107/21/6 0.05 U 0.002 U 0.048	B-21D 1102/91/11 + + +	B-21D 1107/8/21 0.1 0.002 U 0.042	B-21D CLO 87 87 87 87 87 87 87 87 87 87	B-21D 2102/92/9 ! ! !								
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum Antimony Arsenic Barium Barrum	location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-51D	B-21D 6007/52/9	B-21D 6007/61/11 + + + +	B-21D 0107/21/9	B-21D 0107/01/11 + + + +	B-21D 1102/22/9 1 1 1	B-21D 1107/51/6 0.05 U 0.002 U 0.048 0.15 0.011 U	B-21D	B-21D 1007/8/21 0.1 0.002 U 0.042 0.16 0.01 U	B-21D CIO 87 87 87 87 87 87 87 87 87 87	B-21D 2102/92/9								
ii) Deep Aquifer Sample <u>Dissolved metal</u> <u>Aluminum</u> Antimony Arsenic Barium Beryllium Codminum	c location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-51D 8002/91/11	B-21D 6007/52/9	B-21D 6007/61/11	B-21D 0107/21/9	B-21D 0107/01/11	B-21D 1107/27/9	B-21D 107/51/6 0.05 U 0.002 U 0.048 0.051 U 0.001 U	B-21D	B-21D 1107 /8/21 0.1 0.002 U 0.042 0.042 0.001 U 0.001 U	B-21D CIO 87 87 87 87 87 87 87 87 87 87	B-21D 2102/9								
ii) Deep Aquifer Sample <u>Dissolved metal</u> <u>Aluminum</u> Antimony Arsenic Barium Beryllium Cadmium Cheomium	c location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-21D 8002/61/11	B-21D 6007/52/9	B-21D 60007/61/11 	B-21D 0107/21/9	B-21D 0107/01/11	B-21D	B-21D 107/51/6 0.05 U 0.02 U 0.048 0.15 0.001 U 0.001 U 0.001 U	B-21D 1102/91/11	B-21D 1007	B-21D	B-21D 2102/92/9 								
ii) Deep Aquifer Sample <u>Dissolved metal</u> <u>Aluminum</u> Antimony Arsenic Barium Beryllium Cadmium Chromium	c location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-21D 8007/61/11	B-21D 6007/97/9 	B-21D 60007/61/11 <0.005/<0.005	B-21D 0107/21/9 <0.005	B-21D 0107/01/11 0.011	B-21D ILI07/22/9 0.01	B-21D 107/51/6 0.05 U 0.02 U 0.048 0.15 0.001 U 0.001 U 0.005 U	B-21D 1102/91/11	B-21D 1007	B-21D CTO CTO CTO CTO CTO CTO CTO CTO	B-21D CI02/92/9 -								
ii) Deep Aquifer Sample <u>Dissolved metal</u> <u>Aluminum</u> Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt	e location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-21D 8007/61/11	B-21D 60007/52/9 	B-21D 60007/61/11 <0.005/<0.005	B-21D 0107/21/9 	B-21D 0102/01/11 	B-21D ILI07/22/9 	B-21D 1107/sf1/6 0.05 U 0.002 U 0.048 0.15 0.001 U 0.005 U 0.005 U 0.005 U 0.005 U	B-21D 1107/91/11	B-21D 1107 1007	B-21D CTO CTO CTO CTO CTO CTO CTO CTO	B-21D CTI02/92/9 								
ii) Deep Aquifer Sample <u>Dissolved metal</u> <u>Aluminum</u> Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper	e location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-21D 8007/61/11 -	B-21D 60007/52/9 	B-21D 60007/61/11 <0.005/<0.005 <0.004/<0.004	B-21D 0102/21/9 	B-21D 0102/01/11 0.011 <0.004	B-21D ILI07/22/9 	B-21D 1107/51/6 0.05 U 0.002 U 0.048 0.15 0.001 U 0.005 U 0.007 U 0.007 U 0.007 U 1	B-21D 1107/91/11 	B-21D 1107/8/21 0.1 0.042 0.16 0.001 U 0.005 U 0.007 U 0.007 U 0.007 J 12	B-21D CT07/87 87/87 87/87 87/87 0.05 U/0.05 U 0.002 U/0.002 U 0.048/0.045 0.17/0.17 0.001 U/0.001 U 0.001 U/0.001 U 0.005 U/0.005 U 0.007 U/0.007 U 0.002 U/0.002 U 0.09/0.87	B-21D CU02/97/9 -								
ii) Deep Aquifer Sample Dissolved metal Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Iron Lead	e location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-21D 8007/61/11 	B-21D 60007/527/9 <0.005 <0.001 1.21	B-21D 60007/61/11 <0.005/<0.005 <0.004/<0.004 	B-21D 0107/21/9 <0.005 <0.004 0.98	B-21D 0107/01/11 -	B-21D 1002/22/ 	B-21D 1107/51/6 0.05 U 0.002 U 0.002 U 0.001 U 0.001 U 0.007 U 0.002 U 1 0.002 U 1 0.003 U	B-21D 1107/91/11 	B-21D 1007/8/2T 0.1 0.002 U 0.042 0.16 0.001 U 0.005 U 0.007 U 0.007 U 0.001 J 1.2 0.003 U	B-21D CT07/87 87/5 0.05 U/0.05 U 0.002 U/0.002 U 0.048/0.045 0.17/0.17 0.001 U/0.001 U 0.001 U/0.001 U 0.005 U/0.005 U 0.007 U/0.007 U 0.002 U/0.002 U 0.9/0.87 0.003 U/0.003 U	B-21D CU02/97/9 -								
ii) Deep Aquifer Sample Dissolved metal Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Iron Lead Mauganese	e location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-21D 8007/61/11 	B-21D 6007/27/9 <0.005 <0.001 1.21 0.034	B-21D 60007/61/11 <0.005/<0.005 <0.004/<0.004 	B-21D 0107/21/9 <0.005 <0.004 0.98 0.034	B-21D 0107/01/11 -	B-21D 1007/22/2011 	B-21D 1107/51/6 0.05 U 0.002 U 0.002 U 0.001 U 0.001 U 0.007 U 0.002 U 1 0.002 U 1 0.003 U 0.003 U	B-21D 1107/91/11 	B-21D 1007/8 101 0.042 0.16 0.001 U 0.005 U 0.007 U 0.001 J 1.2 0.003 U 0.005	B-21D CT07/87 87/67 0.05 U/0.05 U 0.002 U/0.002 U 0.048/0.045 0.17/0.17 0.001 U/0.001 U 0.001 U/0.001 U 0.005 U/0.005 U 0.007 U/0.007 U 0.002 U/0.002 U 0.9/0.87 0.003 U/0.003 U 0.035/0.034	B-21D CT02/92/9 -								
ii) Deep Aquifer Sample Dissolved metal Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Iron Lead Manganese Mercury	e location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-21D 8007/61/11 	B-21D 6007/27/9 -	B-21D 60007/61/11 <0.005/<0.005 <0.004/<0.004 	B-21D 0107/21/9 <0.005 <0.004 0.98 0.034 	B-21D 0107/01/11 -	B-21D 1007/22/2 	B-21D 1107	B-21D 1107/91/11 	B-21D 1007/8/2T 0.1 0.042 0.16 0.001 U 0.005 U 0.007 U 0.001 J 1.2 0.003 U 0.002 U	B-21D CT07/82 CC 0.05 U/0.05 U 0.002 U/0.002 U 0.048/0.045 0.17/0.17 0.001 U/0.001 U 0.001 U/0.001 U 0.005 U/0.005 U 0.007 U/0.007 U 0.002 U/0.002 U 0.9/0.87 0.003 U/0.003 U 0.0035/0.034 0.002 U/0 0002 U	B-21D CU02/92/9 -								
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Iron Lead Manganese Mercury Nickel	e location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-21D 8007/61/11 	B-21D 6007/27/9 -	B-21D 6007/61/11 <0.005/<0.005 <0.004/<0.004 <0.005/<0.005	B-21D 0107/21/9 <0.005 <0.004 0.98 0.034 <0.005	B-21D 01007/01/11 -	B-21D 1007/22/2 0.01 <0.004 1.54 0.03 0.03 0.03 -	B-21D 1107/51/6 0.05 U 0.002 U 0.048 0.15 0.001 U 0.001 U 0.005 U 0.007 U 0.002 U 1 0.003 U 0.003 U 0.002 U	B-21D 1107/91/11 	B-21D 1007/8/ 0.1 0.002 U 0.042 0.16 0.001 U 0.001 U 0.001 U 0.007 U 0.001 J 1.2 0.003 U 0.003 U 0.002 U 0.002 U	B-21D Clock 88 67 0.05 U/0.05 U 0.002 U/0.002 U 0.048/0.045 0.17/0.17 0.001 U/0.001 U 0.001 U/0.001 U 0.005 U/0.005 U 0.007 U/0.007 U 0.002 U/0.002 U 0.0035/0.003 U 0.002 U/0.002 U	B-21D CT002/92/9 -								
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Iron Lead Manganese Mercury Nickel Selenium	e location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-21D 8007/61/11 	B-21D 6007/27/9 -	B-21D 6007/61/11 <0.005/<0.005 <0.004/<0.004 <0.005/<0.005	B-21D 0107/21/9 	B-21D 0107/01/11 -	B-21D 1007/22/2 0.01 <0.004 1.54 0.03 <0.005 	B-21D 1107/51/6 0.05 U 0.002 U 0.048 0.15 0.001 U 0.005 U 0.007 U 0.002 U 1 0.003 U 0.003 U 0.002 U 0.005 U 0.002 U	B-21D 1107/91/11 	B-21D 1007/8/ 0.1 0.042 0.16 0.001 U 0.001 U 0.001 U 0.007 U 0.001 J 1.2 0.003 U 0.005 0.0002 U 0.005 U 0.005 U	B-21D Clock SC C 0.05 U/0.05 U 0.002 U/0.002 U 0.048/0.045 0.17/0.17 0.001 U/0.001 U 0.001 U/0.001 U 0.005 U/0.005 U 0.007 U/0.007 U 0.002 U/0.002 U 0.0035/0.034 0.0002 U/0.002 U 0.005 U/0.005 U	B-21D CU07/92/9 -								
ii) Deep Aquifer Sample <u>Dissolved metal</u> Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Iron Lead Manganese Mercury Nickel Selenium Silver	e location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-21D 8007/61/11 	B-21D 6007/27/9 -	B-21D 6007/61/11 <0.005/<0.005 <0.004/<0.004 <0.005/<0.005 <0.005/<0.005	B-21D 0107/21/9 	B-21D 0107/01/11 <0.001 <0.005 	B-21D ILI07/27/27/9 	B-21D 1107/51/6 0.05 U 0.002 U 0.048 0.15 0.001 U 0.005 U 0.007 U 0.002 U 1 0.003 U 0.003 U 0.003 U 0.002 U 0.002 U 0.002 U	B-21D 1107/91/11 	B-21D 1007 88 101 10002 U 10002 U 10001 U 10001 U 10001 U 10001 U 10001 U 10001 U 10001 U 10002 U 100002 U 100002 U 100000 U 1000000 U 1000000 U 100000 U 100000 U 100000 U 100000 U 100000 U 100000 U 100000 U 10000 U 100000 U 10000 U 100000 U 10000 U 10000 U 10000 U 10000 U 10000 U 10000 U 10	B-21D CICZ/88 CC 0.05 U/0.05 U 0.002 U/0.002 U 0.048/0.045 0.17/0.17 0.001 U/0.001 U 0.001 U/0.001 U 0.005 U/0.005 U 0.007 U/0.007 U 0.002 U/0.002 U 0.003 U/0.003 U 0.003 U/0.003 U 0.003 U/0.002 U 0.002 U/0.002 U 0.005 U/0.002 U	B-21D C1007/92/9 -								
ii) Deep Aquifer Sample Dissolved metal Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Iron Lead Manganese Mercury Nickel Selenium Silver Thallium	e location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-21D 8007/61/11 	B-21D 6007/27/9 -	B-21D 6007/61/11 <0.005/<0.005 <0.004/<0.004 <0.005/<0.005 <0.005/<0.005 	B-21D 0107/21/9 	B-21D 0107/01/11 <0.001 <0.005 	B-21D ILI07/27/27/27/27/27/27/27/27/27/27/27/27/27	B-21D 1107/51/6 0.05 U 0.002 U 0.048 0.15 0.001 U 0.005 U 0.007 U 0.002 U 1 0.003 U 0.035 0.0002 U 0.035 0.0002 U 0.035 0.0002 U 0.025 U 0.002 U 0.005 U	B-21D 1107/91/11 	B-21D 1007/8/ 0.1 0.042 0.16 0.001 U 0.001 U 0.001 U 0.001 J 1.2 0.003 U 0.005 U 0.002 U 0.005 U 0.002 U 0.005 U 0.002 U 0.005 U 0.002 U 0.001 U 0.005 U 0.0001 U 0.005 U 0.005 U 0.005 U 0.0001 U 0.0001 U 0.005 U 0.0001 U	B-21D CICZ/88 CC 0.05 U/0.05 U 0.002 U/0.002 U 0.048/0.045 0.17/0.17 0.001 U/0.001 U 0.001 U/0.001 U 0.005 U/0.005 U 0.007 U/0.002 U 0.003 U/0.003 U 0.003 U/0.003 U 0.003 U/0.003 U 0.002 U/0.002 U 0.005 U/0.005 U 0.0002 U/0.0002 U 0.0001 U/0.0001 U	B-21D C1007/92/9 -								
ii) Deep Aquifer Sample Dissolved metal Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Iron Lead Manganese Mercury Nickel Selenium Silver Thallium Vanadium	e location: Date: (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)	B-21D 8007/61/11 	B-21D 6007/27 9 	B-21D 6007/61/111 <0.005/<0.005 <0.004/<0.004 <0.005/<0.005 <0.005/<0.005 	B-21D 0107/21/9 <0.005 <0.004 0.98 0.034 <0.005 	B-21D 0107/01/11 0.011 <0.004 <0.005 	B-21D ILI07/27/27/9 0.01 0.004 1.54 0.0033 <0.0005 -	B-21D 1107/51/6 0.05 U 0.002 U 0.048 0.15 0.001 U 0.005 U 0.007 U 0.002 U 1 0.003 U 0.003 U 0.003 U 0.002 U 0.0002 U 0.0002 U 0.0002 U 0.0002 U 0.0002 U 0.0002 U 0.0002 U	B-21D 1107/91/111 	B-21D 1007 88 2010 0.042 0.042 0.042 0.001 U 0.001 U 0.001 U 0.001 J 1.2 0.003 U 0.005 U 0.002 U 0.005 U 0.0005 U 0.005 U 0.0005 U 0.005 U 0.005 U 0.005 U 0.005 U 0.005 U 0.005 U 0.005 U 0.005 U 0.000 U 0.005 U 0.0005 U 0.0005 U 0.0005 U 0.0005 U 0.0005 U 0.0005 U 0.0005 U 0.0005 U 0.0000 U 0.00000 U 0.0000 U 0.0000 U 0.0000 U	B-21D CIC/ 87 67 0.05 U/0.05 U 0.002 U/0.002 U 0.048/0.045 0.17/0.17 0.001 U/0.001 U 0.001 U/0.001 U 0.005 U/0.005 U 0.007 U/0.007 U 0.002 U/0.002 U 0.003 U/0.003 U 0.035/0.034 0.0002 U/0.0002 U 0.005 U/0.005 U 0.0002 U/0.0002 U 0.0002 U/0.0002 U 0.0001 4 J/0.001 U 0.004 U/0.004 U	B-21D CTI07/92/9 <0.005 <0.004 0.64 <0.0042 <0.005 <0.005 <- <0.005 -								

FACILITY-SPECIFIC BACKGROUND CONCENTRATIONS FOR INORGANICS IN GROUNDWATER RACER TRUST COLDWATER ROAD INDUSTRIAL LANDS GENESEE TOWNSHIP, MICHIGAN

					Total Me	etals in Shallow	Water Bea	aring Unit	
		Number of	Percent					Facility-Specific Backgro	und
Analyte	Unit	Samples	ND	Minimum	Maximum	Distribution 1	Outliers	Method	Value
Aluminum	mg/L	9	56%	0.05 U	9.2			95% KM UTL ²	10.5
Antimony	mg/L	9	89%	0.0002 J	0.002 U			NP UTL	0.002 U
Arsenic	mg/L	9	56%	0.005 U	0.0086			95% KM UTL ²	0.01
Barium	mg/L	9	0%	0.033 J	0.13	Normal	1	95% UTL ²	0.15
Beryllium	mg/L	9	100%	0.001 U	0.001 U			NP UTL	0.001 U
Cadmium	mg/L	9	100%	0.001 U	0.001 U			NP UTL	0.001 U
Chromium	mg/L	9	67%	0.005 U	0.03			95% KM UTL ²	0.031
Cobalt	mg/L	9	67%	0.0027 J	0.0056 J			95% KM UTL ²	0.008
Copper	mg/L	9	78%	0.002 U	0.0096			95% KM UTL ²	0.01
Iron	mg/L	9	33%	0.1 U	12	Gamma	0	95% WH Approx. Gamma UTL ²	32.58
Lead	mg/L	9	78%	0.003 U	0.0029 J			95% KM UTL ²	0.0035
Manganese	mg/L	9	11%	0.00445	0.26	Gamma	0	95% WH Approx. Gamma UTL ²	0.963
Mercury	mg/L	9	100%	0.0002 U	0.0002 U			NP UTL	0.0002 U
Nickel	mg/L	9	56%	0.0043 J	0.023			95% KM UTL ²	0.026
Selenium	mg/L	9	100%	0.005 U	0.005 U			NP UTL	0.005 U
Silver	mg/L	9	89%	0.0002 U	0.00053			NP UTL	0.00053
Thallium	mg/L	9	89%	0.00058 J	0.001 U			NP UTL	0.001 U
Vanadium	mg/L	9	67%	0.0014 J	0.023			95% KM UTL ²	0.026
Zinc	mg/L	9	89%	0.02 U	0.039 U			NP UTL	0.039 U

Notes:

J - Estimated concentration.

U - Not present at or above the associated value.

-- Not tested due to high percentage of non-detects (> 50 percent).

¹ Data distribution test result considering detected values only (default ProUCL version 4.1.01 approach).

² With 95% Coverage.

					Dissolved	Metals in Shallo	w Water E	Bearing Unit	
		Number of	Percent					Facility-Specific Backgro	und
Analyte	Unit	Samples	ND	Minimum	Maximum	Distribution ¹	Outliers	Method	Value
Aluminum (dissolved)	mg/L	9	78%	0.05 U	3.4			95% KM UTL ²	3.52
Antimony (dissolved)	mg/L	9	78%	0.00014 J	0.002 U			95% KM UTL^2	0.002 U^3
Arsenic (dissolved)	mg/L	9	78%	0.005 U	0.0072			95% KM UTL ²	0.0072
Barium (dissolved)	mg/L	9	0%	0.027 J	0.077 J	Normal	0	95% UTL ²	0.1
Beryllium (dissolved)	mg/L	9	100%	0.001 U	0.001 U			NP UTL	0.001 U
Cadmium (dissolved)	mg/L	9	100%	0.001 U	0.001 U			NP UTL	0.001 U
Chromium (dissolved)	mg/L	124	76%	0.001	0.017			95% KM UTL ²	0.010
Cobalt (dissolved)	mg/L	9	89%	0.003 J	0.007 U			NP UTL	0.007 U
Copper (dissolved)	mg/L	124	81%	< 0.001	0.027			95% KM UTL ²	0.0074
Iron (dissolved)	mg/L	63	17%	< 0.02	10.6	Not Normal	1	95% KM UTL ²	4.0
Lead (dissolved)	mg/L	9	100%	0.003 U	0.003 U			NP UTL	0.003 U
Manganese (dissolved)	mg/L	59	24%	0.0016 J	0.448	Gamma	0	95% WH Approx. Gamma UTL ²	0.547
Mercury (dissolved)	mg/L	9	89%	0.00019 J	0.0002 U			NP UTL	0.0002 U
Nickel (dissolved)	mg/L	124	65%	0.002	0.062			95% KM UTL ²	0.0185
Selenium (dissolved)	mg/L	9	100%	0.005 U	0.005 U			NP UTL	0.005 U
Silver (dissolved)	mg/L	9	100%	0.0002 U	0.0002 U			NP UTL	0.0002 U
Thallium (dissolved)	mg/L	9	56%	0.00021 J	0.00084 J			95% KM UTL ²	0.0012
Vanadium (dissolved)	mg/L	9	89%	0.004 U	0.0089			NP UTL	0.0089
Zinc (dissolved)	mg/L	124	41%	< 0.005	0.15	Not Normal	1	95% KM UTL ²	0.051

Notes:

J - Estimated concentration.

U - Not present at or above the associated value.

-- Not tested due to high percentage of non-detects (> 50 percent).

¹ Data distribution test result considering detected values only (default ProUCL version 4.1.01 approach).

² With 95% Coverage.

³ Calculated UTL is below the reporting limit; therefore the reporting limit is used as the background value.

FACILITY-SPECIFIC BACKGROUND CONCENTRATIONS FOR INORGANICS IN GROUNDWATER RACER TRUST COLDWATER ROAD INDUSTRIAL LANDS GENESEE TOWNSHIP, MICHIGAN

					T	otal Metals in E	Deep Aquif	fer	
		Number of	Percent					Facility-Specific Backgro	und
Analyte	Unit	Samples	ND	Minimum	Maximum	Distribution 1	Outliers	Method	Value
Aluminum	mg/L	10	0%	0.17	3.7	Gamma	0	95% WH Approx. Gamma UTL ²	5.3
Antimony	mg/L	10	80%	0.000135	0.002 U			95% KM UTL ²	0.002 U^3
Arsenic	mg/L	10	10%	0.005 U	0.054	Normal	0	MLE 95% UTL ²	0.102
Barium	mg/L	10	0%	0.05 J	0.31	Gamma	0	95% WH Approx. Gamma UTL ²	0.47
Beryllium	mg/L	10	100%	0.001 U	0.001 U			NP UTL	0.001 U
Cadmium	mg/L	10	100%	0.001 U	0.001 U			NP UTL	0.001 U
Chromium	mg/L	10	60%	0.005 U	0.0067			95% KM UTL ²	0.007
Cobalt	mg/L	10	80%	0.0018 J	0.007 U			95% KM UTL ²	0.007 U^3
Copper	mg/L	10	40%	0.002 U	0.0091	Normal	0	MLE 95% UTL ²	0.015
Iron	mg/L	10	0%	0.99	7	Normal	1	95% UTL ²	7.9
Lead	mg/L	10	90%	0.0022 J	0.003 U			NP UTL	0.003 U
Manganese	mg/L	10	0%	0.039	0.18	Normal	0	95% UTL ²	0.252
Mercury	mg/L	10	100%	0.0002 U	0.0002 U			NP UTL	0.0002 U
Nickel	mg/L	10	70%	0.0035	0.02 U			95% KM UTL ²	0.02 U^3
Selenium	mg/L	10	100%	0.005 U	0.005 U			NP UTL	0.005 U
Silver	mg/L	10	90%	0.000094	0.0002 U			NP UTL	0.0002 U
Thallium	mg/L	10	70%	0.00018	0.0021 U			95% KM UTL ²	0.001 U^3
Vanadium	mg/L	10	30%	0.0013 J	0.01	Gamma	0	95% WH Approx. Gamma UTL ²	0.015
Zinc	mg/L	10	90%	0.02 U	0.039			NP UPL	0.039

Notes:

J - Estimated concentration.

U - Not present at or above the associated value.

-- Not tested due to high percentage of non-detects (> 50 percent).

¹ Data distribution test result considering detected values only (default ProUCL version 4.1.01 approach).

² With 95% Coverage.

³ Calculated UTL is below the reporting limit; therefore the reporting limit is used as the background value.

FACILITY-SPECIFIC BACKGROUND CONCENTRATIONS FOR INORGANICS IN GROUNDWATER RACER TRUST COLDWATER ROAD INDUSTRIAL LANDS GENESEE TOWNSHIP, MICHIGAN

					Diss	solved Metals in	1 Deep Aq	uifer	
		Number of	Percent					Facility-Specific Backgro	ound
Analyte	Unit	Samples	ND	Minimum	Maximum	Distribution ¹	Outliers	Method	Value
Aluminum (dissolved)	mg/L	9	44%	0.019 J	0.1	Normal	0	95% UTL ²	0.133
Antimony (dissolved)	mg/L	9	89%	0.00017 J	0.002 U			NP UTL	0.002 U^3
Arsenic (dissolved)	mg/L	9	22%	ND(0.005)	0.048	Normal	0	MLE 95% UTL ²	0.089
Barium (dissolved)	mg/L	9	0%	0.042 J	0.33	Gamma	0	95% WH Approx. Gamma UTL ²	0.553
Beryllium (dissolved)	mg/L	9	100%	0.001 U	0.001 U			NP UTL	0.001 U
Cadmium (dissolved)	mg/L	9	100%	0.001 U	0.001 U			NP UTL	0.001 U
Chromium (dissolved)	mg/L	117	82%	0.001	0.032			95% KM UTL ²	0.011
Cobalt (dissolved)	mg/L	9	100%	0.007 U	0.007 U			NP UTL	0.007 U
Copper (dissolved)	mg/L	117	85%	< 0.001	0.203			95% KM UTL ²	0.04
Iron (dissolved)	mg/L	58	7%	< 0.01	2.55	Gamma	0	95% WH Approx. Gamma UTL ²	3.62
Lead (dissolved)	mg/L	9	100%	0.003 U	0.003 U			NP UTL	0.003 U
Manganese (dissolved)	mg/L	52	2%	< 0.005	0.577	Lognormal	1	Log ROS 95% UTL ²	0.292
Mercury (dissolved)	mg/L	9	100%	0.0002 U	0.0002 U			NP UTL	0.0002 U
Nickel (dissolved)	mg/L	117	76%	0.001	0.054			95% KM UTL ²	0.022
Selenium (dissolved)	mg/L	9	100%	0.005 U	0.005 U			NP UTL	0.005 U
Silver (dissolved)	mg/L	9	100%	0.0002 U	0.0002 U			NP UTL	0.0002 U
Thallium (dissolved)	mg/L	9	44%	0.00014	0.001 U	Normal	0	95% UTL ²	0.001 U
Vanadium (dissolved)	mg/L	9	78%	0.00072 J	0.004 U			NP UTL	0.004 U
Zinc (dissolved)	mg/L	117	59%	ND(0.005)	0.124			95% KM UTL ²	0.0521

Notes:

J - Estimated concentration.

U - Not present at or above the associated value.

-- Not tested due to high percentage of non-detects (> 50 percent).

¹ Data distribution test result considering detected values only (default ProUCL version 4.1.01 approach).

² With 95% Coverage.

³ Calculated UTL is below the reporting limit; therefore the reporting limit is used as the background value.

ATTACHMENT A

Tomka, Mike

From:	Conforti, Rich (DEQ) [CONFORTIR@michigan.gov]
Sent:	Thursday, December 13, 2012 4:30 PM
То:	Tomka, Mike
Cc:	Grant Trigger; Dave Favero; Anthony Finch; John O'Neill; Dyck, Wesley; Yocum, William (DEQ); Araujo, Daniela; Chatfield, Richard; Project Email Hold; Rogers, Joseph (DEQ); McCabe, John (DEQ); Schinderle, Jack (DEQ)
Subject:	RE: Calculated Site-Specific Background Values for Inorganics in Groundwater, RACER Trust, Coldwater Road Sites~COR-012636~

Mike,

We have completed our review of the November 21, 2012, Memorandum (Memo) concerning Sitespecific Background values (BV) for inorganics in groundwater and have the following comments.

It is the DEQ's contention that the BVs presented in Table 3 of the Memo, calculated using the 99% upper prediction limits (UPL) statistical method, should be recalculated using an upper tolerance limit (UTL) with 95% confidence and 95% coverage. This 95% UTL is the method that is recommended in Section 7.5 of USEPA's Unified Guidance (USEPA 2010). The 95% UTL method is more conservative than the proposed 99% UPL (i.e. less potential for false negative or Type II error) which is appropriate given the use of the background statistic to determine if any of the naturally occurring inorganics are present above background and/or are migrating off-site.

It is also the DEQ's contention that the BVs calculated for dissolved inorganics are the most appropriate for use at the former Peregrine site. This is due to the fact that groundwater in both the shallow and deep aquifers is historically turbid, with turbidity values typically much higher than 5 NTU despite significant efforts to ensure turbidity is minimized during sampling. The larger data set used to generate the BVs for several of the significant inorganic constituents also supports this position. In light of this, site groundwater samples should be analyzed for dissolved inorganic constituents for purposes of comparison to the proposed BVs.

In addition, please be advised that these calculated BVs apply only to the former Peregrine site. Site specific background inorganic values have already been developed for the purposes of detection monitoring at the hazardous waste landfill and corrective action at the former wastewater treatment plant, for the Coldwater Rd. Landfill site to the north of the former Peregrine site.

Please revise the Memo to reflect the recalculated BVs and resubmit the Memo to the DEQ for final review and approval.

Thank you

Richard A. Conforti, Jr., P.E. Environmental Engineer DEQ - OWMRP Phone: 517-241-2108 Fax: 517-373-4797 William (DEQ)
 Cc: Grant Trigger; Dave Favero; Anthony Finch; John O'Neill; Dyck, Wesley; Araujo, Daniela; Chatfield, Richard; Project Email Hold
 Subject: Calculated Site-Specific Background Values for Inorganics in Groundwater, RACER Trust, Coldwater Road Sites~COR-012636~

Please find attached a memorandum on the calculation of Site-Specific Background Values for inorganics in Groundwater for the RACER Trust Coldwater Road Industrial Lands, for your review and comment. Please let me know if you need a hard copy. Please call or email with any questions or comments. Thanks Mike

Michael Tomka, P. Eng., P.E. Conestoga-Rovers & Associates (CRA)

Phone: 519.884.0510 Fax: 519.884.0525 Cell: 519.241.0007 Email: <u>mtomka@CRAworld.com</u> <u>www.CRAworld.com</u> Think before you print

Perform every task the safe way, the right way, every time!

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ATTACHMENT B

ATTACHMENT B.1

PROUCL OUTPUT TOTAL METALS IN SHALLOW WATER BEARING UNIT

General Background Statistics for Data Sets with Non-Detects

User Selected Options

From FileC:\Documents and Settings\rchatfield\Desktop\Peregrine - Pro UCL\12636 Total Metals - Shallow.wstFull PrecisionOFFConfidence Coefficient95%Coverage95%Different or Future K Values1Number of Bootstrap Operations10000

Aluminum

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 4 Tolerance Factor 3.031

Raw Statistics

Minimum Detected 0.26 Maximum Detected 9.2 Mean of Detected 3.543 SD of Detected 4.124 Minimum Non-Detect 0.05 Maximum Non-Detect 0.2

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), Observations < Largest ND are treated as NDs Number of Detected Data 4 Number of Non-Detect Data 5 Percent Non-Detects 55.56%

Log-transformed Statistics

Minimum Detected -1.347 Maximum Detected 2.219 Mean of Detected 0.479 SD of Detected 1.619 Minimum Non-Detect -2.996 Maximum Non-Detect -1.609

Single Detection Limit Scenario

Number treated as Non-Detect with Single DL 5 Number treated as Detected with Single DL 4 Single DL Non-Detect Percentage 55.56%

Warning: There are only 4 Distinct Detected Values in this data Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

Background Statistics

Normal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic 0.879 5% Shapiro Wilk Critical Value 0.748

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 1.597 SD 3.128 95% UTL 95% Coverage 11.08 95% UPL (t) 7.728 90% Percentile (z) 5.605 95% Percentile (z) 6.742 Lognormal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic 0.956 5% Shapiro Wilk Critical Value 0.748 Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -1.682 SD (Log Scale) 2.319 95% UTL 95% Coverage 210.1 95% UPL (t) 17.53 90% Percentile (z) 3.633 95% Percentile (z) 8.436

99% Percentile (z) 40.98

Log ROS Method Mean in Original Scale 1.582 SD in Original Scale 3.136 95% UTL with 95% Coverage 1351 95% BCA UTL with 95% Coverage 9.2 95% Bootstrap (%) UTL with 95% Coverage 9.2 95% UPL (t) 43.09 90% Percentile (z) 4.855 95% Percentile (z) 15.63 99% Percentile (z) 140

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 1.719 SD 2.886 SE of Mean 1.111 95% KM UTL with 95% Coverage 10.47 95% KM Chebyshev UPL 14.98 95% KM UPL (t) 7.376 90% Percentile (z) 5.417 95% Percentile (z) 6.466 99% Percentile (z) 8.433

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL 9.801
95% Hawkins Wixley (HW) Approx. Gamma UPL 12.43
95% WH Approx. Gamma UTL with 95% Coverage 26.72
95% HW Approx. Gamma UTL with 95% Coverage 45.92

99% Percentile (z) 8.874

Maximum Likelihood Estimate(MLE) Method Mean -0.868 SD 5.244 95% UTL with 95% Coverage 15.03

> 95% UPL (t) 9.41 90% Percentile (z) 5.852 95% Percentile (z) 7.757 99% Percentile (z) 11.33

Gamma Distribution Test with Detected Values Only

k star (bias corrected) 0.357 Theta Star 9.93 nu star 2.854

A-D Test Statistic 0.272 5% A-D Critical Value 0.67 K-S Test Statistic 0.257 5% K-S Critical Value 0.405 Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data Mean 1.574 Median 0.000001 SD 3.14 k star 0.142 Theta star 11.07 Nu star 2.561 95% Percentile of Chisquare (2k) 1.582

90% Percentile 4.63195% Percentile 8.75299% Percentile 20.84

Note: DL/2 is not a recommended method.

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 1 Number of Detected Data 1 Number of Non-Detect Data 8

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set! It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Antimony was not processed!

Arsenic

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 4 Tolerance Factor 3.031

Raw Statistics

Minimum Detected 0.0035 Maximum Detected 0.0086 Mean of Detected 0.00563 SD of Detected 0.00243 Minimum Non-Detect 0.005 Maximum Non-Detect 0.005 Number of Detected Data 4 Number of Non-Detect Data 5 Percent Non-Detects 55.56%

Log-transformed Statistics

Minimum Detected -5.655 Maximum Detected -4.756 Mean of Detected -5.251 SD of Detected 0.434 Minimum Non-Detect -5.298 Maximum Non-Detect -5.298

Warning: There are only 4 Distinct Detected Values in this data Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

Background Statistics

Normal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic 0.895 5% Shapiro Wilk Critical Value 0.748 Data appear Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.00389 SD 0.00222 95% UTL 95% Coverage 0.0106 95% UPL (t) 0.00824 90% Percentile (z) 0.00673 95% Percentile (z) 0.00754 99% Percentile (z) 0.00905 Lognormal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic 0.893 5% Shapiro Wilk Critical Value 0.748 Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -5.662 SD (Log Scale) 0.472 95% UTL 95% Coverage 0.0145 95% UPL (t) 0.00876 90% Percentile (z) 0.00636 95% Percentile (z) 0.00755 99% Percentile (z) 0.0104

Log ROS Method Mean in Original Scale 0.0046 SD in Original Scale 0.0019 Mean in Log Scale -5.448 SD in Log Scale 0.374 95% UTL 95% Coverage 0.0134 95% UPL (t) 0.00896 90% Percentile (z) 0.00695 95% Percentile (z) 0.00796 99% Percentile (z) 0.0103

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.00453 SD 0.00171 SE of Mean 0.0006645 95% KM UTL with 95% Coverage 0.00972 95% KM Chebyshev UPL 0.0124 95% KM UPL (t) 0.00789 90% Percentile (z) 0.00672 95% Percentile (z) 0.00735 99% Percentile (z) 0.00851

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL 0.01
95% Hawkins Wixley (HW) Approx. Gamma UPL 0.0103
95% WH Approx. Gamma UTL with 95% Coverage 0.0147
95% HW Approx. Gamma UTL with 95% Coverage 0.0156

Maximum Likelihood Estimate(MLE) Method N/A

Gamma Distribution Test with Detected Values Only

k star (bias corrected) 1.979 Theta Star 0.00284 nu star 15.83

A-D Test Statistic 0.385 5% A-D Critical Value 0.658 K-S Test Statistic 0.306 5% K-S Critical Value 0.395 Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data

Mean 0.00461 Median 0.00394 SD 0.00216 k star 3.189 Theta star 0.00144 Nu star 57.4 95% Percentile of Chisquare (2k) 13.15

90% Percentile 0.0080695% Percentile 0.009599% Percentile 0.0126

Note: DL/2 is not a recommended method.

General Statistics

Total Number of Observations 9 Tolerance Factor 3.031

Raw Statistics

Minimum 0.033 Maximum 0.13 Second Largest 0.072 First Quartile 0.054 Median 0.0671 Third Quartile 0.072 Mean 0.0652 Geometric Mean 0.0603 SD 0.0285 Coefficient of Variation 0.437 Skewness 1.439

Log-Transformed Statistics

Number of Distinct Observations 8

Minimum -3.411 Maximum -2.04 Second Largest -2.631 First Quartile -2.919 Median -2.702 Third Quartile -2.631 Mean -2.808 SD 0.416

Warning: There are only 9 Values in this data

Note: It should be noted that even though bootstrap methods may be performed on this data set, the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Background Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic 0.842 Shapiro Wilk Critical Value 0.829

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% UTL with 95% Coverage 0.152 95% UPL (t) 0.121 90% Percentile (z) 0.102 95% Percentile (z) 0.112 99% Percentile (z) 0.132

Gamma Distribution Test

k star 4.468 Theta Star 0.0146 MLE of Mean 0.0652 MLE of Standard Deviation 0.0308 nu star 80.42

A-D Test Statistic 0.472 5% A-D Critical Value 0.722 K-S Test Statistic 0.237 5% K-S Critical Value 0.28 Data appear Gamma Distributed at 5% Significance Level

Lognormal Distribution Test

Shapiro Wilk Critical Value 0.829 Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

95% UTL with 95% Coverage 0.213 95% UPL (t) 0.136 90% Percentile (z) 0.103 95% Percentile (z) 0.12 99% Percentile (z) 0.159

Data Distribution Test

Data appear Normal at 5% Significance Level

Nonparametric Statistics

90% Percentile 0.0836 95% Percentile 0.107 99% Percentile 0.125

Shapiro Wilk Test Statistic 0.912

95% UTL with 95% Coverage 0.13 95% Percentile Bootstrap UTL with 95% Coverage 0.13 95% BCA Bootstrap UTL with 95% Coverage 0.13 95% UPL 0.13 95% Chebyshev UPL 0.196 Upper Threshold Limit Based upon IQR 0.099

Assuming Gamma Distribution

90% Percentile 0.10695% Percentile 0.12399% Percentile 0.157

95% WH Approx. Gamma UPL 0.128 95% HW Approx. Gamma UPL 0.13 95% WH Approx. Gamma UTL with 95% Coverage 0.179 95% HW Approx. Gamma UTL with 95% Coverage 0.185

Beryllium

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 0 Number of Detected Data 0 Number of Non-Detect Data 9

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

The data set for variable Beryllium was not processed!

Cadmium

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 0 Number of Detected Data 0 Number of Non-Detect Data 9

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

The data set for variable Cadmium was not processed!

Chromium

General Statistics

Number of Valid Data 9

Number of Distinct Detected Data 3

Number of Detected Data 3 Number of Non-Detect Data 6

Log-transformed Statistics

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful and reliable test statistics and estimates.

No statistics will be produced!

Tolerance Factor 3.031

Percent Non-Detects 66.67%

Raw Statistics

Minimum Detected 0.0078 Maximum Detected 0.03 Mean of Detected 0.0153 SD of Detected 0.0128 Minimum Non-Detect 0.005 Maximum Non-Detect 0.005

Minimum Detected -4.854 Maximum Detected -3.507 Mean of Detected -4.396 SD of Detected 0.771 Minimum Non-Detect -5.298 Maximum Non-Detect -5.298

Warning: There are only 3 Distinct Detected Values in this data set

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods. Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods. However, results obtained using 4 to 9 distinct values may not be reliable. It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

Background Statistics

Normal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic 0.757 5% Shapiro Wilk Critical Value 0.767 Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.00676 SD 0.00902 95% UTL 95% Coverage 0.0341 95% UPL (t) 0.0244 90% Percentile (z) 0.0183 95% Percentile (z) 0.0216 99% Percentile (z) 0.0278

Maximum Likelihood Estimate(MLE) Method

Mean -0.00293 SD 0.0172 95% UTL with 95% Coverage 0.0492 Lognormal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic 0.764 5% Shapiro Wilk Critical Value 0.767 Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -5.46 SD (Log Scale) 0.886 95% UTL 95% Coverage 0.0624 95% UPL (t) 0.0242 90% Percentile (z) 0.0132 95% Percentile (z) 0.0183 99% Percentile (z) 0.0334

Log ROS Method

Mean in Original Scale 0.00572 SD in Original Scale 0.00961 95% UTL with 95% Coverage 0.352 95% BCA UTL with 95% Coverage 0.03 95% Bootstrap (%) UTL with 95% Coverage 0.03

95% UPL (t) 0.0535 90% Percentile (z) 0.0162 95% Percentile (z) 0.0307 99% Percentile (z) 0.102

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.0103 SD 0.00697 SE of Mean 0.00285 95% KM UTL with 95% Coverage 0.0314

95% KM Chebyshev UPL 0.0423

95% KM UPL (t) 0.0239 90% Percentile (z) 0.0192 95% Percentile (z) 0.0218

99% Percentile (z) 0.0265

Gamma ROS Limits with Extrapolated Data

	95% Wilson Hilferty (WH) Approx. Gamma UPL	N/A
ç	95% Hawkins Wixley (HW) Approx. Gamma UPL	N/A

95% WH Approx. Gamma UTL with95% CoverageN/A95% HW Approx. Gamma UTL with95% CoverageN/A

95% UPL (t) 0.0308 90% Percentile (z) 0.0191 95% Percentile (z) 0.0253 99% Percentile (z) 0.0371

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A
5% A-D Critical Value	N/A

K-S Test Statistic N/A

5% K-S Critical Value N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data

Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A
Nu star	N/A
95% Percentile of Chisquare (2k)	N/A
90% Percentile	N/A
95% Percentile	N/A
99% Percentile	N/A

Note: DL/2 is not a recommended method.

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 3 Number of Detected Data 3 Number of Non-Detect Data 6

Log-transformed Statistics

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful and reliable test statistics and estimates.

No statistics will be produced!

Tolerance Factor 3.031

Percent Non-Detects 66.67%

Raw Statistics

Minimum Detected 0.0027 Maximum Detected 0.0056 Mean of Detected 0.0039 SD of Detected 0.00151 Minimum Non-Detect 0.007 Maximum Non-Detect 0.007

Minimum Detected -5.915 Maximum Detected -5.185 Mean of Detected -5.594 SD of Detected 0.373 Minimum Non-Detect -4.962 Maximum Non-Detect -4.962

Warning: There are only 3 Distinct Detected Values in this data set

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods. Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods. However, results obtained using 4 to 9 distinct values may not be reliable. It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

Background Statistics

Normal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic 0.918 5% Shapiro Wilk Critical Value 0.767 Data appear Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.00363 SD 0.0007826 95% UTL 95% Coverage 0.00601 95% UPL (t) 0.00517 90% Percentile (z) 0.00464 95% Percentile (z) 0.00492 99% Percentile (z) 0.00545

Maximum Likelihood Estimate(MLE) Method N/A

5% Shapiro Wilk Critical Value 0.767 Data appear Lognormal at 5% Significance Level

Lognormal Distribution Test with Detected Values Only

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -5.635 SD (Log Scale) 0.189 95% UTL 95% Coverage 0.00633 95% UPL (t) 0.00517 90% Percentile (z) 0.00455 95% Percentile (z) 0.00487 99% Percentile (z) 0.00554

Shapiro Wilk Test Statistic 0.957

Log ROS Method Mean in Original Scale 0.00396 SD in Original Scale 0.00151 Mean in Log Scale -5.594 SD in Log Scale 0.379 95% UTL 95% Coverage 0.0117

95% UPL (t) 0.00782 90% Percentile (z) 0.00605 95% Percentile (z) 0.00694 99% Percentile (z) 0.00899

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.0039

SD 0.00124

SE of Mean 0.0008737

95% KM UTL with 95% Coverage 0.00765

95% KM Chebyshev UPL 0.00958

95% KM UPL (t) 0.00632

90% Percentile (z) 0.00548

95% Percentile (z) 0.00593

99% Percentile (z) 0.00677

Gamma ROS Limits with Extrapolated Data

 95% Wilson Hilferty (WH) Approx. Gamma UPL
 N/A

 95% Hawkins Wixley (HW) Approx. Gamma UPL
 N/A

95% WH Approx. Gamma UTL with95% CoverageN/A95% HW Approx. Gamma UTL with95% CoverageN/A

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A

5% A-D Critical Value N/A

K-S Test Statistic N/A

5% K-S Critical Value N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data

N/A	Mean
N/A	Median
N/A	SD
N/A	k star
N/A	Theta star
N/A	Nu star
N/A	95% Percentile of Chisquare (2k)
N/A	90% Percentile
N/A	95% Percentile
N/A	99% Percentile

Note: DL/2 is not a recommended method.

General Statistics

Number of Valid Data 9

Number of Distinct Detected Data 2

Number of Detected Data 2 Number of Non-Detect Data 7

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful and reliable test statistics and estimates.

No statistics will be produced!

Tolerance Factor 3.031

Raw Statistics

Minimum Detected 0.0039 Maximum Detected 0.0096 Mean of Detected 0.00675 SD of Detected 0.00403 Minimum Non-Detect 0.002 Maximum Non-Detect 0.0045

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), Observations < Largest ND are treated as NDs

Percent Non-Detects 77.78%

Log-transformed Statistics

Minimum Detected -5.547 Maximum Detected -4.646 Mean of Detected -5.096 SD of Detected 0.637 Minimum Non-Detect -6.215 Maximum Non-Detect -5.404

Single Detection Limit Scenario

Number treated as Non-Detect with Single DL 8 Number treated as Detected with Single DL 1 Single DL Non-Detect Percentage 88.89%

Warning: Data set has only 2 Distinct Detected Values.

This may not be adequate enough to compute meaningful and reliable test statistics and estimates. The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods. Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods. However, results obtained using 4 to 9 distinct values may not be reliable. It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

Background Statistics

Normal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic N/A 5% Shapiro Wilk Critical Value N/A

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.00244 SD 0.00286 95% UTL 95% Coverage 0.0111 95% UPL (t) 0.00804 90% Percentile (z) 0.0061 Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic N/A

5% Shapiro Wilk Critical Value N/A

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -6.39 SD (Log Scale) 0.811 95% UTL 95% Coverage 0.0196 95% UPL (t) 0.00823 90% Percentile (z) 0.00475

95% Percentile (z) 0.00637 99% Percentile (z) 0.0111

Log ROS Method Mean in Original Scale N/A SD in Original Scale N/A Mean in Log Scale N/A SD in Log Scale N/A 95% UTL 95% Coverage N/A 95% UPL (t) N/A 90% Percentile (z) N/A

> 95% Percentile (z) N/A 99% Percentile (z) N/A

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.00453 SD 0.00179 SE of Mean 0.0008444 95% KM UTL with 95% Coverage 0.00996 95% KM Chebyshev UPL 0.0128 95% KM UPL (t) 0.00804 90% Percentile (z) 0.00683 95% Percentile (z) 0.00748 99% Percentile (z) 0.0087

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma l	JPL N/A
95% Hawkins Wixley (HW) Approx. Gamma l	JPL N/A
95% WH Approx. Gamma UTL with 95% Cover	age N/A
95% HW Approx. Gamma UTL with 95% Cover	age N/A

95% Percentile (z) 0.00714 99% Percentile (z) 0.00909

Maximum Likelihood Estimate(MLE) Method N/A

Gamma Distribution Test with Detected Values Only

	k star (bias corrected)	N/A
	Theta Star	N/A
	nu star	N/A
	A-D Test Statistic	N/A
	5% A-D Critical Value	N/A
	K-S Test Statistic	N/A
	5% K-S Critical Value	N/A
Data not Gamma Distributed a	at 5% Significance Lev	el

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data

Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A
Nu star	N/A
95% Percentile of Chisquare (2k)	N/A
90% Percentile	N/A
95% Percentile	N/A
99% Percentile	N/A

Note: DL/2 is not a recommended method.

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 6 Tolerance Factor 3.031

Raw Statistics

Minimum Detected 0.0927 Maximum Detected 12 Mean of Detected 3.164 SD of Detected 4.715 Minimum Non-Detect 0.1 Maximum Non-Detect 0.1

Number of Detected Data 6 Number of Non-Detect Data 3 Percent Non-Detects 33.33%

Log-transformed Statistics

Minimum Detected -2.378 Maximum Detected 2.485 Mean of Detected -0.0122 SD of Detected 1.797 Minimum Non-Detect -2.303 Maximum Non-Detect -2.303

Warning: There are only 6 Detected Values in this data Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

Background Statistics

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic 0.964 5% Shapiro Wilk Critical Value 0.788 Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -1.007 SD (Log Scale) 2.06 95% UTL 95% Coverage 188.2 95% UPL (t) 20.73 90% Percentile (z) 5.121 95% Percentile (z) 10.83 99% Percentile (z) 44.07

Log ROS Method

Mean in Original Scale 2.132 SD in Original Scale 4.036 95% UTL with 95% Coverage 213.8 95% BCA UTL with 95% Coverage 12 95% Bootstrap (%) UTL with 95% Coverage 12 95% UPL (t) 22.65 90% Percentile (z) 5.459 95% Percentile (z) 11.69 99% Percentile (z) 48.8

Normal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic 0.732 5% Shapiro Wilk Critical Value 0.788 Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 2.126 SD 4.04 95% UTL 95% Coverage 14.37 95% UPL (t) 10.04 90% Percentile (z) 7.303 95% Percentile (z) 8.771 99% Percentile (z) 11.52

Maximum Likelihood Estimate(MLE) Method

Mean 0.0874 SD 5.792 95% UTL with 95% Coverage 17.64

> 95% UPL (t) 11.44 90% Percentile (z) 7.51 95% Percentile (z) 9.614 99% Percentile (z) 13.56

Data Distribution Test with Detected Values Only

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 2.14 SD 3.801 SE of Mean 1.388 95% KM UTL with 95% Coverage 13.66 95% KM Chebyshev UPL 19.61 95% KM UPL (t) 9.591 90% Percentile (z) 7.012 95% Percentile (z) 8.393 99% Percentile (z) 10.98

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL 12.8
95% Hawkins Wixley (HW) Approx. Gamma UPL 16.7
95% WH Approx. Gamma UTL with 95% Coverage 32.58
95% HW Approx. Gamma UTL with 95% Coverage 55.13

Gamma Distribution Test with Detected Values Only

k star (bias corrected) 0.381 Theta Star 8.308 nu star 4.57

A-D Test Statistic 0.374 5% A-D Critical Value 0.734 K-S Test Statistic 0.291 5% K-S Critical Value 0.348

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data Mean 2.109 Median 0.3 SD 4.05 k star 0.17 Theta star 12.39 Nu star 3.064 95% Percentile of Chisquare (2k) 1.824

90% Percentile 6.33995% Percentile 11.399% Percentile 25.36

Note: DL/2 is not a recommended method.

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 2

Number of Detected Data 2 Number of Non-Detect Data 7

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful and reliable test statistics and estimates.

No statistics will be produced!

Tolerance Factor 3.031

Percent Non-Detects 77.78%

Raw Statistics

Minimum Detected 0.0023 Maximum Detected 0.0029 Mean of Detected 0.0026 SD of Detected 0.0004243 Minimum Non-Detect 0.003 Maximum Non-Detect 0.003

Log-transformed Statistics

Minimum Detected -6.075 Maximum Detected -5.843 Mean of Detected -5.959 SD of Detected 0.164 Minimum Non-Detect -5.809 Maximum Non-Detect -5.809

Warning: Data set has only 2 Distinct Detected Values.

This may not be adequate enough to compute meaningful and reliable test statistics and estimates. The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods. Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods. However, results obtained using 4 to 9 distinct values may not be reliable. It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

Background Statistics

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic N/A

5% Shapiro Wilk Critical Value N/A

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -6.382 SD (Log Scale) 0.247 95% UTL 95% Coverage 0.00357 95% UPL (t) 0.00274 90% Percentile (z) 0.00232 95% Percentile (z) 0.00254 99% Percentile (z) 0.003

Normal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic N/A 5% Shapiro Wilk Critical Value N/A Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.00174 SD 0.0005077 95% UTL 95% Coverage 0.00328 95% UPL (t) 0.00274 90% Percentile (z) 0.0024 95% Percentile (z) 0.00258 99% Percentile (z) 0.00293

Log ROS Method

- Mean in Original Scale N/A
- SD in Original Scale N/A
 - Mean in Log Scale N/A
 - SD in Log Scale N/A
- 95% UTL 95% Coverage N/A
 - 95% UPL (t) N/A
 - 90% Percentile (z) N/A
 - 95% Percentile (z) N/A
 - 99% Percentile (z) N/A

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.0026 SD 0.0003 SE of Mean 0.0003 95% KM UTL with 95% Coverage 0.00351 95% KM Chebyshev UPL 0.00398 95% KM UPL (t) 0.00319 90% Percentile (z) 0.00298 95% Percentile (z) 0.00309

99% Percentile (z) 0.0033

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL	N/A
95% Hawkins Wixley (HW) Approx. Gamma UPL	N/A
95% WH Approx. Gamma UTL with 95% Coverage	N/A
95% HW Approx. Gamma UTL with 95% Coverage	N/A

Maximum Likelihood Estimate(MLE) Method N/A

Gamma Distribution Test with Detected Values Only

- k star (bias corrected) N/A
 - Theta Star N/A nu star N/A
 - A-D Test Statistic N/A
 - 5% A-D Critical Value N/A
 - K-S Test Statistic N/A
 - 5% K-S Critical Value N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Da	ata
Ma	

N/A	Mean
N/A	Median
N/A	SD
N/A	k star
N/A	Theta star
N/A	Nu star
N/A	95% Percentile of Chisquare (2k)
N/A	90% Percentile
N/A	95% Percentile
N/A	99% Percentile

Note: DL/2 is not a recommended method.

Manganese

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 7 Tolerance Factor 3.031

Raw Statistics

Minimum Detected 0.00445 Maximum Detected 0.26 Mean of Detected 0.089 SD of Detected 0.112 Minimum Non-Detect 0.015 Maximum Non-Detect 0.015 Number of Detected Data 8 Number of Non-Detect Data 1 Percent Non-Detects 11.11%

Log-transformed Statistics

Minimum Detected -5.415 Maximum Detected -1.347 Mean of Detected -3.388 SD of Detected 1.603 Minimum Non-Detect -4.2 Maximum Non-Detect -4.2

Warning: There are only 8 Detected Values in this data Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

Background Statistics

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic 0.901 5% Shapiro Wilk Critical Value 0.818 Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -3.555 SD (Log Scale) 1.581 95% UTL 95% Coverage 3.447 95% UPL (t) 0.634 90% Percentile (z) 0.217 95% Percentile (z) 0.385 99% Percentile (z) 1.131

Log ROS Method

 Mean in Original Scale
 0.0796

 SD in Original Scale
 0.108

 95% UTL with
 95% Coverage
 3.903

 95% BCA UTL with
 95% Coverage
 0.26

 95% Bootstrap (%) UTL with
 95% Coverage
 0.26

 95% UPL (t)
 0.674
 90% Percentile (z)
 0.221

 95% Percentile (z)
 0.402
 99% Percentile (z)
 1.229

Normal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic 0.736 5% Shapiro Wilk Critical Value 0.818 Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.0799 SD 0.108 95% UTL 95% Coverage 0.408 95% UPL (t) 0.292 90% Percentile (z) 0.219 95% Percentile (z) 0.258 99% Percentile (z) 0.332

Maximum Likelihood Estimate(MLE) Method

Mean 0.051 SD 0.135 95% UTL with 95% Coverage 0.46

> 95% UPL (t) 0.316 90% Percentile (z) 0.224 95% Percentile (z) 0.273 99% Percentile (z) 0.365

Data Distribution Test with Detected Values Only

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.0797 SD 0.102 SE of Mean 0.0364 95% KM UTL with 95% Coverage 0.389 95% KM Chebyshev UPL 0.549 95% KM UPL (t) 0.28 90% Percentile (z) 0.211 95% Percentile (z) 0.248 99% Percentile (z) 0.317

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL 0.429
95% Hawkins Wixley (HW) Approx. Gamma UPL 0.531
95% WH Approx. Gamma UTL with 95% Coverage 0.963
95% HW Approx. Gamma UTL with 95% Coverage 1.437

Gamma Distribution Test with Detected Values Only

k star (bias corrected) 0.479 Theta Star 0.186 nu star 7.66

A-D Test Statistic 0.556 5% A-D Critical Value 0.753 K-S Test Statistic 0.238 5% K-S Critical Value 0.306

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data Mean 0.0791 Median 0.016 SD 0.109 k star 0.299 Theta star 0.265 Nu star 5.373 95% Percentile of Chisquare (2k) 2.736

90% Percentile 0.23395% Percentile 0.36299% Percentile 0.698

Note: DL/2 is not a recommended method.

Mercury

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 0 Number of Detected Data 0 Number of Non-Detect Data 9

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

The data set for variable Mercury was not processed!

Nickel

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 4 Tolerance Factor 3.031

Raw Statistics

Minimum Detected 0.0043 Maximum Detected 0.023 Mean of Detected 0.0104 SD of Detected 0.0088 Minimum Non-Detect 0.02 Maximum Non-Detect 0.02 Number of Detected Data 4 Number of Non-Detect Data 5 Percent Non-Detects 55.56%

Log-transformed Statistics

Minimum Detected -5.449 Maximum Detected -3.772 Mean of Detected -4.813 SD of Detected 0.797 Minimum Non-Detect -3.912 Maximum Non-Detect -3.912

Warning: There are only 4 Distinct Detected Values in this data Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

Background Statistics

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic 0.873 5% Shapiro Wilk Critical Value 0.748 Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -4.698 SD (Log Scale) 0.5 95% UTL 95% Coverage 0.0415 95% UPL (t) 0.0243 90% Percentile (z) 0.0173 95% Percentile (z) 0.0208 99% Percentile (z) 0.0292

Log ROS Method Mean in Original Scale 0.00816 SD in Original Scale 0.00619 Mean in Log Scale -5.005 SD in Log Scale 0.632 95% UTL 95% Coverage 0.0455 95% UPL (t) 0.0231 90% Percentile (z) 0.019 99% Percentile (z) 0.0292

Normal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic 0.819 5% Shapiro Wilk Critical Value 0.748 Data appear Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.0102 SD 0.00539 95% UTL 95% Coverage 0.0265 95% UPL (t) 0.0208 90% Percentile (z) 0.0171 95% Percentile (z) 0.0191 99% Percentile (z) 0.0227

Maximum Likelihood Estimate(MLE) Method N/A

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.0081 SD 0.00584 SE of Mean 0.00257 95% KM UTL with 95% Coverage 0.0258 95% KM Chebyshev UPL 0.0349 95% KM UPL (t) 0.0195 90% Percentile (z) 0.0176 95% Percentile (z) 0.0177 99% Percentile (z) 0.0217

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL 0.0291
95% Hawkins Wixley (HW) Approx. Gamma UPL 0.0318
95% WH Approx. Gamma UTL with 95% Coverage 0.0517
95% HW Approx. Gamma UTL with 95% Coverage 0.0617

Gamma Distribution Test with Detected Values Only

k star (bias corrected) 0.705 Theta Star 0.0148 nu star 5.643

A-D Test Statistic 0.429 5% A-D Critical Value 0.66 K-S Test Statistic 0.307 5% K-S Critical Value 0.398

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data Mean 0.00851 Median 0.00643 SD 0.00694 k star 0.985 Theta star 0.00864 Nu star 17.73 95% Percentile of Chisquare (2k) 5.933

> 90% Percentile 0.0197 95% Percentile 0.0256 99% Percentile 0.0395

Note: DL/2 is not a recommended method.

Selenium

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 0 Number of Detected Data 0 Number of Non-Detect Data 9

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

The data set for variable Selenium was not processed!

Silver

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 1 Number of Detected Data 1 Number of Non-Detect Data 8

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set! It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Silver was not processed!

Thallium

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 1 Number of Detected Data 1 Number of Non-Detect Data 8

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set! It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Thallium was not processed!

Vanadium

General Statistics

Number of Valid Data 9

Number of Distinct Detected Data 3

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful and reliable test statistics and estimates. No statistics will be produced!

Tolerance Factor 3.031

Raw Statistics

Minimum Detected 0.0014 Maximum Detected 0.023 Mean of Detected 0.0113 SD of Detected 0.0109 Minimum Non-Detect 0.004 Maximum Non-Detect 0.004 Percent Non-Detects 66.67%

Number of Detected Data 3

Number of Non-Detect Data 6

Log-transformed Statistics

Minimum Detected -6.571 Maximum Detected -3.772 Mean of Detected -4.997 SD of Detected 1.432 Minimum Non-Detect -5.521 Maximum Non-Detect -5.521

Warning: There are only 3 Distinct Detected Values in this data set The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods. Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods. However, results obtained using 4 to 9 distinct values may not be reliable. It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

Background Statistics

Normal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic 0.981 5% Shapiro Wilk Critical Value 0.767 Data appear Normal at 5% Significance Level Lognormal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic 0.955 5% Shapiro Wilk Critical Value 0.767 Data appear Lognormal at 5% Significance Level
Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -5.809 SD (Log Scale) 0.94 95% UTL 95% Coverage 0.0519 95% UPL (t) 0.0189 90% Percentile (z) 0.0141 95% Percentile (z) 0.0141

Log ROS Method Mean in Original Scale 0.00495 SD in Original Scale 0.00735 Mean in Log Scale -6.119 SD in Log Scale 1.338 95% UTL 95% Coverage 0.127 95% UPL (t) 0.0303 90% Percentile (z) 0.0122 95% Percentile (z) 0.0199 99% Percentile (z) 0.0495

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.00471 SD 0.00695 SE of Mean 0.00284 95% KM UTL with 95% Coverage 0.0258 95% KM Chebyshev UPL 0.0367 95% KM UPL (t) 0.0183 90% Percentile (z) 0.0161 95% Percentile (z) 0.0209

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Appro	x. Gamma UPL	N/A
95% Hawkins Wixley (HW) Approx. Gamma UPL		N/A
95% WH Approx. Gamma UTL with	95% Coverage	N/A
95% HW Approx. Gamma UTL with	95% Coverage	N/A

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.00511 SD 0.00718 95% UTL 95% Coverage 0.0269 95% UPL (t) 0.0192 90% Percentile (z) 0.0143 95% Percentile (z) 0.0169 99% Percentile (z) 0.0218

Maximum Likelihood Estimate(MLE) Method N/A

Gamma Distribution Test with Detected Values Only

- k star (bias corrected) N/A Theta Star N/A nu star N/A
 - A-D Test Statistic N/A
 - 5% A-D Critical Value N/A
 - K-S Test Statistic N/A
 - 5% K-S Critical Value N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

	Gamma ROS Statistics with Extrapolated Data
N/A	Mean
N/A	Median
N/A	SD
N/A	k star
N/A	Theta star
N/A	Nu star
N/A	95% Percentile of Chisquare (2k)
N/A	90% Percentile
N/A	95% Percentile
N/A	99% Percentile

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 1 Number of Detected Data 1 Number of Non-Detect Data 8

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set! It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Zinc was not processed!

ATTACHMENT B.2

PROUCL OUTPUT TOTAL METALS IN DEEP AQUIFER

General Background Statistics for Data Sets with Non-Detects

User Selected Options	
From File	C:\Documents and Settings\rchatfield\Desktop\Peregrine - Pro UCL\12636 Total Metals - Deep.wst
Full Precision	OFF
Confidence Coefficient	95%
Coverage	95%
Different or Future K Values	1
Number of Bootstrap Operations	10000

Aluminum

General Statistics

Total Number of Observations 10 Tolerance Factor 2.911

Raw Statistics

Minimum 0.17 Maximum 3.7 Second Largest 1.65 First Quartile 0.504 Median 0.6 Third Quartile 1.033 Mean 0.993 Geometric Mean 0.685 SD 1.043 Coefficient of Variation 1.051 Skewness 2.3

Background Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic 0.72 Shapiro Wilk Critical Value 0.842

Data not Normal at 5% Significance Level

Assuming Normal Distribution

95% UTL with 95% Coverage 4.03 95% UPL (t) 2.999 90% Percentile (z) 2.33 95% Percentile (z) 2.709 99% Percentile (z) 3.42

Gamma Distribution Test

k star 1.11 Theta Star 0.894 MLE of Mean 0.993 MLE of Standard Deviation 0.942 nu star 22.2

> A-D Test Statistic 0.406 5% A-D Critical Value 0.739

Number of Distinct Observations 10

Log-Transformed Statistics

Minimum -1.772 Maximum 1.308 Second Largest 0.501 First Quartile -0.686 Median -0.518 Third Quartile 0.0249 Mean -0.379 SD 0.882

Lognormal Distribution Test

Shapiro Wilk Test Statistic 0.974 Shapiro Wilk Critical Value 0.842 Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

95% UTL with 95% Coverage 8.928 95% UPL (t) 3.733 90% Percentile (z) 2.121 95% Percentile (z) 2.922 99% Percentile (z) 5.33

Data Distribution Test

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics 90% Percentile 1.855

95% Percentile 2.778 99% Percentile 3.516

K-S Test Statistic 0.173 5% K-S Critical Value 0.271

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

90% Percentile 2.22895% Percentile 2.86799% Percentile 4.34

95% WH Approx. Gamma UPL 3.147

95% HW Approx. Gamma UPL 3.231

95% WH Approx. Gamma UTL with 95% Coverage 5.334 95% HW Approx. Gamma UTL with 95% Coverage 5.798 95% UTL with 95% Coverage 3.7

95% Percentile Bootstrap UTL with 95% Coverage 3.7

95% BCA Bootstrap UTL with 95% Coverage 3.7

95% UPL 3.7

95% Chebyshev UPL 5.763

Upper Threshold Limit Based upon IQR 1.826

Antimony

General Statistics

Number of Valid Data 10 Number of Distinct Detected Data 2

Number of Detected Data 2 Number of Non-Detect Data 8

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful and reliable test statistics and estimates.

No statistics will be produced!

Tolerance Factor 2.911

Percent Non-Detects 80.00%

Raw Statistics

Minimum Detected 0.000135 Maximum Detected 0.00025 Mean of Detected 0.0001925 SD of Detected 8.132E-05 Minimum Non-Detect 0.002 Maximum Non-Detect 0.002

Minimum Detected -8.91 Maximum Detected -8.294 Mean of Detected -8.602 SD of Detected 0.436 Minimum Non-Detect -6.215 Maximum Non-Detect -6.215

Warning: Data set has only 2 Distinct Detected Values.

This may not be adequate enough to compute meaningful and reliable test statistics and estimates. The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods. Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods. However, results obtained using 4 to 9 distinct values may not be reliable. It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

Background Statistics

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic N/A

5% Shapiro Wilk Critical Value N/A

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -7.247 SD (Log Scale) 0.729 95% UTL 95% Coverage 0.00595 95% UPL (t) 0.00289 90% Percentile (z) 0.00181 95% Percentile (z) 0.00236 99% Percentile (z) 0.00388

Normal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic N/A 5% Shapiro Wilk Critical Value N/A Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.0008385 SD 0.0003416 95% UTL 95% Coverage 0.00183 95% UPL (t) 0.0015 90% Percentile (z) 0.00128 95% Percentile (z) 0.0014 99% Percentile (z) 0.00163

Log-transformed Statistics

Log ROS Method

- Mean in Original Scale N/A
- SD in Original Scale N/A
 - Mean in Log Scale N/A
 - SD in Log Scale N/A
- 95% UTL 95% Coverage N/A
 - 95% UPL (t) N/A
 - 90% Percentile (z) N/A
 - 95% Percentile (z) N/A
 - 99% Percentile (z) N/A

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.0001925 SD 0.0000575 SE of Mean 0.0000575 95% KM UTL with 95% Coverage 0.0003599 95% KM Chebyshev UPL 0.0004554 95% KM UPL (t) 0.0003031 90% Percentile (z) 0.0002662 95% Percentile (z) 0.0002871

99% Percentile (z) 0.0003263

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL	N/A
95% Hawkins Wixley (HW) Approx. Gamma UPL	
95% WH Approx. Gamma UTL with 95% Coverage	N/A
95% HW Approx. Gamma UTL with 95% Coverage	N/A

Maximum Likelihood Estimate(MLE) Method N/A

Gamma Distribution Test with Detected Values Only

- k star (bias corrected) N/A
 - Theta Star N/A nu star N/A
 - A-D Test Statistic N/A
 - 5% A-D Critical Value N/A
 - K-S Test Statistic N/A
 - 5% K-S Critical Value N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

	Gamma ROS Statistics with Extrapolated Data	
N/A	Mean	
Ν/Λ	Modian	

N/A	Median
N/A	SD
N/A	k star
N/A	Theta star
N/A	Nu star
N/A	95% Percentile of Chisquare (2k)
N/A	90% Percentile
N/A	95% Percentile
N/A	99% Percentile

Arsenic

General Statistics

Number of Valid Data 10 Number of Distinct Detected Data 8 Tolerance Factor 2.911

Raw Statistics

Minimum Detected 0.004 Maximum Detected 0.054 Mean of Detected 0.0358 SD of Detected 0.018 Minimum Non-Detect 0.005 Maximum Non-Detect 0.005 Number of Detected Data 8 Number of Non-Detect Data 2 Percent Non-Detects 20.00%

Log-transformed Statistics

Minimum Detected -5.521 Maximum Detected -2.919 Mean of Detected -3.569 SD of Detected 0.908 Minimum Non-Detect -5.298 Maximum Non-Detect -5.298

Warning: There are only 8 Detected Values in this data Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

Background Statistics

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic 0.729 5% Shapiro Wilk Critical Value 0.818 Data not Lognormal at 5% Significance Level

.

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -4.054 SD (Log Scale) 1.298 95% UTL 95% Coverage 0.759 95% UPL (t) 0.21 90% Percentile (z) 0.0916 95% Percentile (z) 0.147 99% Percentile (z) 0.355

Log ROS Method

Mean in Original Scale 0.03 SD in Original Scale 0.02 95% UTL with 95% Coverage 0.395 95% BCA UTL with 95% Coverage 0.054 95% Bootstrap (%) UTL with 95% Coverage 0.054 95% UPL (t) 0.146 90% Percentile (z) 0.0769 95% Percentile (z) 0.111 99% Percentile (z) 0.22

Normal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic 0.858 5% Shapiro Wilk Critical Value 0.818 Data appear Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.0291 SD 0.0212 95% UTL 95% Coverage 0.0908 95% UPL (t) 0.0699 90% Percentile (z) 0.0563 95% Percentile (z) 0.064 99% Percentile (z) 0.0784

Maximum Likelihood Estimate(MLE) Method

Mean 0.0252 SD 0.0264 95% UTL with 95% Coverage 0.102

> 95% UPL (t) 0.0758 90% Percentile (z) 0.0589 95% Percentile (z) 0.0685 99% Percentile (z) 0.0865

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.0294 SD 0.0197 SE of Mean 0.00667 95% KM UTL with 95% Coverage 0.0868 95% KM Chebyshev UPL 0.12 95% KM UPL (t) 0.0673 90% Percentile (z) 0.0547 95% Percentile (z) 0.0618 99% Percentile (z) 0.0753

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL 0.128
95% Hawkins Wixley (HW) Approx. Gamma UPL 0.17
95% WH Approx. Gamma UTL with 95% Coverage 0.242
95% HW Approx. Gamma UTL with 95% Coverage 0.377

Gamma Distribution Test with Detected Values Only

k star (bias corrected) 1.491 Theta Star 0.024 nu star 23.85

A-D Test Statistic 0.931 5% A-D Critical Value 0.723 K-S Test Statistic 0.374 5% K-S Critical Value 0.297

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data Mean 0.0294 Median 0.0385 SD 0.0208 k star 0.437 Theta star 0.0674 Nu star 8.736 95% Percentile of Chisquare (2k) 3.52

90% Percentile 0.081895% Percentile 0.11999% Percentile 0.21

General Statistics

Total Number of Observations 10 Tolerance Factor 2.911

Raw Statistics

Minimum 0.05 Maximum 0.31 Second Largest 0.18 First Quartile 0.0603 Median 0.0859 Third Quartile 0.168 Mean 0.123 Geometric Mean 0.102 SD 0.0829 Coefficient of Variation 0.675 Skewness 1.378

Background Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic 0.832 Shapiro Wilk Critical Value 0.842 Data not Normal at 5% Significance Level

Data not Normal at 5 % Orgnineance Leve

Assuming Normal Distribution

95% UTL with 95% Coverage 0.364 95% UPL (t) 0.282 90% Percentile (z) 0.229 95% Percentile (z) 0.259 99% Percentile (z) 0.315

Gamma Distribution Test

k star 2.069 Theta Star 0.0593 MLE of Mean 0.123 MLE of Standard Deviation 0.0853 nu star 41.38

A-D Test Statistic 0.493 5% A-D Critical Value 0.733 K-S Test Statistic 0.226 5% K-S Critical Value 0.269

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

90% Percentile 0.23795% Percentile 0.28899% Percentile 0.401

Number of Distinct Observations 9

Log-Transformed Statistics

Minimum -2.996 Maximum -1.171 Second Largest -1.715 First Quartile -2.828 Median -2.455 Third Quartile -1.787 Mean -2.283 SD 0.63

Lognormal Distribution Test

Shapiro Wilk Test Statistic 0.909 Shapiro Wilk Critical Value 0.842 Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

95% UTL with 95% Coverage 0.639 95% UPL (t) 0.343 90% Percentile (z) 0.229 95% Percentile (z) 0.288 99% Percentile (z) 0.442

Data Distribution Test

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

90% Percentile 0.19395% Percentile 0.25299% Percentile 0.298

 95% UTL with
 95% Coverage
 0.31

 95% Percentile Bootstrap UTL with
 95% Coverage
 0.31

 95% BCA Bootstrap UTL with
 95% Coverage
 0.31

 95% UPL
 0.31
 95% UPL
 0.31

 95% Chebyshev UPL
 0.502
 0.502
 0.502

95% WH Approx. Gamma UPL 0.308 95% HW Approx. Gamma UPL 0.315 95% WH Approx. Gamma UTL with 95% Coverage 0.47

95% HW Approx. Gamma UTL with 95% Coverage 0.498

Beryllium

General Statistics

Number of Valid Data 10 Number of Distinct Detected Data 0 Number of Detected Data 0 Number of Non-Detect Data 10

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

The data set for variable Beryllium was not processed!

Cadmium

General Statistics

Number of Valid Data 10 Number of Distinct Detected Data 0 Number of Detected Data 0 Number of Non-Detect Data 10

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

The data set for variable Cadmium was not processed!

Upper Threshold Limit Based upon IQR 0.328

Chromium

General Statistics

Number of Valid Data 10 Number of Distinct Detected Data 3 Number of Detected Data 3 Number of Non-Detect Data 7

Log-transformed Statistics

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful and reliable test statistics and estimates.

No statistics will be produced!

Tolerance Factor 2.911

Percent Non-Detects 70.00%

Raw Statistics

Minimum Detected 0.0025 Maximum Detected 0.0067 Mean of Detected 0.00408 SD of Detected 0.00228 Minimum Non-Detect 0.005 Maximum Non-Detect 0.005

Minimum Detected -5.991 Maximum Detected -5.006 Mean of Detected -5.597 SD of Detected 0.521 Minimum Non-Detect -5.298 Maximum Non-Detect -5.298

Warning: There are only 3 Distinct Detected Values in this data set

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods. Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods. However, results obtained using 4 to 9 distinct values may not be reliable. It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

Background Statistics

Normal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic 0.846 5% Shapiro Wilk Critical Value 0.767 Data appear Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.00298 SD 0.00132 95% UTL 95% Coverage 0.00682 95% UPL (t) 0.00551 90% Percentile (z) 0.00467 95% Percentile (z) 0.00515 99% Percentile (z) 0.00605

Maximum Likelihood Estimate(MLE) Method N/A

Lognormal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic 0.894 5% Shapiro Wilk Critical Value 0.767 Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -5.873 SD (Log Scale) 0.311 95% UTL 95% Coverage 0.00696 95% UPL (t) 0.00512 90% Percentile (z) 0.00419 95% Percentile (z) 0.00469 99% Percentile (z) 0.0058

Log ROS Method Mean in Original Scale 0.00326 SD in Original Scale 0.00143 Mean in Log Scale -5.798 SD in Log Scale 0.388 95% UTL 95% Coverage 0.0094

95% UPL (t) 0.0064 90% Percentile (z) 0.00499 95% Percentile (z) 0.00575 99% Percentile (z) 0.00749

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.00317

SD 0.00121

SE of Mean 0.0005039

95% KM UTL with 95% Coverage 0.00668

95% KM Chebyshev UPL 0.00868

95% KM UPL (t) 0.00549 90% Percentile (z) 0.00471

95% Percentile (z) 0.00515

99% Percentile (z) 0.00597

Gamma ROS Limits with Extrapolated Data

 95% Wilson Hilferty (WH) Approx. Gamma UPL
 N/A

 95% Hawkins Wixley (HW) Approx. Gamma UPL
 N/A

95% WH Approx. Gamma UTL with95% CoverageN/A95% HW Approx. Gamma UTL with95% CoverageN/A

Gamma Distribution Test with Detected Values Only

k star (bias corrected) N/A Theta Star N/A nu star N/A A-D Test Statistic N/A

5% A-D Critical Value N/A

K-S Test Statistic N/A

5% K-S Critical Value N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data

N/A	Mean
N/A	Median
N/A	SD
N/A	k star
N/A	Theta star
N/A	Nu star
N/A	95% Percentile of Chisquare (2k)
N/A	90% Percentile
N/A	95% Percentile
N/A	99% Percentile

Cobalt

General Statistics

Number of Valid Data 10 Number of Distinct Detected Data 2

Number of Detected Data 2 Number of Non-Detect Data 8

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful and reliable test statistics and estimates.

No statistics will be produced!

Tolerance Factor 2.911

Percent Non-Detects 80.00%

Raw Statistics

Minimum Dete Maximum Dete Mean of Dete SD of Dete Minimum Non-De Maximum Non-De

.32 .809 .065 361 .962 .962

Warning: Data set has only 2 Distinct Detected Values.

This may not be adequate enough to compute meaningful and reliable test statistics and estimates. The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods. Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods. However, results obtained using 4 to 9 distinct values may not be reliable.

Background Statistics

Normal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic N/A 5% Shapiro Wilk Critical Value N/A Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.00328 SD 0.0005432 95% UTL 95% Coverage 0.00486 95% UPL (t) 0.00432 90% Percentile (z) 0.00398 95% Percentile (z) 0.00417 99% Percentile (z) 0.00454

Log ROS Method

Maximum Likelihood Estimate(MLE) Method N/A

	Log-transformed Statistics
cted 0.0018	Minimum Detected -6
cted 0.003	Maximum Detected -5
cted 0.0024	Mean of Detected -6
cted 0.0008485	SD of Detected 0.3
etect 0.007	Minimum Non-Detect -4
etect 0.007	Maximum Non-Detect -4

It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic N/A

5% Shapiro Wilk Critical Value N/A

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -5.737 SD (Log Scale) 0.211 95% UTL 95% Coverage 0.00595 95% UPL (t) 0.00483 90% Percentile (z) 0.00422 95% Percentile (z) 0.00456 99% Percentile (z) 0.00526

- Mean in Original Scale N/A
- SD in Original Scale N/A
- Mean in Log Scale N/A
 - SD in Log Scale N/A
- 95% UTL 95% Coverage N/A
 - 95% UPL (t) N/A
 - 90% Percentile (z) N/A
 - 95% Percentile (z) N/A
 - 99% Percentile (z) N/A

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.0024 SD 0.0006 SE of Mean 0.0006 95% KM UTL with 95% Coverage 0.00415 95% KM Chebyshev UPL 0.00514 95% KM UPL (t) 0.00355 90% Percentile (z) 0.00317

- 95% Percentile (z) 0.00339
- 99% Percentile (z) 0.0038

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL	N/A
95% Hawkins Wixley (HW) Approx. Gamma UPL	N/A
95% WH Approx. Gamma UTL with 95% Coverage	N/A
95% HW Approx. Gamma UTL with 95% Coverage	N/A

Gamma Distribution Test with Detected Values Only

k star (bias corrected	l) N/A
Theta Sta	ar N/A
nu sta	ar N/A
A-D Test Statisti	c N/A
5% A-D Critical Valu	e N/A
K-S Test Statisti	c N/A
5% K-S Critical Valu	e N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data	
Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A
Nu star	N/A
95% Percentile of Chisquare (2k)	N/A
90% Percentile	N/A
95% Percentile	N/A
99% Percentile	N/A

General Statistics

Number of Valid Data 10 Number of Distinct Detected Data 6 Tolerance Factor 2 911

Raw Statistics

Minimum Detected 0.0025 Maximum Detected 0.0091 Mean of Detected 0.00482 SD of Detected 0.00274 Minimum Non-Detect 0.002 Maximum Non-Detect 0.0037

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), Observations < Largest ND are treated as NDs

Number of Detected Data 6 Number of Non-Detect Data 4 Percent Non-Detects 40.00%

Log-transformed Statistics

Minimum Detected -5.991 Maximum Detected -4.699 Mean of Detected -5.462 SD of Detected 0.54 Minimum Non-Detect -6.215 Maximum Non-Detect -5.599

Single Detection Limit Scenario

Number treated as Non-Detect with Single DL 7 Number treated as Detected with Single DL 3 Single DL Non-Detect Percentage 70.00%

Warning: There are only 6 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

Background Statistics

Normal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic 0.843 5% Shapiro Wilk Critical Value 0.788 Data appear Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.00341 SD 0.00274 95% UTL 95% Coverage 0.0114 95% UPL (t) 0.00869 90% Percentile (z) 0.00693 95% Percentile (z) 0.00792 99% Percentile (z) 0.00979

Maximum Likelihood Estimate(MLE) Method

Mean 0.00137 SD 0.00463 95% UTL with 95% Coverage 0.0149

> 95% UPL (t) 0.0103 90% Percentile (z) 0.0073

Lognormal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic 0.888 5% Shapiro Wilk Critical Value 0.788 Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -5.948 SD (Log Scale) 0.762 95% UTL 95% Coverage 0.024 95% UPL (t) 0.0113 90% Percentile (z) 0.00694 95% Percentile (z) 0.00915 99% Percentile (z) 0.0154

Log ROS Method

Mean in Original Scale 0.00346 SD in Original Scale 0.0027 95% UTL with 95% Coverage 0.0217 95% BCA UTL with 95% Coverage 0.0091 95% Bootstrap (%) UTL with 95% Coverage 0.0091 95% UPL (t) 0.0107 90% Percentile (z) 0.0068

99% Percentile (z) 0.0143

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.0039 SD 0.00224 SE of Mean 0.0007768 95% KM UTL with 95% Coverage 0.0104 95% KM Chebyshev UPL 0.0141 95% KM UPL (t) 0.00821 90% Percentile (z) 0.00678 95% Percentile (z) 0.00759 99% Percentile (z) 0.00912

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL 0.017 95% Hawkins Wixley (HW) Approx. Gamma UPL 0.0233 95% WH Approx. Gamma UTL with 95% Coverage 0.037 95% HW Approx. Gamma UTL with 95% Coverage 0.0622

95% Percentile (z) 0.00899 99% Percentile (z) 0.0121

Gamma Distribution Test with Detected Values Only

k star (bias corrected) 2.166 Theta Star 0.00222 nu star 26

A-D Test Statistic 0.451 5% A-D Critical Value 0.7 K-S Test Statistic 0.228 5% K-S Critical Value 0.333 Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data Mean 0.00295 Median 0.00258 SD 0.00316 k star 0.274 Theta star 0.0108 Nu star 5.474 95% Percentile of Chisquare (2k) 2.578

> 90% Percentile 0.00879 95% Percentile 0.0139 99% Percentile 0.0273

General Statistics

Total Number of Observations 10 Tolerance Factor 2.911

Raw Statistics

Minimum 0.99 Maximum 7 Second Largest 4.4 First Quartile 2.125 Median 2.6 Third Quartile 3.358 Mean 3.057 Geometric Mean 2.711 SD 1.662 Coefficient of Variation 0.544 Skewness 1.578

Background Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic 0.864 Shapiro Wilk Critical Value 0.842 Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% UTL with 95% Coverage 7.896 95% UPL (t) 6.253 90% Percentile (z) 5.187 95% Percentile (z) 5.791 99% Percentile (z) 6.924

Gamma Distribution Test

k star 3.088 Theta Star 0.99 MLE of Mean 3.057 MLE of Standard Deviation 1.74 nu star 61.76

A-D Test Statistic 0.317 5% A-D Critical Value 0.729 K-S Test Statistic 0.17 5% K-S Critical Value 0.268 Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

90% Percentile 5.3995% Percentile 6.36299% Percentile 8.468

95% WH Approx. Gamma UPL 6.691

Number of Distinct Observations 10

Log-Transformed Statistics

Minimum -0.0101 Maximum 1.946 Second Largest 1.482 First Quartile 0.754 Median 0.955 Third Quartile 1.211 Mean 0.997 SD 0.519

Lognormal Distribution Test

Shapiro Wilk Test Statistic 0.962 Shapiro Wilk Critical Value 0.842 Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

95% UTL with 95% Coverage 12.28 95% UPL (t) 7.353 90% Percentile (z) 5.272 95% Percentile (z) 6.366 99% Percentile (z) 9.067

Data Distribution Test

Data appear Normal at 5% Significance Level

Nonparametric Statistics

90% Percentile 4.6695% Percentile 5.8399% Percentile 6.766

95% UTL with 95% Coverage 7 95% Percentile Bootstrap UTL with 95% Coverage 7 95% BCA Bootstrap UTL with 95% Coverage 7 95% UPL 7 95% Chebyshev UPL 10.66

Upper Threshold Limit Based upon IQR 5.206

95% HW Approx. Gamma UPL 6.811 95% WH Approx. Gamma UTL with 95% Coverage 9.618 95% HW Approx. Gamma UTL with 95% Coverage 10.07

Lead

General Statistics

Number of Valid Data 10 Number of Distinct Detected Data 1 Number of Detected Data 1 Number of Non-Detect Data 9

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set! It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Lead was not processed!

General Statistics

Total Number of Observations 10 Tolerance Factor 2.911

Raw Statistics

Minimum 0.039 Maximum 0.18 Second Largest 0.167 First Quartile 0.0569 Median 0.072 Third Quartile 0.145 Mean 0.0981 Geometric Mean 0.0857 SD 0.053 Coefficient of Variation 0.54 Skewness 0.54

Background Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic 0.863 Shapiro Wilk Critical Value 0.842 Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% UTL with 95% Coverage 0.252 95% UPL (t) 0.2 90% Percentile (z) 0.166 95% Percentile (z) 0.185 99% Percentile (z) 0.221

Gamma Distribution Test

k star 2.774 Theta Star 0.0354 MLE of Mean 0.0981 MLE of Standard Deviation 0.0589 nu star 55.47

A-D Test Statistic 0.558 5% A-D Critical Value 0.73 K-S Test Statistic 0.229 5% K-S Critical Value 0.268

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

90% Percentile 0.17795% Percentile 0.21199% Percentile 0.284

Number of Distinct Observations 9

Log-Transformed Statistics

Minimum -3.244 Maximum -1.715 Second Largest -1.79 First Quartile -2.869 Median -2.637 Third Quartile -1.933 Mean -2.457 SD 0.55

Lognormal Distribution Test

Shapiro Wilk Test Statistic 0.906 Shapiro Wilk Critical Value 0.842 Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

95% UTL with 95% Coverage 0.425 95% UPL (t) 0.247 90% Percentile (z) 0.173 95% Percentile (z) 0.212 99% Percentile (z) 0.308

Data Distribution Test

Data appear Normal at 5% Significance Level

Nonparametric Statistics

90% Percentile 0.16895% Percentile 0.17499% Percentile 0.179

95% UTL with 95% Coverage 0.18 95% Percentile Bootstrap UTL with 95% Coverage 0.18 95% BCA Bootstrap UTL with 95% Coverage 0.18 95% UPL 0.18 95% Chebyshev UPL 0.34 95% WH Approx. Gamma UPL 0.223 95% HW Approx. Gamma UPL 0.228 95% WH Approx. Gamma UTL with 95% Coverage 0.326 95% HW Approx. Gamma UTL with 95% Coverage 0.343

Mercury

General Statistics

Number of Valid Data 10 Number of Distinct Detected Data 0 Number of Detected Data 0 Number of Non-Detect Data 10

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

The data set for variable Mercury was not processed!

Upper Threshold Limit Based upon IQR 0.277

Nickel

General Statistics

Number of Valid Data 10 Number of Distinct Detected Data 2 Number of Detected Data 2 Number of Non-Detect Data 8

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful and reliable test statistics and estimates.

No statistics will be produced!

Tolerance Factor 2.911

Percent Non-Detects 80.00%

Raw Statistics

Minimum Detected 0.0055 Maximum Detected 0.0065 Mean of Detected 0.006 SD of Detected 0.0007071 Minimum Non-Detect 0.02 Maximum Non-Detect 0.02 Log-transformed Statistics

Minimum Detected -5.203 Maximum Detected -5.036 Mean of Detected -5.119 SD of Detected 0.118 Minimum Non-Detect -3.912 Maximum Non-Detect -3.912

Warning: Data set has only 2 Distinct Detected Values.

This may not be adequate enough to compute meaningful and reliable test statistics and estimates. The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods. Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods. However, results obtained using 4 to 9 distinct values may not be reliable. It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

Background Statistics

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic N/A

5% Shapiro Wilk Critical Value N/A

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -4.708 SD (Log Scale) 0.22 95% UTL 95% Coverage 0.0171 95% UPL (t) 0.0138 90% Percentile (z) 0.012 95% Percentile (z) 0.013 99% Percentile (z) 0.0151

Normal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic N/A 5% Shapiro Wilk Critical Value N/A Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.0092 SD 0.0017 95% UTL 95% Coverage 0.0142 95% UPL (t) 0.0125 90% Percentile (z) 0.0114 95% Percentile (z) 0.012 99% Percentile (z) 0.0132

Log ROS Method

- Mean in Original Scale N/A
- SD in Original Scale N/A
 - Mean in Log Scale N/A
 - SD in Log Scale N/A
- 95% UTL 95% Coverage N/A
 - 95% UPL (t) N/A
 - 90% Percentile (z) N/A
 - 95% Percentile (z) N/A
 - 99% Percentile (z) N/A

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.006 SD 0.0005 SE of Mean 0.0005 95% KM UTL with 95% Coverage 0.00746 95% KM Chebyshev UPL 0.00829 95% KM UPL (t) 0.00696 90% Percentile (z) 0.00664 95% Percentile (z) 0.00682 99% Percentile (z) 0.00716

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UI	PL N/A
95% Hawkins Wixley (HW) Approx. Gamma UI	PL N/A
95% WH Approx. Gamma UTL with 95% Coverage	ge N/A
95% HW Approx. Gamma UTL with 95% Coverage	ge N/A

Maximum Likelihood Estimate(MLE) Method N/A

Gamma Distribution Test with Detected Values Only

- k star (bias corrected) N/A Theta Star N/A
 - nu star N/A
 - A-D Test Statistic N/A
 - 5% A-D Critical Value N/A
 - K-S Test Statistic N/A
 - 5% K-S Critical Value N/A

99% Percentile

N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution	
ma ROS Statistics with Extrapolated Data	
Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A
Nu star	N/A
95% Percentile of Chisquare (2k)	N/A
90% Percentile	N/A
95% Percentile	N/A

Note: DL/2 is not a recommended method.

Gam

Selenium

General Statistics

Number of Detected Data 0 Number of Non-Detect Data 10

Number of Valid Data 10 Number of Distinct Detected Data 0

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

The data set for variable Selenium was not processed!

General Statistics

Number of Valid Data 10 Number of Distinct Detected Data 0

 Number of Distinct Detected Data 0
 Number of Non-Detect Data 10

 Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit! The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Silver was not processed!

Thallium

General Statistics

Number of Valid Data 10 Number of Distinct Detected Data 2

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful and reliable test statistics and estimates.

No statistics will be produced!

Tolerance Factor 2.911

Percent Non-Detects 80.00%

Number of Detected Data 0

Number of Detected Data 2

Number of Non-Detect Data 8

Raw Statistics

Minimum Detected 0.00019 Maximum Detected 0.00028 Mean of Detected 0.000235 SD of Detected 6.364E-05 Minimum Non-Detect 0.001 Maximum Non-Detect 0.0021 Log-transformed Statistics

Minimum Detected -8.568 Maximum Detected -8.181 Mean of Detected -8.375 SD of Detected 0.274 Minimum Non-Detect -6.908 Maximum Non-Detect -6.166

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), Observations < Largest ND are treated as NDs Single Detection Limit Scenario

Number treated as Non-Detect with Single DL 10 Number treated as Detected with Single DL 0 Single DL Non-Detect Percentage 100.00%

Warning: Data set has only 2 Distinct Detected Values.

This may not be adequate enough to compute meaningful and reliable test statistics and estimates. The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods. Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods.

However, results obtained using 4 to 9 distinct values may not be reliable.

It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

Background Statistics

Normal Distribution Test with Detected Values Only

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic N/A

5% Shapiro Wilk Critical Value N/A

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -7.681 SD (Log Scale) 0.442 95% UTL 95% Coverage 0.00167 95% UPL (t) 0.00108 90% Percentile (z) 0.0009544 95% Percentile (z) 0.00129

Log ROS Method

- Mean in Original Scale N/A
- SD in Original Scale N/A
- Mean in Log Scale N/A
 - SD in Log Scale N/A
- 95% UTL 95% Coverage N/A
 - 95% UPL (t) N/A
 - 90% Percentile (z) N/A
 - 95% Percentile (z) N/A
 - 99% Percentile (z) N/A

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.000235 SD 0.000045 SE of Mean 0.000045 95% KM UTL with 95% Coverage 0.000366 95% KM Chebyshev UPL 0.0004407 95% KM UPL (t) 0.0003215

> 90% Percentile (z) 0.0002927 95% Percentile (z) 0.000309

> 99% Percentile (z) 0.0003397

Gamma ROS Limits with Extrapolated Data

- 95% Wilson Hilferty (WH) Approx. Gamma UPL N/A 95% Hawkins Wixley (HW) Approx. Gamma UPL N/A
- 95% WH Approx. Gamma UTL with 95% Coverage N/A 95% HW Approx. Gamma UTL with 95% Coverage N/A

Shapiro Wilk Test Statistic N/A

5% Shapiro Wilk Critical Value N/A

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.000502 SD 0.0002229 95% UTL 95% Coverage 0.00115 95% UPL (t) 0.0009305 90% Percentile (z) 0.0007876 95% Percentile (z) 0.0008686 99% Percentile (z) 0.00102

Maximum Likelihood Estimate(MLE) Method N/A

Gamma Distribution Test with Detected Values Only

k star (bias corrected)	N/A
Theta Star	N/A
nu star	N/A
A-D Test Statistic	N/A

- 5% A-D Critical Value N/A
 - K-S Test Statistic N/A
- 5% K-S Critical Value N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data

Mean	N/A
Median	N/A
SD	N/A
k star	N/A
Theta star	N/A
Nu star	N/A
95% Percentile of Chisquare (2k)	N/A
90% Percentile	N/A
95% Percentile	N/A
99% Percentile	N/A

Vanadium

General Statistics

Number of Valid Data 10 Number of Distinct Detected Data 6 Tolerance Factor 2.911

Raw Statistics

Minimum Detected 0.0013 Maximum Detected 0.01 Mean of Detected 0.00366 SD of Detected 0.00306 Minimum Non-Detect 0.004 Maximum Non-Detect 0.004 Number of Detected Data 7 Number of Non-Detect Data 3 Percent Non-Detects 30.00%

Log-transformed Statistics

Minimum Detected -6.645 Maximum Detected -4.605 Mean of Detected -5.858 SD of Detected 0.732 Minimum Non-Detect -5.521 Maximum Non-Detect -5.521

Warning: There are only 7 Detected Values in this data Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

Background Statistics

Lognormal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic 0.936 5% Shapiro Wilk Critical Value 0.803 Data appear Lognormal at 5% Significance Level

Assuming Normal Distribution

Data not Normal at 5% Significance Level

Normal Distribution Test with Detected Values Only

DL/2 Substitution Method Mean 0.00316 SD 0.00262 95% UTL 95% Coverage 0.0108 95% UPL (t) 0.0082 90% Percentile (z) 0.00652 95% Percentile (z) 0.00747 99% Percentile (z) 0.00926

Shapiro Wilk Test Statistic 0.792

5% Shapiro Wilk Critical Value 0.803

Maximum Likelihood Estimate(MLE) Method N/A

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -5.965 SD (Log Scale) 0.622 95% UTL 95% Coverage 0.0157 95% UPL (t) 0.00849 90% Percentile (z) 0.0057 95% Percentile (z) 0.00715 99% Percentile (z) 0.0109

Log ROS Method Mean in Original Scale 0.00321 SD in Original Scale 0.00263 Mean in Log Scale -5.959 SD in Log Scale 0.651 95% UTL 95% Coverage 0.0172 95% UPL (t) 0.00902 90% Percentile (z) 0.00594 95% Percentile (z) 0.00753

99% Percentile (z) 0.0117

Data Distribution Test with Detected Values Only

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.00321 SD 0.00251 SE of Mean 0.0008813 95% KM UTL with 95% Coverage 0.0105 95% KM Chebyshev UPL 0.0147 95% KM UPL (t) 0.00804 90% Percentile (z) 0.00643 95% Percentile (z) 0.00734 99% Percentile (z) 0.00905

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL 0.00931 95% Hawkins Wixley (HW) Approx. Gamma UPL 0.0096 95% WH Approx. Gamma UTL with 95% Coverage 0.0149 95% HW Approx. Gamma UTL with 95% Coverage 0.0162

Gamma Distribution Test with Detected Values Only

k star (bias corrected) 1.341 Theta Star 0.00273 nu star 18.78

A-D Test Statistic 0.346 5% A-D Critical Value 0.714 K-S Test Statistic 0.187 5% K-S Critical Value 0.315

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data Mean 0.00331 Median 0.00253 SD 0.00269 k star 1.519 Theta star 0.00218 Nu star 30.37 95% Percentile of Chisquare (2k) 7.879 90% Percentile 0.00687 95% Percentile 0.00858

Note: DL/2 is not a recommended method.

Zinc

General Statistics

Number of Valid Data 10 Number of Distinct Detected Data 1

99% Percentile 0.0124

Number of Detected Data 1 Number of Non-Detect Data 9

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set! It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Zinc was not processed!

ATTACHMENT B.3

PROUCL OUTPUT DISSOLVED METALS IN SHALLOW WATER BEARING UNIT

General Background Statistics for Data Sets with Non-Detects

User Selected Options	
From File	C:\Documents and Settings\rchatfield\Desktop\Peregrine - Pro UCL\12636 Dissolved Metals - Shallow.wst
Full Precision	OFF
Confidence Coefficient	95%
Coverage	95%
Different or Future K Values	1
Number of Bootstrap Operations	10000

Aluminum

General Statistics

Number of Detected Data 2 Number of Non-Detect Data 7

Number of Distinct Detected Data 2

Number of Valid Data 9

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful and reliable test statistics and estimates.

No statistics will be produced!

Tolerance Factor 3.031

Percent Non-Detects 77.78%

Raw Statistics

Minimum Detected 1.6 Maximum Detected 3.4 Mean of Detected 2.5 SD of Detected 1.273 Minimum Non-Detect 0.05 Maximum Non-Detect 0.05 Log-transformed Statistics Minimum Detected 0.47 Maximum Detected 1.224 Mean of Detected 0.847 SD of Detected 0.533 Minimum Non-Detect -2.996 Maximum Non-Detect -2.996

Warning: Data set has only 2 Distinct Detected Values. This may not be adequate enough to compute meaningful and reliable test statistics and estimates. The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods. Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods. However, results obtained using 4 to 9 distinct values may not be reliable. It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

Background Statistics

Normal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic N/A

5% Shapiro Wilk Critical Value N/A

Data not Normal at 5% Significance Level

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic N/A

5% Shapiro Wilk Critical Value N/A

Data not Lognormal at 5% Significance Level

Assuming Normal Distribution

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -2.681 SD (Log Scale) 2.009 95% UTL 95% Coverage 30.21 95% UPL (t) 3.514 90% Percentile (z) 0.899 95% Percentile (z) 1.865 99% Percentile (z) 7.334

Log ROS Method

- Mean in Original Scale N/A
- SD in Original Scale N/A
- Mean in Log Scale N/A
 - SD in Log Scale N/A
- 95% UTL 95% Coverage N/A
 - 95% UPL (t) N/A
 - 90% Percentile (z) N/A
 - 95% Percentile (z) N/A
 - 99% Percentile (z) N/A

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 1.8 SD 0.566 SE of Mean 0.267 95% KM UTL with 95% Coverage 3.515 95% KM Chebyshev UPL 4.399 95% KM UPL (t) 2.909 90% Percentile (z) 2.525 95% Percentile (z) 2.73

99% Percentile (z) 3.116

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Appro	x. Gamma UPL	N/A
95% Hawkins Wixley (HW) Approx	x. Gamma UPL	N/A
95% WH Approx. Gamma UTL with	95% Coverage	N/A
95% HW Approx. Gamma UTL with	95% Coverage	N/A

DL/2 Substitution Method Mean 0.575 SD 1.181 95% UTL 95% Coverage 4.153 95% UPL (t) 2.889 90% Percentile (z) 2.088 95% Percentile (z) 2.517 99% Percentile (z) 3.321

Maximum Likelihood Estimate(MLE) Method N/A

Gamma Distribution Test with Detected Values Only

- k star (bias corrected) N/A Theta Star N/A nu star N/A A-D Test Statistic N/A
 - 5% A-D Critical Value N/A
 - K-S Test Statistic N/A
 - 5% K-S Critical Value N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data

N/A	Mean
N/A	Median
N/A	SD
r N/A	k star
r N/A	Theta star
r N/A	Nu star
) N/A	95% Percentile of Chisquare (2k)
e N/A	90% Percentile
• N/A	95% Percentile
N/A	99% Percentile

Antimony

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 2

Number of Detected Data 2 Number of Non-Detect Data 7

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful and reliable test statistics and estimates.

No statistics will be produced!

Tolerance Factor 3.031

Percent Non-Detects 77.78%

Raw Statistics

Minimum Detected 0.00014 Maximum Detected 0.0004 Mean of Detected 0.00027 SD of Detected 0.0001839 Minimum Non-Detect 0.002 Maximum Non-Detect 0.002

Log-transformed Statistics

Minimum Detected -8.874 Maximum Detected -7.824 Mean of Detected -8.349 SD of Detected 0.742 Minimum Non-Detect -6.215 Maximum Non-Detect -6.215

Warning: Data set has only 2 Distinct Detected Values.

This may not be adequate enough to compute meaningful and reliable test statistics and estimates. The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods. Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods. However, results obtained using 4 to 9 distinct values may not be reliable. It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

Background Statistics

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic N/A

5% Shapiro Wilk Critical Value N/A

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -7.228 SD (Log Scale) 0.688 95% UTL 95% Coverage 0.00583 95% UPL (t) 0.00279 90% Percentile (z) 0.00175 95% Percentile (z) 0.00225 99% Percentile (z) 0.00359

Normal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic N/A 5% Shapiro Wilk Critical Value N/A Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.0008378 SD 0.0003284 95% UTL 95% Coverage 0.00183 95% UPL (t) 0.00148 90% Percentile (z) 0.00126 95% Percentile (z) 0.00138 99% Percentile (z) 0.0016

Log ROS Method

- Mean in Original Scale N/A
- SD in Original Scale N/A
 - Mean in Log Scale N/A
 - SD in Log Scale N/A
- 95% UTL 95% Coverage N/A
 - 95% UPL (t) N/A
 - 90% Percentile (z) N/A
 - 95% Percentile (z) N/A
 - 99% Percentile (z) N/A

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.00027 SD 0.00013 SE of Mean 0.00013 95% KM UTL with 95% Coverage 0.000664 95% KM Chebyshev UPL 0.0008673 95% KM UPL (t) 0.0005248 90% Percentile (z) 0.0004366 95% Percentile (z) 0.0004838

99% Percentile (z) 0.0005724

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL		√/A
95% Hawkins Wixley (HW) Approx. Gamma UPL		۸/A
95% WH Approx. Gamma UTL with 95%	Coverage N	۸/A
95% HW Approx. Gamma UTL with 95%	Coverage N	N/A

Maximum Likelihood Estimate(MLE) Method N/A

Gamma Distribution Test with Detected Values Only

- k star (bias corrected) N/A
 - Theta Star N/A
 - nu star N/A

N/A

- A-D Test Statistic N/A
- 5% A-D Critical Value N/A
- K-S Test Statistic N/A
- 5% K-S Critical Value N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data	
Mean	

N/A	Median
N/A	SD
N/A	k star
N/A	Theta star
N/A	Nu star
N/A	95% Percentile of Chisquare (2k)
N/A	90% Percentile
N/A	95% Percentile
N/A	99% Percentile

Arsenic

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 2

Number of Detected Data 2 Number of Non-Detect Data 7

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful and reliable test statistics and estimates.

No statistics will be produced!

Tolerance Factor 3.031

Percent Non-Detects 77.78%

Raw Statistics

Minimum Detected 0.0066 Maximum Detected 0.0072 Mean of Detected 0.0069 SD of Detected 0.0004243 Minimum Non-Detect 0.005 Maximum Non-Detect 0.005

Minimum Detected -5.021 Maximum Detected -4.934

Mean of Detected -4.977 SD of Detected 0.0615 Minimum Non-Detect -5.298

Warning: Data set has only 2 Distinct Detected Values.

This may not be adequate enough to compute meaningful and reliable test statistics and estimates. The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

Unless Data Quality Objectives (DQOs) have been met, it is suggested to collect additional observations.

The number of detected data may not be adequate enough to perform GOF tests, bootstrap, and ROS methods. Those methods will return a 'N/A' value on your output display!

It is necessary to have 4 or more Distinct Values for bootstrap methods. However, results obtained using 4 to 9 distinct values may not be reliable. It is recommended to have 10 to 15 or more observations for accurate and meaningful results and estimates.

Background Statistics

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic N/A

5% Shapiro Wilk Critical Value N/A

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -5.766 SD (Log Scale) 0.448 95% UTL 95% Coverage 0.0122 95% UPL (t) 0.00753 90% Percentile (z) 0.00556 95% Percentile (z) 0.00654 99% Percentile (z) 0.00888

Normal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic N/A 5% Shapiro Wilk Critical Value N/A Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.00348 SD 0.00195 95% UTL 95% Coverage 0.00938 95% UPL (t) 0.00729 90% Percentile (z) 0.00597 95% Percentile (z) 0.00668 99% Percentile (z) 0.008

Log-transformed Statistics

Maximum Non-Detect -5.298

Log ROS Method

- Mean in Original Scale N/A
- SD in Original Scale N/A
 - Mean in Log Scale N/A
 - SD in Log Scale N/A
- 95% UTL 95% Coverage N/A
 - 95% UPL (t) N/A
 - 90% Percentile (z) N/A
 - 95% Percentile (z) N/A
 - 99% Percentile (z) N/A

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.00667 SD 0.0001886 SE of Mean 8.889E-05 95% KM UTL with 95% Coverage 0.00724 95% KM Chebyshev UPL 0.00753 95% KM UPL (t) 0.00704 90% Percentile (z) 0.00691 95% Percentile (z) 0.00698

99% Percentile (z) 0.00711

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL	N/A
95% Hawkins Wixley (HW) Approx. Gamma UPL	
95% WH Approx. Gamma UTL with 95% Coverage	N/A
95% HW Approx. Gamma UTL with 95% Coverage	N/A

Maximum Likelihood Estimate(MLE) Method N/A

Gamma Distribution Test with Detected Values Only

- k star (bias corrected) N/A
 - Theta Star N/A nu star N/A
 - A-D Test Statistic N/A
 - 5% A-D Critical Value N/A
 - K-S Test Statistic N/A
 - 5% K-S Critical Value N/A

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data	
Mean	N/A
Median	N/A
SD	N/A

- k star N/A Theta star N/A
 - Nu star N/A
- 95% Percentile of Chisquare (2k) N/A
 - 90% Percentile N/A

99% Percentile

95% Percentile N/A

N/A

General Statistics

Total Number of Observations 9 Tolerance Factor 3.031

Raw Statistics

Minimum 0.027 Maximum 0.077 Second Largest 0.071 First Quartile 0.035 Median 0.045 Third Quartile 0.053 Mean 0.0474 Geometric Mean 0.0448 SD 0.0174 Coefficient of Variation 0.366 Skewness 0.726

Number of Distinct Observations 8

Log-Transformed Statistics

Minimum -3.612 Maximum -2.564 Second Largest -2.645 First Quartile -3.352 Median -3.101 Third Quartile -2.937 Mean -3.106 SD 0.357

Warning: There are only 9 Values in this data

Note: It should be noted that even though bootstrap methods may be performed on this data set, the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Background Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic 0.909 Shapiro Wilk Critical Value 0.829

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% UTL with 95% Coverage 0.1 95% UPL (t) 0.0815 90% Percentile (z) 0.0697 95% Percentile (z) 0.076 99% Percentile (z) 0.0879

Gamma Distribution Test

k star 5.978 Theta Star 0.00794 MLE of Mean 0.0474 MLE of Standard Deviation 0.0194 nu star 107.6

A-D Test Statistic 0.329 5% A-D Critical Value 0.722 K-S Test Statistic 0.217 5% K-S Critical Value 0.279 Data appear Gamma Distributed at 5% Significance Level

Lognormal Distribution Test Shapiro Wilk Test Statistic 0.946

Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

95% UTL with 95% Coverage 0.132 95% UPL (t) 0.0903 90% Percentile (z) 0.0708 95% Percentile (z) 0.0806 99% Percentile (z) 0.103

Data Distribution Test

Data appear Normal at 5% Significance Level

Nonparametric Statistics

90% Percentile 0.0722 95% Percentile 0.0746 99% Percentile 0.0765

Shapiro Wilk Critical Value 0.829

 Assuming Gamma Distribution
 95% UTL with
 95% Coverage
 0.077

 90% Percentile
 0.0734
 95% Percentile Bootstrap UTL with
 95% Coverage
 0.077

 95% Percentile
 0.0832
 95% BCA Bootstrap UTL with
 95% Coverage
 0.077

 99% Percentile
 0.104
 95% UPL
 0.077

 99% Percentile
 0.104
 95% Coverage
 0.077

 95% WH Approx. Gamma UPL
 0.0862
 Upper Threshold Limit Based upon IQR
 0.08

 95% WH Approx. Gamma UTL with
 95% Coverage
 0.116
 95% HW Approx. Gamma UTL with
 95% Coverage
 0.119

Beryllium

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 0 Number of Detected Data 0 Number of Non-Detect Data 9

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

The data set for variable Beryllium was not processed!

Cadmium

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 0 Number of Detected Data 0 Number of Non-Detect Data 9

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

The data set for variable Cadmium was not processed!
Number of Valid Data 124 Number of Distinct Detected Data 12 Tolerance Factor 1.892

Raw Statistics

Minimum Detected 0.001 Maximum Detected 0.017 Mean of Detected 0.00812 SD of Detected 0.0037 Minimum Non-Detect 0.005 Maximum Non-Detect 0.02

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), Observations < Largest ND are treated as NDs

Number of Detected Data 30 Number of Non-Detect Data 94 Percent Non-Detects 75.81%

Log-transformed Statistics

Minimum Detected -6.908 Maximum Detected -4.075 Mean of Detected -4.948 SD of Detected 0.588 Minimum Non-Detect -5.298 Maximum Non-Detect -3.912

Single Detection Limit Scenario

Number treated as Non-Detect with Single DL 124 Number treated as Detected with Single DL 0 Single DL Non-Detect Percentage 100.00%

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic 0.884 5% Shapiro Wilk Critical Value 0.927 Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -5.432 SD (Log Scale) 0.596 95% UTL 95% Coverage 0.0135 95% UPL (t) 0.0118 90% Percentile (z) 0.00939 95% Percentile (z) 0.0117 99% Percentile (z) 0.0175

Log ROS Method Mean in Original Scale 0.00422 SD in Original Scale 0.0032 Mean in Log Scale -5.722 SD in Log Scale 0.719 95% UTL 95% Coverage 0.0128 95% UPL (t) 0.0108 90% Percentile (z) 0.00823 95% Percentile (z) 0.0107 99% Percentile (z) 0.0174

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Background Statistics

Normal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic 0.957

5% Shapiro Wilk Critical Value 0.927 Data appear Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.00525 SD 0.00333 95% UTL 95% Coverage 0.0115 95% UPL (t) 0.0108 90% Percentile (z) 0.00952 95% Percentile (z) 0.0107 99% Percentile (z) 0.013

Maximum Likelihood Estimate(MLE) Method N/A

Gamma Distribution Test with Detected Values Only

k star (bias corrected) 3.521 Theta Star 0.00231 nu star 211.3

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.00429 SD 0.00323 SE of Mean 0.0004727 95% KM UTL with 95% Coverage 0.0104 95% KM Chebyshev UPL 0.0184 95% KM UPL (t) 0.00967 90% Percentile (z) 0.00844 95% Percentile (z) 0.00961 99% Percentile (z) 0.0118

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL 0.0178
95% Hawkins Wixley (HW) Approx. Gamma UPL 0.0228
95% WH Approx. Gamma UTL with 95% Coverage 0.0216
95% HW Approx. Gamma UTL with 95% Coverage 0.029

A-D Test Statistic 0.838 5% A-D Critical Value 0.75 K-S Test Statistic 0.18 5% K-S Critical Value 0.161 Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data Mean 0.00449 Median 0.00449 SD 0.00377 k star 0.36 Theta star 0.0125 Nu star 89.3 95% Percentile of Chisquare (2k) 3.102

90% Percentile 0.012995% Percentile 0.019399% Percentile 0.0357

Note: DL/2 is not a recommended method.

Cobalt

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 1 Number of Detected Data 1 Number of Non-Detect Data 8

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set! It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Cobalt was not processed!

Number of Valid Data 124 Number of Distinct Detected Data 11 Tolerance Factor 1.892

Raw Statistics

Minimum Detected 0.001 Maximum Detected 0.027 Mean of Detected 0.00451 SD of Detected 0.00537 Minimum Non-Detect 0.001 Maximum Non-Detect 0.02

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), Observations < Largest ND are treated as NDs Number of Detected Data 23 Number of Non-Detect Data 101 Percent Non-Detects 81.45%

Log-transformed Statistics

Minimum Detected -6.908 Maximum Detected -3.612 Mean of Detected -5.758 SD of Detected 0.798 Minimum Non-Detect -6.908 Maximum Non-Detect -3.912

Single Detection Limit Scenario

Number treated as Non-Detect with Single DL 123 Number treated as Detected with Single DL 1 Single DL Non-Detect Percentage 99.19%

Background Statistics

Normal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic 0.567 5% Shapiro Wilk Critical Value 0.914 Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.00399 SD 0.00342 95% UTL 95% Coverage 0.0105 95% UPL (t) 0.00968 90% Percentile (z) 0.00837 95% Percentile (z) 0.00961 99% Percentile (z) 0.0119

Maximum Likelihood Estimate(MLE) Method N/A

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic 0.935 5% Shapiro Wilk Critical Value 0.914 Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -5.788 SD (Log Scale) 0.719 95% UTL 95% Coverage 0.0119 95% UPL (t) 0.0101 90% Percentile (z) 0.0077 95% Percentile (z) 0.01 99% Percentile (z) 0.0163

Log ROS Method Mean in Original Scale 0.00217 SD in Original Scale 0.00275 Mean in Log Scale -6.489 SD in Log Scale 0.805 95% UTL 95% Coverage 0.00697 95% UPL (t) 0.0058 90% Percentile (z) 0.00426 95% Percentile (z) 0.00571 99% Percentile (z) 0.00989

Data Distribution Test with Detected Values Only

Data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Distribution Test with Detected Values Only

k star (bias corrected) 1.374 Theta Star 0.00329 nu star 63.18

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.00231 SD 0.0027 SE of Mean 0.0002981 95% KM UTL with 95% Coverage 0.00742 95% KM Chebyshev UPL 0.0141 95% KM UPL (t) 0.0068 90% Percentile (z) 0.00577 95% Percentile (z) 0.00675 99% Percentile (z) 0.00859

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL 0.0103
95% Hawkins Wixley (HW) Approx. Gamma UPL 0.0127
95% WH Approx. Gamma UTL with 95% Coverage 0.0128
95% HW Approx. Gamma UTL with 95% Coverage 0.0168

A-D Test Statistic 0.916 5% A-D Critical Value 0.76 K-S Test Statistic 0.173 5% K-S Critical Value 0.185 Data follow Appx. Gamma Distribution at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data Mean 0.00241 Median 0.00164 SD 0.00324 k star 0.257 Theta star 0.00939 Nu star 63.72 95% Percentile of Chisquare (2k) 2.467

90% Percentile 0.0072395% Percentile 0.011699% Percentile 0.0231

Note: DL/2 is not a recommended method.

Number of Valid Data 63 Number of Distinct Detected Data 42 Tolerance Factor 2.007

Raw Statistics

Minimum Detected 0.01 Maximum Detected 10.6 Mean of Detected 0.892 SD of Detected 1.769 Minimum Non-Detect 0.02 Maximum Non-Detect 0.1

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), Observations < Largest ND are treated as NDs Number of Detected Data 52 Number of Non-Detect Data 11 Percent Non-Detects 17.46%

Log-transformed Statistics

Minimum Detected -4.605 Maximum Detected 2.361 Mean of Detected -1.24 SD of Detected 1.473 Minimum Non-Detect -3.912 Maximum Non-Detect -2.303

Single Detection Limit Scenario

Number treated as Non-Detect with Single DL 20 Number treated as Detected with Single DL 43 Single DL Non-Detect Percentage 31.75%

Background Statistics

Lognormal Distribution Test with Detected Values Only

Lilliefors Test Statistic 0.163 5% Lilliefors Critical Value 0.123 Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -1.7 SD (Log Scale) 1.707 95% UTL 95% Coverage 5.615 95% UPL (t) 3.232 90% Percentile (z) 1.629 95% Percentile (z) 3.028 99% Percentile (z) 9.694

Log ROS Method Mean in Original Scale 0.74 SD in Original Scale 1.639 95% UTL with 95% Coverage 6 95% BCA UTL with 95% Coverage 4.36 95% Bootstrap (%) UTL with 95% Coverage 4.4 95% UPL (t) 3.391 90% Percentile (z) 1.671 95% Percentile (z) 3.171

99% Percentile (z) 10.55

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Normal Distribution Test with Detected Values Only Lilliefors Test Statistic 0.359 5% Lilliefors Critical Value 0.123

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.741 SD 1.638 95% UTL 95% Coverage 4.028 95% UPL (t) 3.498 90% Percentile (z) 2.84 95% Percentile (z) 3.435 99% Percentile (z) 4.552

Maximum Likelihood Estimate(MLE) Method Mean 0.253 SD 2.079 95% UTL with 95% Coverage 4.423

> 95% UPL (t) 3.751 90% Percentile (z) 2.917 95% Percentile (z) 3.672 99% Percentile (z) 5.088

Gamma Distribution Test with Detected Values Only

k star (bias corrected) 0.536 Theta Star 1.663 nu star 55.75

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.739 SD 1.626 SE of Mean 0.207 95% KM UTL with 95% Coverage 4.002 95% KM Chebyshev UPL 7.882 95% KM UPL (t) 3.476 90% Percentile (z) 2.823 95% Percentile (z) 3.414 99% Percentile (z) 4.522

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL 2.779
95% Hawkins Wixley (HW) Approx. Gamma UPL 3.177
95% WH Approx. Gamma UTL with 95% Coverage 3.775
95% HW Approx. Gamma UTL with 95% Coverage 4.619

A-D Test Statistic 3.349 5% A-D Critical Value 0.81 K-S Test Statistic 0.273 5% K-S Critical Value 0.13 Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data Mean 0.736 Median 0.19 SD 1.64 k star 0.23 Theta star 3.205 Nu star 28.94 95% Percentile of Chisquare (2k) 2.279

90% Percentile 2.2295% Percentile 3.65299% Percentile 7.511

Note: DL/2 is not a recommended method.

Lead

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 0 Number of Detected Data 0 Number of Non-Detect Data 9

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

The data set for variable Lead was not processed!

Number of Valid Data 59 Number of Distinct Detected Data 41 Tolerance Factor 2.02

Raw Statistics

Minimum Detected 0.0016 Maximum Detected 0.448 Mean of Detected 0.123 SD of Detected 0.117 Minimum Non-Detect 0.005 Maximum Non-Detect 0.02

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), Observations < Largest ND are treated as NDs Number of Detected Data 45 Number of Non-Detect Data 14 Percent Non-Detects 23.73%

Log-transformed Statistics

Minimum Detected -6.438 Maximum Detected -0.803 Mean of Detected -2.776 SD of Detected 1.411 Minimum Non-Detect -5.298 Maximum Non-Detect -3.912

Single Detection Limit Scenario

Number treated as Non-Detect with Single DL 22 Number treated as Detected with Single DL 37 Single DL Non-Detect Percentage 37.29%

Background Statistics

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic 0.928 5% Shapiro Wilk Critical Value 0.945 Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -3.497 SD (Log Scale) 1.804 95% UTL 95% Coverage 1.16 95% UPL (t) 0.634 90% Percentile (z) 0.306 95% Percentile (z) 0.589 99% Percentile (z) 2.015

Log ROS Method

Mean in Original Scale 0.0948 SD in Original Scale 0.114 95% UTL with 95% Coverage 1.082 95% BCA UTL with 95% Coverage 0.426 95% Bootstrap (%) UTL with 95% Coverage 0.426 95% UPL (t) 0.605 90% Percentile (z) 0.3 95% Percentile (z) 1.84

Data Distribution Test with Detected Values Only

Data appear Gamma Distributed at 5% Significance Level

Normal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic 0.867 5% Shapiro Wilk Critical Value 0.945

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.0945 SD 0.114 95% UTL 95% Coverage 0.326 95% UPL (t) 0.287 90% Percentile (z) 0.241 95% Percentile (z) 0.283 99% Percentile (z) 0.361

Maximum Likelihood Estimate(MLE) Method Mean 0.0588 SD 0.156 95% UTL with 95% Coverage 0.373

95% UPL (t) 0.321 90% Percentile (z) 0.258 95% Percentile (z) 0.315 99% Percentile (z) 0.421

Gamma Distribution Test with Detected Values Only

k star (bias corrected) 0.823 Theta Star 0.149 nu star 74.03 A-D Test Statistic 0.475 5% A-D Critical Value 0.784 K-S Test Statistic 0.109 5% K-S Critical Value 0.136 Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data Mean 0.0937 Median 0.042 SD 0.115 k star 0.236 Theta star 0.397 Nu star 27.84 95% Percentile of Chisquare (2k) 2.323

90% Percentile 0.28295% Percentile 0.46199% Percentile 0.942

Note: DL/2 is not a recommended method.

Mercury

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 1

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.0943 SD 0.114 SE of Mean 0.0149 95% KM UTL with 95% Coverage 0.324 95% KM Chebyshev UPL 0.593 95% KM UPL (t) 0.286 90% Percentile (z) 0.24 95% Percentile (z) 0.281 99% Percentile (z) 0.358

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL 0.402
95% Hawkins Wixley (HW) Approx. Gamma UPL 0.508
95% WH Approx. Gamma UTL with 95% Coverage 0.547
95% HW Approx. Gamma UTL with 95% Coverage 0.75

Number of Detected Data 1 Number of Non-Detect Data 8

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set! It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Mercury was not processed!

Number of Valid Data 124 Number of Distinct Detected Data 19 Tolerance Factor 1.892

Raw Statistics

Minimum Detected 0.002 Maximum Detected 0.062 Mean of Detected 0.0101 SD of Detected 0.01 Minimum Non-Detect 0.005 Maximum Non-Detect 0.04

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), Observations < Largest ND are treated as NDs Number of Detected Data 42 Number of Non-Detect Data 82 Percent Non-Detects 66.13%

Log-transformed Statistics

Minimum Detected -6.215 Maximum Detected -2.781 Mean of Detected -4.836 SD of Detected 0.623 Minimum Non-Detect -5.298 Maximum Non-Detect -3.219

Single Detection Limit Scenario

Number treated as Non-Detect with Single DL 123 Number treated as Detected with Single DL 1 Single DL Non-Detect Percentage 99.19%

Background Statistics

Normal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic 0.567 5% Shapiro Wilk Critical Value 0.942 Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.00674 SD 0.00736 95% UTL 95% Coverage 0.0207 95% UPL (t) 0.019 90% Percentile (z) 0.0162 95% Percentile (z) 0.0189 99% Percentile (z) 0.0239

Maximum Likelihood Estimate(MLE) Method N/A

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic 0.9 5% Shapiro Wilk Critical Value 0.942 Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -5.336 SD (Log Scale) 0.762 95% UTL 95% Coverage 0.0203 95% UPL (t) 0.0171 90% Percentile (z) 0.0128 95% Percentile (z) 0.0168 99% Percentile (z) 0.0283

Log ROS Method Mean in Original Scale 0.00542 SD in Original Scale 0.00684 Mean in Log Scale -5.584 SD in Log Scale 0.808 95% UTL 95% Coverage 0.0173 95% UPL (t) 0.0144 90% Percentile (z) 0.0142 95% Percentile (z) 0.0246

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Gamma Distribution Test with Detected Values Only

k star (bias corrected) 2.107 Theta Star 0.00478 nu star 177 A-D Test Statistic 2.244 5% A-D Critical Value 0.758 K-S Test Statistic 0.238 5% K-S Critical Value 0.138

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data Mean 0.00499 Median 0.00401 SD 0.00736 k star 0.249 Theta star 0.02 Nu star 61.73 95% Percentile of Chisquare (2k) 2.413

90% Percentile 0.01595% Percentile 0.024299% Percentile 0.0487

Note: DL/2 is not a recommended method.

Selenium

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 0

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.00589 SD 0.00669 SE of Mean 0.0006795 95% KM UTL with 95% Coverage 0.0185 95% KM Chebyshev UPL 0.0351 95% KM UPL (t) 0.017 90% Percentile (z) 0.0145 95% Percentile (z) 0.0169 99% Percentile (z) 0.0214

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL 0.0211
95% Hawkins Wixley (HW) Approx. Gamma UPL 0.0264
95% WH Approx. Gamma UTL with 95% Coverage 0.0263
95% HW Approx. Gamma UTL with 95% Coverage 0.0348

 Number of Distinct Detected Data 0
 Number of Non-Detect Data 9

 Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit! The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Selenium was not processed!

Silver

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 0 Number of Detected Data 0 Number of Non-Detect Data 9

Number of Detected Data 0

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

The data set for variable Silver was not processed!

Thallium

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 4 Tolerance Factor 3.031

Raw Statistics

Minimum Detected 0.00021 Maximum Detected 0.00084 Mean of Detected 0.0003925 SD of Detected 0.0002994 Minimum Non-Detect 0.001 Maximum Non-Detect 0.001 Number of Detected Data 4 Number of Non-Detect Data 5 Percent Non-Detects 55.56%

Log-transformed Statistics

Minimum Detected -8.468 Maximum Detected -7.082 Mean of Detected -8.015 SD of Detected 0.631 Minimum Non-Detect -6.908 Maximum Non-Detect -6.908

Warning: There are only 4 Distinct Detected Values in this data Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

Background Statistics

Lognormal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic 0.78 5% Shapiro Wilk Critical Value 0.748

Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -7.785 SD (Log Scale) 0.444 95% UTL 95% Coverage 0.0016 95% UPL (t) 0.0009928 90% Percentile (z) 0.0007346 95% Percentile (z) 0.0008631 99% Percentile (z) 0.00117

Log ROS Method Mean in Original Scale 0.0003832 SD in Original Scale 0.0002364 Mean in Log Scale -8.015 SD in Log Scale 0.561 95% UTL 95% Coverage 0.00181 95% UPL (t) 0.0009918 90% Percentile (z) 0.0006778 95% Percentile (z) 0.00122

Normal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic 0.708 5% Shapiro Wilk Critical Value 0.748 Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.0004522 SD 0.0001919 95% UTL 95% Coverage 0.00103 95% UPL (t) 0.0008283 90% Percentile (z) 0.0006981 95% Percentile (z) 0.0007678 99% Percentile (z) 0.0008986

Maximum Likelihood Estimate(MLE) Method N/A

Data Distribution Test with Detected Values Only

Data appear Lognormal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.0003925 SD 0.0002593 SE of Mean 0.0001497 95% KM UTL with 95% Coverage 0.00118 95% KM Chebyshev UPL 0.00158 95% KM UPL (t) 0.0009007 90% Percentile (z) 0.0007248 95% Percentile (z) 0.000819 99% Percentile (z) 0.000956

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL 0.00106
95% Hawkins Wixley (HW) Approx. Gamma UPL 0.00111
95% WH Approx. Gamma UTL with 95% Coverage 0.00171
95% HW Approx. Gamma UTL with 95% Coverage 0.00188

Gamma Distribution Test with Detected Values Only k star (bias corrected) 0.931 Theta Star 0.0004217 nu star 7.446

> A-D Test Statistic 0.683 5% A-D Critical Value 0.659 K-S Test Statistic 0.412 5% K-S Critical Value 0.397

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data Mean 0.0003929 Median 0.00027 SD 0.0002572 k star 1.737 Theta star 0.0002262 Nu star 31.26 95% Percentile of Chisquare (2k) 8.621

> 90% Percentile 0.0007902 95% Percentile 0.0009752 99% Percentile 0.00139

Note: DL/2 is not a recommended method.

Vanadium

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 1 Number of Detected Data 1 Number of Non-Detect Data 8

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set! It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Vanadium was not processed!

Number of Valid Data 124 Number of Distinct Detected Data 27 Tolerance Factor 1.892

Raw Statistics

Minimum Detected 0.005 Maximum Detected 0.15 Mean of Detected 0.0212 SD of Detected 0.023 Minimum Non-Detect 0.005 Maximum Non-Detect 0.02

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), Observations < Largest ND are treated as NDs Number of Detected Data 71 Number of Non-Detect Data 53 Percent Non-Detects 42.74%

Log-transformed Statistics

Minimum Detected -5.298 Maximum Detected -1.897 Mean of Detected -4.174 SD of Detected 0.729 Minimum Non-Detect -5.298 Maximum Non-Detect -3.912

Single Detection Limit Scenario

Number treated as Non-Detect with Single DL 100 Number treated as Detected with Single DL 24 Single DL Non-Detect Percentage 80.65%

Background Statistics

Lognormal Distribution Test with Detected Values Only

Lilliefors Test Statistic 0.134 5% Lilliefors Critical Value 0.105 Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -4.755 SD (Log Scale) 0.956 95% UTL 95% Coverage 0.0526 95% UPL (t) 0.0423 90% Percentile (z) 0.0293 95% Percentile (z) 0.0415 99% Percentile (z) 0.0796

Log ROS Method Mean in Original Scale 0.0139 SD in Original Scale 0.0194 95% UTL with 95% Coverage 0.0567 95% BCA UTL with 95% Coverage 0.06 95% Bootstrap (%) UTL with 95% Coverage 0.06 95% UPL (t) 0.0447 90% Percentile (z) 0.0301 95% Percentile (z) 0.0439

99% Percentile (z) 0.0888

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Normal Distribution Test with Detected Values Only Lilliefors Test Statistic 0.296 5% Lilliefors Critical Value 0.105 Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.0142 SD 0.0193 95% UTL 95% Coverage 0.0507 95% UPL (t) 0.0463 90% Percentile (z) 0.0389 95% Percentile (z) 0.046 99% Percentile (z) 0.0591

Maximum Likelihood Estimate(MLE) Method Mean -0.0233 SD 0.048 95% UTL with 95% Coverage 0.0675

> 95% UPL (t) 0.0566 90% Percentile (z) 0.0382 95% Percentile (z) 0.0557 99% Percentile (z) 0.0884

Gamma Distribution Test with Detected Values Only

k star (bias corrected) 1.641 Theta Star 0.0129 nu star 233.1

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.0147 SD 0.0189 SE of Mean 0.00172 95% KM UTL with 95% Coverage 0.0505 95% KM Chebyshev UPL 0.0976 95% KM UPL (t) 0.0462 90% Percentile (z) 0.039 95% Percentile (z) 0.0458 99% Percentile (z) 0.0588

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL 0.0553
95% Hawkins Wixley (HW) Approx. Gamma UPL 0.0694
95% WH Approx. Gamma UTL with 95% Coverage 0.0694
95% HW Approx. Gamma UTL with 95% Coverage 0.0926

A-D Test Statistic 3.807 5% A-D Critical Value 0.767 K-S Test Statistic 0.202 5% K-S Critical Value 0.107 Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data Mean 0.0129 Median 0.00907 SD 0.0202 k star 0.21 Theta star 0.0615 Nu star 52.05 95% Percentile of Chisquare (2k) 2.136

90% Percentile 0.039195% Percentile 0.065799% Percentile 0.138

Note: DL/2 is not a recommended method.

ATTACHMENT B.4

PROUCL OUTPUT DISSOLVED METALS IN DEEP AQUIFER

General Background Statistics for Data Sets with Non-Detects

User Selected Options

From FileC:\Documents and Settings\rchatfield\Desktop\Peregrine - Pro UCL\12636 Dissolved Metals - Deep.wstFull PrecisionOFFConfidence Coefficient95%Coverage95%Different or Future K Values1Number of Bootstrap Operations10000

Aluminum

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 5 Tolerance Factor 3.031

Raw Statistics

Minimum Detected 0.019 Maximum Detected 0.1 Mean of Detected 0.0575 SD of Detected 0.0341 Minimum Non-Detect 0.05 Maximum Non-Detect 0.05

Number of Detected Data 5 Number of Non-Detect Data 4 Percent Non-Detects 44.44%

Log-transformed Statistics

Minimum Detected -3.963 Maximum Detected -2.303 Mean of Detected -3.024 SD of Detected 0.679 Minimum Non-Detect -2.996 Maximum Non-Detect -2.996

Warning: There are only 5 Detected Values in this data Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

Background Statistics

Normal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic 0.939 5% Shapiro Wilk Critical Value 0.762 Data appear Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.0431 SD 0.0296 95% UTL 95% Coverage 0.133 95% UPL (t) 0.101 90% Percentile (z) 0.081 95% Percentile (z) 0.0917 99% Percentile (z) 0.112

Maximum Likelihood Estimate(MLE) Method N/A

Lognormal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic 0.952 5% Shapiro Wilk Critical Value 0.762 Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -3.319 SD (Log Scale) 0.594 95% UTL 95% Coverage 0.219 95% UPL (t) 0.116 90% Percentile (z) 0.0775 95% Percentile (z) 0.0962 99% Percentile (z) 0.144

> Log ROS Method Mean in Original Scale 0.0466

SD in Original Scale 0.0285 Mean in Log Scale -3.224 SD in Log Scale 0.59 95% UTL 95% Coverage 0.238 95% UPL (t) 0.127 90% Percentile (z) 0.0848 95% Percentile (z) 0.105 99% Percentile (z) 0.157

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.0471 SD 0.0269 SE of Mean 0.0111 95% KM UTL with 95% Coverage 0.129 95% KM Chebyshev UPL 0.171 95% KM UPL (t) 0.0998 90% Percentile (z) 0.0815 95% Percentile (z) 0.0913 99% Percentile (z) 0.11

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL 0.133
95% Hawkins Wixley (HW) Approx. Gamma UPL 0.141
95% WH Approx. Gamma UTL with 95% Coverage 0.217
95% HW Approx. Gamma UTL with 95% Coverage 0.243

Gamma Distribution Test with Detected Values Only

k star (bias corrected) 1.389 Theta Star 0.0414 nu star 13.89

A-D Test Statistic 0.242 5% A-D Critical Value 0.682 K-S Test Statistic 0.222 5% K-S Critical Value 0.359 Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data Mean 0.0479 Median 0.0456 SD 0.0303 k star 1.623 Theta star 0.0295 Nu star 29.21 95% Percentile of Chisquare (2k) 8.236

> 90% Percentile 0.0979 95% Percentile 0.122 99% Percentile 0.175

Note: DL/2 is not a recommended method.

Antimony

General Statistics

Number of Detected Data 1 Number of Non-Detect Data 8

Number of Valid Data 9 Number of Distinct Detected Data 1

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set! It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Antimony was not processed!

Arsenic

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 6 Tolerance Factor 3.031

Raw Statistics

Minimum Detected 0.014 Maximum Detected 0.048 Mean of Detected 0.0368 SD of Detected 0.0113 Minimum Non-Detect 0.005 Maximum Non-Detect 0.005 Number of Detected Data 7 Number of Non-Detect Data 2 Percent Non-Detects 22.22%

Log-transformed Statistics

Minimum Detected -4.269 Maximum Detected -3.037 Mean of Detected -3.364 SD of Detected 0.419 Minimum Non-Detect -5.298 Maximum Non-Detect -5.298

Warning: There are only 7 Detected Values in this data Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

Background Statistics

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic 0.728 5% Shapiro Wilk Critical Value 0.803 Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -3.947 SD (Log Scale) 1.214 95% UTL 95% Coverage 0.766 95% UPL (t) 0.209 90% Percentile (z) 0.0915 95% Percentile (z) 0.142 99% Percentile (z) 0.325

Log ROS Method

 Mean in Original Scale
 0.0319

 SD in Original Scale
 0.0138

 95% UTL with
 95% Coverage
 0.14

 95% BCA UTL with
 95% Coverage
 0.048

 95% Bootstrap (%) UTL with
 95% Coverage
 0.048

 95% UPL (t)
 0.0799

 90%
 Percentile (z)
 0.0678

 99%
 Percentile (z)
 0.0967

Normal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic 0.845 5% Shapiro Wilk Critical Value 0.803 Data appear Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.0292 SD 0.018 95% UTL 95% Coverage 0.0838 95% UPL (t) 0.0645 90% Percentile (z) 0.0523 95% Percentile (z) 0.0588 99% Percentile (z) 0.0711

Maximum Likelihood Estimate(MLE) Method

Mean 0.0275 SD 0.0202 95% UTL with 95% Coverage 0.0886

> 95% UPL (t) 0.067 90% Percentile (z) 0.0533 95% Percentile (z) 0.0606 99% Percentile (z) 0.0744

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.0317 SD 0.0132 SE of Mean 0.00477 95% KM UTL with 95% Coverage 0.0719 95% KM Chebyshev UPL 0.0926 95% KM UPL (t) 0.0577 90% Percentile (z) 0.0487 95% Percentile (z) 0.0535 99% Percentile (z) 0.0625

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL 0.129
95% Hawkins Wixley (HW) Approx. Gamma UPL 0.178
95% WH Approx. Gamma UTL with 95% Coverage 0.25
95% HW Approx. Gamma UTL with 95% Coverage 0.413

Gamma Distribution Test with Detected Values Only

k star (bias corrected) 4.883 Theta Star 0.00753 nu star 68.37

A-D Test Statistic 0.794 5% A-D Critical Value 0.709 K-S Test Statistic 0.346 5% K-S Critical Value 0.312

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data Mean 0.0293 Median 0.036 SD 0.0179 k star 0.428 Theta star 0.0684 Nu star 7.708 95% Percentile of Chisquare (2k) 3.475

90% Percentile 0.081895% Percentile 0.11999% Percentile 0.212

Note: DL/2 is not a recommended method.

Total Number of Observations 9 Tolerance Factor 3.031

Raw Statistics

Minimum 0.042 Maximum 0.33 Second Largest 0.17 First Quartile 0.049 Median 0.08 Third Quartile 0.16 Mean 0.123 Geometric Mean 0.0978 SD 0.0927 Coefficient of Variation 0.755 Skewness 1.518

Number of Distinct Observations 9

Log-Transformed Statistics

Minimum -3.17 Maximum -1.109 Second Largest -1.772 First Quartile -3.016 Median -2.526 Third Quartile -1.833 Mean -2.325 SD 0.708

Warning: There are only 9 Values in this data

Note: It should be noted that even though bootstrap methods may be performed on this data set, the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

Background Statistics

Normal Distribution Test

Shapiro Wilk Test Statistic 0.824 Shapiro Wilk Critical Value 0.829

Data not Normal at 5% Significance Level

Assuming Normal Distribution

95% UTL with 95% Coverage 0.404 95% UPL (t) 0.305 90% Percentile (z) 0.242 95% Percentile (z) 0.275 99% Percentile (z) 0.339

Gamma Distribution Test

k star 1.637 Theta Star 0.0751 MLE of Mean 0.123 MLE of Standard Deviation 0.0961 nu star 29.46

A-D Test Statistic 0.431 5% A-D Critical Value 0.729 K-S Test Statistic 0.206 5% K-S Critical Value 0.282 Data appear Gamma Distributed at 5% Significance Level

Lognormal Distribution Test Shapiro Wilk Test Statistic 0.921 Shapiro Wilk Critical Value 0.829 Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

95% UTL with 95% Coverage 0.835 95% UPL (t) 0.392 90% Percentile (z) 0.242 95% Percentile (z) 0.313 99% Percentile (z) 0.507

Data Distribution Test

Data appear Gamma Distributed at 5% Significance Level

Nonparametric Statistics

90% Percentile 0.202 95% Percentile 0.266 99% Percentile 0.317

Assuming Gamma Distribution	95% UTL with 95% Coverage 0.	33
90% Percentile 0.251	95% Percentile Bootstrap UTL with 95% Coverage 0.	33
95% Percentile 0.311	95% BCA Bootstrap UTL with 95% Coverage 0.	33
99% Percentile 0.446	95% UPL 0.	33
	95% Chebyshev UPL 0.	549
95% WH Approx. Gamma UPL 0.34	Upper Threshold Limit Based upon IQR 0.	327
95% HW Approx. Gamma UPL 0.349		
95% WH Approx. Gamma UTL with 95% Coverage 0.553		
95% HW Approx. Gamma UTL with 95% Coverage 0.596		

Beryllium

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 0 Number of Detected Data 0 Number of Non-Detect Data 9

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

The data set for variable Beryllium was not processed!

Cadmium

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 0 Number of Detected Data 0 Number of Non-Detect Data 9

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

The data set for variable Cadmium was not processed!

Number of Valid Data 117 Number of Distinct Detected Data 10 Tolerance Factor 1.9

Raw Statistics

Minimum Detected 0.001 Maximum Detected 0.032 Mean of Detected 0.00925 SD of Detected 0.00614 Minimum Non-Detect 0.005 Maximum Non-Detect 0.02

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), Observations < Largest ND are treated as NDs Number of Detected Data 20 Number of Non-Detect Data 97 Percent Non-Detects 82.91%

Log-transformed Statistics

Minimum Detected -6.908 Maximum Detected -3.442 Mean of Detected -4.883 SD of Detected 0.719 Minimum Non-Detect -5.298 Maximum Non-Detect -3.912

Single Detection Limit Scenario

Number treated as Non-Detect with Single DL 116 Number treated as Detected with Single DL 1 Single DL Non-Detect Percentage 99.15%

Background Statistics

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic 0.805 5% Shapiro Wilk Critical Value 0.905 Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -5.429 SD (Log Scale) 0.609 95% UTL 95% Coverage 0.014 95% UPL (t) 0.0121 90% Percentile (z) 0.00958 95% Percentile (z) 0.0119 99% Percentile (z) 0.0181

Log ROS Method Mean in Original Scale 0.00381 SD in Original Scale 0.00386 Mean in Log Scale -5.916 SD in Log Scale 0.829 95% UTL 95% Coverage 0.013 95% UPL (t) 0.0107 90% Percentile (z) 0.0078 95% Percentile (z) 0.0105 99% Percentile (z) 0.0185

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Gamma Distribution Test with Detected Values Only

k star (bias corrected) 2.291 Theta Star 0.00404 nu star 91.62

Normal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic 0.684 5% Shapiro Wilk Critical Value 0.905

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.00534 SD 0.00391 95% UTL 95% Coverage 0.0128 95% UPL (t) 0.0119 90% Percentile (z) 0.0104 95% Percentile (z) 0.0118 99% Percentile (z) 0.0144

Maximum Likelihood Estimate(MLE) Method N/A

A-D Test Statistic 1.522 5% A-D Critical Value 0.749 K-S Test Statistic 0.261 5% K-S Critical Value 0.195

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data Mean 0.00449 Median 0.00391 SD 0.00456 k star 0.289 Theta star 0.0155 Nu star 67.74 95% Percentile of Chisquare (2k) 2.679

90% Percentile 0.013395% Percentile 0.020899% Percentile 0.0403

Note: DL/2 is not a recommended method.

Cobalt

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 0

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.00363 SD 0.00395 SE of Mean 0.00056 95% KM UTL with 95% Coverage 0.0111 95% KM Chebyshev UPL 0.0209 95% KM UPL (t) 0.0102 90% Percentile (z) 0.00869 95% Percentile (z) 0.0101 99% Percentile (z) 0.0128

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL 0.0189
95% Hawkins Wixley (HW) Approx. Gamma UPL 0.0242
95% WH Approx. Gamma UTL with 95% Coverage 0.0234
95% HW Approx. Gamma UTL with 95% Coverage 0.0317

Number of Detected Data 0 Number of Non-Detect Data 9

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

The data set for variable Cobalt was not processed!

Number of Valid Data 117 Number of Distinct Detected Data 9 Tolerance Factor 1.9

Raw Statistics

Minimum Detected 0.001 Maximum Detected 0.203 Mean of Detected 0.0198 SD of Detected 0.0482 Minimum Non-Detect 0.001 Maximum Non-Detect 0.02

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), Observations < Largest ND are treated as NDs Number of Detected Data 17 Number of Non-Detect Data 100 Percent Non-Detects 85.47%

Log-transformed Statistics

Minimum Detected -6.908 Maximum Detected -1.595 Mean of Detected -5.377 SD of Detected 1.636 Minimum Non-Detect -6.908 Maximum Non-Detect -3.912

Single Detection Limit Scenario

Number treated as Non-Detect with Single DL 111 Number treated as Detected with Single DL 6 Single DL Non-Detect Percentage 94.87%

Background Statistics

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic 0.845 5% Shapiro Wilk Critical Value 0.892 Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -5.72 SD (Log Scale) 0.932 95% UTL 95% Coverage 0.0193 95% UPL (t) 0.0155 90% Percentile (z) 0.0108 95% Percentile (z) 0.0152 99% Percentile (z) 0.0287

Log ROS Method Mean in Original Scale 0.00383 SD in Original Scale 0.0191 95% UTL with 95% Coverage 0.0149 95% BCA UTL with 95% Coverage 0.0212 95% Bootstrap (%) UTL with 95% Coverage 0.0212 95% UPL (t) 0.0102 90% Percentile (z) 0.00546 95% Percentile (z) 0.00985 99% Percentile (z) 0.0298

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Normal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic 0.413 5% Shapiro Wilk Critical Value 0.892

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.00629 SD 0.0189 95% UTL 95% Coverage 0.0423 95% UPL (t) 0.0378 90% Percentile (z) 0.0305 95% Percentile (z) 0.0374 99% Percentile (z) 0.0503

Maximum Likelihood Estimate(MLE) Method Mean -0.156 SD 0.106 95% UTL with 95% Coverage 0.0457

95% UPL (t) 0.0208 90% Percentile (z) -0.02 95% Percentile (z) 0.0186 99% Percentile (z) 0.091

Gamma Distribution Test with Detected Values Only

k star (bias corrected) 0.406 Theta Star 0.0487 nu star 13.8

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.00389 SD 0.019 SE of Mean 0.00181 95% KM UTL with 95% Coverage 0.04 95% KM Chebyshev UPL 0.087 95% KM UPL (t) 0.0355 90% Percentile (z) 0.0282 95% Percentile (z) 0.0351 99% Percentile (z) 0.0481

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL 0.0221
95% Hawkins Wixley (HW) Approx. Gamma UPL 0.0228
95% WH Approx. Gamma UTL with 95% Coverage 0.0292
95% HW Approx. Gamma UTL with 95% Coverage 0.0322

A-D Test Statistic 1.585 5% A-D Critical Value 0.81 K-S Test Statistic 0.249 5% K-S Critical Value 0.223 Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data Mean 0.00624 Median 0.00001 SD 0.0201 k star 0.149 Theta star 0.0419 Nu star 34.85 95% Percentile of Chisquare (2k) 1.642

90% Percentile 0.018595% Percentile 0.034499% Percentile 0.0806

Note: DL/2 is not a recommended method.

Number of Valid Data 58 Number of Distinct Detected Data 46 Tolerance Factor 2.024

Raw Statistics

Minimum Detected 0.02 Maximum Detected 2.55 Mean of Detected 0.815 SD of Detected 0.746 Minimum Non-Detect 0.01 Maximum Non-Detect 0.1

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), Observations < Largest ND are treated as NDs Number of Detected Data 53 Number of Non-Detect Data 5 Percent Non-Detects 8.62%

Log-transformed Statistics

Minimum Detected -3.912 Maximum Detected 0.936 Mean of Detected -0.84 SD of Detected 1.322 Minimum Non-Detect -4.605 Maximum Non-Detect -2.303

Single Detection Limit Scenario

Number treated as Non-Detect with Single DL 11 Number treated as Detected with Single DL 47 Single DL Non-Detect Percentage 18.97%

Background Statistics

Lognormal Distribution Test with Detected Values Only

Lilliefors Test Statistic 0.148 5% Lilliefors Critical Value 0.122 Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -1.133 SD (Log Scale) 1.617 95% UTL 95% Coverage 8.5 95% UPL (t) 4.922 90% Percentile (z) 2.558 95% Percentile (z) 4.603 99% Percentile (z) 13.86

Log ROS Method

Mean in Original Scale 0.748 SD in Original Scale 0.747 95% UTL with 95% Coverage 6.918 95% BCA UTL with 95% Coverage 2.4 95% Bootstrap (%) UTL with 95% Coverage 2.423 95% UPL (t) 4.186 90% Percentile (z) 2.293 95% Percentile (z) 3.935 99% Percentile (z) 10.84

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Normal Distribution Test with Detected Values Only Lilliefors Test Statistic 0.208 5% Lilliefors Critical Value 0.122

Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.747 SD 0.747 95% UTL 95% Coverage 2.26 95% UPL (t) 2.007 90% Percentile (z) 1.705 95% Percentile (z) 1.976 99% Percentile (z) 2.486

Maximum Likelihood Estimate(MLE) Method Mean 0.661 SD 0.858

95% UTL with 95% Coverage 2.398

95% UPL (t) 2.108 90% Percentile (z) 1.761 95% Percentile (z) 2.073 99% Percentile (z) 2.657

Gamma Distribution Test with Detected Values Only

k star (bias corrected) 0.877 Theta Star 0.93 nu star 92.99 A-D Test Statistic 1.181 5% A-D Critical Value 0.784 K-S Test Statistic 0.128 5% K-S Critical Value 0.126

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data Mean 0.745 Median 0.325 SD 0.749 k star 0.387 Theta star 1.926 Nu star 44.89 95% Percentile of Chisquare (2k) 3.252

90% Percentile 2.11795% Percentile 3.13299% Percentile 5.692

Note: DL/2 is not a recommended method.

Lead

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 0

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.747 SD 0.74 SE of Mean 0.0982 95% KM UTL with 95% Coverage 2.246 95% KM Chebyshev UPL 4.003 95% KM UPL (t) 1.996 90% Percentile (z) 1.696 95% Percentile (z) 1.965 99% Percentile (z) 2.47

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL 2.772
95% Hawkins Wixley (HW) Approx. Gamma UPL 3.355
95% WH Approx. Gamma UTL with 95% Coverage 3.617
95% HW Approx. Gamma UTL with 95% Coverage 4.643

Number of Detected Data 0 Number of Non-Detect Data 9

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

The data set for variable Lead was not processed!

Number of Valid Data 52 Number of Distinct Detected Data 41 Tolerance Factor 2.049

Raw Statistics

Minimum Detected 0.0036 Maximum Detected 0.577 Mean of Detected 0.0665 SD of Detected 0.0827 Minimum Non-Detect 0.005 Maximum Non-Detect 0.005 Number of Detected Data 51 Number of Non-Detect Data 1 Percent Non-Detects 1.92%

Log-transformed Statistics

Minimum Detected -5.627 Maximum Detected -0.55 Mean of Detected -3.094 SD of Detected 0.895 Minimum Non-Detect -5.298 Maximum Non-Detect -5.298

Background Statistics

Lognormal Distribution Test with Detected Values Only Lilliefors Test Statistic 0.152 5% Lilliefors Critical Value 0.124

Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -3.149 SD (Log Scale) 0.973 95% UTL 95% Coverage 0.315 95% UPL (t) 0.222 90% Percentile (z) 0.149 95% Percentile (z) 0.213 99% Percentile (z) 0.413

Log ROS Method

Mean in Original Scale 0.0653 SD in Original Scale 0.0823 95% UTL with 95% Coverage 0.292 95% BCA UTL with 95% Coverage 0.348 95% Bootstrap (%) UTL with 95% Coverage 0.369 95% UPL (t) 0.21 90% Percentile (z) 0.143 95% Percentile (z) 0.201 99% Percentile (z) 0.378

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Nonparametric Statistics Kaplan-Meier (KM) Method

Mean 0.0653

Normal Distribution Test with Detected Values Only Lilliefors Test Statistic 0.264

5% Lilliefors Critical Value 0.124 Data not Normal at 5% Significance Level

-

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.0653 SD 0.0824 95% UTL 95% Coverage 0.234 95% UPL (t) 0.205 90% Percentile (z) 0.171 95% Percentile (z) 0.201 99% Percentile (z) 0.257

Maximum Likelihood Estimate(MLE) Method

Mean 0.0634 SD 0.0839 95% UTL with 95% Coverage 0.235

95% UPL (t) 0.205 90% Percentile (z) 0.171 95% Percentile (z) 0.201 99% Percentile (z) 0.259

Gamma Distribution Test with Detected Values Only

k star (bias corrected) 1.378 Theta Star 0.0483 nu star 140.6

A-D Test Statistic 1.305 5% A-D Critical Value 0.769 K-S Test Statistic 0.142

SD 0.0816 SE of Mean 0.0114 95% KM UTL with 95% Coverage 0.232 95% KM Chebyshev UPL 0.424 95% KM UPL (t) 0.203 90% Percentile (z) 0.17 95% Percentile (z) 0.199 99% Percentile (z) 0.255

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL 0.184
95% Hawkins Wixley (HW) Approx. Gamma UPL 0.198
95% WH Approx. Gamma UTL with 95% Coverage 0.229
95% HW Approx. Gamma UTL with 95% Coverage 0.254

5% K-S Critical Value 0.127

Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data Mean 0.0652 Median 0.049 SD 0.0824 k star 0.966 Theta star 0.0675 Nu star 100.5 95% Percentile of Chisquare (2k) 5.861 90% Percentile 0.151

> 95% Percentile 0.198 99% Percentile 0.306

Note: DL/2 is not a recommended method.

Mercury

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 0 Number of Detected Data 0 Number of Non-Detect Data 9

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

The data set for variable Mercury was not processed!

Number of Valid Data 117 Number of Distinct Detected Data 17 Tolerance Factor 1.9

Raw Statistics

Minimum Detected 0.001 Maximum Detected 0.054 Mean of Detected 0.0144 SD of Detected 0.0131 Minimum Non-Detect 0.005 Maximum Non-Detect 0.04

Data with Multiple Detection Limits

Normal Distribution Test with Detected Values Only

Data not Normal at 5% Significance Level

Assuming Normal Distribution

Note: Data have multiple DLs - Use of KM Method is recommended For all methods (except KM, DL/2, and ROS Methods), Observations < Largest ND are treated as NDs Number of Detected Data 28 Number of Non-Detect Data 89 Percent Non-Detects 76.07%

Log-transformed Statistics

Minimum Detected -6.908 Maximum Detected -2.919 Mean of Detected -4.602 SD of Detected 0.879 Minimum Non-Detect -5.298 Maximum Non-Detect -3.219

Single Detection Limit Scenario

Number treated as Non-Detect with Single DL 115 Number treated as Detected with Single DL 2 Single DL Non-Detect Percentage 98.29%

Background Statistics

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic 0.948 5% Shapiro Wilk Critical Value 0.924 Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -5.329 SD (Log Scale) 0.856 95% UTL 95% Coverage 0.0247 95% UPL (t) 0.0202 90% Percentile (z) 0.0145 95% Percentile (z) 0.0198 99% Percentile (z) 0.0355

Log ROS Method Mean in Original Scale 0.00507 SD in Original Scale 0.0084 Mean in Log Scale -6.068 SD in Log Scale 1.239 95% UTL 95% Coverage 0.0244 95% UPL (t) 0.0182 90% Percentile (z) 0.0113 95% Percentile (z) 0.0178 99% Percentile (z) 0.0414

Gamma Distribution Test with Detected Values Only

k star (bias corrected) 1.398 Theta Star 0.0103 nu star 78.29

DL/2 Substitution Method Mean 0.00741

SD 0.00741 SD 0.00855 95% UTL 95% Coverage 0.0237 95% UPL (t) 0.0217 90% Percentile (z) 0.0184 95% Percentile (z) 0.0215 99% Percentile (z) 0.0273

Shapiro Wilk Test Statistic 0.79

5% Shapiro Wilk Critical Value 0.924

Maximum Likelihood Estimate(MLE) Method N/A

Data Distribution Test with Detected Values Only

Data follow Appr. Gamma Distribution at 5% Significance Level

A-D Test Statistic 0.891 5% A-D Critical Value 0.762 K-S Test Statistic 0.138 5% K-S Critical Value 0.168

Data follow Appx. Gamma Distribution at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data Mean 0.00497 Median 0.00001 SD 0.00892 k star 0.176 Theta star 0.0282 Nu star 41.24 95% Percentile of Chisquare (2k) 1.874

90% Percentile 0.01595% Percentile 0.026499% Percentile 0.0586

Note: DL/2 is not a recommended method.

Selenium

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 0

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.0057 SD 0.00831 SE of Mean 0.00112 95% KM UTL with 95% Coverage 0.0215 95% KM Chebyshev UPL 0.0421 95% KM UPL (t) 0.0195 90% Percentile (z) 0.0194 95% Percentile (z) 0.025

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL 0.0207
95% Hawkins Wixley (HW) Approx. Gamma UPL 0.0238
95% WH Approx. Gamma UTL with 95% Coverage 0.0267
95% HW Approx. Gamma UTL with 95% Coverage 0.0329

Number of Detected Data 0 Number of Non-Detect Data 9

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

The data set for variable Selenium was not processed!

Silver

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 0 Number of Detected Data 0 Number of Non-Detect Data 9

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

The data set for variable Silver was not processed!

Thallium

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 4 Tolerance Factor 3.031

Raw Statistics

Minimum Detected 0.00015 Maximum Detected 0.00027 Mean of Detected 0.0002025 SD of Detected 5.377E-05 Minimum Non-Detect 0.001 Maximum Non-Detect 0.001 Number of Detected Data 4 Number of Non-Detect Data 5 Percent Non-Detects 55.56%

Log-transformed Statistics

Minimum Detected -8.805 Maximum Detected -8.217 Mean of Detected -8.531 SD of Detected 0.263 Minimum Non-Detect -6.908 Maximum Non-Detect -6.908

Warning: There are only 4 Distinct Detected Values in this data Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

Background Statistics

Lognormal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic 0.963 5% Shapiro Wilk Critical Value 0.748 Data appear Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -8.014 SD (Log Scale) 0.516 95% UTL 95% Coverage 0.00158 95% UPL (t) 0.0009092 90% Percentile (z) 0.0006407 95% Percentile (z) 0.0007727 99% Percentile (z) 0.0011

Log ROS Method Mean in Original Scale 0.0002029 SD in Original Scale 5.087E-05 Mean in Log Scale -8.531 SD in Log Scale 0.251 95% UTL 95% Coverage 0.0004216 95% UPL (t) 0.0003224 90% Percentile (z) 0.0002979 99% Percentile (z) 0.0003534

Normal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic 0.951 5% Shapiro Wilk Critical Value 0.748 Data appear Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.0003678 SD 0.0001602 95% UTL 95% Coverage 0.0008534 95% UPL (t) 0.0006818 90% Percentile (z) 0.0005731 95% Percentile (z) 0.0006313 99% Percentile (z) 0.0007405

Maximum Likelihood Estimate(MLE) Method N/A

Data Distribution Test with Detected Values Only

Data appear Normal at 5% Significance Level

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.0002025 SD 4.657E-05 SE of Mean 2.689E-05 95% KM UTL with 95% Coverage 0.0003437 95% KM Chebyshev UPL 0.0004165 95% KM UPL (t) 0.0002938 90% Percentile (z) 0.0002622 95% Percentile (z) 0.0002791 99% Percentile (z) 0.0003108

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL 0.0003153
95% Hawkins Wixley (HW) Approx. Gamma UPL 0.0003178
95% WH Approx. Gamma UTL with 95% Coverage 0.0003954
95% HW Approx. Gamma UTL with 95% Coverage 0.000403

Gamma Distribution Test with Detected Values Only k star (bias corrected) 4.994 Theta Star 4.055E-05 nu star 39.95

A-D Test Statistic 0.261 5% A-D Critical Value 0.657 K-S Test Statistic 0.249 5% K-S Critical Value 0.394

Data appear Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data Mean 0.000202 Median 0.0002088 SD 5.011E-05 k star 11.65 Theta star 1.733E-05 Nu star 209.8 95% Percentile of Chisquare (2k) 35.56

> 90% Percentile 0.0002806 95% Percentile 0.0003081 99% Percentile 0.0003644

Note: DL/2 is not a recommended method.

Vanadium

General Statistics

Number of Valid Data 9 Number of Distinct Detected Data 1 Number of Detected Data 1 Number of Non-Detect Data 8

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set! It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Vanadium was not processed!

Number of Valid Data 117 Number of Distinct Detected Data 19 Tolerance Factor 1.9

Raw Statistics

Minimum Detected 0.005 Maximum Detected 0.124 Mean of Detected 0.0236 SD of Detected 0.0292 Minimum Non-Detect 0.005 Maximum Non-Detect 0.02

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), Observations < Largest ND are treated as NDs Number of Detected Data 48 Number of Non-Detect Data 69 Percent Non-Detects 58.97%

Log-transformed Statistics

Minimum Detected -5.298 Maximum Detected -2.087 Mean of Detected -4.234 SD of Detected 0.912 Minimum Non-Detect -5.298 Maximum Non-Detect -3.912

Single Detection Limit Scenario

Number treated as Non-Detect with Single DL 101 Number treated as Detected with Single DL 16 Single DL Non-Detect Percentage 86.32%

Background Statistics

Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic 0.857 5% Shapiro Wilk Critical Value 0.947 Data not Lognormal at 5% Significance Level

Assuming Lognormal Distribution

DL/2 Substitution Method Mean (Log Scale) -4.933 SD (Log Scale) 0.928 95% UTL 95% Coverage 0.0421 95% UPL (t) 0.0338 90% Percentile (z) 0.0237 95% Percentile (z) 0.0332 99% Percentile (z) 0.0625

Log ROS Method Mean in Original Scale 0.0115 SD in Original Scale 0.0213 95% UTL with 95% Coverage 0.0582 95% BCA UTL with 95% Coverage 0.061 95% Bootstrap (%) UTL with 95% Coverage 0.0714 95% UPL (t) 0.0425 90% Percentile (z) 0.0254 95% Percentile (z) 0.0413

99% Percentile (z) 0.103

Data Distribution Test with Detected Values Only

Data do not follow a Discernable Distribution (0.05)

Normal Distribution Test with Detected Values Only Shapiro Wilk Test Statistic 0.638

5% Shapiro Wilk Critical Value 0.947 Data not Normal at 5% Significance Level

Assuming Normal Distribution

DL/2 Substitution Method Mean 0.0128 SD 0.0208 95% UTL 95% Coverage 0.0523 95% UPL (t) 0.0475 90% Percentile (z) 0.0395 95% Percentile (z) 0.047 99% Percentile (z) 0.0612

Maximum Likelihood Estimate(MLE) Method Mean -0.0569 SD 0.0698 95% UTL with 95% Coverage 0.0757

> 95% UPL (t) 0.0593 90% Percentile (z) 0.0325 95% Percentile (z) 0.0579 99% Percentile (z) 0.105

Gamma Distribution Test with Detected Values Only

k star (bias corrected) 1.103 Theta Star 0.0214 nu star 105.9

Nonparametric Statistics

Kaplan-Meier (KM) Method Mean 0.013 SD 0.0206 SE of Mean 0.00192 95% KM UTL with 95% Coverage 0.0521 95% KM Chebyshev UPL 0.103 95% KM UPL (t) 0.0473 90% Percentile (z) 0.0394 95% Percentile (z) 0.0468 99% Percentile (z) 0.0608

Gamma ROS Limits with Extrapolated Data

95% Wilson Hilferty (WH) Approx. Gamma UPL 0.0445
95% Hawkins Wixley (HW) Approx. Gamma UPL 0.0515
95% WH Approx. Gamma UTL with 95% Coverage 0.0575
95% HW Approx. Gamma UTL with 95% Coverage 0.0713

A-D Test Statistic 3.637 5% A-D Critical Value 0.775 K-S Test Statistic 0.289 5% K-S Critical Value 0.131 Data not Gamma Distributed at 5% Significance Level

Assuming Gamma Distribution

Gamma ROS Statistics with Extrapolated Data Mean 0.0109 Median 0.00108 SD 0.0219 k star 0.169 Theta star 0.0645 Nu star 39.53 95% Percentile of Chisquare (2k) 1.814

90% Percentile 0.032795% Percentile 0.058599% Percentile 0.132

Note: DL/2 is not a recommended method.