ATTACHMENT 2-1
SOIL PROUCL RESULTS

User Selected Options	
Date/Time of Computation	ProUCL 5.2 11/30/2023 6:53:58 PM
From File	ProUCL_Export_SO_Avg_20231012_a.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	10000

C (soil | 1,1,1,2-tetrachloroethane | 630-20-6)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

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 C (soil | 1,1,1,2-tetrachloroethane | 630-20-6) was not processed!

C (soil | 1,1,1-trichloroethane | 71-55-6)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

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 C (soil | 1,1,1-trichloroethane | 71-55-6) was not processed!

C (soil | 1,1,2,2-tetrachloroethane | 79-34-5)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	10
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (soil | 1,1,2,2-tetrachloroethane | 79-34-5) was not processed!

C (soil | 1,1,2-trichloro-1,2,2-trifluoroethane | 76-13-1)

General Statistics			
Total Number of Observations	11	Number of Distinct Observations	10
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (soil | 1,1,2-trichloro-1,2,2-trifluoroethane | 76-13-1) was not processed!

C (soil | 1,1,2-trichloroethane | 79-00-5)

General Statistics			
Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

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 C (soil | 1,1,2-trichloroethane | 79-00-5) was not processed!

C (soil | 1,1-dichloroethane | 75-34-3)

General Statistics			
Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

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 C (soil | 1,1-dichloroethane | 75-34-3) was not processed!

C (soil | 1,1-dichloroethene | 75-35-4)

General Statistics			
Total Number of Observations	11	Number of Distinct Observations	11
Number of Detects	0	Number of Non-Detects	11

Number of Distinct Detects	0	Number of Distinct Non-Detects	11

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 C (soil | 1,1-dichloroethene | 75-35-4) was not processed!

C (soil | 1,1-dichloropropene | 563-58-6)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

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 C (soil | 1,1-dichloropropene | 563-58-6) was not processed!

C (soil | 1,2,3-trichlorobenzene | 87-61-6)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

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 C (soil | 1,2,3-trichlorobenzene | 87-61-6) was not processed!

C (soil | 1,2,3-trichloropropane | 96-18-4)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

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 C (soil | 1,2,3-trichloropropane | 96-18-4) was not processed!

C (soil | 1,2,4,5-tetrachlorobenzene | 95-94-3)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

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 C (soil | 1,2,4,5-tetrachlorobenzene | 95-94-3) was not processed!

C (soil | 1,2,4-trichlorobenzene | 120-82-1)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	18
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	18

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 C (soil | 1,2,4-trichlorobenzene | 120-82-1) was not processed!

C (soil | 1,2,4-trimethylbenzene | 95-63-6)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	2	Number of Non-Detects	9
Number of Distinct Detects	2	Number of Distinct Non-Detects	6
Minimum Detect	0.96	Minimum Non-Detect	6.4000E-4
Maximum Detect	4.4	Maximum Non-Detect	0.0019
Variance Detects	5.917	Percent Non-Detects	81.82%
Mean Detects	2.68	SD Detects	2.432
Median Detects	2.68	CV Detects	0.908
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	0.72	SD of Logged Detects	1.077

Warning: Data set has only 2 Detected Values.

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

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.488	KM Standard Error of Mean	0.54
90KM SD	1.267	95% KM (BCA) UCL	N/A
95% KM (t) UCL	1.467	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	1.377	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	2.109	95% KM Chebyshev UCL	2.843
97.5% KM Chebyshev UCL	3.862	99% KM Chebyshev UCL	5.864
Gamma GOF Tests on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Gamma Statistics on Detected Data Only			
k hat (MLE)	2.035	k star (bias corrected MLE)	N/A
Theta hat (MLE)	1.317	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	8.139	nu star (bias corrected)	N/A
Mean (detects)	2.68		
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.488	SD (KM)	1.267
Variance (KM)	1.606	SE of Mean (KM)	0.54
k hat (KM)	0.148	k star (KM)	0.168
nu hat (KM)	3.26	nu star (KM)	3.704
theta hat (KM)	3.292	theta star (KM)	2.897
80% gamma percentile (KM)	0.579	90% gamma percentile (KM)	1.465
95% gamma percentile (KM)	2.621	99% gamma percentile (KM)	5.9
Gamma Kaplan-Meier (KM) Statistics			
		Adjusted Level of Significance (β)	0.0278
Approximate Chi Square Value (3.70, α)	0.608	Adjusted Chi Square Value (3.70, β)	0.44
95% KM Approximate Gamma UCL	2.97	95% KM Adjusted Gamma UCL	4.106
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.493	Mean in Log Scale	-4.518
SD in Original Scale	1.327	SD in Log Scale	2.869
95% t UCL (assumes normality of ROS data)	1.218	95% Percentile Bootstrap UCL	1.208
95% BCA Bootstrap UCL	1.691	95% Bootstrap t UCL	79.41
95% H-UCL (Log ROS)	451.1		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-5.886	KM Geo Mean	0.00278
KM SD (logged)	3.131	95% Critical H Value (KM-Log)	7.798
KM Standard Error of Mean (logged)	1.335	95% H-UCL (KM -Log)	843.1
KM SD (logged)	3.131	95% Critical H Value (KM-Log)	7.798
KM Standard Error of Mean (logged)	1.335		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.488	Mean in Log Scale	-5.717
SD in Original Scale	1.329	SD in Log Scale	3.215
95% t UCL (Assumes normality)	1.214	95% H-Stat UCL	1963

<p style="color:red; text-align:center">DL/2 is not a recommended method, provided for comparisons and historical reasons</p>

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution

Suggested UCL to Use			
95% KM (t) UCL	1.467		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | 1,2-dibromo-3-chloropropane | 96-12-8)

General Statistics			
Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

<p style="color:red; text-align:center">Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!</p>

<p style="color:red; text-align:center">Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!</p>

<p style="color:red; text-align:center">The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).</p>

<p style="color:red; text-align:center">The data set for variable C (soil | 1,2-dibromo-3-chloropropane | 96-12-8) was not processed!</p>

C (soil | 1,2-dibromoethane | 106-93-4)

General Statistics			
Total Number of Observations	11	Number of Distinct Observations	10
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	10

<p style="color:red; text-align:center">Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!</p>

<p style="color:red; text-align:center">Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!</p>

<p style="color:red; text-align:center">The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).</p>

<p style="color:red; text-align:center">The data set for variable C (soil | 1,2-dibromoethane | 106-93-4) was not processed!</p>

C (soil | 1,2-dichlorobenzene | 95-50-1)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	18
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	18

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 C (soil | 1,2-dichlorobenzene | 95-50-1) was not processed!

C (soil | 1,2-dichloroethane | 107-06-2)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

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 C (soil | 1,2-dichloroethane | 107-06-2) was not processed!

C (soil | 1,2-dichloropropane | 78-87-5)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

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 C (soil | 1,2-dichloropropane | 78-87-5) was not processed!

C (soil | 1,2-diphenylhydrazine | 122-66-7)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

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).

C (soil | 1,3,5-trichlorobenzene | 108-70-3)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

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 C (soil | 1,3,5-trichlorobenzene | 108-70-3) was not processed!

C (soil | 1,3,5-trimethylbenzene | 108-67-8)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	2	Number of Non-Detects	9
Number of Distinct Detects	2	Number of Distinct Non-Detects	6
Minimum Detect	0.31	Minimum Non-Detect	4.3333E-4
Maximum Detect	1.3	Maximum Non-Detect	0.0019
Variance Detects	0.49	Percent Non-Detects	81.82%
Mean Detects	0.805	SD Detects	0.7
Median Detects	0.805	CV Detects	0.87
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-0.454	SD of Logged Detects	1.014

Warning: Data set has only 2 Detected Values.

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

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.147	KM Standard Error of Mean	0.16
90KM SD	0.375	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.437	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.41	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.627	95% KM Chebyshev UCL	0.844
97.5% KM Chebyshev UCL	1.146	99% KM Chebyshev UCL	1.739

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only				
k hat (MLE)	2.258	k star (bias corrected MLE)	N/A	
Theta hat (MLE)	0.357	Theta star (bias corrected MLE)	N/A	
nu hat (MLE)	9.032	nu star (bias corrected)	N/A	
Mean (detects)	0.805			

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.147	SD (KM)	0.375
Variance (KM)	0.141	SE of Mean (KM)	0.16
k hat (KM)	0.153	k star (KM)	0.172
nu hat (KM)	3.362	nu star (KM)	3.779
theta hat (KM)	0.96	theta star (KM)	0.854
80% gamma percentile (KM)	0.177	90% gamma percentile (KM)	0.441
95% gamma percentile (KM)	0.785	99% gamma percentile (KM)	1.756

Gamma Kaplan-Meier (KM) Statistics			
		Adjusted Level of Significance (β)	0.0278
Approximate Chi Square Value (3.78, α)	0.636	Adjusted Chi Square Value (3.78, β)	0.462
95% KM Approximate Gamma UCL	0.871	95% KM Adjusted Gamma UCL	1.2

Lognormal GOF Test on Detected Observations Only
Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.149	Mean in Log Scale	-5.387
SD in Original Scale	0.393	SD in Log Scale	2.702
95% t UCL (assumes normality of ROS data)	0.363	95% Percentile Bootstrap UCL	0.358
95% BCA Bootstrap UCL	0.502	95% Bootstrap t UCL	17.97
95% H-UCL (Log ROS)	57.9		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-6.419	KM Geo Mean	0.00163
KM SD (logged)	2.828	95% Critical H Value (KM-Log)	7.082
KM Standard Error of Mean (logged)	1.206	95% H-UCL (KM -Log)	50.12
KM SD (logged)	2.828	95% Critical H Value (KM-Log)	7.082
KM Standard Error of Mean (logged)	1.206		

DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.147	Mean in Log Scale	-5.966
SD in Original Scale	0.393	SD in Log Scale	2.776
95% t UCL (Assumes normality)	0.362	95% H-Stat UCL	54.32
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.437		

C (soil | 1,3-dichlorobenzene | 541-73-1)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	18
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	18

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 C (soil | 1,3-dichlorobenzene | 541-73-1) was not processed!

C (soil | 1,3-dichloropropane | 142-28-9)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	10
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (soil | 1,3-dichloropropane | 142-28-9) was not processed!

C (soil | 1,3-dichloropropene (total) | 542-75-6)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	10
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (soil | 1,3-dichloropropene (total) | 542-75-6) was not processed!

C (soil | 1,4-dichlorobenzene | 106-46-7)

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	18
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	18

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 C (soil | 1,4-dichlorobenzene | 106-46-7) was not processed!

C (soil | 1,4-dioxane | 123-91-1)

General Statistics			
Total Number of Observations	11	Number of Distinct Observations	10
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (soil | 1,4-dioxane | 123-91-1) was not processed!

C (soil | 1-methylnaphthalene | 90-12-0)

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	20
Number of Detects	14	Number of Non-Detects	6
Number of Distinct Detects	14	Number of Distinct Non-Detects	6
Minimum Detect	0.056	Minimum Non-Detect	0.193
Maximum Detect	9.8	Maximum Non-Detect	0.22
Variance Detects	11.01	Percent Non-Detects	30%
Mean Detects	1.497	SD Detects	3.318
Median Detects	0.105	CV Detects	2.216
Skewness Detects	2.293	Kurtosis Detects	3.868
Mean of Logged Detects	-1.439	SD of Logged Detects	1.749

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.482	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.825	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.447	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.263	Detected Data Not Normal at 1% Significance Level
Detected Data Not Normal at 1% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.075	KM Standard Error of Mean	0.639
90KM SD	2.752	95% KM (BCA) UCL	2.316
95% KM (t) UCL	2.179	95% KM (Percentile Bootstrap) UCL	2.074
95% KM (z) UCL	2.125	95% KM Bootstrap t UCL	16.92
90% KM Chebyshev UCL	2.991	95% KM Chebyshev UCL	3.859
97.5% KM Chebyshev UCL	5.063	99% KM Chebyshev UCL	7.429

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	2.23	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.82	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.326	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.246	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.363	k star (bias corrected MLE)	0.333
Theta hat (MLE)	4.128	Theta star (bias corrected MLE)	4.502
nu hat (MLE)	10.16	nu star (bias corrected)	9.314
Mean (detects)	1.497		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	1.051
Maximum	9.8	Median	0.076
SD	2.832	CV	2.694
k hat (MLE)	0.285	k star (bias corrected MLE)	0.276
Theta hat (MLE)	3.687	Theta star (bias corrected MLE)	3.813
nu hat (MLE)	11.4	nu star (bias corrected)	11.03
Adjusted Level of Significance (β)	0.038		
Approximate Chi Square Value (11.03, α)	4.593	Adjusted Chi Square Value (11.03, β)	4.269
95% Gamma Approximate UCL	2.524	95% Gamma Adjusted UCL	2.715

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.075	SD (KM)	2.752
Variance (KM)	7.573	SE of Mean (KM)	0.639
k hat (KM)	0.153	k star (KM)	0.163
nu hat (KM)	6.104	nu star (KM)	6.522
theta hat (KM)	7.045	theta star (KM)	6.593
80% gamma percentile (KM)	1.248	90% gamma percentile (KM)	3.219
95% gamma percentile (KM)	5.816	99% gamma percentile (KM)	13.23

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (6.52, α)	1.912	Adjusted Chi Square Value (6.52, β)	1.722
95% KM Approximate Gamma UCL	3.667	95% KM Adjusted Gamma UCL	4.072

Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.769	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.895	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.241	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.208	Detected Data Not Lognormal at 10% Significance Level	
Detected Data Not Lognormal at 10% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	1.08	Mean in Log Scale	-1.682
SD in Original Scale	2.822	SD in Log Scale	1.496
95% t UCL (assumes normality of ROS data)	2.171	95% Percentile Bootstrap UCL	2.077
95% BCA Bootstrap UCL	2.514	95% Bootstrap t UCL	15.64
95% H-UCL (Log ROS)	1.843		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.751	KM Geo Mean	0.174
KM SD (logged)	1.5	95% Critical H Value (KM-Log)	3.427
KM Standard Error of Mean (logged)	0.353	95% H-UCL (KM -Log)	1.74
KM SD (logged)	1.5	95% Critical H Value (KM-Log)	3.427
KM Standard Error of Mean (logged)	0.353		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.079	Mean in Log Scale	-1.69
SD in Original Scale	2.822	SD in Log Scale	1.5
95% t UCL (Assumes normality)	2.17	95% H-Stat UCL	1.847
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution			
Suggested UCL to Use			
95% KM (t) UCL	2.179		
The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.			
Please verify the data were collected from random locations.			
If the data were collected using judgmental or other non-random methods,			
then contact a statistician to correctly calculate UCLs.			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
C (soil | 2,2-dichloropropane | 594-20-7)			
General Statistics			
Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

C (soil | 2,2'-oxybis(1-chloropropane) | 108-60-1)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

C (soil | 2,4,5-trichlorophenol | 95-95-4)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

C (soil | 2,4,6-trichlorophenol | 88-06-2)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

C (soil | 2,4-dichlorophenol | 120-83-2)

	General Statistics		
Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

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 C (soil | 2,4-dichlorophenol | 120-83-2) was not processed!

C (soil | 2,4-dimethylphenol | 105-67-9)

	General Statistics		
Total Number of Observations	20	Number of Distinct Observations	16
Number of Detects	2	Number of Non-Detects	18
Number of Distinct Detects	2	Number of Distinct Non-Detects	14
Minimum Detect	0.14	Minimum Non-Detect	0.38
Maximum Detect	0.2	Maximum Non-Detect	0.44
Variance Detects	0.0018	Percent Non-Detects	90%
Mean Detects	0.17	SD Detects	0.0424
Median Detects	0.17	CV Detects	0.25
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-1.788	SD of Logged Detects	0.252

Warning: Data set has only 2 Detected Values.

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

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.17	KM Standard Error of Mean	0.03
90KM SD	0.03	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.222	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.219	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.26	95% KM Chebyshev UCL	0.301
97.5% KM Chebyshev UCL	0.357	99% KM Chebyshev UCL	0.468

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	31.77	k star (bias corrected MLE)	N/A

Theta hat (MLE)	0.00535	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	127.1	nu star (bias corrected)	N/A
Mean (detects)	0.17		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.17	SD (KM)	0.03
Variance (KM)	9.0000E-4	SE of Mean (KM)	0.03
k hat (KM)	32.11	k star (KM)	27.33
nu hat (KM)	1284	nu star (KM)	1093
theta hat (KM)	0.00529	theta star (KM)	0.00622
80% gamma percentile (KM)	0.197	90% gamma percentile (KM)	0.213
95% gamma percentile (KM)	0.227	99% gamma percentile (KM)	0.255

Gamma Kaplan-Meier (KM) Statistics

		Adjusted Level of Significance (β)	0.038
Approximate Chi Square Value (N/A, α)	1017	Adjusted Chi Square Value (N/A, β)	1012
95% KM Approximate Gamma UCL	0.183	95% KM Adjusted Gamma UCL	0.184

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.169	Mean in Log Scale	-1.788
SD in Original Scale	0.024	SD in Log Scale	0.141
95% t UCL (assumes normality of ROS data)	0.178	95% Percentile Bootstrap UCL	0.178
95% BCA Bootstrap UCL	0.178	95% Bootstrap t UCL	0.18
95% H-UCL (Log ROS)	0.179		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.788	KM Geo Mean	0.167
KM SD (logged)	0.178	95% Critical H Value (KM-Log)	1.773
KM Standard Error of Mean (logged)	0.178	95% H-UCL (KM -Log)	0.183
KM SD (logged)	0.178	95% Critical H Value (KM-Log)	1.773
KM Standard Error of Mean (logged)	0.178		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.197	Mean in Log Scale	-1.629
SD in Original Scale	0.0153	SD in Log Scale	0.0874
95% t UCL (Assumes normality)	0.203	95% H-Stat UCL	N/A

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.222		

Warning: Recommended UCL exceeds the maximum observation

C (soil | 2,4-dinitrophenol | 51-28-5)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	18
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	18

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 C (soil | 2,4-dinitrophenol | 51-28-5) was not processed!

C (soil | 2,4-dinitrotoluene | 121-14-2)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

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 C (soil | 2,4-dinitrotoluene | 121-14-2) was not processed!

C (soil | 2,6-dinitrotoluene | 606-20-2)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

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 C (soil | 2,6-dinitrotoluene | 606-20-2) was not processed!

C (soil | 2-butanone | 78-93-3)

General Statistics				
Total Number of Observations	11	Number of Distinct Observations		11
Number of Detects	3	Number of Non-Detects		8
Number of Distinct Detects	3	Number of Distinct Non-Detects		8
Minimum Detect	0.0285	Minimum Non-Detect		0.012
Maximum Detect	1.8	Maximum Non-Detect		0.038
Variance Detects	0.839	Percent Non-Detects		72.73%
Mean Detects	0.78	SD Detects		0.916
Median Detects	0.51	CV Detects		1.175
Skewness Detects	1.209	Kurtosis Detects		N/A
Mean of Logged Detects	-1.214	SD of Logged Detects		2.125

Warning: Data set has only 3 Detected Values.

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

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.935	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.753	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.282	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.429	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.227	KM Standard Error of Mean	0.191
90KM SD	0.517	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.573	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.541	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.799	95% KM Chebyshev UCL	1.059
97.5% KM Chebyshev UCL	1.419	99% KM Chebyshev UCL	2.127

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.255	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.646	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.232	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.446	Detected data appear Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.635	k star (bias corrected MLE)	N/A
Theta hat (MLE)	1.228	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	3.809	nu star (bias corrected)	N/A
Mean (detects)	0.78		

Gamma ROS Statistics using Imputed Non-Detects	

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.22
Maximum	1.8	Median	0.01
SD	0.545	CV	2.479
k hat (MLE)	0.316	k star (bias corrected MLE)	0.29
Theta hat (MLE)	0.696	Theta star (bias corrected MLE)	0.758
nu hat (MLE)	6.947	nu star (bias corrected)	6.385
Adjusted Level of Significance (β)	0.0278		
Approximate Chi Square Value (6.39, α)	1.84	Adjusted Chi Square Value (6.39, β)	1.471
95% Gamma Approximate UCL	0.763	95% Gamma Adjusted UCL	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.227	SD (KM)	0.517
Variance (KM)	0.267	SE of Mean (KM)	0.191
k hat (KM)	0.192	k star (KM)	0.2
nu hat (KM)	4.226	nu star (KM)	4.407
theta hat (KM)	1.18	theta star (KM)	1.131
80% gamma percentile (KM)	0.299	90% gamma percentile (KM)	0.685
95% gamma percentile (KM)	1.167	99% gamma percentile (KM)	2.493

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (4.41, α)	0.889	Adjusted Chi Square Value (4.41, β)	0.665
95% KM Approximate Gamma UCL	1.124	95% KM Adjusted Gamma UCL	1.502

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.951	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.789	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.267	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.389	Detected Data appear Lognormal at 10% Significance Level
Detected Data appear Lognormal at 10% Significance Level		
Note GOF tests may be unreliable for small sample sizes		

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.216	Mean in Log Scale	-4.338
SD in Original Scale	0.547	SD in Log Scale	2.294
95% t UCL (assumes normality of ROS data)	0.515	95% Percentile Bootstrap UCL	0.514
95% BCA Bootstrap UCL	0.704	95% Bootstrap t UCL	15.89
95% H-UCL (Log ROS)	12.46		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-3.273	KM Geo Mean	0.0379
KM SD (logged)	1.595	95% Critical H Value (KM-Log)	4.241
KM Standard Error of Mean (logged)	0.648	95% H-UCL (KM -Log)	1.148
KM SD (logged)	1.595	95% Critical H Value (KM-Log)	4.241
KM Standard Error of Mean (logged)	0.648		

DL/2 Statistics

DL/2 Normal	**DL/2 Log-Transformed**

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Mean in Original Scale	0.224	Mean in Log Scale	-3.374
SD in Original Scale	0.543	SD in Log Scale	1.711
95% t UCL (Assumes normality)	0.521	95% H-Stat UCL	1.692

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.573		

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | 2-chloronaphthalene | 91-58-7)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

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 C (soil | 2-chloronaphthalene | 91-58-7) was not processed!

C (soil | 2-chlorophenol | 95-57-8)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

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 C (soil | 2-chlorophenol | 95-57-8) was not processed!

C (soil | 2-chlorotoluene | 95-49-8)

General Statistics			
Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

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 C (soil | 2-chlorotoluene | 95-49-8) was not processed!

C (soil | 2-hexanone | 591-78-6)

General Statistics			
Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

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 C (soil | 2-hexanone | 591-78-6) was not processed!

C (soil | 2-methylnaphthalene | 91-57-6)

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	19
Number of Detects	14	Number of Non-Detects	6
Number of Distinct Detects	13	Number of Distinct Non-Detects	6
Minimum Detect	0.084	Minimum Non-Detect	0.193
Maximum Detect	16	Maximum Non-Detect	0.22
Variance Detects	28.71	Percent Non-Detects	30%
Mean Detects	2.416	SD Detects	5.358
Median Detects	0.145	CV Detects	2.218
Skewness Detects	2.299	Kurtosis Detects	3.928
Mean of Logged Detects	-1.003	SD of Logged Detects	1.78

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.485	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.825	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.447	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.263	Detected Data Not Normal at 1% Significance Level
Detected Data Not Normal at 1% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.726	KM Standard Error of Mean	1.032
90KM SD	4.446	95% KM (BCA) UCL	3.69
95% KM (t) UCL	3.511	95% KM (Percentile Bootstrap) UCL	3.364
95% KM (z) UCL	3.424	95% KM Bootstrap t UCL	23.93
90% KM Chebyshev UCL	4.822	95% KM Chebyshev UCL	6.224
97.5% KM Chebyshev UCL	8.17	99% KM Chebyshev UCL	11.99

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	2.266	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.821	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.348	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.246	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.356	k star (bias corrected MLE)	0.327
Theta hat (MLE)	6.79	Theta star (bias corrected MLE)	7.384
nu hat (MLE)	9.962	nu star (bias corrected)	9.161
Mean (detects)	2.416		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	1.694
Maximum	16	Median	0.12
SD	4.574	CV	2.7
k hat (MLE)	0.269	k star (bias corrected MLE)	0.262
Theta hat (MLE)	6.301	Theta star (bias corrected MLE)	6.469
nu hat (MLE)	10.76	nu star (bias corrected)	10.48
Adjusted Level of Significance (β)	0.038		
Approximate Chi Square Value (10.48, α)	4.241	Adjusted Chi Square Value (10.48, β)	3.931
95% Gamma Approximate UCL	4.185	95% Gamma Adjusted UCL	4.514

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.726	SD (KM)	4.446
Variance (KM)	19.77	SE of Mean (KM)	1.032
k hat (KM)	0.151	k star (KM)	0.161
nu hat (KM)	6.031	nu star (KM)	6.459
theta hat (KM)	11.45	theta star (KM)	10.69
80% gamma percentile (KM)	1.99	90% gamma percentile (KM)	5.165
95% gamma percentile (KM)	9.36	99% gamma percentile (KM)	21.36

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (6.46, α)	1.879	Adjusted Chi Square Value (6.46, β)	1.691
95% KM Approximate Gamma UCL	5.935	95% KM Adjusted Gamma UCL	6.596

Lognormal GOF Test on Detected Observations Only		
Shapiro Wilk Test Statistic	0.758	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.895	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.259	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.208	Detected Data Not Lognormal at 10% Significance Level
Detected Data Not Lognormal at 10% Significance Level		

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	1.733	Mean in Log Scale	-1.294
SD in Original Scale	4.56	SD in Log Scale	1.541
95% t UCL (assumes normality of ROS data)	3.496	95% Percentile Bootstrap UCL	3.367
95% BCA Bootstrap UCL	4.068	95% Bootstrap t UCL	23.37
95% H-UCL (Log ROS)	3.096		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.349	KM Geo Mean	0.26
KM SD (logged)	1.533	95% Critical H Value (KM-Log)	3.482
KM Standard Error of Mean (logged)	0.357	95% H-UCL (KM -Log)	2.857
KM SD (logged)	1.533	95% Critical H Value (KM-Log)	3.482
KM Standard Error of Mean (logged)	0.357		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.722	Mean in Log Scale	-1.384
SD in Original Scale	4.564	SD in Log Scale	1.589
95% t UCL (Assumes normality)	3.486	95% H-Stat UCL	3.264
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics		
Data do not follow a Discernible Distribution		

Suggested UCL to Use		
95% KM (t) UCL	3.511	

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | 2-methylphenol | 95-48-7)

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	16
Number of Detects	2	Number of Non-Detects	18
Number of Distinct Detects	2	Number of Distinct Non-Detects	14

Minimum Detect	0.085		Minimum Non-Detect	0.38
Maximum Detect	0.13		Maximum Non-Detect	0.44
Variance Detects	0.00101		Percent Non-Detects	90%
Mean Detects	0.108		SD Detects	0.0318
Median Detects	0.108		CV Detects	0.296
Skewness Detects	N/A		Kurtosis Detects	N/A
Mean of Logged Detects	-2.253		SD of Logged Detects	0.3

Warning: Data set has only 2 Detected Values.

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

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.108		KM Standard Error of Mean	0.0225
90KM SD	0.0225		95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.146		95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.145		95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.175		95% KM Chebyshev UCL	0.206
97.5% KM Chebyshev UCL	0.248		99% KM Chebyshev UCL	0.331

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	22.49		k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00478		Theta star (bias corrected MLE)	N/A
nu hat (MLE)	89.96		nu star (bias corrected)	N/A
Mean (detects)	0.108			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.108		SD (KM)	0.0225
Variance (KM)	5.0625E-4		SE of Mean (KM)	0.0225
k hat (KM)	22.83		k star (KM)	19.44
nu hat (KM)	913.1		nu star (KM)	777.5
theta hat (KM)	0.00471		theta star (KM)	0.00553
80% gamma percentile (KM)	0.127		90% gamma percentile (KM)	0.14
95% gamma percentile (KM)	0.15		99% gamma percentile (KM)	0.172

Gamma Kaplan-Meier (KM) Statistics

			Adjusted Level of Significance (β)	0.038
Approximate Chi Square Value (777.46, α)	713.8		Adjusted Chi Square Value (777.46, β)	708.9
95% KM Approximate Gamma UCL	0.117		95% KM Adjusted Gamma UCL	0.118

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.107	Mean in Log Scale	-2.253
SD in Original Scale	0.0181	SD in Log Scale	0.167
95% t UCL (assumes normality of ROS data)	0.114	95% Percentile Bootstrap UCL	0.113
95% BCA Bootstrap UCL	0.113	95% Bootstrap t UCL	0.115
95% H-UCL (Log ROS)	0.114		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.253	KM Geo Mean	0.105
KM SD (logged)	0.212	95% Critical H Value (KM-Log)	1.793
KM Standard Error of Mean (logged)	0.212	95% H-UCL (KM -Log)	0.117
KM SD (logged)	0.212	95% Critical H Value (KM-Log)	1.793
KM Standard Error of Mean (logged)	0.212		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.19	Mean in Log Scale	-1.676
SD in Original Scale	0.0302	SD in Log Scale	0.212
95% t UCL (Assumes normality)	0.202	95% H-Stat UCL	0.209

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution

Suggested UCL to Use			
95% KM (t) UCL	0.146		

Warning: Recommended UCL exceeds the maximum observation

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | 2-nitroaniline | 88-74-4)

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

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 C (soil | 2-nitroaniline | 88-74-4) was not processed!

C (soil | 2-nitrophenol | 88-75-5)

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

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 C (soil | 2-nitrophenol | 88-75-5) was not processed!

C (soil | 3&4-methylphenol | 65794-96-9)

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	16
Number of Detects	3	Number of Non-Detects	17
Number of Distinct Detects	3	Number of Distinct Non-Detects	13
Minimum Detect	0.088	Minimum Non-Detect	0.38
Maximum Detect	0.12	Maximum Non-Detect	0.44
Variance Detects	2.6133E-4	Percent Non-Detects	85%
Mean Detects	0.103	SD Detects	0.0162
Median Detects	0.1	CV Detects	0.157
Skewness Detects	0.722	Kurtosis Detects	N/A
Mean of Logged Detects	-2.284	SD of Logged Detects	0.156

Warning: Data set has only 3 Detected Values.

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

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.98	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.753	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.232	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.429	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.103	KM Standard Error of Mean	0.00933
90KM SD	0.0132	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.119	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.118	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.131	95% KM Chebyshev UCL	0.143
97.5% KM Chebyshev UCL	0.161	99% KM Chebyshev UCL	0.196

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.264	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.634	Detected data appear Gamma Distributed at 5% Significance Level	

K-S Test Statistic	0.236	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.431	Detected data appear Gamma Distributed at 5% Significance Level	

<p style="text-align:center; color:red;">**Detected Data Not Gamma Distributed at 5% Significance Level**</p>

Gamma Statistics on Detected Data Only

k hat (MLE)	61.48	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00167	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	368.9	nu star (bias corrected)	N/A
Mean (detects)	0.103		

Gamma ROS Statistics using Imputed Non-Detects

<p style="text-align:center; color:blue;">GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs</p>
<p style="text-align:center; color:blue;">GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)</p>
<p style="text-align:center; color:blue;">For such situations, GROS method may yield incorrect values of UCLs and BTVs</p>
<p style="text-align:center; color:blue;">This is especially true when the sample size is small.</p>
<p style="text-align:center; color:blue;">For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates</p>

Minimum	0.0868	Mean	0.102
Maximum	0.12	Median	0.102
SD	0.00904	CV	0.0882
k hat (MLE)	135.8	k star (bias corrected MLE)	115.5
Theta hat (MLE)	7.5485E-4	Theta star (bias corrected MLE)	8.8780E-4
nu hat (MLE)	5431	nu star (bias corrected)	4618
Adjusted Level of Significance (β)	0.038		
Approximate Chi Square Value (N/A, α)	4461	Adjusted Chi Square Value (N/A, β)	4449
95% Gamma Approximate UCL	0.106	95% Gamma Adjusted UCL	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.103	SD (KM)	0.0132
Variance (KM)	1.7422E-4	SE of Mean (KM)	0.00933
k hat (KM)	60.5	k star (KM)	51.46
nu hat (KM)	2420	nu star (KM)	2058
theta hat (KM)	0.0017	theta star (KM)	0.002
80% gamma percentile (KM)	0.114	90% gamma percentile (KM)	0.121
95% gamma percentile (KM)	0.127	99% gamma percentile (KM)	0.139

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (N/A, α)	1954	Adjusted Chi Square Value (N/A, β)	1946
95% KM Approximate Gamma UCL	0.108	95% KM Adjusted Gamma UCL	0.109

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.99	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.789	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.213	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.389	Detected Data appear Lognormal at 10% Significance Level	

<p style="text-align:center; color:blue;">**Detected Data appear Lognormal at 10% Significance Level**</p>
<p style="text-align:center; color:red;">**Note GOF tests may be unreliable for small sample sizes**</p>

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.102	Mean in Log Scale	-2.284

SD in Original Scale	0.00898	SD in Log Scale	0.0873
95% t UCL (assumes normality of ROS data)	0.106	95% Percentile Bootstrap UCL	0.105
95% BCA Bootstrap UCL	0.106	95% Bootstrap t UCL	0.106
95% H-UCL (Log ROS)	N/A		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-2.284	KM Geo Mean	0.102
KM SD (logged)	0.127	95% Critical H Value (KM-Log)	1.746
KM Standard Error of Mean (logged)	0.09	95% H-UCL (KM -Log)	0.108
KM SD (logged)	0.127	95% Critical H Value (KM-Log)	1.746
KM Standard Error of Mean (logged)	0.09		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.185	Mean in Log Scale	-1.713
SD in Original Scale	0.0367	SD in Log Scale	0.254
95% t UCL (Assumes normality)	0.199	95% H-Stat UCL	0.207

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.119		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | 3,3'-dichlorobenzidine | 91-94-1)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	13
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	13

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 C (soil | 3,3'-dichlorobenzidine | 91-94-1) was not processed!

C (soil | 3-nitroaniline | 99-09-2)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20

Number of Distinct Detects	0	Number of Distinct Non-Detects	15

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 C (soil | 3-nitroaniline | 99-09-2) was not processed!

C (soil | 4,6-dinitro-2-methylphenol | 534-52-1)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

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 C (soil | 4,6-dinitro-2-methylphenol | 534-52-1) was not processed!

C (soil | 4-bromophenyl-phenyl ether | 101-55-3)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

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 C (soil | 4-bromophenyl-phenyl ether | 101-55-3) was not processed!

C (soil | 4-chloro-3-methylphenol | 59-50-7)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	18
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	18

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 C (soil | 4-chloro-3-methylphenol | 59-50-7) was not processed!

C (soil | 4-chloroaniline | 106-47-8)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	18
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	18

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 C (soil | 4-chloroaniline | 106-47-8) was not processed!

C (soil | 4-chlorophenyl-phenyl ether | 7005-72-3)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

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 C (soil | 4-chlorophenyl-phenyl ether | 7005-72-3) was not processed!

C (soil | 4-chlorotoluene | 106-43-4)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

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 C (soil | 4-chlorotoluene | 106-43-4) was not processed!

C (soil | 4-methyl-2-pentanone | 108-10-1)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11

| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 8 |

C (soil | 4-nitroaniline | 100-01-6)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

C (soil | 4-nitrophenol | 100-02-7)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	18
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	18

C (soil | acenaphthene | 83-32-9)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	16
Number of Detects	4	Number of Non-Detects	16
Number of Distinct Detects	4	Number of Distinct Non-Detects	12
Minimum Detect	0.065	Minimum Non-Detect	0.187
Maximum Detect	0.55	Maximum Non-Detect	0.22
Variance Detects	0.0477	Percent Non-Detects	80%
Mean Detects	0.229	SD Detects	0.218
Median Detects	0.15	CV Detects	0.955
Skewness Detects	1.764	Kurtosis Detects	3.285

Mean of Logged Detects	-1.786	SD of Logged Detects	0.89

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.807	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.356	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.413	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.143	KM Standard Error of Mean	0.0365
90KM SD	0.102	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.206	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.203	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.253	95% KM Chebyshev UCL	0.302
97.5% KM Chebyshev UCL	0.371	99% KM Chebyshev UCL	0.506

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.348	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.661	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.296	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.399	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	1.757	k star (bias corrected MLE)	0.606
Theta hat (MLE)	0.13	Theta star (bias corrected MLE)	0.377
nu hat (MLE)	14.06	nu star (bias corrected)	4.848
Mean (detects)	0.229		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.049	Mean	0.142
Maximum	0.55	Median	0.117
SD	0.104	CV	0.733
k hat (MLE)	3.62	k star (bias corrected MLE)	3.11
Theta hat (MLE)	0.0391	Theta star (bias corrected MLE)	0.0456
nu hat (MLE)	144.8	nu star (bias corrected)	124.4
Adjusted Level of Significance (β)	0.038		
Approximate Chi Square Value (124.42, α)	99.66	Adjusted Chi Square Value (124.42, β)	97.91
95% Gamma Approximate UCL	0.177	95% Gamma Adjusted UCL	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.143		SD (KM)	0.102
Variance (KM)	0.0105		SE of Mean (KM)	0.0365
k hat (KM)	1.951		k star (KM)	1.692
nu hat (KM)	78.04		nu star (KM)	67.67
theta hat (KM)	0.0733		theta star (KM)	0.0846
80% gamma percentile (KM)	0.218		90% gamma percentile (KM)	0.29
95% gamma percentile (KM)	0.358		99% gamma percentile (KM)	0.512

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (67.67, α)	49.74		Adjusted Chi Square Value (67.67, β)	48.52
95% KM Approximate Gamma UCL	0.195		95% KM Adjusted Gamma UCL	0.2

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.964	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.792	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.244	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.346	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.139		Mean in Log Scale	-2.097
SD in Original Scale	0.101		SD in Log Scale	0.444
95% t UCL (assumes normality of ROS data)	0.178		95% Percentile Bootstrap UCL	0.181
95% BCA Bootstrap UCL	0.205		95% Bootstrap t UCL	0.247
95% H-UCL (Log ROS)	0.166			

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-2.103		KM Geo Mean	0.122
KM SD (logged)	0.524		95% Critical H Value (KM-Log)	2.043
KM Standard Error of Mean (logged)	0.272		95% H-UCL (KM -Log)	0.179
KM SD (logged)	0.524		95% Critical H Value (KM-Log)	2.043
KM Standard Error of Mean (logged)	0.272			

DL/2 Statistics

DL/2 Normal			DL/2 Log-Transformed	
Mean in Original Scale	0.126		Mean in Log Scale	-2.201
SD in Original Scale	0.102		SD in Log Scale	0.415
95% t UCL (Assumes normality)	0.165		95% H-Stat UCL	0.145

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.206			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

C (soil | acenaphthylene | 208-96-8)

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	16
Number of Detects	4	Number of Non-Detects	16
Number of Distinct Detects	4	Number of Distinct Non-Detects	12
Minimum Detect	0.067	Minimum Non-Detect	0.187
Maximum Detect	0.29	Maximum Non-Detect	0.22
Variance Detects	0.00965	Percent Non-Detects	80%
Mean Detects	0.147	SD Detects	0.0982
Median Detects	0.115	CV Detects	0.669
Skewness Detects	1.662	Kurtosis Detects	3.108
Mean of Logged Detects	-2.067	SD of Logged Detects	0.61

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.829	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.357	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.413	Detected Data appear Normal at 1% Significance Level
Detected Data appear Normal at 1% Significance Level		
Note GOF tests may be unreliable for small sample sizes		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.109	KM Standard Error of Mean	0.0181
90KM SD	0.0473	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.14	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.138	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.163	95% KM Chebyshev UCL	0.187
97.5% KM Chebyshev UCL	0.222	99% KM Chebyshev UCL	0.289

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.387	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.659	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.323	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.396	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		
Note GOF tests may be unreliable for small sample sizes		

Gamma Statistics on Detected Data Only			
k hat (MLE)	3.534	k star (bias corrected MLE)	1.05
Theta hat (MLE)	0.0415	Theta star (bias corrected MLE)	0.14
nu hat (MLE)	28.27	nu star (bias corrected)	8.402
Mean (detects)	0.147		

Gamma ROS Statistics using Imputed Non-Detects		
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs		
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)		

Minimum	0.0616	Mean	0.109
Maximum	0.29	Median	0.0986
SD	0.0472	CV	0.433
k hat (MLE)	8.702	k star (bias corrected MLE)	7.43
Theta hat (MLE)	0.0125	Theta star (bias corrected MLE)	0.0147
nu hat (MLE)	348.1	nu star (bias corrected)	297.2
Adjusted Level of Significance (β)	0.038		
Approximate Chi Square Value (297.21, α)	258.3	Adjusted Chi Square Value (297.21, β)	255.4
95% Gamma Approximate UCL	0.125	95% Gamma Adjusted UCL	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.109	SD (KM)	0.0473
Variance (KM)	0.00224	SE of Mean (KM)	0.0181
k hat (KM)	5.272	k star (KM)	4.514
nu hat (KM)	210.9	nu star (KM)	180.6
theta hat (KM)	0.0206	theta star (KM)	0.024
80% gamma percentile (KM)	0.148	90% gamma percentile (KM)	0.177
95% gamma percentile (KM)	0.204	99% gamma percentile (KM)	0.261

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (180.58, α)	150.5	Adjusted Chi Square Value (180.58, β)	148.3
95% KM Approximate Gamma UCL	0.13	95% KM Adjusted Gamma UCL	0.132

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.936	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.792	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.285	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.346	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.108	Mean in Log Scale	-2.278
SD in Original Scale	0.0461	SD in Log Scale	0.303
95% t UCL (assumes normality of ROS data)	0.126	95% Percentile Bootstrap UCL	0.127
95% BCA Bootstrap UCL	0.136	95% Bootstrap t UCL	0.148
95% H-UCL (Log ROS)	0.122		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-2.288	KM Geo Mean	0.101
KM SD (logged)	0.347	95% Critical H Value (KM-Log)	1.886
KM Standard Error of Mean (logged)	0.174	95% H-UCL (KM -Log)	0.125
KM SD (logged)	0.347	95% Critical H Value (KM-Log)	1.886
KM Standard Error of Mean (logged)	0.174		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.109	Mean in Log Scale	-2.258
SD in Original Scale	0.0437	SD in Log Scale	0.264
95% t UCL (Assumes normality)	0.126	95% H-Stat UCL	0.121

<p style="color:red; text-align:center;">DL/2 is not a recommended method, provided for comparisons and historical reasons</p>

<p style="text-align:center;">Nonparametric Distribution Free UCL Statistics</p>

<p style="color:blue; text-align:center;">Detected Data appear Normal Distributed at 1% Significance Level</p>

<p style="text-align:center;">Suggested UCL to Use</p>

95% KM (t) UCL	0.14		

<p style="color:blue; text-align:center;">Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.</p>

<p style="color:blue; text-align:center;">Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.</p>

<p style="color:blue; text-align:center;">However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.</p>

C (soil | acetone | 67-64-1)

<p style="text-align:center;">General Statistics</p>

Total Number of Observations	11	Number of Distinct Observations	10
Number of Detects	2	Number of Non-Detects	9
Number of Distinct Detects	2	Number of Distinct Non-Detects	8
Minimum Detect	1.6	Minimum Non-Detect	0.032
Maximum Detect	4.9	Maximum Non-Detect	0.0955
Variance Detects	5.445	Percent Non-Detects	81.82%
Mean Detects	3.25	SD Detects	2.333
Median Detects	3.25	CV Detects	0.718
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	1.03	SD of Logged Detects	0.791

<p style="color:red; text-align:center;">Warning: Data set has only 2 Detected Values.</p>

<p style="color:red; text-align:center;">This is not enough to compute meaningful or reliable statistics and estimates.</p>

<p style="text-align:center;">Normal GOF Test on Detects Only</p>

<p style="color:red; text-align:center;">Not Enough Data to Perform GOF Test</p>

<p style="text-align:center;">Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</p>

KM Mean	0.617	KM Standard Error of Mean	0.608
90KM SD	1.427	95% KM (BCA) UCL	N/A
95% KM (t) UCL	1.72	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	1.618	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	2.442	95% KM Chebyshev UCL	3.269
97.5% KM Chebyshev UCL	4.416	99% KM Chebyshev UCL	6.67

<p style="text-align:center;">Gamma GOF Tests on Detected Observations Only</p>

<p style="color:red; text-align:center;">Not Enough Data to Perform GOF Test</p>

<p style="text-align:center;">Gamma Statistics on Detected Data Only</p>

k hat (MLE)	3.513	k star (bias corrected MLE)	N/A	
Theta hat (MLE)	0.925	Theta star (bias corrected MLE)	N/A	
nu hat (MLE)	14.05	nu star (bias corrected)	N/A	
Mean (detects)	3.25			

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.617	SD (KM)	1.427
Variance (KM)	2.035	SE of Mean (KM)	0.608
k hat (KM)	0.187	k star (KM)	0.197
nu hat (KM)	4.116	nu star (KM)	4.327
theta hat (KM)	3.299	theta star (KM)	3.138
80% gamma percentile (KM)	0.806	90% gamma percentile (KM)	1.866
95% gamma percentile (KM)	3.194	99% gamma percentile (KM)	6.858

Gamma Kaplan-Meier (KM) Statistics

		Adjusted Level of Significance (β)	0.0278
Approximate Chi Square Value (4.33, α)	0.855	Adjusted Chi Square Value (4.33, β)	0.637
95% KM Approximate Gamma UCL	3.123	95% KM Adjusted Gamma UCL	4.191

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.615	Mean in Log Scale	-2.801
SD in Original Scale	1.497	SD in Log Scale	1.968
95% t UCL (assumes normality of ROS data)	1.433	95% Percentile Bootstrap UCL	1.371
95% BCA Bootstrap UCL	1.805	95% Bootstrap t UCL	58.06
95% H-UCL (Log ROS)	9.944		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-2.629	KM Geo Mean	0.0722
KM SD (logged)	1.741	95% Critical H Value (KM-Log)	4.567
KM Standard Error of Mean (logged)	0.742	95% H-UCL (KM -Log)	4.06
KM SD (logged)	1.741	95% Critical H Value (KM-Log)	4.567
KM Standard Error of Mean (logged)	0.742		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.624	Mean in Log Scale	-2.461
SD in Original Scale	1.493	SD in Log Scale	1.771
95% t UCL (Assumes normality)	1.44	95% H-Stat UCL	5.477

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	1.72		

C (soil | acetophenone | 98-86-2)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	17
Number of Detects	2	Number of Non-Detects	18
Number of Distinct Detects	2	Number of Distinct Non-Detects	15
Minimum Detect	0.068	Minimum Non-Detect	0.38
Maximum Detect	0.56	Maximum Non-Detect	0.51
Variance Detects	0.121	Percent Non-Detects	90%
Mean Detects	0.314	SD Detects	0.348
Median Detects	0.314	CV Detects	1.108
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-1.634	SD of Logged Detects	1.491

Warning: Data set has only 2 Detected Values.

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

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0926	KM Standard Error of Mean	0.0339
90KM SD	0.107	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.151	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.148	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.194	95% KM Chebyshev UCL	0.24
97.5% KM Chebyshev UCL	0.304	99% KM Chebyshev UCL	0.43

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	1.19	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.264	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	4.761	nu star (bias corrected)	N/A
Mean (detects)	0.314		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0926	SD (KM)	0.107
Variance (KM)	0.0115	SE of Mean (KM)	0.0339
k hat (KM)	0.746	k star (KM)	0.667
nu hat (KM)	29.83	nu star (KM)	26.69
theta hat (KM)	0.124	theta star (KM)	0.139
80% gamma percentile (KM)	0.152	90% gamma percentile (KM)	0.235

95% gamma percentile (KM)	0.321	99% gamma percentile (KM)	0.526

Gamma Kaplan-Meier (KM) Statistics

		Adjusted Level of Significance (β)	0.038
Approximate Chi Square Value (26.69, α)	15.91	Adjusted Chi Square Value (26.69, β)	15.25
95% KM Approximate Gamma UCL	0.155	95% KM Adjusted Gamma UCL	0.162

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0946	Mean in Log Scale	-2.585
SD in Original Scale	0.111	SD in Log Scale	0.537
95% t UCL (assumes normality of ROS data)	0.138	95% Percentile Bootstrap UCL	0.142
95% BCA Bootstrap UCL	0.17	95% Bootstrap t UCL	0.364
95% H-UCL (Log ROS)	0.112		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-2.583	KM Geo Mean	0.0756
KM SD (logged)	0.46	95% Critical H Value (KM-Log)	1.981
KM Standard Error of Mean (logged)	0.145	95% H-UCL (KM -Log)	0.103
KM SD (logged)	0.46	95% Critical H Value (KM-Log)	1.981
KM Standard Error of Mean (logged)	0.145		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.214	Mean in Log Scale	-1.602
SD in Original Scale	0.0881	SD in Log Scale	0.349
95% t UCL (Assumes normality)	0.248	95% H-Stat UCL	0.249

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.151		

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | acrylonitrile | 107-13-1)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	10
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (soil | acrylonitrile | 107-13-1) was not processed!

C (soil | aluminum | 7429-90-5)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	1200	Mean	8051
Maximum	13000	Median	8500
SD	3040	Std. Error of Mean	679.8
Coefficient of Variation	0.378	Skewness	-0.783

Normal GOF Test

Shapiro Wilk Test Statistic	0.931	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.868	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.191	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.223	Data appear Normal at 1% Significance Level	

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	9226	95% Adjusted-CLT UCL (Chen-1995)	9042
		95% Modified-t UCL (Johnson-1978)	9207

Gamma GOF Test

A-D Test Statistic	1.417	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.745	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.256	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.195	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	4.434	k star (bias corrected MLE)	3.803
Theta hat (MLE)	1816	Theta star (bias corrected MLE)	2117
nu hat (MLE)	177.4	nu star (bias corrected)	152.1
MLE Mean (bias corrected)	8051	MLE Sd (bias corrected)	4129
		Approximate Chi Square Value (0.05)	124.6
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	122.6

Assuming Gamma Distribution			
95% Approximate Gamma UCL	9828	95% Adjusted Gamma UCL	9986

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.756	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.92	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.274	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.176	Data Not Lognormal at 10% Significance Level	

Data Not Lognormal at 10% Significance Level

Lognormal Statistics			
Minimum of Logged Data	7.09	Mean of logged Data	8.877
Maximum of Logged Data	9.473	SD of logged Data	0.585

Assuming Lognormal Distribution			
95% H-UCL	11277	90% Chebyshev (MVUE) UCL	11882
95% Chebyshev (MVUE) UCL	13452	97.5% Chebyshev (MVUE) UCL	15631
99% Chebyshev (MVUE) UCL	19911		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs			
95% CLT UCL	9169	95% BCA Bootstrap UCL	9054
95% Standard Bootstrap UCL	9137	95% Bootstrap-t UCL	9105
95% Hall's Bootstrap UCL	9072	95% Percentile Bootstrap UCL	9112
90% Chebyshev(Mean, Sd) UCL	10090	95% Chebyshev(Mean, Sd) UCL	11014
97.5% Chebyshev(Mean, Sd) UCL	12296	99% Chebyshev(Mean, Sd) UCL	14815

Suggested UCL to Use			
95% Student's-t UCL	9226		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be

reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

C (soil | aniline | 62-53-3)

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

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 data set for variable C (soil | aniline | 62-53-3) was not processed!

C (soil | anthracene | 120-12-7)

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	16
Number of Detects	4	Number of Non-Detects	16
Number of Distinct Detects	4	Number of Distinct Non-Detects	12
Minimum Detect	0.14	Minimum Non-Detect	0.187
Maximum Detect	0.69	Maximum Non-Detect	0.22
Variance Detects	0.0509	Percent Non-Detects	80%
Mean Detects	0.403	SD Detects	0.226
Median Detects	0.39	CV Detects	0.56
Skewness Detects	0.328	Kurtosis Detects	1.405
Mean of Logged Detects	-1.056	SD of Logged Detects	0.665

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.969	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.237	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.413	Detected Data appear Normal at 1% Significance Level	
Detected Data appear Normal at 1% Significance Level			
Note GOF tests may be unreliable for small sample sizes			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.193	KM Standard Error of Mean	0.0353
90KM SD	0.137	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.253	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.251	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.298	95% KM Chebyshev UCL	0.346
97.5% KM Chebyshev UCL	0.413	99% KM Chebyshev UCL	0.543

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.287	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.659	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.258	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.396	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Note GOF tests may be unreliable for small sample sizes			

Gamma Statistics on Detected Data Only			
k hat (MLE)	3.59	k star (bias corrected MLE)	1.064
Theta hat (MLE)	0.112	Theta star (bias corrected MLE)	0.378
nu hat (MLE)	28.72	nu star (bias corrected)	8.513
Mean (detects)	0.403		

Gamma ROS Statistics using Imputed Non-Detects			
Minimum	0.01	Mean	0.165
Maximum	0.69	Median	0.105
SD	0.158	CV	0.954
k hat (MLE)	1.612	k star (bias corrected MLE)	1.404
Theta hat (MLE)	0.102	Theta star (bias corrected MLE)	0.118
nu hat (MLE)	64.5	nu star (bias corrected)	56.16
Adjusted Level of Significance (β)	0.038		
Approximate Chi Square Value (56.16, α)	39.93	Adjusted Chi Square Value (56.16, β)	38.85
95% Gamma Approximate UCL	0.232	95% Gamma Adjusted UCL	N/A

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.193	SD (KM)	0.137
Variance (KM)	0.0187	SE of Mean (KM)	0.0353
k hat (KM)	1.986	k star (KM)	1.721
nu hat (KM)	79.44	nu star (KM)	68.86
theta hat (KM)	0.0969	theta star (KM)	0.112
80% gamma percentile (KM)	0.293	90% gamma percentile (KM)	0.388
95% gamma percentile (KM)	0.479	99% gamma percentile (KM)	0.683

Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (68.86, α)	50.76	Adjusted Chi Square Value (68.86, β)	49.53
95% KM Approximate Gamma UCL	0.261	95% KM Adjusted Gamma UCL	0.268

Lognormal GOF Test on Detected Observations Only		
Shapiro Wilk Test Statistic	0.933	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.792	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.287	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.346	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.19	Mean in Log Scale	-1.818
SD in Original Scale	0.143	SD in Log Scale	0.509
95% t UCL (assumes normality of ROS data)	0.246	95% Percentile Bootstrap UCL	0.246
95% BCA Bootstrap UCL	0.264	95% Bootstrap t UCL	0.301
95% H-UCL (Log ROS)	0.234		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.784	KM Geo Mean	0.168
KM SD (logged)	0.446	95% Critical H Value (KM-Log)	1.969
KM Standard Error of Mean (logged)	0.115	95% H-UCL (KM -Log)	0.227
KM SD (logged)	0.446	95% Critical H Value (KM-Log)	1.969

KM Standard Error of Mean (logged)	0.115		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.16	Mean in Log Scale	-2.055
SD in Original Scale	0.153	SD in Log Scale	0.578
95% t UCL (Assumes normality)	0.22	95% H-Stat UCL	0.2

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.253		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | antimony | 7440-36-0)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	17
Number of Detects	2	Number of Non-Detects	18
Number of Distinct Detects	2	Number of Distinct Non-Detects	15
Minimum Detect	1.367	Minimum Non-Detect	0.737
Maximum Detect	1.6	Maximum Non-Detect	2.5
Variance Detects	0.0272	Percent Non-Detects	90%
Mean Detects	1.483	SD Detects	0.165
Median Detects	1.483	CV Detects	0.111
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	0.391	SD of Logged Detects	0.111

Warning: Data set has only 2 Detected Values.

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

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.986	KM Standard Error of Mean	0.207
90KM SD	0.358	95% KM (BCA) UCL	N/A
95% KM (t) UCL	1.343	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	1.326	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	1.606	95% KM Chebyshev UCL	1.887
97.5% KM Chebyshev UCL	2.278	99% KM Chebyshev UCL	3.044

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test			
Gamma Statistics on Detected Data Only			
k hat (MLE)	161.3	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0092	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	645.3	nu star (bias corrected)	N/A
Mean (detects)	1.483		
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.986	SD (KM)	0.358
Variance (KM)	0.128	SE of Mean (KM)	0.207
k hat (KM)	7.563	k star (KM)	6.462
nu hat (KM)	302.5	nu star (KM)	258.5
theta hat (KM)	0.13	theta star (KM)	0.153
80% gamma percentile (KM)	1.288	90% gamma percentile (KM)	1.504
95% gamma percentile (KM)	1.698	99% gamma percentile (KM)	2.103
Gamma Kaplan-Meier (KM) Statistics			
		Adjusted Level of Significance (β)	0.038
Approximate Chi Square Value (258.48, α)	222.3	Adjusted Chi Square Value (258.48, β)	219.6
95% KM Approximate Gamma UCL	1.146	95% KM Adjusted Gamma UCL	1.16
Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	1.068	Mean in Log Scale	0.0525
SD in Original Scale	0.186	SD in Log Scale	0.16
95% t UCL (assumes normality of ROS data)	1.139	95% Percentile Bootstrap UCL	1.138
95% BCA Bootstrap UCL	1.152	95% Bootstrap t UCL	1.161
95% H-UCL (Log ROS)	1.139		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-0.0734	KM Geo Mean	0.929
KM SD (logged)	0.332	95% Critical H Value (KM-Log)	1.874
KM Standard Error of Mean (logged)	0.191	95% H-UCL (KM -Log)	1.132
KM SD (logged)	0.332	95% Critical H Value (KM-Log)	1.874
KM Standard Error of Mean (logged)	0.191		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.911	Mean in Log Scale	-0.168
SD in Original Scale	0.32	SD in Log Scale	0.426
95% t UCL (Assumes normality)	1.035	95% H-Stat UCL	1.12
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution			

Suggested UCL to Use			
95% KM (t) UCL	1.343		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | arsenic | 7440-38-2)

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	20
		Number of Missing Observations	0
Minimum	3	Mean	7.01
Maximum	25	Median	5.658
SD	4.731	Std. Error of Mean	1.058
Coefficient of Variation	0.675	Skewness	3.146

Normal GOF Test			
Shapiro Wilk Test Statistic	0.646	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.868	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.242	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.223	Data Not Normal at 1% Significance Level	
Data Not Normal at 1% Significance Level			

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	8.839	95% Adjusted-CLT UCL (Chen-1995)	9.545
		95% Modified-t UCL (Johnson-1978)	8.963

Gamma GOF Test			
A-D Test Statistic	0.917	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.746	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.188	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.195	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	4.003	k star (bias corrected MLE)	3.436
Theta hat (MLE)	1.751	Theta star (bias corrected MLE)	2.04
nu hat (MLE)	160.1	nu star (bias corrected)	137.5
MLE Mean (bias corrected)	7.01	MLE Sd (bias corrected)	3.781
		Approximate Chi Square Value (0.05)	111.4
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	109.5

Assuming Gamma Distribution			
95% Approximate Gamma UCL	8.652	95% Adjusted Gamma UCL	8.798

Lognormal GOF Test			

Shapiro Wilk Test Statistic	0.916	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.92	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.15	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.176	Data appear Lognormal at 10% Significance Level	

Data appear Approximate Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.099	Mean of logged Data	1.817
Maximum of Logged Data	3.219	SD of logged Data	0.476

Assuming Lognormal Distribution

95% H-UCL	8.571	90% Chebyshev (MVUE) UCL	9.11
95% Chebyshev (MVUE) UCL	10.13	97.5% Chebyshev (MVUE) UCL	11.55
99% Chebyshev (MVUE) UCL	14.35		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	8.75	95% BCA Bootstrap UCL	9.753
95% Standard Bootstrap UCL	8.706	95% Bootstrap-t UCL	10.81
95% Hall's Bootstrap UCL	15.96	95% Percentile Bootstrap UCL	8.875
90% Chebyshev(Mean, Sd) UCL	10.18	95% Chebyshev(Mean, Sd) UCL	11.62
97.5% Chebyshev(Mean, Sd) UCL	13.62	99% Chebyshev(Mean, Sd) UCL	17.54

Suggested UCL to Use

95% Adjusted Gamma UCL	8.798		

When a data set follows an approximate distribution passing only one of the GOF tests,

it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | barium | 7440-39-3)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	18
		Number of Missing Observations	0
Minimum	41	Mean	63.93
Maximum	140	Median	59.08
SD	22.74	Std. Error of Mean	5.085
Coefficient of Variation	0.356	Skewness	2.273

Normal GOF Test

Shapiro Wilk Test Statistic	0.766	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.868	Data Not Normal at 1% Significance Level	

Lilliefors Test Statistic	0.264	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.223	Data Not Normal at 1% Significance Level	

<p style="color:red; text-align:center;">**Data Not Normal at 1% Significance Level**</p>

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	72.72	95% Adjusted-CLT UCL (Chen-1995)	75.05
		95% Modified-t UCL (Johnson-1978)	73.15

Gamma GOF Test

A-D Test Statistic	0.897	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.742	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.218	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.194	Data Not Gamma Distributed at 5% Significance Level	

<p style="color:red; text-align:center;">**Data Not Gamma Distributed at 5% Significance Level**</p>

Gamma Statistics

k hat (MLE)	11.14	k star (bias corrected MLE)	9.499
Theta hat (MLE)	5.741	Theta star (bias corrected MLE)	6.73
nu hat (MLE)	445.4	nu star (bias corrected)	380
MLE Mean (bias corrected)	63.93	MLE Sd (bias corrected)	20.74
		Approximate Chi Square Value (0.05)	335.8
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	332.5

Assuming Gamma Distribution

95% Approximate Gamma UCL	72.34	95% Adjusted Gamma UCL	73.05

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.899	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.92	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.195	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.176	Data Not Lognormal at 10% Significance Level	

<p style="color:red; text-align:center;">**Data Not Lognormal at 10% Significance Level**</p>

Lognormal Statistics

Minimum of Logged Data	3.714	Mean of logged Data	4.112
Maximum of Logged Data	4.942	SD of logged Data	0.292

Assuming Lognormal Distribution

95% H-UCL	72.11	90% Chebyshev (MVUE) UCL	76.2
95% Chebyshev (MVUE) UCL	81.91	97.5% Chebyshev (MVUE) UCL	89.83
99% Chebyshev (MVUE) UCL	105.4		

Nonparametric Distribution Free UCL Statistics

<p style="color:blue; text-align:center;">Data do not follow a Discernible Distribution</p>

Nonparametric Distribution Free UCLs

95% CLT UCL	72.29	95% BCA Bootstrap UCL	75.25
95% Standard Bootstrap UCL	72.04	95% Bootstrap-t UCL	79.54

95% Hall's Bootstrap UCL	114.4	95% Percentile Bootstrap UCL	72.59
90% Chebyshev(Mean, Sd) UCL	79.18	95% Chebyshev(Mean, Sd) UCL	86.09
97.5% Chebyshev(Mean, Sd) UCL	95.68	99% Chebyshev(Mean, Sd) UCL	114.5

Suggested UCL to Use

95% Student's-t UCL	72.72		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | benzene | 71-43-2)

General Statistics

Total Number of Observations	21	Number of Distinct Observations	18
Number of Detects	7	Number of Non-Detects	14
Number of Distinct Detects	7	Number of Distinct Non-Detects	11
Minimum Detect	0.001	Minimum Non-Detect	4.6667E-4
Maximum Detect	1.5	Maximum Non-Detect	0.27
Variance Detects	0.294	Percent Non-Detects	66.67%
Mean Detects	0.304	SD Detects	0.542
Median Detects	0.07	CV Detects	1.785
Skewness Detects	2.378	Kurtosis Detects	5.764
Mean of Logged Detects	-2.704	SD of Logged Detects	2.279

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.617	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.73	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.372	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.35	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.105	KM Standard Error of Mean	0.0761
90KM SD	0.323	95% KM (BCA) UCL	0.247
95% KM (t) UCL	0.236	95% KM (Percentile Bootstrap) UCL	0.242
95% KM (z) UCL	0.23	95% KM Bootstrap t UCL	0.961
90% KM Chebyshev UCL	0.333	95% KM Chebyshev UCL	0.437
97.5% KM Chebyshev UCL	0.58	99% KM Chebyshev UCL	0.862

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.385	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.763	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.278	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.33	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	0.43	k star (bias corrected MLE)	0.341
Theta hat (MLE)	0.707	Theta star (bias corrected MLE)	0.891
nu hat (MLE)	6.018	nu star (bias corrected)	4.772
Mean (detects)	0.304		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.001	Mean	0.108
Maximum	1.5	Median	0.01
SD	0.329	CV	3.05
k hat (MLE)	0.38	k star (bias corrected MLE)	0.358
Theta hat (MLE)	0.284	Theta star (bias corrected MLE)	0.302
nu hat (MLE)	15.96	nu star (bias corrected)	15.02
Adjusted Level of Significance (β)	0.0383		
Approximate Chi Square Value (15.02, α)	7.274	Adjusted Chi Square Value (15.02, β)	6.862
95% Gamma Approximate UCL	0.223	95% Gamma Adjusted UCL	0.236

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.105	SD (KM)	0.323
Variance (KM)	0.104	SE of Mean (KM)	0.0761
k hat (KM)	0.106	k star (KM)	0.122
nu hat (KM)	4.438	nu star (KM)	5.137
theta hat (KM)	0.992	theta star (KM)	0.857
80% gamma percentile (KM)	0.0939	90% gamma percentile (KM)	0.299
95% gamma percentile (KM)	0.597	99% gamma percentile (KM)	1.503

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (5.14, α)	1.216	Adjusted Chi Square Value (5.14, β)	1.078
95% KM Approximate Gamma UCL	0.443	95% KM Adjusted Gamma UCL	0.5

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.931	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.838	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.208	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.28	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.102	Mean in Log Scale	-5.881
SD in Original Scale	0.331	SD in Log Scale	2.776
95% t UCL (assumes normality of ROS data)	0.227	95% Percentile Bootstrap UCL	0.237
95% BCA Bootstrap UCL	0.328	95% Bootstrap t UCL	1.238
95% H-UCL (Log ROS)	4.002		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-5.554	KM Geo Mean	0.00387
KM SD (logged)	2.564	95% Critical H Value (KM-Log)	5.126
KM Standard Error of Mean (logged)	0.67	95% H-UCL (KM -Log)	1.957
KM SD (logged)	2.564	95% Critical H Value (KM-Log)	5.126
KM Standard Error of Mean (logged)	0.67		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.123	Mean in Log Scale	-4.68
SD in Original Scale	0.327	SD in Log Scale	2.676
95% t UCL (Assumes normality)	0.247	95% H-Stat UCL	8.05

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	0.5		

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | benzidine | 92-87-5)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	18
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	18

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 C (soil | benzidine | 92-87-5) was not processed!

C (soil | benzo(a)anthracene | 56-55-3)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	17
Number of Detects	8	Number of Non-Detects	12
Number of Distinct Detects	8	Number of Distinct Non-Detects	9

Minimum Detect	0.07	Minimum Non-Detect	0.192
Maximum Detect	1.8	Maximum Non-Detect	0.22
Variance Detects	0.476	Percent Non-Detects	60%
Mean Detects	0.588	SD Detects	0.69
Median Detects	0.3	CV Detects	1.174
Skewness Detects	1.174	Kurtosis Detects	-0.187
Mean of Logged Detects	-1.286	SD of Logged Detects	1.379

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.775	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.749	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.256	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.333	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.285	KM Standard Error of Mean	0.114
90KM SD	0.477	95% KM (BCA) UCL	0.482
95% KM (t) UCL	0.482	95% KM (Percentile Bootstrap) UCL	0.48
95% KM (z) UCL	0.473	95% KM Bootstrap t UCL	0.808
90% KM Chebyshev UCL	0.628	95% KM Chebyshev UCL	0.783
97.5% KM Chebyshev UCL	0.998	99% KM Chebyshev UCL	1.422

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.623	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.744	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.276	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.304	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	0.788	k star (bias corrected MLE)	0.576
Theta hat (MLE)	0.746	Theta star (bias corrected MLE)	1.02
nu hat (MLE)	12.61	nu star (bias corrected)	9.217
Mean (detects)	0.588		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.262
Maximum	1.8	Median	0.072
SD	0.502	CV	1.918
k hat (MLE)	0.431	k star (bias corrected MLE)	0.399
Theta hat (MLE)	0.608	Theta star (bias corrected MLE)	0.656

nu hat (MLE)	17.22	nu star (bias corrected)	15.97
Adjusted Level of Significance (β)	0.038		
Approximate Chi Square Value (15.97, α)	7.942	Adjusted Chi Square Value (15.97, β)	7.496
95% Gamma Approximate UCL	0.527	95% Gamma Adjusted UCL	0.558

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.285	SD (KM)	0.477
Variance (KM)	0.228	SE of Mean (KM)	0.114
k hat (KM)	0.356	k star (KM)	0.336
nu hat (KM)	14.25	nu star (KM)	13.44
theta hat (KM)	0.8	theta star (KM)	0.848
80% gamma percentile (KM)	0.448	90% gamma percentile (KM)	0.828
95% gamma percentile (KM)	1.256	99% gamma percentile (KM)	2.353

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (13.44, α)	6.193	Adjusted Chi Square Value (13.44, β)	5.807
95% KM Approximate Gamma UCL	0.619	95% KM Adjusted Gamma UCL	0.66

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.843	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.851	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.248	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.265	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Approximate Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.296	Mean in Log Scale	-1.916
SD in Original Scale	0.485	SD in Log Scale	1.025
95% t UCL (assumes normality of ROS data)	0.484	95% Percentile Bootstrap UCL	0.485
95% BCA Bootstrap UCL	0.543	95% Bootstrap t UCL	0.854
95% H-UCL (Log ROS)	0.467		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-2.017	KM Geo Mean	0.133
KM SD (logged)	1.021	95% Critical H Value (KM-Log)	2.665
KM Standard Error of Mean (logged)	0.253	95% H-UCL (KM -Log)	0.418
KM SD (logged)	1.021	95% Critical H Value (KM-Log)	2.665
KM Standard Error of Mean (logged)	0.253		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.296	Mean in Log Scale	-1.889
SD in Original Scale	0.485	SD in Log Scale	0.979
95% t UCL (Assumes normality)	0.483	95% H-Stat UCL	0.438

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use			
95% KM (t) UCL	0.482		

C (soil | benzo(a)pyrene | 50-32-8)

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	16
Number of Detects	7	Number of Non-Detects	13
Number of Distinct Detects	6	Number of Distinct Non-Detects	10
Minimum Detect	0.065	Minimum Non-Detect	0.19
Maximum Detect	1.5	Maximum Non-Detect	0.22
Variance Detects	0.275	Percent Non-Detects	65%
Mean Detects	0.429	SD Detects	0.525
Median Detects	0.25	CV Detects	1.223
Skewness Detects	1.785	Kurtosis Detects	3.043
Mean of Logged Detects	-1.484	SD of Logged Detects	1.235

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.765	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.73	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.289	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.35	Detected Data appear Normal at 1% Significance Level	
Detected Data appear Normal at 1% Significance Level			
Note GOF tests may be unreliable for small sample sizes			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.196	KM Standard Error of Mean	0.0809
90KM SD	0.334	95% KM (BCA) UCL	0.356
95% KM (t) UCL	0.336	95% KM (Percentile Bootstrap) UCL	0.341
95% KM (z) UCL	0.329	95% KM Bootstrap t UCL	0.662
90% KM Chebyshev UCL	0.439	95% KM Chebyshev UCL	0.549
97.5% KM Chebyshev UCL	0.701	99% KM Chebyshev UCL	1.001

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.414	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.73	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.233	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.321	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.915	k star (bias corrected MLE)	0.618
Theta hat (MLE)	0.469	Theta star (bias corrected MLE)	0.694
nu hat (MLE)	12.81	nu star (bias corrected)	8.653
Mean (detects)	0.429		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.166
Maximum	1.5	Median	0.0375
SD	0.356	CV	2.15
k hat (MLE)	0.453	k star (bias corrected MLE)	0.418
Theta hat (MLE)	0.365	Theta star (bias corrected MLE)	0.396
nu hat (MLE)	18.12	nu star (bias corrected)	16.74
Adjusted Level of Significance (β)	0.038		
Approximate Chi Square Value (16.74, α)	8.486	Adjusted Chi Square Value (16.74, β)	8.023
95% Gamma Approximate UCL	0.327	95% Gamma Adjusted UCL	0.345
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.196	SD (KM)	0.334
Variance (KM)	0.112	SE of Mean (KM)	0.0809
k hat (KM)	0.345	k star (KM)	0.326
nu hat (KM)	13.78	nu star (KM)	13.05
theta hat (KM)	0.57	theta star (KM)	0.602
80% gamma percentile (KM)	0.307	90% gamma percentile (KM)	0.573
95% gamma percentile (KM)	0.874	99% gamma percentile (KM)	1.648
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (13.05, α)	5.925	Adjusted Chi Square Value (13.05, β)	5.549
95% KM Approximate Gamma UCL	0.432	95% KM Adjusted Gamma UCL	0.462
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.903	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.838	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.221	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.28	Detected Data appear Lognormal at 10% Significance Level	
Detected Data appear Lognormal at 10% Significance Level			
Note GOF tests may be unreliable for small sample sizes			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.201	Mean in Log Scale	-2.2
SD in Original Scale	0.342	SD in Log Scale	0.912
95% t UCL (assumes normality of ROS data)	0.333	95% Percentile Bootstrap UCL	0.336

95% BCA Bootstrap UCL	0.406	95% Bootstrap t UCL	0.72
95% H-UCL (Log ROS)	0.284		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-2.243	KM Geo Mean	0.106
KM SD (logged)	0.881	95% Critical H Value (KM-Log)	2.467
KM Standard Error of Mean (logged)	0.219	95% H-UCL (KM -Log)	0.258
KM SD (logged)	0.881	95% Critical H Value (KM-Log)	2.467
KM Standard Error of Mean (logged)	0.219		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.216	Mean in Log Scale	-2.012
SD in Original Scale	0.336	SD in Log Scale	0.801
95% t UCL (Assumes normality)	0.345	95% H-Stat UCL	0.284

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.336		

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | benzo(b)fluoranthene | 205-99-2)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	16
Number of Detects	9	Number of Non-Detects	11
Number of Distinct Detects	8	Number of Distinct Non-Detects	8
Minimum Detect	0.069	Minimum Non-Detect	0.192
Maximum Detect	2.8	Maximum Non-Detect	0.22
Variance Detects	0.961	Percent Non-Detects	55%
Mean Detects	0.721	SD Detects	0.98
Median Detects	0.13	CV Detects	1.359
Skewness Detects	1.607	Kurtosis Detects	1.621
Mean of Logged Detects	-1.2	SD of Logged Detects	1.408

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.728	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.764	Detected Data Not Normal at 1% Significance Level	

Lilliefors Test Statistic	0.282	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.316	Detected Data appear Normal at 1% Significance Level	

<p style="text-align:center; color:blue;">**Detected Data appear Approximate Normal at 1% Significance Level**</p>

<p style="text-align:center; color:red;">**Note GOF tests may be unreliable for small sample sizes**</p>

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.381	KM Standard Error of Mean	0.164
90KM SD	0.692	95% KM (BCA) UCL	0.671
95% KM (t) UCL	0.665	95% KM (Percentile Bootstrap) UCL	0.66
95% KM (z) UCL	0.651	95% KM Bootstrap t UCL	1.303
90% KM Chebyshev UCL	0.874	95% KM Chebyshev UCL	1.097
97.5% KM Chebyshev UCL	1.407	99% KM Chebyshev UCL	2.016

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.74	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.756	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.308	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.29	Detected Data Not Gamma Distributed at 5% Significance Level

<p style="text-align:center; color:blue;">**Detected data follow Appr. Gamma Distribution at 5% Significance Level**</p>

<p style="text-align:center; color:red;">**Note GOF tests may be unreliable for small sample sizes**</p>

Gamma Statistics on Detected Data Only

k hat (MLE)	0.693	k star (bias corrected MLE)	0.536
Theta hat (MLE)	1.041	Theta star (bias corrected MLE)	1.345
nu hat (MLE)	12.47	nu star (bias corrected)	9.649
Mean (detects)	0.721		

Gamma ROS Statistics using Imputed Non-Detects

<p style="text-align:center; color:blue;">GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs</p>

<p style="text-align:center; color:blue;">GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)</p>

<p style="text-align:center; color:blue;">For such situations, GROS method may yield incorrect values of UCLs and BTVs</p>

<p style="text-align:center; color:blue;">This is especially true when the sample size is small.</p>

<p style="text-align:center; color:blue;">For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates</p>

Minimum	0.01	Mean	0.352
Maximum	2.8	Median	0.101
SD	0.724	CV	2.054
k hat (MLE)	0.407	k star (bias corrected MLE)	0.379
Theta hat (MLE)	0.867	Theta star (bias corrected MLE)	0.93
nu hat (MLE)	16.26	nu star (bias corrected)	15.15
Adjusted Level of Significance (β)	0.038		
Approximate Chi Square Value (15.15, α)	7.369	Adjusted Chi Square Value (15.15, β)	6.943
95% Gamma Approximate UCL	0.725	95% Gamma Adjusted UCL	0.769

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.381	SD (KM)	0.692
Variance (KM)	0.48	SE of Mean (KM)	0.164
k hat (KM)	0.302	k star (KM)	0.29
nu hat (KM)	12.08	nu star (KM)	11.6
theta hat (KM)	1.26	theta star (KM)	1.312

80% gamma percentile (KM)	0.579	90% gamma percentile (KM)	1.127
95% gamma percentile (KM)	1.76	99% gamma percentile (KM)	3.412

Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (11.60, α)	4.968	Adjusted Chi Square Value (11.60, β)	4.628
95% KM Approximate Gamma UCL	0.889	95% KM Adjusted Gamma UCL	0.954

Lognormal GOF Test on Detected Observations Only		
Shapiro Wilk Test Statistic	0.861	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.28	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.252	Detected Data Not Lognormal at 10% Significance Level
Detected Data appear Approximate Lognormal at 10% Significance Level		
Note GOF tests may be unreliable for small sample sizes		

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.394	Mean in Log Scale	-1.712
SD in Original Scale	0.706	SD in Log Scale	1.064
95% t UCL (assumes normality of ROS data)	0.667	95% Percentile Bootstrap UCL	0.669
95% BCA Bootstrap UCL	0.771	95% Bootstrap t UCL	1.348
95% H-UCL (Log ROS)	0.619		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.808	KM Geo Mean	0.164
KM SD (logged)	1.059	95% Critical H Value (KM-Log)	2.721
KM Standard Error of Mean (logged)	0.26	95% H-UCL (KM -Log)	0.556
KM SD (logged)	1.059	95% Critical H Value (KM-Log)	2.721
KM Standard Error of Mean (logged)	0.26		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.38	Mean in Log Scale	-1.8
SD in Original Scale	0.71	SD in Log Scale	1.071
95% t UCL (Assumes normality)	0.655	95% H-Stat UCL	0.574
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics	
Detected Data appear Approximate Normal Distributed at 1% Significance Level	

Suggested UCL to Use			
95% KM (t) UCL	0.665		

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

When a data set follows an approximate distribution passing only one of the GOF tests,

it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

C (soil | benzo(g,h,i)perylene | 191-24-2)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	16
Number of Detects	4	Number of Non-Detects	16
Number of Distinct Detects	4	Number of Distinct Non-Detects	12
Minimum Detect	0.14	Minimum Non-Detect	0.187
Maximum Detect	0.64	Maximum Non-Detect	0.22
Variance Detects	0.0522	Percent Non-Detects	80%
Mean Detects	0.383	SD Detects	0.228
Median Detects	0.375	CV Detects	0.597
Skewness Detects	0.118	Kurtosis Detects	-3.265
Mean of Logged Detects	-1.123	SD of Logged Detects	0.689

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.95	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.219	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.413	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.189	KM Standard Error of Mean	0.0339
90KM SD	0.131	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.247	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.244	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.29	95% KM Chebyshev UCL	0.336
97.5% KM Chebyshev UCL	0.4	99% KM Chebyshev UCL	0.526

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.276	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.659	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.254	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.396	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	3.245	k star (bias corrected MLE)	0.978
Theta hat (MLE)	0.118	Theta star (bias corrected MLE)	0.391
nu hat (MLE)	25.96	nu star (bias corrected)	7.823
Mean (detects)	0.383		

Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.153
Maximum	0.64	Median	0.0941
SD	0.154	CV	1.007
k hat (MLE)	1.527	k star (bias corrected MLE)	1.331
Theta hat (MLE)	0.1	Theta star (bias corrected MLE)	0.115
nu hat (MLE)	61.06	nu star (bias corrected)	53.24
Adjusted Level of Significance (β)	0.038		
Approximate Chi Square Value (53.24, α)	37.48	Adjusted Chi Square Value (53.24, β)	36.43
95% Gamma Approximate UCL	0.218	95% Gamma Adjusted UCL	N/A

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.189	SD (KM)	0.131
Variance (KM)	0.0172	SE of Mean (KM)	0.0339
k hat (KM)	2.062	k star (KM)	1.786
nu hat (KM)	82.48	nu star (KM)	71.44
theta hat (KM)	0.0914	theta star (KM)	0.106
80% gamma percentile (KM)	0.286	90% gamma percentile (KM)	0.377
95% gamma percentile (KM)	0.464	99% gamma percentile (KM)	0.658

Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (71.44, α)	52.98	Adjusted Chi Square Value (71.44, β)	51.72
95% KM Approximate Gamma UCL	0.254	95% KM Adjusted Gamma UCL	0.26

Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.947	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.792	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.234	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.346	Detected Data appear Lognormal at 10% Significance Level	
Detected Data appear Lognormal at 10% Significance Level			
Note GOF tests may be unreliable for small sample sizes			

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.181	Mean in Log Scale	-1.868
SD in Original Scale	0.14	SD in Log Scale	0.506
95% t UCL (assumes normality of ROS data)	0.235	95% Percentile Bootstrap UCL	0.236
95% BCA Bootstrap UCL	0.253	95% Bootstrap t UCL	0.364
95% H-UCL (Log ROS)	0.222		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.797	KM Geo Mean	0.166
KM SD (logged)	0.43	95% Critical H Value (KM-Log)	1.955
KM Standard Error of Mean (logged)	0.111	95% H-UCL (KM -Log)	0.22
KM SD (logged)	0.43	95% Critical H Value (KM-Log)	1.955

KM Standard Error of Mean (logged)	0.111		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.156	Mean in Log Scale	-2.069
SD in Original Scale	0.147	SD in Log Scale	0.559
95% t UCL (Assumes normality)	0.213	95% H-Stat UCL	0.193

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.247		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | benzo(k)fluoranthene | 207-08-9)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	14
Number of Detects	4	Number of Non-Detects	16
Number of Distinct Detects	3	Number of Distinct Non-Detects	12
Minimum Detect	0.2	Minimum Non-Detect	0.187
Maximum Detect	1	Maximum Non-Detect	0.22
Variance Detects	0.177	Percent Non-Detects	80%
Mean Detects	0.56	SD Detects	0.421
Median Detects	0.52	CV Detects	0.751
Skewness Detects	0.124	Kurtosis Detects	-5.29
Mean of Logged Detects	-0.848	SD of Logged Detects	0.882

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.813	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.304	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.413	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.262	KM Standard Error of Mean	0.057
90KM SD	0.221	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.361	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.356	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.433	95% KM Chebyshev UCL	0.511
97.5% KM Chebyshev UCL	0.618	99% KM Chebyshev UCL	0.829

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.599	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.661	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.34	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.398	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only			
k hat (MLE)	2.013	k star (bias corrected MLE)	0.67
Theta hat (MLE)	0.278	Theta star (bias corrected MLE)	0.836
nu hat (MLE)	16.1	nu star (bias corrected)	5.359
Mean (detects)	0.56		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.12
Maximum	1	Median	0.01
SD	0.281	CV	2.341
k hat (MLE)	0.382	k star (bias corrected MLE)	0.358
Theta hat (MLE)	0.314	Theta star (bias corrected MLE)	0.335
nu hat (MLE)	15.29	nu star (bias corrected)	14.33
Adjusted Level of Significance (β)	0.038		
Approximate Chi Square Value (14.33, α)	6.801	Adjusted Chi Square Value (14.33, β)	6.393
95% Gamma Approximate UCL	0.253	95% Gamma Adjusted UCL	N/A

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.262	SD (KM)	0.221
Variance (KM)	0.0488	SE of Mean (KM)	0.057
k hat (KM)	1.408	k star (KM)	1.23
nu hat (KM)	56.3	nu star (KM)	49.19
theta hat (KM)	0.186	theta star (KM)	0.213
80% gamma percentile (KM)	0.414	90% gamma percentile (KM)	0.573
95% gamma percentile (KM)	0.73	99% gamma percentile (KM)	1.089

Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (49.19, α)	34.09	Adjusted Chi Square Value (49.19, β)	33.09
95% KM Approximate Gamma UCL	0.378	95% KM Adjusted Gamma UCL	0.389

Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.778	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.792	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.306	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.346	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Approximate Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.133	Mean in Log Scale	-3.194
SD in Original Scale	0.276	SD in Log Scale	1.342
95% t UCL (assumes normality of ROS data)	0.239	95% Percentile Bootstrap UCL	0.239
95% BCA Bootstrap UCL	0.279	95% Bootstrap t UCL	0.585
95% H-UCL (Log ROS)	0.267		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.509	KM Geo Mean	0.221
KM SD (logged)	0.475	95% Critical H Value (KM-Log)	1.996
KM Standard Error of Mean (logged)	0.123	95% H-UCL (KM -Log)	0.308
KM SD (logged)	0.475	95% Critical H Value (KM-Log)	1.996
KM Standard Error of Mean (logged)	0.123		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.192	Mean in Log Scale	-2.014
SD in Original Scale	0.252	SD in Log Scale	0.694
95% t UCL (Assumes normality)	0.289	95% H-Stat UCL	0.242
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 1% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.361		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

C (soil | benzoic acid | 65-85-0)

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	9
Number of Detects	1	Number of Non-Detects	19
Number of Distinct Detects	1	Number of Distinct Non-Detects	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 C (soil | benzoic acid | 65-85-0) was not processed!			

C (soil | beryllium | 7440-41-7)

General Statistics				
Total Number of Observations	20	Number of Distinct Observations	20	
		Number of Missing Observations	0	
Minimum	0.31	Mean	0.754	
Maximum	2	Median	0.664	
SD	0.375	Std. Error of Mean	0.0839	
Coefficient of Variation	0.497	Skewness	2.417	

Normal GOF Test			
Shapiro Wilk Test Statistic	0.715	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.868	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.299	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.223	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.9	95% Adjusted-CLT UCL (Chen-1995)	0.941
		95% Modified-t UCL (Johnson-1978)	0.907

Gamma GOF Test			
A-D Test Statistic	1.214	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.744	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.245	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.194	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics			
k hat (MLE)	6.105	k star (bias corrected MLE)	5.223
Theta hat (MLE)	0.124	Theta star (bias corrected MLE)	0.144
nu hat (MLE)	244.2	nu star (bias corrected)	208.9
MLE Mean (bias corrected)	0.754	MLE Sd (bias corrected)	0.33
		Approximate Chi Square Value (0.05)	176.5
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	174.1

Assuming Gamma Distribution			
95% Approximate Gamma UCL	0.893	95% Adjusted Gamma UCL	0.905

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.899	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.92	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.215	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.176	Data Not Lognormal at 10% Significance Level	

Data Not Lognormal at 10% Significance Level

Lognormal Statistics			
Minimum of Logged Data	-1.171	Mean of logged Data	-0.366
Maximum of Logged Data	0.693	SD of logged Data	0.396

Assuming Lognormal Distribution				
95% H-UCL	0.894	90% Chebyshev (MVUE) UCL		0.95
95% Chebyshev (MVUE) UCL	1.042	97.5% Chebyshev (MVUE) UCL		1.17
99% Chebyshev (MVUE) UCL	1.421			

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.892	95% BCA Bootstrap UCL	0.948
95% Standard Bootstrap UCL	0.889	95% Bootstrap-t UCL	1.081
95% Hall's Bootstrap UCL	1.74	95% Percentile Bootstrap UCL	0.898
90% Chebyshev(Mean, Sd) UCL	1.006	95% Chebyshev(Mean, Sd) UCL	1.12
97.5% Chebyshev(Mean, Sd) UCL	1.278	99% Chebyshev(Mean, Sd) UCL	1.589

Suggested UCL to Use

95% Student's-t UCL	0.9		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | bis(2-chloroethoxy)methane | 111-91-1)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

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 C (soil | bis(2-chloroethoxy)methane | 111-91-1) was not processed!

C (soil | bis(2-chloroethyl) ether | 111-44-4)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

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 C (soil | bis(2-chloroethyl) ether | 111-44-4) was not processed!

C (soil | bis(2-ethylhexyl)phthalate | 117-81-7)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	2	Number of Non-Detects	18
Number of Distinct Detects	2	Number of Distinct Non-Detects	14
Minimum Detect	0.12	Minimum Non-Detect	0.38
Maximum Detect	0.39	Maximum Non-Detect	0.44
Variance Detects	0.0365	Percent Non-Detects	90%
Mean Detects	0.255	SD Detects	0.191
Median Detects	0.255	CV Detects	0.749
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-1.531	SD of Logged Detects	0.833

Warning: Data set has only 2 Detected Values.

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

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.154	KM Standard Error of Mean	0.0446
90KM SD	0.0893	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.231	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.227	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.288	95% KM Chebyshev UCL	0.348
97.5% KM Chebyshev UCL	0.433	99% KM Chebyshev UCL	0.598

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	3.198	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0797	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	12.79	nu star (bias corrected)	N/A
Mean (detects)	0.255		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.154	SD (KM)	0.0893
Variance (KM)	0.00797	SE of Mean (KM)	0.0446
k hat (KM)	2.965	k star (KM)	2.553
nu hat (KM)	118.6	nu star (KM)	102.1
theta hat (KM)	0.0519	theta star (KM)	0.0602
80% gamma percentile (KM)	0.224	90% gamma percentile (KM)	0.283
95% gamma percentile (KM)	0.338	99% gamma percentile (KM)	0.46

Gamma Kaplan-Meier (KM) Statistics

		Adjusted Level of Significance (β)	0.038
Approximate Chi Square Value (102.13, α)	79.82	Adjusted Chi Square Value (102.13, β)	78.26
95% KM Approximate Gamma UCL	0.197	95% KM Adjusted Gamma UCL	0.201

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.144	Mean in Log Scale	-1.998
SD in Original Scale	0.0643	SD in Log Scale	0.325
95% t UCL (assumes normality of ROS data)	0.169	95% Percentile Bootstrap UCL	0.17
95% BCA Bootstrap UCL	0.182	95% Bootstrap t UCL	0.205
95% H-UCL (Log ROS)	0.164		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.973	KM Geo Mean	0.139
KM SD (logged)	0.39	95% Critical H Value (KM-Log)	1.92
KM Standard Error of Mean (logged)	0.195	95% H-UCL (KM -Log)	0.178
KM SD (logged)	0.39	95% Critical H Value (KM-Log)	1.92
KM Standard Error of Mean (logged)	0.195		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.205	Mean in Log Scale	-1.604
SD in Original Scale	0.0476	SD in Log Scale	0.196
95% t UCL (Assumes normality)	0.224	95% H-Stat UCL	0.222

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.231		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | bromobenzene | 108-86-1)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

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).

C (soil | bromochloromethane | 74-97-5)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

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 C (soil | bromochloromethane | 74-97-5) was not processed!

C (soil | bromodichloromethane | 75-27-4)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

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 C (soil | bromodichloromethane | 75-27-4) was not processed!

C (soil | bromoform | 75-25-2)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

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 C (soil | bromoform | 75-25-2) was not processed!

C (soil | bromomethane | 74-83-9)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	10
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (soil | bromomethane | 74-83-9) was not processed!

C (soil | butylbenzylphthalate | 85-68-7)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

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 C (soil | butylbenzylphthalate | 85-68-7) was not processed!

C (soil | cadmium | 7440-43-9)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	8	Number of Non-Detects	12
Number of Distinct Detects	7	Number of Distinct Non-Detects	9
Minimum Detect	0.21	Minimum Non-Detect	0.187
Maximum Detect	0.52	Maximum Non-Detect	0.5
Variance Detects	0.00851	Percent Non-Detects	60%
Mean Detects	0.351	SD Detects	0.0922
Median Detects	0.34	CV Detects	0.263
Skewness Detects	0.506	Kurtosis Detects	1.028
Mean of Logged Detects	-1.078	SD of Logged Detects	0.268

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.971	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.749	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.172	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.333	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.286	KM Standard Error of Mean	0.0271

90KM SD	0.0927	95% KM (BCA) UCL	0.332
95% KM (t) UCL	0.333	95% KM (Percentile Bootstrap) UCL	0.33
95% KM (z) UCL	0.331	95% KM Bootstrap t UCL	0.331
90% KM Chebyshev UCL	0.368	95% KM Chebyshev UCL	0.405
97.5% KM Chebyshev UCL	0.456	99% KM Chebyshev UCL	0.556

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.197	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.716	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.143	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.294	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	16.44	k star (bias corrected MLE)	10.36
Theta hat (MLE)	0.0213	Theta star (bias corrected MLE)	0.0339
nu hat (MLE)	263.1	nu star (bias corrected)	165.7
Mean (detects)	0.351		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.179	Mean	0.283
Maximum	0.52	Median	0.264
SD	0.0872	CV	0.308
k hat (MLE)	12.19	k star (bias corrected MLE)	10.39
Theta hat (MLE)	0.0232	Theta star (bias corrected MLE)	0.0272
nu hat (MLE)	487.6	nu star (bias corrected)	415.8
Adjusted Level of Significance (β)	0.038		
Approximate Chi Square Value (415.75, α)	369.5	Adjusted Chi Square Value (415.75, β)	366
95% Gamma Approximate UCL	0.318	95% Gamma Adjusted UCL	0.321

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.286	SD (KM)	0.0927
Variance (KM)	0.00859	SE of Mean (KM)	0.0271
k hat (KM)	9.551	k star (KM)	8.152
nu hat (KM)	382.1	nu star (KM)	326.1
theta hat (KM)	0.03	theta star (KM)	0.0351
80% gamma percentile (KM)	0.366	90% gamma percentile (KM)	0.42
95% gamma percentile (KM)	0.469	99% gamma percentile (KM)	0.57

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (326.08, α)	285.2	Adjusted Chi Square Value (326.08, β)	282.2
95% KM Approximate Gamma UCL	0.327	95% KM Adjusted Gamma UCL	0.331

Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.977	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.851	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.15	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.265	Detected Data appear Lognormal at 10% Significance Level	
Detected Data appear Lognormal at 10% Significance Level			
Note GOF tests may be unreliable for small sample sizes			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.286	Mean in Log Scale	-1.288
SD in Original Scale	0.0833	SD in Log Scale	0.269
95% t UCL (assumes normality of ROS data)	0.318	95% Percentile Bootstrap UCL	0.317
95% BCA Bootstrap UCL	0.322	95% Bootstrap t UCL	0.328
95% H-UCL (Log ROS)	0.32		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.301	KM Geo Mean	0.272
KM SD (logged)	0.319	95% Critical H Value (KM-Log)	1.865
KM Standard Error of Mean (logged)	0.0977	95% H-UCL (KM -Log)	0.328
KM SD (logged)	0.319	95% Critical H Value (KM-Log)	1.865
KM Standard Error of Mean (logged)	0.0977		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.244	Mean in Log Scale	-1.51
SD in Original Scale	0.112	SD in Log Scale	0.468
95% t UCL (Assumes normality)	0.287	95% H-Stat UCL	0.305
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 1% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.333		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | carbazole | 86-74-8)

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	16
Number of Detects	4	Number of Non-Detects	16
Number of Distinct Detects	4	Number of Distinct Non-Detects	12
Minimum Detect	0.23	Minimum Non-Detect	0.187
Maximum Detect	0.46	Maximum Non-Detect	0.22
Variance Detects	0.0109	Percent Non-Detects	80%
Mean Detects	0.318	SD Detects	0.104

Median Detects	0.29		CV Detects	0.329
Skewness Detects	1.125		Kurtosis Detects	0.318
Mean of Logged Detects	-1.185		SD of Logged Detects	0.313

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.9	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.241	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.413	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.213	KM Standard Error of Mean	0.0171
90KM SD	0.0661	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.242	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.241	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.264	95% KM Chebyshev UCL	0.287
97.5% KM Chebyshev UCL	0.319	99% KM Chebyshev UCL	0.383

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.325	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.657	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.272	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.395	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	13.32	k star (bias corrected MLE)	3.496
Theta hat (MLE)	0.0238	Theta star (bias corrected MLE)	0.0908
nu hat (MLE)	106.5	nu star (bias corrected)	27.97
Mean (detects)	0.318		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.0715
Maximum	0.46	Median	0.01
SD	0.133	CV	1.858
k hat (MLE)	0.496	k star (bias corrected MLE)	0.455
Theta hat (MLE)	0.144	Theta star (bias corrected MLE)	0.157
nu hat (MLE)	19.83	nu star (bias corrected)	18.19
Adjusted Level of Significance (β)	0.038		
Approximate Chi Square Value (18.19, α)	9.526	Adjusted Chi Square Value (18.19, β)	9.032
95% Gamma Approximate UCL	0.137	95% Gamma Adjusted UCL	N/A

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.213	SD (KM)	0.0661
Variance (KM)	0.00437	SE of Mean (KM)	0.0171
k hat (KM)	10.36	k star (KM)	8.839
nu hat (KM)	414.4	nu star (KM)	353.6
theta hat (KM)	0.0205	theta star (KM)	0.0241
80% gamma percentile (KM)	0.27	90% gamma percentile (KM)	0.308
95% gamma percentile (KM)	0.343	99% gamma percentile (KM)	0.414

Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (353.56, α)	311	Adjusted Chi Square Value (353.56, β)	307.8
95% KM Approximate Gamma UCL	0.242	95% KM Adjusted Gamma UCL	0.244

Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.929	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.792	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.24	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.346	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.119	Mean in Log Scale	-2.401
SD in Original Scale	0.111	SD in Log Scale	0.676
95% t UCL (assumes normality of ROS data)	0.162	95% Percentile Bootstrap UCL	0.161
95% BCA Bootstrap UCL	0.172	95% Bootstrap t UCL	0.19
95% H-UCL (Log ROS)	0.16		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.58	KM Geo Mean	0.206
KM SD (logged)	0.232	95% Critical H Value (KM-Log)	1.805
KM Standard Error of Mean (logged)	0.0598	95% H-UCL (KM -Log)	0.233
KM SD (logged)	0.232	95% Critical H Value (KM-Log)	1.805
KM Standard Error of Mean (logged)	0.0598		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.143	Mean in Log Scale	-2.081
SD in Original Scale	0.0986	SD in Log Scale	0.478
95% t UCL (Assumes normality)	0.181	95% H-Stat UCL	0.174

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics	

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use			
95% KM (t) UCL	0.242		

C (soil | carbon disulfide | 75-15-0)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	10
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (soil | carbon disulfide | 75-15-0) was not processed!

C (soil | carbon tetrachloride | 56-23-5)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

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 C (soil | carbon tetrachloride | 56-23-5) was not processed!

C (soil | chlorobenzene | 108-90-7)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

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 C (soil | chlorobenzene | 108-90-7) was not processed!

C (soil | chloroethane | 75-00-3)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

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 C (soil | chloroethane | 75-00-3) was not processed!

C (soil | chloroform | 67-66-3)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	11
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	11

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 C (soil | chloroform | 67-66-3) was not processed!

C (soil | chloromethane | 74-87-3)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	10
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (soil | chloromethane | 74-87-3) was not processed!

C (soil | chromium (total) | 7440-47-3)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	11.43	Mean	86.49
Maximum	1400	Median	16.67
SD	309.2	Std. Error of Mean	69.14
Coefficient of Variation	3.575	Skewness	4.471

Normal GOF Test

Shapiro Wilk Test Statistic	0.246	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.868	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.526	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.223	Data Not Normal at 1% Significance Level
Data Not Normal at 1% Significance Level		

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	206	95% Adjusted-CLT UCL (Chen-1995)	274.1
		95% Modified-t UCL (Johnson-1978)	217.6

Gamma GOF Test

A-D Test Statistic	6.326	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.812	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.506	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.206	Data Not Gamma Distributed at 5% Significance Level
Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics

k hat (MLE)	0.457	k star (bias corrected MLE)	0.422
Theta hat (MLE)	189.3	Theta star (bias corrected MLE)	205.1
nu hat (MLE)	18.28	nu star (bias corrected)	16.87
MLE Mean (bias corrected)	86.49	MLE Sd (bias corrected)	133.2
		Approximate Chi Square Value (0.05)	8.578
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	8.112

Assuming Gamma Distribution

95% Approximate Gamma UCL	170.1	95% Adjusted Gamma UCL	179.8

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.429	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.92	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.354	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.176	Data Not Lognormal at 10% Significance Level
Data Not Lognormal at 10% Significance Level		

Lognormal Statistics

Minimum of Logged Data	2.437	Mean of logged Data	3.05
Maximum of Logged Data	7.244	SD of logged Data	1.011

Assuming Lognormal Distribution

95% H-UCL	65.09	90% Chebyshev (MVUE) UCL	59.75
95% Chebyshev (MVUE) UCL	71.44	97.5% Chebyshev (MVUE) UCL	87.67
99% Chebyshev (MVUE) UCL	119.5		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs				
95% CLT UCL	200.2	95% BCA Bootstrap UCL		294.4
95% Standard Bootstrap UCL	197.1	95% Bootstrap-t UCL		6873
95% Hall's Bootstrap UCL	2986	95% Percentile Bootstrap UCL		224.5
90% Chebyshev(Mean, Sd) UCL	293.9	95% Chebyshev(Mean, Sd) UCL		387.9
97.5% Chebyshev(Mean, Sd) UCL	518.3	99% Chebyshev(Mean, Sd) UCL		774.4

Suggested UCL to Use			
95% Student's-t UCL	206		

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | chrysene | 218-01-9)

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	16
Number of Detects	9	Number of Non-Detects	11
Number of Distinct Detects	8	Number of Distinct Non-Detects	8
Minimum Detect	0.063	Minimum Non-Detect	0.192
Maximum Detect	2.9	Maximum Non-Detect	0.22
Variance Detects	0.972	Percent Non-Detects	55%
Mean Detects	0.757	SD Detects	0.986
Median Detects	0.16	CV Detects	1.302
Skewness Detects	1.548	Kurtosis Detects	1.831
Mean of Logged Detects	-1.127	SD of Logged Detects	1.411

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.754	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.764	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.289	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.316	Detected Data appear Normal at 1% Significance Level

Detected Data appear Approximate Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.403	KM Standard Error of Mean	0.167
90KM SD	0.701	95% KM (BCA) UCL	0.689
95% KM (t) UCL	0.691	95% KM (Percentile Bootstrap) UCL	0.683
95% KM (z) UCL	0.677	95% KM Bootstrap t UCL	0.974
90% KM Chebyshev UCL	0.903	95% KM Chebyshev UCL	1.129
97.5% KM Chebyshev UCL	1.443	99% KM Chebyshev UCL	2.061

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.679	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.754	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.287	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.29	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.711	k star (bias corrected MLE)	0.548
Theta hat (MLE)	1.065	Theta star (bias corrected MLE)	1.382
nu hat (MLE)	12.79	nu star (bias corrected)	9.863
Mean (detects)	0.757		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.373
Maximum	2.9	Median	0.11
SD	0.735	CV	1.971
k hat (MLE)	0.407	k star (bias corrected MLE)	0.379
Theta hat (MLE)	0.916	Theta star (bias corrected MLE)	0.983
nu hat (MLE)	16.27	nu star (bias corrected)	15.16
Adjusted Level of Significance (β)	0.038		
Approximate Chi Square Value (15.16, α)	7.374	Adjusted Chi Square Value (15.16, β)	6.947
95% Gamma Approximate UCL	0.766	95% Gamma Adjusted UCL	0.813

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.403	SD (KM)	0.701
Variance (KM)	0.492	SE of Mean (KM)	0.167
k hat (KM)	0.329	k star (KM)	0.313
nu hat (KM)	13.18	nu star (KM)	12.53
theta hat (KM)	1.222	theta star (KM)	1.285
80% gamma percentile (KM)	0.624	90% gamma percentile (KM)	1.181
95% gamma percentile (KM)	1.816	99% gamma percentile (KM)	3.457

Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (12.53, α)	5.58	Adjusted Chi Square Value (12.53, β)	5.217
95% KM Approximate Gamma UCL	0.904	95% KM Adjusted Gamma UCL	0.967

Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.883	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.247	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.252	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level			
Note GOF tests may be unreliable for small sample sizes			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.414	Mean in Log Scale	-1.647
SD in Original Scale	0.715	SD in Log Scale	1.07
95% t UCL (assumes normality of ROS data)	0.691	95% Percentile Bootstrap UCL	0.69
95% BCA Bootstrap UCL	0.793	95% Bootstrap t UCL	1
95% H-UCL (Log ROS)	0.669		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.733	KM Geo Mean	0.177
KM SD (logged)	1.072	95% Critical H Value (KM-Log)	2.74
KM Standard Error of Mean (logged)	0.272	95% H-UCL (KM -Log)	0.616
KM SD (logged)	1.072	95% Critical H Value (KM-Log)	2.74
KM Standard Error of Mean (logged)	0.272		
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.396	Mean in Log Scale	-1.767
SD in Original Scale	0.722	SD in Log Scale	1.092
95% t UCL (Assumes normality)	0.675	95% H-Stat UCL	0.621
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Approximate Normal Distributed at 1% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.691		
The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.			
Please verify the data were collected from random locations.			
If the data were collected using judgmental or other non-random methods,			
then contact a statistician to correctly calculate UCLs.			
When a data set follows an approximate distribution passing only one of the GOF tests,			
it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

C (soil | cis-1,2-dichloroethene | 156-59-2)

General Statistics			
Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

The data set for variable C (soil | cis-1,2-dichloroethene | 156-59-2) was not processed!

C (soil | cobalt | 7440-48-4)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	4.2	Mean	9.066
Maximum	18	Median	8.45
SD	3.38	Std. Error of Mean	0.756
Coefficient of Variation	0.373	Skewness	0.972

Normal GOF Test

Shapiro Wilk Test Statistic	0.934	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.868	Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.147	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.223	Data appear Normal at 1% Significance Level
Data appear Normal at 1% Significance Level		

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	10.37	95% Adjusted-CLT UCL (Chen-1995)	10.48
		95% Modified-t UCL (Johnson-1978)	10.4

Gamma GOF Test

A-D Test Statistic	0.234	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.743	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.132	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.194	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics

k hat (MLE)	8.148	k star (bias corrected MLE)	6.959
Theta hat (MLE)	1.113	Theta star (bias corrected MLE)	1.303
nu hat (MLE)	325.9	nu star (bias corrected)	278.4
MLE Mean (bias corrected)	9.066	MLE Sd (bias corrected)	3.437
		Approximate Chi Square Value (0.05)	240.7
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	238

Assuming Gamma Distribution

95% Approximate Gamma UCL	10.48	95% Adjusted Gamma UCL	10.61

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.986	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.92	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.122	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.176	Data appear Lognormal at 10% Significance Level	

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.435	Mean of logged Data	2.142
Maximum of Logged Data	2.89	SD of logged Data	0.362

Assuming Lognormal Distribution

95% H-UCL	10.64	90% Chebyshev (MVUE) UCL	11.3
95% Chebyshev (MVUE) UCL	12.32	97.5% Chebyshev (MVUE) UCL	13.73
99% Chebyshev (MVUE) UCL	16.5		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	10.31	95% BCA Bootstrap UCL	10.48
95% Standard Bootstrap UCL	10.28	95% Bootstrap-t UCL	10.62
95% Hall's Bootstrap UCL	10.71	95% Percentile Bootstrap UCL	10.32
90% Chebyshev(Mean, Sd) UCL	11.33	95% Chebyshev(Mean, Sd) UCL	12.36
97.5% Chebyshev(Mean, Sd) UCL	13.79	99% Chebyshev(Mean, Sd) UCL	16.59

Suggested UCL to Use

95% Student's-t UCL	10.37		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | copper | 7440-50-8)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	19
		Number of Missing Observations	0
Minimum	11	Mean	70.3
Maximum	1000	Median	16.05
SD	219.1	Std. Error of Mean	48.99
Coefficient of Variation	3.117	Skewness	4.456

Normal GOF Test

Shapiro Wilk Test Statistic	0.27	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.868	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.483	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.223	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	155	95% Adjusted-CLT UCL (Chen-1995)	203
		95% Modified-t UCL (Johnson-1978)	163.1

Gamma GOF Test			
A-D Test Statistic	4.797	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.796	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.379	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.204	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	0.573	k star (bias corrected MLE)	0.52
Theta hat (MLE)	122.8	Theta star (bias corrected MLE)	135.2
nu hat (MLE)	22.9	nu star (bias corrected)	20.8
MLE Mean (bias corrected)	70.3	MLE Sd (bias corrected)	97.49
		Approximate Chi Square Value (0.05)	11.44
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	10.89

Assuming Gamma Distribution			
95% Approximate Gamma UCL	127.8	95% Adjusted Gamma UCL	134.2

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.603	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.92	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.235	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.176	Data Not Lognormal at 10% Significance Level	
Data Not Lognormal at 10% Significance Level			

Lognormal Statistics			
Minimum of Logged Data	2.398	Mean of logged Data	3.166
Maximum of Logged Data	6.908	SD of logged Data	0.97

Assuming Lognormal Distribution			
95% H-UCL	67.59	90% Chebyshev (MVUE) UCL	63.39
95% Chebyshev (MVUE) UCL	75.45	97.5% Chebyshev (MVUE) UCL	92.2
99% Chebyshev (MVUE) UCL	125.1		

Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution			

Nonparametric Distribution Free UCLs			
95% CLT UCL	150.9	95% BCA Bootstrap UCL	218.9
95% Standard Bootstrap UCL	148.7	95% Bootstrap-t UCL	1579
95% Hall's Bootstrap UCL	821.8	95% Percentile Bootstrap UCL	167.7
90% Chebyshev(Mean, Sd) UCL	217.3	95% Chebyshev(Mean, Sd) UCL	283.8
97.5% Chebyshev(Mean, Sd) UCL	376.2	99% Chebyshev(Mean, Sd) UCL	557.7

	Suggested UCL to Use			
95% Student's-t UCL	155			

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | cumene | 98-82-8)

General Statistics				
Total Number of Observations	11	Number of Distinct Observations	8	
Number of Detects	2	Number of Non-Detects	9	
Number of Distinct Detects	2	Number of Distinct Non-Detects	6	
Minimum Detect	0.14	Minimum Non-Detect	7.1000E-4	
Maximum Detect	0.49	Maximum Non-Detect	0.0019	
Variance Detects	0.0613	Percent Non-Detects	81.82%	
Mean Detects	0.315	SD Detects	0.247	
Median Detects	0.315	CV Detects	0.786	
Skewness Detects	N/A	Kurtosis Detects	N/A	
Mean of Logged Detects	-1.34	SD of Logged Detects	0.886	

Warning: Data set has only 2 Detected Values.

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

Normal GOF Test on Detects Only				
Not Enough Data to Perform GOF Test				

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs				
KM Mean	0.0579	KM Standard Error of Mean	0.0607	
90KM SD	0.142	95% KM (BCA) UCL	N/A	
95% KM (t) UCL	0.168	95% KM (Percentile Bootstrap) UCL	N/A	
95% KM (z) UCL	0.158	95% KM Bootstrap t UCL	N/A	
90% KM Chebyshev UCL	0.24	95% KM Chebyshev UCL	0.322	
97.5% KM Chebyshev UCL	0.437	99% KM Chebyshev UCL	0.662	

Gamma GOF Tests on Detected Observations Only				
Not Enough Data to Perform GOF Test				

Gamma Statistics on Detected Data Only				
k hat (MLE)	2.865	k star (bias corrected MLE)	N/A	
Theta hat (MLE)	0.11	Theta star (bias corrected MLE)	N/A	
nu hat (MLE)	11.46	nu star (bias corrected)	N/A	

Mean (detects)	0.315		

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0579	SD (KM)	0.142
Variance (KM)	0.0203	SE of Mean (KM)	0.0607
k hat (KM)	0.165	k star (KM)	0.181
nu hat (KM)	3.634	nu star (KM)	3.976
theta hat (KM)	0.35	theta star (KM)	0.32
80% gamma percentile (KM)	0.072	90% gamma percentile (KM)	0.175
95% gamma percentile (KM)	0.306	99% gamma percentile (KM)	0.673

Gamma Kaplan-Meier (KM) Statistics			
		Adjusted Level of Significance (β)	0.0278
Approximate Chi Square Value (3.98, α)	0.712	Adjusted Chi Square Value (3.98, β)	0.522
95% KM Approximate Gamma UCL	0.323	95% KM Adjusted Gamma UCL	0.441

Lognormal GOF Test on Detected Observations Only	
Not Enough Data to Perform GOF Test	

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0591	Mean in Log Scale	-5.65
SD in Original Scale	0.149	SD in Log Scale	2.361
95% t UCL (assumes normality of ROS data)	0.14	95% Percentile Bootstrap UCL	0.137
95% BCA Bootstrap UCL	0.192	95% Bootstrap t UCL	3.986
95% H-UCL (Log ROS)	4.985		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-6.176	KM Geo Mean	0.00208
KM SD (logged)	2.295	95% Critical H Value (KM-Log)	5.834
KM Standard Error of Mean (logged)	0.979	95% H-UCL (KM -Log)	1.999
KM SD (logged)	2.295	95% Critical H Value (KM-Log)	5.834
KM Standard Error of Mean (logged)	0.979		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0579	Mean in Log Scale	-6.082
SD in Original Scale	0.149	SD in Log Scale	2.377
95% t UCL (Assumes normality)	0.14	95% H-Stat UCL	3.57
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics	
Data do not follow a Discernible Distribution	

Suggested UCL to Use			
95% KM (t) UCL	0.168		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | cyanide (total) | 57-12-5)

General Statistics

Total Number of Observations	16	Number of Distinct Observations	15
Number of Detects	4	Number of Non-Detects	12
Number of Distinct Detects	4	Number of Distinct Non-Detects	11
Minimum Detect	0.66	Minimum Non-Detect	0.327
Maximum Detect	2.2	Maximum Non-Detect	0.65
Variance Detects	0.462	Percent Non-Detects	75%
Mean Detects	1.291	SD Detects	0.68
Median Detects	1.153	CV Detects	0.526
Skewness Detects	0.94	Kurtosis Detects	-0.0067
Mean of Logged Detects	0.152	SD of Logged Detects	0.524

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.94	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.215	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.413	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.568	KM Standard Error of Mean	0.147
90KM SD	0.511	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.826	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.81	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	1.01	95% KM Chebyshev UCL	1.211
97.5% KM Chebyshev UCL	1.489	99% KM Chebyshev UCL	2.035

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.234	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.659	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.225	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.396	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	5.005	k star (bias corrected MLE)	1.418
Theta hat (MLE)	0.258	Theta star (bias corrected MLE)	0.911
nu hat (MLE)	40.04	nu star (bias corrected)	11.34
Mean (detects)	1.291		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

Minimum	0.01	Mean	0.33
Maximum	2.2	Median	0.01
SD	0.649	CV	1.964
k hat (MLE)	0.299	k star (bias corrected MLE)	0.285
Theta hat (MLE)	1.105	Theta star (bias corrected MLE)	1.161
nu hat (MLE)	9.566	nu star (bias corrected)	9.106
Adjusted Level of Significance (β)	0.0335		
Approximate Chi Square Value (9.11, α)	3.391	Adjusted Chi Square Value (9.11, β)	3.005
95% Gamma Approximate UCL	0.887	95% Gamma Adjusted UCL	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.568	SD (KM)	0.511
Variance (KM)	0.261	SE of Mean (KM)	0.147
k hat (KM)	1.235	k star (KM)	1.045
nu hat (KM)	39.52	nu star (KM)	33.45
theta hat (KM)	0.46	theta star (KM)	0.543
80% gamma percentile (KM)	0.91	90% gamma percentile (KM)	1.293
95% gamma percentile (KM)	1.675	99% gamma percentile (KM)	2.558

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (33.45, α)	21.22	Adjusted Chi Square Value (33.45, β)	20.12
95% KM Approximate Gamma UCL	0.895	95% KM Adjusted Gamma UCL	0.944

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.983	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.792	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.185	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.346	Detected Data appear Lognormal at 10% Significance Level
Detected Data appear Lognormal at 10% Significance Level		
Note GOF tests may be unreliable for small sample sizes		

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.412	Mean in Log Scale	-1.571
SD in Original Scale	0.606	SD in Log Scale	1.07
95% t UCL (assumes normality of ROS data)	0.678	95% Percentile Bootstrap UCL	0.671
95% BCA Bootstrap UCL	0.751	95% Bootstrap t UCL	0.962
95% H-UCL (Log ROS)	0.802		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.801	KM Geo Mean	0.449
KM SD (logged)	0.595	95% Critical H Value (KM-Log)	2.155
KM Standard Error of Mean (logged)	0.172	95% H-UCL (KM -Log)	0.746
KM SD (logged)	0.595	95% Critical H Value (KM-Log)	2.155
KM Standard Error of Mean (logged)	0.172		

DL/2 Statistics

DL/2 Normal	**DL/2 Log-Transformed**

Mean in Original Scale	0.498		Mean in Log Scale	-1.076
SD in Original Scale	0.565		SD in Log Scale	0.804
95% t UCL (Assumes normality)	0.746		95% H-Stat UCL	0.778

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.826			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | dibenz(a,h)anthracene | 53-70-3)

General Statistics

Total Number of Observations	20		Number of Distinct Observations	14
Number of Detects	2		Number of Non-Detects	18
Number of Distinct Detects	2		Number of Distinct Non-Detects	13
Minimum Detect	0.21		Minimum Non-Detect	0.187
Maximum Detect	0.24		Maximum Non-Detect	0.26
Variance Detects	4.5000E-4		Percent Non-Detects	90%
Mean Detects	0.225		SD Detects	0.0212
Median Detects	0.225		CV Detects	0.0943
Skewness Detects	N/A		Kurtosis Detects	N/A
Mean of Logged Detects	-1.494		SD of Logged Detects	0.0944

Warning: Data set has only 2 Detected Values.

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

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.191		KM Standard Error of Mean	0.00421
90KM SD	0.0128		95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.198		95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.198		95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.203		95% KM Chebyshev UCL	0.209
97.5% KM Chebyshev UCL	0.217		99% KM Chebyshev UCL	0.233

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	224.7		k star (bias corrected MLE)	N/A

Theta hat (MLE)	0.001	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	898.7	nu star (bias corrected)	N/A
Mean (detects)	0.225		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.191	SD (KM)	0.0128
Variance (KM)	1.6440E-4	SE of Mean (KM)	0.00421
k hat (KM)	221.6	k star (KM)	188.4
nu hat (KM)	8863	nu star (KM)	7535
theta hat (KM)	8.6139E-4	theta star (KM)	0.00101
80% gamma percentile (KM)	0.202	90% gamma percentile (KM)	0.209
95% gamma percentile (KM)	0.214	99% gamma percentile (KM)	0.225

Gamma Kaplan-Meier (KM) Statistics

		Adjusted Level of Significance (β)	0.038
Approximate Chi Square Value (N/A, α)	7334	Adjusted Chi Square Value (N/A, β)	7318
95% KM Approximate Gamma UCL	0.196	95% KM Adjusted Gamma UCL	0.196

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.153	Mean in Log Scale	-1.888
SD in Original Scale	0.0272	SD in Log Scale	0.155
95% t UCL (assumes normality of ROS data)	0.164	95% Percentile Bootstrap UCL	0.164
95% BCA Bootstrap UCL	0.167	95% Bootstrap t UCL	0.175
95% H-UCL (Log ROS)	0.163		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.658	KM Geo Mean	0.19
KM SD (logged)	0.0611	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0201	95% H-UCL (KM -Log)	N/A
KM SD (logged)	0.0611	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0201		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.114	Mean in Log Scale	-2.211
SD in Original Scale	0.0391	SD in Log Scale	0.256
95% t UCL (Assumes normality)	0.129	95% H-Stat UCL	0.126

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.198		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

C (soil | dibenzofuran | 132-64-9)

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	19
Number of Detects	7	Number of Non-Detects	13
Number of Distinct Detects	7	Number of Distinct Non-Detects	12
Minimum Detect	0.077	Minimum Non-Detect	0.382
Maximum Detect	3.6	Maximum Non-Detect	0.44
Variance Detects	2.119	Percent Non-Detects	65%
Mean Detects	1.077	SD Detects	1.456
Median Detects	0.27	CV Detects	1.352
Skewness Detects	1.279	Kurtosis Detects	-0.123
Mean of Logged Detects	-0.941	SD of Logged Detects	1.608

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.74	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.73	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.319	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.35	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.466	KM Standard Error of Mean	0.224
90KM SD	0.917	95% KM (BCA) UCL	0.865
95% KM (t) UCL	0.852	95% KM (Percentile Bootstrap) UCL	0.839
95% KM (z) UCL	0.833	95% KM Bootstrap t UCL	2.012
90% KM Chebyshev UCL	1.136	95% KM Chebyshev UCL	1.44
97.5% KM Chebyshev UCL	1.862	99% KM Chebyshev UCL	2.69

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.583	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.745	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.238	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.325	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.608	k star (bias corrected MLE)	0.443
Theta hat (MLE)	1.771	Theta star (bias corrected MLE)	2.432
nu hat (MLE)	8.51	nu star (bias corrected)	6.196
Mean (detects)	1.077		

Gamma ROS Statistics using Imputed Non-Detects	

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

Minimum	0.01	Mean	0.395
Maximum	3.6	Median	0.01
SD	0.967	CV	2.446
k hat (MLE)	0.307	k star (bias corrected MLE)	0.295
Theta hat (MLE)	1.286	Theta star (bias corrected MLE)	1.342
nu hat (MLE)	12.3	nu star (bias corrected)	11.79
Adjusted Level of Significance (β)	0.038		
Approximate Chi Square Value (11.79, α)	5.088	Adjusted Chi Square Value (11.79, β)	4.743
95% Gamma Approximate UCL	0.916	95% Gamma Adjusted UCL	0.983

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.466	SD (KM)	0.917
Variance (KM)	0.841	SE of Mean (KM)	0.224
k hat (KM)	0.258	k star (KM)	0.252
nu hat (KM)	10.31	nu star (KM)	10.1
theta hat (KM)	1.806	theta star (KM)	1.844
80% gamma percentile (KM)	0.678	90% gamma percentile (KM)	1.396
95% gamma percentile (KM)	2.247	99% gamma percentile (KM)	4.507

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (10.10, α)	4.004	Adjusted Chi Square Value (10.10, β)	3.705
95% KM Approximate Gamma UCL	1.174	95% KM Adjusted Gamma UCL	1.269

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.868	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.838	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.23	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.28	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.467	Mean in Log Scale	-1.625
SD in Original Scale	0.938	SD in Log Scale	1.056
95% t UCL (assumes normality of ROS data)	0.83	95% Percentile Bootstrap UCL	0.831
95% BCA Bootstrap UCL	0.965	95% Bootstrap t UCL	2.675
95% H-UCL (Log ROS)	0.664		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.709	KM Geo Mean	0.181
KM SD (logged)	1.115	95% Critical H Value (KM-Log)	2.805
KM Standard Error of Mean (logged)	0.331	95% H-UCL (KM -Log)	0.691
KM SD (logged)	1.115	95% Critical H Value (KM-Log)	2.805
KM Standard Error of Mean (logged)	0.331		

DL/2 Statistics				
DL/2 Normal		DL/2 Log-Transformed		
Mean in Original Scale	0.508	Mean in Log Scale		-1.37
SD in Original Scale	0.923	SD in Log Scale		0.96
95% t UCL (Assumes normality)	0.865	95% H-Stat UCL		0.71

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.852		

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | dibromochloromethane | 124-48-1)

General Statistics			
Total Number of Observations	11	Number of Distinct Observations	10
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (soil | dibromochloromethane | 124-48-1) was not processed!

C (soil | dibromomethane | 74-95-3)

General Statistics			
Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

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 C (soil | dibromomethane | 74-95-3) was not processed!

C (soil | dichlorodifluoromethane | 75-71-8)

General Statistics			
Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

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 C (soil | dichlorodifluoromethane | 75-71-8) was not processed!

C (soil | diethyl ether | 60-29-7)

General Statistics			
Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

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 C (soil | diethyl ether | 60-29-7) was not processed!

C (soil | diethylphthalate | 84-66-2)

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

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 C (soil | diethylphthalate | 84-66-2) was not processed!

C (soil | diisopropyl ether | 108-20-3)

General Statistics			
Total Number of Observations	11	Number of Distinct Observations	10
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	10

The data set for variable C (soil | diisopropyl ether | 108-20-3) was not processed!

C (soil | dimethylphthalate | 131-11-3)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

The data set for variable C (soil | dimethylphthalate | 131-11-3) was not processed!

C (soil | di-n-butylphthalate | 84-74-2)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

The data set for variable C (soil | di-n-butylphthalate | 84-74-2) was not processed!

C (soil | di-n-octylphthalate | 117-84-0)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

The data set for variable C (soil | di-n-octylphthalate | 117-84-0) was not processed!

C (soil | ethyl benzene | 100-41-4)

General Statistics			
Total Number of Observations	21	Number of Distinct Observations	18
Number of Detects	10	Number of Non-Detects	11
Number of Distinct Detects	10	Number of Distinct Non-Detects	8
Minimum Detect	0.019	Minimum Non-Detect	4.4333E-4
Maximum Detect	1.4	Maximum Non-Detect	0.23
Variance Detects	0.219	Percent Non-Detects	52.38%
Mean Detects	0.406	SD Detects	0.467
Median Detects	0.165	CV Detects	1.152
Skewness Detects	1.261	Kurtosis Detects	0.752
Mean of Logged Detects	-1.68	SD of Logged Detects	1.443

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.815	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.781	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.293	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.304	Detected Data appear Normal at 1% Significance Level	
Detected Data appear Normal at 1% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.197	KM Standard Error of Mean	0.0842
90KM SD	0.366	95% KM (BCA) UCL	0.351
95% KM (t) UCL	0.342	95% KM (Percentile Bootstrap) UCL	0.344
95% KM (z) UCL	0.335	95% KM Bootstrap t UCL	0.45
90% KM Chebyshev UCL	0.45	95% KM Chebyshev UCL	0.564
97.5% KM Chebyshev UCL	0.723	99% KM Chebyshev UCL	1.035

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.347	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.756	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.204	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.276	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.767	k star (bias corrected MLE)	0.603
Theta hat (MLE)	0.529	Theta star (bias corrected MLE)	0.673
nu hat (MLE)	15.33	nu star (bias corrected)	12.07
Mean (detects)	0.406		

Gamma ROS Statistics using Imputed Non-Detects
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.199
Maximum	1.4	Median	0.01
SD	0.373	CV	1.881
k hat (MLE)	0.411	k star (bias corrected MLE)	0.384
Theta hat (MLE)	0.483	Theta star (bias corrected MLE)	0.517
nu hat (MLE)	17.25	nu star (bias corrected)	16.12
Adjusted Level of Significance (β)	0.0383		
Approximate Chi Square Value (16.12, α)	8.045	Adjusted Chi Square Value (16.12, β)	7.609
95% Gamma Approximate UCL	0.398	95% Gamma Adjusted UCL	0.421

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.197	SD (KM)	0.366
Variance (KM)	0.134	SE of Mean (KM)	0.0842
k hat (KM)	0.29	k star (KM)	0.28
nu hat (KM)	12.18	nu star (KM)	11.77
theta hat (KM)	0.679	theta star (KM)	0.703
80% gamma percentile (KM)	0.297	90% gamma percentile (KM)	0.585
95% gamma percentile (KM)	0.92	99% gamma percentile (KM)	1.799

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (11.77, α)	5.076	Adjusted Chi Square Value (11.77, β)	4.742
95% KM Approximate Gamma UCL	0.457	95% KM Adjusted Gamma UCL	0.489

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.954	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.869	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.139	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.241	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.197	Mean in Log Scale	-3.52
SD in Original Scale	0.374	SD in Log Scale	2.105
95% t UCL (assumes normality of ROS data)	0.338	95% Percentile Bootstrap UCL	0.338
95% BCA Bootstrap UCL	0.374	95% Bootstrap t UCL	0.444
95% H-UCL (Log ROS)	2.078		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-4.652	KM Geo Mean	0.00954
KM SD (logged)	3.138	95% Critical H Value (KM-Log)	6.156
KM Standard Error of Mean (logged)	0.747	95% H-UCL (KM -Log)	98.54
KM SD (logged)	3.138	95% Critical H Value (KM-Log)	6.156
KM Standard Error of Mean (logged)	0.747		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.204	Mean in Log Scale	-4.093
SD in Original Scale	0.372	SD in Log Scale	2.931
95% t UCL (Assumes normality)	0.344	95% H-Stat UCL	54.13

Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 1% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	0.342		
The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.			
Please verify the data were collected from random locations.			
If the data were collected using judgmental or other non-random methods,			
then contact a statistician to correctly calculate UCLs.			
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.			
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			

C (soil | ethyl tert-butyl ether | 637-92-3)

General Statistics			
Total Number of Observations	11	Number of Distinct Observations	10
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (soil | ethyl tert-butyl ether | 637-92-3) was not processed!

C (soil | fluoranthene | 206-44-0)

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	16
Number of Detects	9	Number of Non-Detects	11
Number of Distinct Detects	9	Number of Distinct Non-Detects	8
Minimum Detect	0.0825	Minimum Non-Detect	0.192
Maximum Detect	3	Maximum Non-Detect	0.22
Variance Detects	1.412	Percent Non-Detects	55%
Mean Detects	1.043	SD Detects	1.188
Median Detects	0.22	CV Detects	1.14
Skewness Detects	0.805	Kurtosis Detects	-1.234
Mean of Logged Detects	-0.825	SD of Logged Detects	1.507

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.791	Shapiro Wilk GOF Test
1% Shapiro Wilk Critical Value	0.764	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.311	Lilliefors GOF Test

1% Lilliefors Critical Value	0.316	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.533	KM Standard Error of Mean	0.209
90KM SD	0.882	95% KM (BCA) UCL	0.894
95% KM (t) UCL	0.895	95% KM (Percentile Bootstrap) UCL	0.88
95% KM (z) UCL	0.877	95% KM Bootstrap t UCL	1.067
90% KM Chebyshev UCL	1.161	95% KM Chebyshev UCL	1.445
97.5% KM Chebyshev UCL	1.84	99% KM Chebyshev UCL	2.616

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.739	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.755	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.283	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.29	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	0.698	k star (bias corrected MLE)	0.539
Theta hat (MLE)	1.494	Theta star (bias corrected MLE)	1.933
nu hat (MLE)	12.56	nu star (bias corrected)	9.708
Mean (detects)	1.043		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.5
Maximum	3	Median	0.11
SD	0.922	CV	1.844
k hat (MLE)	0.374	k star (bias corrected MLE)	0.352
Theta hat (MLE)	1.337	Theta star (bias corrected MLE)	1.423
nu hat (MLE)	14.97	nu star (bias corrected)	14.06
Adjusted Level of Significance (β)	0.038		
Approximate Chi Square Value (14.06, α)	6.613	Adjusted Chi Square Value (14.06, β)	6.212
95% Gamma Approximate UCL	1.064	95% Gamma Adjusted UCL	1.132

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.533	SD (KM)	0.882
Variance (KM)	0.778	SE of Mean (KM)	0.209
k hat (KM)	0.365	k star (KM)	0.343
nu hat (KM)	14.59	nu star (KM)	13.74
theta hat (KM)	1.46	theta star (KM)	1.551
80% gamma percentile (KM)	0.841	90% gamma percentile (KM)	1.543

95% gamma percentile (KM)	2.331		99% gamma percentile (KM)	4.347

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (13.74, α)	6.393		Adjusted Chi Square Value (13.74, β)	6
95% KM Approximate Gamma UCL	1.145		95% KM Adjusted Gamma UCL	1.22

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.842	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.859	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.232	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.252	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Approximate Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.543		Mean in Log Scale	-1.514
SD in Original Scale	0.9		SD in Log Scale	1.202
95% t UCL (assumes normality of ROS data)	0.891		95% Percentile Bootstrap UCL	0.882
95% BCA Bootstrap UCL	0.961		95% Bootstrap t UCL	1.088
95% H-UCL (Log ROS)	1.019			

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.574		KM Geo Mean	0.207
KM SD (logged)	1.183		95% Critical H Value (KM-Log)	2.91
KM Standard Error of Mean (logged)	0.293		95% H-UCL (KM -Log)	0.92
KM SD (logged)	1.183		95% Critical H Value (KM-Log)	2.91
KM Standard Error of Mean (logged)	0.293			

DL/2 Statistics

DL/2 Normal			DL/2 Log-Transformed	
Mean in Original Scale	0.525		Mean in Log Scale	-1.631
SD in Original Scale	0.908		SD in Log Scale	1.232
95% t UCL (Assumes normality)	0.876		95% H-Stat UCL	0.972

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.895		

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | fluorene | 86-73-7)

General Statistics				
Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	4	Number of Non-Detects	16
Number of Distinct Detects	4	Number of Distinct Non-Detects	12
Minimum Detect	0.11	Minimum Non-Detect	0.187
Maximum Detect	0.8	Maximum Non-Detect	0.22
Variance Detects	0.0924	Percent Non-Detects	80%
Mean Detects	0.363	SD Detects	0.304
Median Detects	0.27	CV Detects	0.839
Skewness Detects	1.534	Kurtosis Detects	2.544
Mean of Logged Detects	-1.271	SD of Logged Detects	0.827

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.869	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.306	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.413	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.161	KM Standard Error of Mean	0.0401
90KM SD	0.155	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.23	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.226	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.281	95% KM Chebyshev UCL	0.335
97.5% KM Chebyshev UCL	0.411	99% KM Chebyshev UCL	0.559

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.257	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.66	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.227	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.398	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only			
k hat (MLE)	2.103	k star (bias corrected MLE)	0.692
Theta hat (MLE)	0.172	Theta star (bias corrected MLE)	0.524
nu hat (MLE)	16.82	nu star (bias corrected)	5.538
Mean (detects)	0.363		

Gamma ROS Statistics using Imputed Non-Detects
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	0.0991
Maximum	0.8	Median	0.0188
SD	0.184	CV	1.858
k hat (MLE)	0.637	k star (bias corrected MLE)	0.575
Theta hat (MLE)	0.156	Theta star (bias corrected MLE)	0.172
nu hat (MLE)	25.49	nu star (bias corrected)	23
Adjusted Level of Significance (β)	0.038		
Approximate Chi Square Value (23.00, α)	13.09	Adjusted Chi Square Value (23.00, β)	12.5
95% Gamma Approximate UCL	0.174	95% Gamma Adjusted UCL	N/A
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.161	SD (KM)	0.155
Variance (KM)	0.0241	SE of Mean (KM)	0.0401
k hat (KM)	1.07	k star (KM)	0.943
nu hat (KM)	42.82	nu star (KM)	37.73
theta hat (KM)	0.15	theta star (KM)	0.17
80% gamma percentile (KM)	0.259	90% gamma percentile (KM)	0.375
95% gamma percentile (KM)	0.491	99% gamma percentile (KM)	0.761
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (37.73, α)	24.66	Adjusted Chi Square Value (37.73, β)	23.83
95% KM Approximate Gamma UCL	0.246	95% KM Adjusted Gamma UCL	0.254
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.992	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.792	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.187	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.346	Detected Data appear Lognormal at 10% Significance Level	
Detected Data appear Lognormal at 10% Significance Level			
Note GOF tests may be unreliable for small sample sizes			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.151	Mean in Log Scale	-2.138
SD in Original Scale	0.164	SD in Log Scale	0.594
95% t UCL (assumes normality of ROS data)	0.214	95% Percentile Bootstrap UCL	0.216
95% BCA Bootstrap UCL	0.255	95% Bootstrap t UCL	0.384
95% H-UCL (Log ROS)	0.188		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.02	KM Geo Mean	0.133
KM SD (logged)	0.493	95% Critical H Value (KM-Log)	2.012
KM Standard Error of Mean (logged)	0.127	95% H-UCL (KM -Log)	0.188
KM SD (logged)	0.493	95% Critical H Value (KM-Log)	2.012
KM Standard Error of Mean (logged)	0.127		
DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	

Mean in Original Scale	0.152		Mean in Log Scale	-2.098
SD in Original Scale	0.162		SD in Log Scale	0.538
95% t UCL (Assumes normality)	0.215		95% H-Stat UCL	0.183

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.23		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | hexachlorobenzene | 118-74-1)

General Statistics

Total Number of Observations	20		Number of Distinct Observations	15
Number of Detects	0		Number of Non-Detects	20
Number of Distinct Detects	0		Number of Distinct Non-Detects	15

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 C (soil | hexachlorobenzene | 118-74-1) was not processed!

C (soil | hexachlorobutadiene | 87-68-3)

General Statistics

Total Number of Observations	20		Number of Distinct Observations	18
Number of Detects	0		Number of Non-Detects	20
Number of Distinct Detects	0		Number of Distinct Non-Detects	18

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 C (soil | hexachlorobutadiene | 87-68-3) was not processed!

C (soil | hexachlorocyclopentadiene | 77-47-4)

General Statistics

Total Number of Observations	20		Number of Distinct Observations	15
Number of Detects	0		Number of Non-Detects	20
Number of Distinct Detects	0		Number of Distinct Non-Detects	15

The data set for variable C (soil | hexachlorocyclopentadiene | 77-47-4) was not processed!

C (soil | hexachloroethane | 67-72-1)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

The data set for variable C (soil | hexachloroethane | 67-72-1) was not processed!

C (soil | indeno(1,2,3-cd)pyrene | 193-39-5)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	16
Number of Detects	4	Number of Non-Detects	16
Number of Distinct Detects	4	Number of Distinct Non-Detects	12
Minimum Detect	0.15	Minimum Non-Detect	0.187
Maximum Detect	0.73	Maximum Non-Detect	0.22
Variance Detects	0.0905	Percent Non-Detects	80%
Mean Detects	0.418	SD Detects	0.301
Median Detects	0.395	CV Detects	0.721
Skewness Detects	0.111	Kurtosis Detects	-5.322
Mean of Logged Detects	-1.115	SD of Logged Detects	0.835

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.828	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.295	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.413	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.212	KM Standard Error of Mean	0.0408
90KM SD	0.156	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.282	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.279	95% KM Bootstrap t UCL	N/A

90% KM Chebyshev UCL	0.334	95% KM Chebyshev UCL	0.389
97.5% KM Chebyshev UCL	0.466	99% KM Chebyshev UCL	0.618

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.542	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.66	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.323	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.398	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	2.219	k star (bias corrected MLE)	0.721
Theta hat (MLE)	0.188	Theta star (bias corrected MLE)	0.579
nu hat (MLE)	17.75	nu star (bias corrected)	5.77
Mean (detects)	0.418		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0656	Mean	0.218
Maximum	0.73	Median	0.165
SD	0.165	CV	0.758
k hat (MLE)	3.062	k star (bias corrected MLE)	2.636
Theta hat (MLE)	0.0711	Theta star (bias corrected MLE)	0.0825
nu hat (MLE)	122.5	nu star (bias corrected)	105.5
Adjusted Level of Significance (β)	0.038		
Approximate Chi Square Value (105.46, α)	82.76	Adjusted Chi Square Value (105.46, β)	81.17
95% Gamma Approximate UCL	0.277	95% Gamma Adjusted UCL	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.212	SD (KM)	0.156
Variance (KM)	0.0243	SE of Mean (KM)	0.0408
k hat (KM)	1.844	k star (KM)	1.6
nu hat (KM)	73.75	nu star (KM)	64.02
theta hat (KM)	0.115	theta star (KM)	0.132
80% gamma percentile (KM)	0.325	90% gamma percentile (KM)	0.434
95% gamma percentile (KM)	0.539	99% gamma percentile (KM)	0.776

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (64.02, α)	46.61	Adjusted Chi Square Value (64.02, β)	45.44
95% KM Approximate Gamma UCL	0.29	95% KM Adjusted Gamma UCL	0.298

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.814	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.792	Detected Data appear Lognormal at 10% Significance Level	

Lilliefors Test Statistic	0.284	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.346	Detected Data appear Lognormal at 10% Significance Level	

<p style="color:blue; text-align:center;">**Detected Data appear Lognormal at 10% Significance Level**</p>

<p style="color:red; text-align:center;">**Note GOF tests may be unreliable for small sample sizes**</p>

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.222	Mean in Log Scale	-1.646
SD in Original Scale	0.16	SD in Log Scale	0.472
95% t UCL (assumes normality of ROS data)	0.283	95% Percentile Bootstrap UCL	0.283
95% BCA Bootstrap UCL	0.305	95% Bootstrap t UCL	0.466
95% H-UCL (Log ROS)	0.267		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.691	KM Geo Mean	0.184
KM SD (logged)	0.436	95% Critical H Value (KM-Log)	1.96
KM Standard Error of Mean (logged)	0.121	95% H-UCL (KM -Log)	0.247
KM SD (logged)	0.436	95% Critical H Value (KM-Log)	1.96
KM Standard Error of Mean (logged)	0.121		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.163	Mean in Log Scale	-2.067
SD in Original Scale	0.177	SD in Log Scale	0.592
95% t UCL (Assumes normality)	0.232	95% H-Stat UCL	0.201

<p style="color:red;">**DL/2 is not a recommended method, provided for comparisons and historical reasons**</p>

Nonparametric Distribution Free UCL Statistics

<p style="color:blue; text-align:center;">**Detected Data appear Normal Distributed at 1% Significance Level**</p>

Suggested UCL to Use

95% KM (t) UCL	0.282		

<p style="color:blue; text-align:center;">Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.</p>

<p style="color:blue; text-align:center;">Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.</p>

<p style="color:blue; text-align:center;">However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.</p>

C (soil | iron | 7439-89-6)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	11000	Mean	39083
Maximum	330000	Median	24583
SD	68835	Std. Error of Mean	15392
Coefficient of Variation	1.761	Skewness	4.394

Normal GOF Test

Shapiro Wilk Test Statistic	0.326	**Shapiro Wilk GOF Test**	

1% Shapiro Wilk Critical Value	0.868	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.453	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.223	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	65698	95% Adjusted-CLT UCL (Chen-1995)	80562
		95% Modified-t UCL (Johnson-1978)	68219

Gamma GOF Test

A-D Test Statistic	3.402	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.761	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.364	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.198	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.35	k star (bias corrected MLE)	1.181
Theta hat (MLE)	28946	Theta star (bias corrected MLE)	33093
nu hat (MLE)	54.01	nu star (bias corrected)	47.24
MLE Mean (bias corrected)	39083	MLE Sd (bias corrected)	35964
		Approximate Chi Square Value (0.05)	32.47
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	31.5

Assuming Gamma Distribution

95% Approximate Gamma UCL	56867	95% Adjusted Gamma UCL	58614

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.702	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.92	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.266	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.176	Data Not Lognormal at 10% Significance Level	

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	9.306	Mean of logged Data	10.16
Maximum of Logged Data	12.71	SD of logged Data	0.686

Assuming Lognormal Distribution

95% H-UCL	46382	90% Chebyshev (MVUE) UCL	48048
95% Chebyshev (MVUE) UCL	55208	97.5% Chebyshev (MVUE) UCL	65146
99% Chebyshev (MVUE) UCL	84668		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	64401	95% BCA Bootstrap UCL	85650

95% Standard Bootstrap UCL	63701	95% Bootstrap-t UCL	225162
95% Hall's Bootstrap UCL	205367	95% Percentile Bootstrap UCL	69400
90% Chebyshev(Mean, Sd) UCL	85259	95% Chebyshev(Mean, Sd) UCL	106175
97.5% Chebyshev(Mean, Sd) UCL	135206	99% Chebyshev(Mean, Sd) UCL	192231

Suggested UCL to Use

95% Student's-t UCL	65698		

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | isophorone | 78-59-1)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

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 C (soil | isophorone | 78-59-1) was not processed!

C (soil | lead | 7439-92-1)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	18
		Number of Missing Observations	0
Minimum	7.2	Mean	15.76
Maximum	64.63	Median	12.73
SD	12.33	Std. Error of Mean	2.758
Coefficient of Variation	0.783	Skewness	3.625

Normal GOF Test

Shapiro Wilk Test Statistic	0.532	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.868	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.376	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.223	Data Not Normal at 1% Significance Level
Data Not Normal at 1% Significance Level		

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	20.53	95% Adjusted-CLT UCL (Chen-1995)	22.68
		95% Modified-t UCL (Johnson-1978)	20.9

Gamma GOF Test			
A-D Test Statistic	1.737	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.746	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.296	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.195	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics			
k hat (MLE)	3.605	k star (bias corrected MLE)	3.098
Theta hat (MLE)	4.371	Theta star (bias corrected MLE)	5.087
nu hat (MLE)	144.2	nu star (bias corrected)	123.9
MLE Mean (bias corrected)	15.76	MLE Sd (bias corrected)	8.954
		Approximate Chi Square Value (0.05)	99.2
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	97.46

Assuming Gamma Distribution			
95% Approximate Gamma UCL	19.69	95% Adjusted Gamma UCL	20.04

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.828	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.92	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.244	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.176	Data Not Lognormal at 10% Significance Level	

Data Not Lognormal at 10% Significance Level

Lognormal Statistics			
Minimum of Logged Data	1.974	Mean of logged Data	2.612
Maximum of Logged Data	4.169	SD of logged Data	0.477

Assuming Lognormal Distribution			
95% H-UCL	19.01	90% Chebyshev (MVUE) UCL	20.2
95% Chebyshev (MVUE) UCL	22.48	97.5% Chebyshev (MVUE) UCL	25.63
99% Chebyshev (MVUE) UCL	31.83		

Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution			

Nonparametric Distribution Free UCLs			
95% CLT UCL	20.3	95% BCA Bootstrap UCL	24.19
95% Standard Bootstrap UCL	20.2	95% Bootstrap-t UCL	31.17
95% Hall's Bootstrap UCL	41.96	95% Percentile Bootstrap UCL	20.73
90% Chebyshev(Mean, Sd) UCL	24.03	95% Chebyshev(Mean, Sd) UCL	27.78
97.5% Chebyshev(Mean, Sd) UCL	32.98	99% Chebyshev(Mean, Sd) UCL	43.2

Suggested UCL to Use			
95% Student's-t UCL	20.53		

C (soil | manganese | 7439-96-5)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	20
		Number of Missing Observations	0
Minimum	61	Mean	292.1
Maximum	2700	Median	130
SD	580	Std. Error of Mean	129.7
Coefficient of Variation	1.986	Skewness	4.17

Normal GOF Test

Shapiro Wilk Test Statistic	0.377	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.868	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.42	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.223	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	516.3	95% Adjusted-CLT UCL (Chen-1995)	634.6
		95% Modified-t UCL (Johnson-1978)	536.5

Gamma GOF Test

A-D Test Statistic	2.666	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.769	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.305	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.2	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.978	k star (bias corrected MLE)	0.864
Theta hat (MLE)	298.8	Theta star (bias corrected MLE)	337.9
nu hat (MLE)	39.1	nu star (bias corrected)	34.57
MLE Mean (bias corrected)	292.1	MLE Sd (bias corrected)	314.2
		Approximate Chi Square Value (0.05)	22.12
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	21.33

Assuming Gamma Distribution

95% Approximate Gamma UCL	456.4	95% Adjusted Gamma UCL	473.3

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.803	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.92	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.2	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.176	Data Not Lognormal at 10% Significance Level	

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	4.111	Mean of logged Data	5.085
Maximum of Logged Data	7.901	SD of logged Data	0.854

Assuming Lognormal Distribution

95% H-UCL	374.7	90% Chebyshev (MVUE) UCL	369.6
95% Chebyshev (MVUE) UCL	434.1	97.5% Chebyshev (MVUE) UCL	523.6
99% Chebyshev (MVUE) UCL	699.4		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	505.4	95% BCA Bootstrap UCL	685.2
95% Standard Bootstrap UCL	499	95% Bootstrap-t UCL	1892
95% Hall's Bootstrap UCL	1464	95% Percentile Bootstrap UCL	538.5
90% Chebyshev(Mean, Sd) UCL	681.1	95% Chebyshev(Mean, Sd) UCL	857.3
97.5% Chebyshev(Mean, Sd) UCL	1102	99% Chebyshev(Mean, Sd) UCL	1582

Suggested UCL to Use

95% Student's-t UCL	516.3		

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | mercury | 7439-97-6)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	18
		Number of Missing Observations	0
Minimum	0.011	Mean	0.0376
Maximum	0.16	Median	0.029
SD	0.0329	Std. Error of Mean	0.00735
Coefficient of Variation	0.875	Skewness	2.982

Normal GOF Test

Shapiro Wilk Test Statistic	0.667	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.868	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.269	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.223	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	0.0503	95% Adjusted-CLT UCL (Chen-1995)	0.0549
		95% Modified-t UCL (Johnson-1978)	0.0511

Gamma GOF Test

A-D Test Statistic	0.628	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.751	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.189	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.196	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.375	k star (bias corrected MLE)	2.052
Theta hat (MLE)	0.0158	Theta star (bias corrected MLE)	0.0183
nu hat (MLE)	94.98	nu star (bias corrected)	82.07
MLE Mean (bias corrected)	0.0376	MLE Sd (bias corrected)	0.0262
		Approximate Chi Square Value (0.05)	62.19
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	60.83

Assuming Gamma Distribution

95% Approximate Gamma UCL	0.0496	95% Adjusted Gamma UCL	0.0507

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.959	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.92	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.138	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.176	Data appear Lognormal at 10% Significance Level	

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-4.51	Mean of logged Data	-3.506
Maximum of Logged Data	-1.833	SD of logged Data	0.64

Assuming Lognormal Distribution

95% H-UCL	0.0506	90% Chebyshev (MVUE) UCL	0.0529
95% Chebyshev (MVUE) UCL	0.0604	97.5% Chebyshev (MVUE) UCL	0.0708
99% Chebyshev (MVUE) UCL	0.0912		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	0.0497	95% BCA Bootstrap UCL	0.0567
95% Standard Bootstrap UCL	0.0494	95% Bootstrap-t UCL	0.0638
95% Hall's Bootstrap UCL	0.102	95% Percentile Bootstrap UCL	0.0507
90% Chebyshev(Mean, Sd) UCL	0.0596	95% Chebyshev(Mean, Sd) UCL	0.0696
97.5% Chebyshev(Mean, Sd) UCL	0.0835	99% Chebyshev(Mean, Sd) UCL	0.111

Suggested UCL to Use

95% Adjusted Gamma UCL	0.0507		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | methyl acetate | 79-20-9)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	3	Number of Non-Detects	8
Number of Distinct Detects	3	Number of Distinct Non-Detects	5
Minimum Detect	0.0041	Minimum Non-Detect	0.00133
Maximum Detect	0.95	Maximum Non-Detect	0.0019
Variance Detects	0.234	Percent Non-Detects	72.73%
Mean Detects	0.535	SD Detects	0.483
Median Detects	0.65	CV Detects	0.904
Skewness Detects	-1.012	Kurtosis Detects	N/A
Mean of Logged Detects	-1.993	SD of Logged Detects	3.04

Warning: Data set has only 3 Detected Values.

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

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.957	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.753	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.261	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.429	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.147	KM Standard Error of Mean	0.116
90KM SD	0.314	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.357	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.338	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.495	95% KM Chebyshev UCL	0.653
97.5% KM Chebyshev UCL	0.872	99% KM Chebyshev UCL	1.302

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.514	**Anderson-Darling GOF Test**	

5% A-D Critical Value	0.654	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.4	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.45	Detected data appear Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.469	k star (bias corrected MLE)	N/A
Theta hat (MLE)	1.139	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	2.816	nu star (bias corrected)	N/A
Mean (detects)	0.535		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0041	Mean	0.153
Maximum	0.95	Median	0.01
SD	0.327	CV	2.135
k hat (MLE)	0.336	k star (bias corrected MLE)	0.305
Theta hat (MLE)	0.456	Theta star (bias corrected MLE)	0.502
nu hat (MLE)	7.388	nu star (bias corrected)	6.706
Adjusted Level of Significance (β)	0.0278		
Approximate Chi Square Value (6.71, α)	2.011	Adjusted Chi Square Value (6.71, β)	1.619
95% Gamma Approximate UCL	0.511	95% Gamma Adjusted UCL	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.147	SD (KM)	0.314
Variance (KM)	0.0989	SE of Mean (KM)	0.116
k hat (KM)	0.218	k star (KM)	0.219
nu hat (KM)	4.793	nu star (KM)	4.819
theta hat (KM)	0.674	theta star (KM)	0.67
80% gamma percentile (KM)	0.202	90% gamma percentile (KM)	0.444
95% gamma percentile (KM)	0.738	99% gamma percentile (KM)	1.537

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (4.82, α)	1.07	Adjusted Chi Square Value (4.82, β)	0.814
95% KM Approximate Gamma UCL	0.661	95% KM Adjusted Gamma UCL	0.869

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.802	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.789	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.363	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.389	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.146	Mean in Log Scale	-10.39
SD in Original Scale	0.33	SD in Log Scale	5.946
95% t UCL (assumes normality of ROS data)	0.326	95% Percentile Bootstrap UCL	0.319
95% BCA Bootstrap UCL	0.378	95% Bootstrap t UCL	39.08
95% H-UCL (Log ROS)	1.131E+15		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-5.358	KM Geo Mean	0.00471
KM SD (logged)	2.435	95% Critical H Value (KM-Log)	6.159
KM Standard Error of Mean (logged)	0.899	95% H-UCL (KM -Log)	10.46
KM SD (logged)	2.435	95% Critical H Value (KM-Log)	6.159
KM Standard Error of Mean (logged)	0.899		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.146	Mean in Log Scale	-5.689
SD in Original Scale	0.33	SD in Log Scale	2.737
95% t UCL (Assumes normality)	0.327	95% H-Stat UCL	54.76

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.357		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | methyl tert-butyl ether | 1634-04-4)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	11
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	11

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 C (soil | methyl tert-butyl ether | 1634-04-4) was not processed!

C (soil | methylcyclohexane | 108-87-2)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	2	Number of Non-Detects	9

Number of Distinct Detects	2	Number of Distinct Non-Detects	6
Minimum Detect	5.3	Minimum Non-Detect	7.2333E-4
Maximum Detect	22	Maximum Non-Detect	0.0019
Variance Detects	139.4	Percent Non-Detects	81.82%
Mean Detects	13.65	SD Detects	11.81
Median Detects	13.65	CV Detects	0.865
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	2.379	SD of Logged Detects	1.006

Warning: Data set has only 2 Detected Values.

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

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	2.482	KM Standard Error of Mean	2.71
90KM SD	6.355	95% KM (BCA) UCL	N/A
95% KM (t) UCL	7.394	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	6.94	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	10.61	95% KM Chebyshev UCL	14.29
97.5% KM Chebyshev UCL	19.41	99% KM Chebyshev UCL	29.45

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	2.286	k star (bias corrected MLE)	N/A
Theta hat (MLE)	5.971	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	9.145	nu star (bias corrected)	N/A
Mean (detects)	13.65		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.482	SD (KM)	6.355
Variance (KM)	40.39	SE of Mean (KM)	2.71
k hat (KM)	0.153	k star (KM)	0.172
nu hat (KM)	3.356	nu star (KM)	3.774
theta hat (KM)	16.27	theta star (KM)	14.47
80% gamma percentile (KM)	2.986	90% gamma percentile (KM)	7.465
95% gamma percentile (KM)	13.28	99% gamma percentile (KM)	29.72

Gamma Kaplan-Meier (KM) Statistics

		Adjusted Level of Significance (β)	0.0278
Approximate Chi Square Value (3.77, α)	0.635	Adjusted Chi Square Value (3.77, β)	0.461
95% KM Approximate Gamma UCL	14.76	95% KM Adjusted Gamma UCL	20.34

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	2.523	Mean in Log Scale	-2.518
SD in Original Scale	6.649	SD in Log Scale	2.682
95% t UCL (assumes normality of ROS data)	6.157	95% Percentile Bootstrap UCL	6.06
95% BCA Bootstrap UCL	8.508	95% Bootstrap t UCL	295.1
95% H-UCL (Log ROS)	894.4		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-5.484	KM Geo Mean	0.00415
KM SD (logged)	3.719	95% Critical H Value (KM-Log)	9.192
KM Standard Error of Mean (logged)	1.586	95% H-UCL (KM -Log)	207716
KM SD (logged)	3.719	95% Critical H Value (KM-Log)	9.192
KM Standard Error of Mean (logged)	1.586		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	2.482	Mean in Log Scale	-5.404
SD in Original Scale	6.666	SD in Log Scale	3.871
95% t UCL (Assumes normality)	6.125	95% H-Stat UCL	971043

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution

Suggested UCL to Use			
95% KM (t) UCL	7.394		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | methylene chloride | 75-09-2)

General Statistics			
Total Number of Observations	11	Number of Distinct Observations	9
Number of Detects	3	Number of Non-Detects	8
Number of Distinct Detects	3	Number of Distinct Non-Detects	6
Minimum Detect	6.2000E-4	Minimum Non-Detect	5.6000E-4
Maximum Detect	6.9000E-4	Maximum Non-Detect	1.6
Variance Detects	1.4333E-9	Percent Non-Detects	72.73%
Mean Detects	6.6333E-4	SD Detects	3.7859E-5
Median Detects	6.8000E-4	CV Detects	0.0571
Skewness Detects	-1.597	Kurtosis Detects	N/A
Mean of Logged Detects	-7.319	SD of Logged Detects	0.058

Warning: Data set has only 3 Detected Values.

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

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.855	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.753	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.337	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.429	Detected Data appear Normal at 1% Significance Level
Detected Data appear Normal at 1% Significance Level		
Note GOF tests may be unreliable for small sample sizes		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs		
KM Mean	6.3750E-4	KM Standard Error of Mean	3.1930E-5
90KM SD	5.2142E-5	95% KM (BCA) UCL	N/A
95% KM (t) UCL	6.9537E-4	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	6.9002E-4	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	7.3329E-4	95% KM Chebyshev UCL	7.7668E-4
97.5% KM Chebyshev UCL	8.3690E-4	99% KM Chebyshev UCL	9.5520E-4

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.461	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.635	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.374	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.431	Detected data appear Gamma Distributed at 5% Significance Level
Detected Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only		
k hat (MLE)	450.8	k star (bias corrected MLE)	N/A
Theta hat (MLE)	1.4716E-6	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	2705	nu star (bias corrected)	N/A
Mean (detects)	6.6333E-4		

Gamma ROS Statistics using Imputed Non-Detects		
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs		
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)		
For such situations, GROS method may yield incorrect values of UCLs and BTVs		
This is especially true when the sample size is small.		
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates		
Minimum	6.2000E-4	Mean	0.00745
Maximum	0.01	Median	0.01
SD	0.00436	CV	0.585
k hat (MLE)	1.261	k star (bias corrected MLE)	0.978
Theta hat (MLE)	0.00591	Theta star (bias corrected MLE)	0.00762
nu hat (MLE)	27.74	nu star (bias corrected)	21.51
Adjusted Level of Significance (β)	0.0278		
Approximate Chi Square Value (21.51, α)	11.97	Adjusted Chi Square Value (21.51, β)	10.83
95% Gamma Approximate UCL	0.0134	95% Gamma Adjusted UCL	N/A

Estimates of Gamma Parameters using KM Estimates		
Mean (KM)	6.3750E-4	SD (KM)	5.2142E-5
Variance (KM)	2.7188E-9	SE of Mean (KM)	3.1930E-5

k hat (KM)	149.5	k star (KM)	108.8
nu hat (KM)	3289	nu star (KM)	2393
theta hat (KM)	4.2647E-6	theta star (KM)	5.8607E-6
80% gamma percentile (KM)	6.8829E-4	90% gamma percentile (KM)	7.1698E-4
95% gamma percentile (KM)	7.4126E-4	99% gamma percentile (KM)	7.8825E-4

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (N/A, α)	2280	Adjusted Chi Square Value (N/A, β)	2262
95% KM Approximate Gamma UCL	6.6899E-4	95% KM Adjusted Gamma UCL	6.7430E-4

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.85	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.789	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.339	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.389	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	6.4015E-4	Mean in Log Scale	-7.355
SD in Original Scale	3.5199E-5	SD in Log Scale	0.0557
95% t UCL (assumes normality of ROS data)	6.5939E-4	95% Percentile Bootstrap UCL	6.5686E-4
95% BCA Bootstrap UCL	6.5539E-4	95% Bootstrap t UCL	6.5833E-4
95% H-UCL (Log ROS)	N/A		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-7.361	KM Geo Mean	6.3531E-4
KM SD (logged)	0.0836	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0512	95% H-UCL (KM -Log)	N/A
KM SD (logged)	0.0836	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0512		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.101	Mean in Log Scale	-5.038
SD in Original Scale	0.245	SD in Log Scale	2.51
95% t UCL (Assumes normality)	0.235	95% H-Stat UCL	23.15

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	6.9537E-4		

Warning: Recommended UCL exceeds the maximum observation

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | naphthalene | 91-20-3)

General Statistics			
Total Number of Observations	30	Number of Distinct Observations	28
Number of Detects	23	Number of Non-Detects	7
Number of Distinct Detects	21	Number of Distinct Non-Detects	7
Minimum Detect	0.053	Minimum Non-Detect	0.0622
Maximum Detect	11	Maximum Non-Detect	0.217
Variance Detects	8.016	Percent Non-Detects	23.33%
Mean Detects	1.605	SD Detects	2.831
Median Detects	0.183	CV Detects	1.764
Skewness Detects	2.438	Kurtosis Detects	5.71
Mean of Logged Detects	-0.884	SD of Logged Detects	1.711

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.612	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.881	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.31	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.209	Detected Data Not Normal at 1% Significance Level
Detected Data Not Normal at 1% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	1.25	KM Standard Error of Mean	0.468
90KM SD	2.509	95% KM (BCA) UCL	2.094
95% KM (t) UCL	2.046	95% KM (Percentile Bootstrap) UCL	2.071
95% KM (z) UCL	2.02	95% KM Bootstrap t UCL	2.903
90% KM Chebyshev UCL	2.655	95% KM Chebyshev UCL	3.291
97.5% KM Chebyshev UCL	4.175	99% KM Chebyshev UCL	5.91

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	1.383	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.811	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.242	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.193	Detected Data Not Gamma Distributed at 5% Significance Level
Detected Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.472	k star (bias corrected MLE)	0.44
Theta hat (MLE)	3.4	Theta star (bias corrected MLE)	3.652
nu hat (MLE)	21.72	nu star (bias corrected)	20.22
Mean (detects)	1.605		

Gamma ROS Statistics using Imputed Non-Detects
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	1.233
Maximum	11	Median	0.125
SD	2.56	CV	2.076
k hat (MLE)	0.344	k star (bias corrected MLE)	0.332
Theta hat (MLE)	3.587	Theta star (bias corrected MLE)	3.719
nu hat (MLE)	20.63	nu star (bias corrected)	19.9
Adjusted Level of Significance (β)	0.041		
Approximate Chi Square Value (19.90, α)	10.78	Adjusted Chi Square Value (19.90, β)	10.39
95% Gamma Approximate UCL	2.277	95% Gamma Adjusted UCL	2.362

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.25	SD (KM)	2.509
Variance (KM)	6.294	SE of Mean (KM)	0.468
k hat (KM)	0.248	k star (KM)	0.246
nu hat (KM)	14.89	nu star (KM)	14.73
theta hat (KM)	5.036	theta star (KM)	5.089
80% gamma percentile (KM)	1.803	90% gamma percentile (KM)	3.756
95% gamma percentile (KM)	6.082	99% gamma percentile (KM)	12.29

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (14.73, α)	7.077	Adjusted Chi Square Value (14.73, β)	6.771
95% KM Approximate Gamma UCL	2.602	95% KM Adjusted Gamma UCL	2.719

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.9	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.928	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.204	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.165	Detected Data Not Lognormal at 10% Significance Level	

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	1.248	Mean in Log Scale	-1.327
SD in Original Scale	2.552	SD in Log Scale	1.734
95% t UCL (assumes normality of ROS data)	2.04	95% Percentile Bootstrap UCL	2.071
95% BCA Bootstrap UCL	2.316	95% Bootstrap t UCL	2.9
95% H-UCL (Log ROS)	3.702		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.282	KM Geo Mean	0.277
KM SD (logged)	1.644	95% Critical H Value (KM-Log)	3.381
KM Standard Error of Mean (logged)	0.309	95% H-UCL (KM -Log)	3.011
KM SD (logged)	1.644	95% Critical H Value (KM-Log)	3.381
KM Standard Error of Mean (logged)	0.309		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.249	Mean in Log Scale	-1.303
SD in Original Scale	2.552	SD in Log Scale	1.697
95% t UCL (Assumes normality)	2.04	95% H-Stat UCL	3.411

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	2.046	

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | n-butylbenzene | 104-51-8)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	2	Number of Non-Detects	9
Number of Distinct Detects	2	Number of Distinct Non-Detects	6
Minimum Detect	0.056	Minimum Non-Detect	5.1000E-4
Maximum Detect	0.43	Maximum Non-Detect	0.0019
Variance Detects	0.0699	Percent Non-Detects	81.82%
Mean Detects	0.243	SD Detects	0.264
Median Detects	0.243	CV Detects	1.088
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-1.863	SD of Logged Detects	1.441

Warning: Data set has only 2 Detected Values.

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

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0446	KM Standard Error of Mean	0.0524
90KM SD	0.123	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.14	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.131	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.202	95% KM Chebyshev UCL	0.273
97.5% KM Chebyshev UCL	0.372	99% KM Chebyshev UCL	0.566

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only			
k hat (MLE)	1.255	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.194	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	5.021	nu star (bias corrected)	N/A
Mean (detects)	0.243		

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0446	SD (KM)	0.123
Variance (KM)	0.0151	SE of Mean (KM)	0.0524
k hat (KM)	0.132	k star (KM)	0.156
nu hat (KM)	2.897	nu star (KM)	3.44
theta hat (KM)	0.339	theta star (KM)	0.285
80% gamma percentile (KM)	0.0502	90% gamma percentile (KM)	0.133
95% gamma percentile (KM)	0.243	99% gamma percentile (KM)	0.561

Gamma Kaplan-Meier (KM) Statistics			
		Adjusted Level of Significance (β)	0.0278
Approximate Chi Square Value (3.44, α)	0.514	Adjusted Chi Square Value (3.44, β)	0.367
95% KM Approximate Gamma UCL	0.299	95% KM Adjusted Gamma UCL	0.418

Lognormal GOF Test on Detected Observations Only	
Not Enough Data to Perform GOF Test	

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0443	Mean in Log Scale	-8.877
SD in Original Scale	0.129	SD in Log Scale	3.842
95% t UCL (assumes normality of ROS data)	0.115	95% Percentile Bootstrap UCL	0.117
95% BCA Bootstrap UCL	0.162	95% Bootstrap t UCL	38.36
95% H-UCL (Log ROS)	22637		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-6.541	KM Geo Mean	0.00144
KM SD (logged)	2.248	95% Critical H Value (KM-Log)	5.724
KM Standard Error of Mean (logged)	0.958	95% H-UCL (KM -Log)	1.055
KM SD (logged)	2.248	95% Critical H Value (KM-Log)	5.724
KM Standard Error of Mean (logged)	0.958		

DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0448	Mean in Log Scale	-6.207
SD in Original Scale	0.129	SD in Log Scale	2.227
95% t UCL (Assumes normality)	0.115	95% H-Stat UCL	1.309
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics	
Data do not follow a Discernible Distribution	

Suggested UCL to Use		
95% KM (t) UCL	0.14	

C (soil | nickel | 7440-02-0)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	8.467	Mean	48.92
Maximum	730	Median	13.16
SD	160.3	Std. Error of Mean	35.85
Coefficient of Variation	3.278	Skewness	4.469

Normal GOF Test

Shapiro Wilk Test Statistic	0.253	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.868	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.517	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.223	Data Not Normal at 1% Significance Level
Data Not Normal at 1% Significance Level		

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	110.9	95% Adjusted-CLT UCL (Chen-1995)	146.2
		95% Modified-t UCL (Johnson-1978)	116.9

Gamma GOF Test

A-D Test Statistic	5.832	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.798	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.469	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.204	Data Not Gamma Distributed at 5% Significance Level
Data Not Gamma Distributed at 5% Significance Level		

Gamma Statistics

k hat (MLE)	0.545	k star (bias corrected MLE)	0.497
Theta hat (MLE)	89.72	Theta star (bias corrected MLE)	98.47
nu hat (MLE)	21.81	nu star (bias corrected)	19.87
MLE Mean (bias corrected)	48.92	MLE Sd (bias corrected)	69.41
		Approximate Chi Square Value (0.05)	10.76
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	10.23

Assuming Gamma Distribution

95% Approximate Gamma UCL	90.38	95% Adjusted Gamma UCL	95.05

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.479	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.92	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.311	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.176	Data Not Lognormal at 10% Significance Level	

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.136	Mean of logged Data	2.741
Maximum of Logged Data	6.593	SD of logged Data	0.941

Assuming Lognormal Distribution

95% H-UCL	41.83	90% Chebyshev (MVUE) UCL	39.79
95% Chebyshev (MVUE) UCL	47.21	97.5% Chebyshev (MVUE) UCL	57.51
99% Chebyshev (MVUE) UCL	77.73		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	107.9	95% BCA Bootstrap UCL	157
95% Standard Bootstrap UCL	106.3	95% Bootstrap-t UCL	2196
95% Hall's Bootstrap UCL	914.5	95% Percentile Bootstrap UCL	120.5
90% Chebyshev(Mean, Sd) UCL	156.5	95% Chebyshev(Mean, Sd) UCL	205.2
97.5% Chebyshev(Mean, Sd) UCL	272.8	99% Chebyshev(Mean, Sd) UCL	405.7

Suggested UCL to Use

95% Student's-t UCL	110.9		

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | nitrobenzene | 98-95-3)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

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 data set for variable C (soil | nitrobenzene | 98-95-3) was not processed!

C (soil | n-nitrosodimethylamine | 62-75-9)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

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 C (soil | n-nitrosodimethylamine | 62-75-9) was not processed!

C (soil | n-nitroso-di-n-propylamine | 621-64-7)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

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 C (soil | n-nitroso-di-n-propylamine | 621-64-7) was not processed!

C (soil | n-nitrosodiphenylamine | 86-30-6)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

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 C (soil | n-nitrosodiphenylamine | 86-30-6) was not processed!

C (soil | n-propylbenzene | 103-65-1)

General Statistics				
Total Number of Observations	11	Number of Distinct Observations	8	
Number of Detects	2	Number of Non-Detects	9	
Number of Distinct Detects	2	Number of Distinct Non-Detects	6	
Minimum Detect	0.13	Minimum Non-Detect	3.8333E-4	
Maximum Detect	0.7	Maximum Non-Detect	0.0019	
Variance Detects	0.162	Percent Non-Detects	81.82%	
Mean Detects	0.415	SD Detects	0.403	
Median Detects	0.415	CV Detects	0.971	
Skewness Detects	N/A	Kurtosis Detects	N/A	
Mean of Logged Detects	-1.198	SD of Logged Detects	1.19	

Warning: Data set has only 2 Detected Values.

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

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0758	KM Standard Error of Mean	0.0856
90KM SD	0.201	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.231	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.217	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.333	95% KM Chebyshev UCL	0.449
97.5% KM Chebyshev UCL	0.611	99% KM Chebyshev UCL	0.928

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	1.715	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.242	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	6.861	nu star (bias corrected)	N/A
Mean (detects)	0.415		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0758	SD (KM)	0.201
Variance (KM)	0.0403	SE of Mean (KM)	0.0856
k hat (KM)	0.142	k star (KM)	0.164
nu hat (KM)	3.131	nu star (KM)	3.61
theta hat (KM)	0.532	theta star (KM)	0.462
80% gamma percentile (KM)	0.0884	90% gamma percentile (KM)	0.227
95% gamma percentile (KM)	0.409	99% gamma percentile (KM)	0.929

Gamma Kaplan-Meier (KM) Statistics

		Adjusted Level of Significance (β)	0.0278
Approximate Chi Square Value (3.61, α)	0.574	Adjusted Chi Square Value (3.61, β)	0.413
95% KM Approximate Gamma UCL	0.477	95% KM Adjusted Gamma UCL	0.662

Lognormal GOF Test on Detected Observations Only				
Not Enough Data to Perform GOF Test				

Lognormal ROS Statistics Using Imputed Non-Detects				
Mean in Original Scale	0.0759	Mean in Log Scale		-6.991
SD in Original Scale	0.211	SD in Log Scale		3.173
95% t UCL (assumes normality of ROS data)	0.191	95% Percentile Bootstrap UCL		0.192
95% BCA Bootstrap UCL	0.267	95% Bootstrap t UCL		20.64
95% H-UCL (Log ROS)	389.3			

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution				
KM Mean (logged)	-6.654	KM Geo Mean		0.00129
KM SD (logged)	2.597	95% Critical H Value (KM-Log)		6.538
KM Standard Error of Mean (logged)	1.107	95% H-UCL (KM -Log)		8.058
KM SD (logged)	2.597	95% Critical H Value (KM-Log)		6.538
KM Standard Error of Mean (logged)	1.107			

DL/2 Statistics				
DL/2 Normal		**DL/2 Log-Transformed**		
Mean in Original Scale	0.0761	Mean in Log Scale		-6.112
SD in Original Scale	0.211	SD in Log Scale		2.501
95% t UCL (Assumes normality)	0.191	95% H-Stat UCL		7.437
DL/2 is not a recommended method, provided for comparisons and historical reasons				

Nonparametric Distribution Free UCL Statistics				
Data do not follow a Discernible Distribution				

Suggested UCL to Use				
95% KM (t) UCL	0.231			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | pcbs (total) | 1336-36-3)

General Statistics				
Total Number of Observations	6	Number of Distinct Observations		6
Number of Detects	0	Number of Non-Detects		6
Number of Distinct Detects	0	Number of Distinct Non-Detects		6

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 C (soil | pcbs (total) | 1336-36-3) was not processed!

C (soil | p-cymene | 99-87-6)

General Statistics			
Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	2	Number of Non-Detects	9
Number of Distinct Detects	2	Number of Distinct Non-Detects	6
Minimum Detect	0.057	Minimum Non-Detect	4.5667E-4
Maximum Detect	0.3	Maximum Non-Detect	0.0019
Variance Detects	0.0295	Percent Non-Detects	81.82%
Mean Detects	0.179	SD Detects	0.172
Median Detects	0.179	CV Detects	0.963
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-2.034	SD of Logged Detects	1.174

Warning: Data set has only 2 Detected Values.

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

Normal GOF Test on Detects Only	
Not Enough Data to Perform GOF Test	

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.0328	KM Standard Error of Mean	0.0367
90KM SD	0.086	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0993	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0932	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.143	95% KM Chebyshev UCL	0.193
97.5% KM Chebyshev UCL	0.262	99% KM Chebyshev UCL	0.398

Gamma GOF Tests on Detected Observations Only	
Not Enough Data to Perform GOF Test	

Gamma Statistics on Detected Data Only			
k hat (MLE)	1.755	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.102	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	7.02	nu star (bias corrected)	N/A
Mean (detects)	0.179		

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0328	SD (KM)	0.086
Variance (KM)	0.0074	SE of Mean (KM)	0.0367
k hat (KM)	0.146	k star (KM)	0.167
nu hat (KM)	3.204	nu star (KM)	3.664
theta hat (KM)	0.225	theta star (KM)	0.197
80% gamma percentile (KM)	0.0387	90% gamma percentile (KM)	0.0985
95% gamma percentile (KM)	0.177	99% gamma percentile (KM)	0.399

Gamma Kaplan-Meier (KM) Statistics			
		Adjusted Level of Significance (β)	0.0278

Approximate Chi Square Value (3.66, α)	0.593	Adjusted Chi Square Value (3.66, β)	0.428
95% KM Approximate Gamma UCL	0.203	95% KM Adjusted Gamma UCL	0.281

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0327	Mean in Log Scale	-7.748
SD in Original Scale	0.0903	SD in Log Scale	3.13
95% t UCL (assumes normality of ROS data)	0.082	95% Percentile Bootstrap UCL	0.0822
95% BCA Bootstrap UCL	0.114	95% Bootstrap t UCL	8.246
95% H-UCL (Log ROS)	129.5		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-6.663	KM Geo Mean	0.00128
KM SD (logged)	2.21	95% Critical H Value (KM-Log)	5.638
KM Standard Error of Mean (logged)	0.943	95% H-UCL (KM -Log)	0.757
KM SD (logged)	2.21	95% Critical H Value (KM-Log)	5.638
KM Standard Error of Mean (logged)	0.943		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0331	Mean in Log Scale	-6.248
SD in Original Scale	0.0901	SD in Log Scale	2.155
95% t UCL (Assumes normality)	0.0824	95% H-Stat UCL	0.841

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.0993		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | pentachloronitrobenzene | 82-68-8)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

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 C (soil | pentachloronitrobenzene | 82-68-8) was not processed!

C (soil | pentachlorophenol | 87-86-5)

<div align="center">General Statistics</div>

Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

<div align="center" style="color:red">

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 C (soil | pentachlorophenol | 87-86-5) was not processed!

</div>

C (soil | phenanthrene | 85-01-8)

<div align="center">General Statistics</div>

Total Number of Observations	20	Number of Distinct Observations	20
Number of Detects	14	Number of Non-Detects	6
Number of Distinct Detects	14	Number of Distinct Non-Detects	6
Minimum Detect	0.067	Minimum Non-Detect	0.193
Maximum Detect	7	Maximum Non-Detect	0.22
Variance Detects	4.828	Percent Non-Detects	30%
Mean Detects	1.319	SD Detects	2.197
Median Detects	0.202	CV Detects	1.666
Skewness Detects	1.917	Kurtosis Detects	2.841
Mean of Logged Detects	-1.071	SD of Logged Detects	1.692

<div align="center">Normal GOF Test on Detects Only</div>

Shapiro Wilk Test Statistic	0.648	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.825	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.348	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.263	Detected Data Not Normal at 1% Significance Level	

<div align="center" style="color:red">**Detected Data Not Normal at 1% Significance Level**</div>

<div align="center">Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</div>

KM Mean	0.951	KM Standard Error of Mean	0.431
90KM SD	1.859	95% KM (BCA) UCL	1.707
95% KM (t) UCL	1.697	95% KM (Percentile Bootstrap) UCL	1.678
95% KM (z) UCL	1.66	95% KM Bootstrap t UCL	2.776
90% KM Chebyshev UCL	2.245	95% KM Chebyshev UCL	2.831
97.5% KM Chebyshev UCL	3.644	99% KM Chebyshev UCL	5.242

<div align="center">Gamma GOF Tests on Detected Observations Only</div>

A-D Test Statistic	1.238	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.798	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.264	**Kolmogorov-Smirnov GOF**	

5% K-S Critical Value	0.242	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.475	k star (bias corrected MLE)	0.421
Theta hat (MLE)	2.776	Theta star (bias corrected MLE)	3.133
nu hat (MLE)	13.3	nu star (bias corrected)	11.79
Mean (detects)	1.319		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.926
Maximum	7	Median	0.091
SD	1.919	CV	2.072
k hat (MLE)	0.33	k star (bias corrected MLE)	0.314
Theta hat (MLE)	2.803	Theta star (bias corrected MLE)	2.948
nu hat (MLE)	13.22	nu star (bias corrected)	12.57
Adjusted Level of Significance (β)	0.038		
Approximate Chi Square Value (12.57, α)	5.602	Adjusted Chi Square Value (12.57, β)	5.238
95% Gamma Approximate UCL	2.077	95% Gamma Adjusted UCL	2.222

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.951	SD (KM)	1.859
Variance (KM)	3.454	SE of Mean (KM)	0.431
k hat (KM)	0.262	k star (KM)	0.256
nu hat (KM)	10.47	nu star (KM)	10.23
theta hat (KM)	3.634	theta star (KM)	3.718
80% gamma percentile (KM)	1.392	90% gamma percentile (KM)	2.849
95% gamma percentile (KM)	4.571	99% gamma percentile (KM)	9.14

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (10.23, α)	4.086	Adjusted Chi Square Value (10.23, β)	3.783
95% KM Approximate Gamma UCL	2.38	95% KM Adjusted Gamma UCL	2.571

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.85	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.895	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.195	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.208	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Approximate Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.955	Mean in Log Scale	-1.425
SD in Original Scale	1.905	SD in Log Scale	1.505
95% t UCL (assumes normality of ROS data)	1.691	95% Percentile Bootstrap UCL	1.692

95% BCA Bootstrap UCL	1.915	95% Bootstrap t UCL	2.632
95% H-UCL (Log ROS)	2.447		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.478	KM Geo Mean	0.228
KM SD (logged)	1.506	95% Critical H Value (KM-Log)	3.437
KM Standard Error of Mean (logged)	0.353	95% H-UCL (KM -Log)	2.326
KM SD (logged)	1.506	95% Critical H Value (KM-Log)	3.437
KM Standard Error of Mean (logged)	0.353		

DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.954	Mean in Log Scale	-1.432
SD in Original Scale	1.905	SD in Log Scale	1.51
95% t UCL (Assumes normality)	1.691	95% H-Stat UCL	2.462

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 10% Significance Level

Suggested UCL to Use			
KM (t) UCL	1.697		

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | phenol | 108-95-2)

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

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 C (soil | phenol | 108-95-2) was not processed!

C (soil | pyrene | 129-00-0)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	16
Number of Detects	9	Number of Non-Detects	11
Number of Distinct Detects	8	Number of Distinct Non-Detects	8
Minimum Detect	0.0885	Minimum Non-Detect	0.192
Maximum Detect	2.9	Maximum Non-Detect	0.22
Variance Detects	1.389	Percent Non-Detects	55%
Mean Detects	0.999	SD Detects	1.179
Median Detects	0.19	CV Detects	1.18
Skewness Detects	1.041	Kurtosis Detects	-0.556
Mean of Logged Detects	-0.837	SD of Logged Detects	1.45

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.756	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.764	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.309	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.316	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Approximate Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.525	KM Standard Error of Mean	0.204
90KM SD	0.86	95% KM (BCA) UCL	0.879
95% KM (t) UCL	0.878	95% KM (Percentile Bootstrap) UCL	0.87
95% KM (z) UCL	0.861	95% KM Bootstrap t UCL	1.224
90% KM Chebyshev UCL	1.138	95% KM Chebyshev UCL	1.416
97.5% KM Chebyshev UCL	1.801	99% KM Chebyshev UCL	2.558

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.774	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.754	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.308	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.29	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.721	k star (bias corrected MLE)	0.554
Theta hat (MLE)	1.386	Theta star (bias corrected MLE)	1.801
nu hat (MLE)	12.97	nu star (bias corrected)	9.979
Mean (detects)	0.999		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.516
Maximum	2.9	Median	0.125
SD	0.891	CV	1.725

k hat (MLE)	0.516	k star (bias corrected MLE)	0.472
Theta hat (MLE)	1.001	Theta star (bias corrected MLE)	1.094
nu hat (MLE)	20.64	nu star (bias corrected)	18.88
Adjusted Level of Significance (β)	0.038		
Approximate Chi Square Value (18.88, α)	10.03	Adjusted Chi Square Value (18.88, β)	9.52
95% Gamma Approximate UCL	0.972	95% Gamma Adjusted UCL	1.024

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.525	SD (KM)	0.86
Variance (KM)	0.74	SE of Mean (KM)	0.204
k hat (KM)	0.373	k star (KM)	0.35
nu hat (KM)	14.91	nu star (KM)	14.01
theta hat (KM)	1.409	theta star (KM)	1.5
80% gamma percentile (KM)	0.832	90% gamma percentile (KM)	1.516
95% gamma percentile (KM)	2.283	99% gamma percentile (KM)	4.24

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (14.01, α)	6.576	Adjusted Chi Square Value (14.01, β)	6.176
95% KM Approximate Gamma UCL	1.119	95% KM Adjusted Gamma UCL	1.191

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.838	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.859	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.271	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.252	Detected Data Not Lognormal at 10% Significance Level	

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.546	Mean in Log Scale	-1.372
SD in Original Scale	0.874	SD in Log Scale	1.1
95% t UCL (assumes normality of ROS data)	0.884	95% Percentile Bootstrap UCL	0.882
95% BCA Bootstrap UCL	0.957	95% Bootstrap t UCL	1.257
95% H-UCL (Log ROS)	0.938		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.487	KM Geo Mean	0.226
KM SD (logged)	1.108	95% Critical H Value (KM-Log)	2.794
KM Standard Error of Mean (logged)	0.276	95% H-UCL (KM -Log)	0.85
KM SD (logged)	1.108	95% Critical H Value (KM-Log)	2.794
KM Standard Error of Mean (logged)	0.276		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.505	Mean in Log Scale	-1.637
SD in Original Scale	0.892	SD in Log Scale	1.199
95% t UCL (Assumes normality)	0.85	95% H-Stat UCL	0.895

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 1% Significance Level		
Suggested UCL to Use		
95% KM (t) UCL	0.878	
The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.		
Please verify the data were collected from random locations.		
If the data were collected using judgmental or other non-random methods,		
then contact a statistician to correctly calculate UCLs.		
When a data set follows an approximate distribution passing only one of the GOF tests,		
it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.		
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.		
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.		

C (soil | pyridine | 110-86-1)

General Statistics			
Total Number of Observations	20	Number of Distinct Observations	15
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	15

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 C (soil | pyridine | 110-86-1) was not processed!

C (soil | sec-butylbenzene | 135-98-8)

General Statistics			
Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	2	Number of Non-Detects	9
Number of Distinct Detects	2	Number of Distinct Non-Detects	6
Minimum Detect	0.041	Minimum Non-Detect	9.6333E-4
Maximum Detect	0.19	Maximum Non-Detect	0.0019
Variance Detects	0.0111	Percent Non-Detects	81.82%
Mean Detects	0.116	SD Detects	0.105
Median Detects	0.116	CV Detects	0.912
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-2.427	SD of Logged Detects	1.084

Warning: Data set has only 2 Detected Values.

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

Normal GOF Test on Detects Only				
Not Enough Data to Perform GOF Test				

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs				
KM Mean	0.0218	KM Standard Error of Mean	0.0232
90KM SD	0.0544	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0638	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.06	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0914	95% KM Chebyshev UCL	0.123
97.5% KM Chebyshev UCL	0.167	99% KM Chebyshev UCL	0.253

Gamma GOF Tests on Detected Observations Only			
Not Enough Data to Perform GOF Test			

Gamma Statistics on Detected Data Only			
k hat (MLE)	2.01	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0575	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	8.039	nu star (bias corrected)	N/A
Mean (detects)	0.116		

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0218	SD (KM)	0.0544
Variance (KM)	0.00296	SE of Mean (KM)	0.0232
k hat (KM)	0.16	k star (KM)	0.177
nu hat (KM)	3.528	nu star (KM)	3.899
theta hat (KM)	0.136	theta star (KM)	0.123
80% gamma percentile (KM)	0.0268	90% gamma percentile (KM)	0.0657
95% gamma percentile (KM)	0.116	99% gamma percentile (KM)	0.256

Gamma Kaplan-Meier (KM) Statistics			
		Adjusted Level of Significance (β)	0.0278
Approximate Chi Square Value (3.90, α)	0.682	Adjusted Chi Square Value (3.90, β)	0.498
95% KM Approximate Gamma UCL	0.125	95% KM Adjusted Gamma UCL	0.171

Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0212	Mean in Log Scale	-7.703
SD in Original Scale	0.0573	SD in Log Scale	2.89
95% t UCL (assumes normality of ROS data)	0.0525	95% Percentile Bootstrap UCL	0.0522
95% BCA Bootstrap UCL	0.073	95% Bootstrap t UCL	3.545
95% H-UCL (Log ROS)	21.71		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-6.124	KM Geo Mean	0.00219
KM SD (logged)	1.773	95% Critical H Value (KM-Log)	4.638
KM Standard Error of Mean (logged)	0.756	95% H-UCL (KM -Log)	0.142
KM SD (logged)	1.773	95% Critical H Value (KM-Log)	4.638

KM Standard Error of Mean (logged)	0.756		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0217	Mean in Log Scale	-6.252
SD in Original Scale	0.0571	SD in Log Scale	1.931
95% t UCL (Assumes normality)	0.0529	95% H-Stat UCL	0.262

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.0638		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | selenium | 7782-49-2)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	14
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	14

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 C (soil | selenium | 7782-49-2) was not processed!

C (soil | silver | 7440-22-4)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	14
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	14

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 C (soil | silver | 7440-22-4) was not processed!

C (soil | styrene | 100-42-5)

General Statistics			
Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

C (soil | t-amyl methyl ether | 994-05-8)

General Statistics			
Total Number of Observations	11	Number of Distinct Observations	10
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	10

C (soil | tert-butyl alcohol | 75-65-0)

General Statistics			
Total Number of Observations	11	Number of Distinct Observations	10
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	10

C (soil | tert-butylbenzene | 98-06-6)

General Statistics			
Total Number of Observations	11	Number of Distinct Observations	11
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	11

C (soil | tetrachloroethene | 127-18-4)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

C (soil | tetrahydrofuran | 109-99-9)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	10
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	10

C (soil | thallium | 7440-28-0)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	17
Number of Detects	3	Number of Non-Detects	17
Number of Distinct Detects	3	Number of Distinct Non-Detects	14
Minimum Detect	1.35	Minimum Non-Detect	0.877
Maximum Detect	1.45	Maximum Non-Detect	2.5
Variance Detects	0.0025	Percent Non-Detects	85%
Mean Detects	1.4	SD Detects	0.05
Median Detects	1.4	CV Detects	0.0357
Skewness Detects	6.017E-14	Kurtosis Detects	N/A
Mean of Logged Detects	0.336	SD of Logged Detects	0.0357

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	1	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.753	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.175	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.429	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.051	KM Standard Error of Mean	0.101
90KM SD	0.248	95% KM (BCA) UCL	N/A
95% KM (t) UCL	1.226	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	1.218	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	1.355	95% KM Chebyshev UCL	1.492
97.5% KM Chebyshev UCL	1.683	99% KM Chebyshev UCL	2.058

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.246	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.635	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.224	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.431	Detected data appear Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1175	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00119	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	7052	nu star (bias corrected)	N/A
Mean (detects)	1.4		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	1.169	Mean	1.264
Maximum	1.45	Median	1.26
SD	0.0754	CV	0.0596
k hat (MLE)	306.6	k star (bias corrected MLE)	260.6
Theta hat (MLE)	0.00412	Theta star (bias corrected MLE)	0.00485
nu hat (MLE)	12264	nu star (bias corrected)	10426
Adjusted Level of Significance (β)	0.038		
Approximate Chi Square Value (N/A, α)	10190	Adjusted Chi Square Value (N/A, β)	10171
95% Gamma Approximate UCL	1.293	95% Gamma Adjusted UCL	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.051	SD (KM)	0.248

Variance (KM)	0.0614		SE of Mean (KM)	0.101
k hat (KM)	17.99		k star (KM)	15.32
nu hat (KM)	719.6		nu star (KM)	613
theta hat (KM)	0.0584		theta star (KM)	0.0686
80% gamma percentile (KM)	1.268		90% gamma percentile (KM)	1.407
95% gamma percentile (KM)	1.528		99% gamma percentile (KM)	1.774

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (612.96, α)	556.5		Adjusted Chi Square Value (612.96, β)	552.3
95% KM Approximate Gamma UCL	1.158		95% KM Adjusted Gamma UCL	1.167

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	1	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.789	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.176	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.389	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	1.27		Mean in Log Scale	0.238
SD in Original Scale	0.0712		SD in Log Scale	0.0546
95% t UCL (assumes normality of ROS data)	1.298		95% Percentile Bootstrap UCL	1.296
95% BCA Bootstrap UCL	1.299		95% Bootstrap t UCL	1.304
95% H-UCL (Log ROS)	N/A			

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.0243		KM Geo Mean	1.025
KM SD (logged)	0.221		95% Critical H Value (KM-Log)	1.799
KM Standard Error of Mean (logged)	0.0903		95% H-UCL (KM -Log)	1.15
KM SD (logged)	0.221		95% Critical H Value (KM-Log)	1.799
KM Standard Error of Mean (logged)	0.0903			

DL/2 Statistics

DL/2 Normal			DL/2 Log-Transformed	
Mean in Original Scale	0.88		Mean in Log Scale	-0.205
SD in Original Scale	0.331		SD in Log Scale	0.418
95% t UCL (Assumes normality)	1.008		95% H-Stat UCL	1.072

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	1.226		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | toluene | 108-88-3)

General Statistics

Total Number of Observations	21	Number of Distinct Observations	17
Number of Detects	3	Number of Non-Detects	18
Number of Distinct Detects	3	Number of Distinct Non-Detects	14
Minimum Detect	4.8000E-4	Minimum Non-Detect	5.5667E-4
Maximum Detect	13	Maximum Non-Detect	0.44
Variance Detects	45.88	Percent Non-Detects	85.71%
Mean Detects	5.4	SD Detects	6.773
Median Detects	3.2	CV Detects	1.254
Skewness Detects	1.307	Kurtosis Detects	N/A
Mean of Logged Detects	-1.305	SD of Logged Detects	5.533

Warning: Data set has only 3 Detected Values.

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

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.921	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.753	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.294	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.429	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.772	KM Standard Error of Mean	0.753
90KM SD	2.818	95% KM (BCA) UCL	N/A
95% KM (t) UCL	2.071	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	2.011	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	3.031	95% KM Chebyshev UCL	4.054
97.5% KM Chebyshev UCL	5.475	99% KM Chebyshev UCL	8.265

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.397	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.681	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.338	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.46	Detected data appear Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.239	k star (bias corrected MLE)	N/A
Theta hat (MLE)	22.58	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	1.435	nu star (bias corrected)	N/A
Mean (detects)	5.4		

Gamma ROS Statistics using Imputed Non-Detects

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	4.8000E-4	Mean	0.78
Maximum	13	Median	0.01
SD	2.885	CV	3.699
k hat (MLE)	0.191	k star (bias corrected MLE)	0.195
Theta hat (MLE)	4.088	Theta star (bias corrected MLE)	3.994
nu hat (MLE)	8.014	nu star (bias corrected)	8.202
Adjusted Level of Significance (β)	0.0383		
Approximate Chi Square Value (8.20, α)	2.853	Adjusted Chi Square Value (8.20, β)	2.615
95% Gamma Approximate UCL	2.243	95% Gamma Adjusted UCL	N/A
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.772	SD (KM)	2.818
Variance (KM)	7.939	SE of Mean (KM)	0.753
k hat (KM)	0.075	k star (KM)	0.0961
nu hat (KM)	3.152	nu star (KM)	4.035
theta hat (KM)	10.29	theta star (KM)	8.035
80% gamma percentile (KM)	0.504	90% gamma percentile (KM)	2.019
95% gamma percentile (KM)	4.489	99% gamma percentile (KM)	12.51
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (4.03, α)	0.735	Adjusted Chi Square Value (4.03, β)	0.638
95% KM Approximate Gamma UCL	4.234	95% KM Adjusted Gamma UCL	4.881
95% KM Adjusted Gamma UCL (use when k<=1 and 15 < n < 50)			
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.851	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.789	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.339	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.389	Detected Data appear Lognormal at 10% Significance Level	
Detected Data appear Lognormal at 10% Significance Level			
Note GOF tests may be unreliable for small sample sizes			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.772	Mean in Log Scale	-6.73
SD in Original Scale	2.887	SD in Log Scale	3.143
95% t UCL (assumes normality of ROS data)	1.859	95% Percentile Bootstrap UCL	2.01
95% BCA Bootstrap UCL	2.781	95% Bootstrap t UCL	1684
95% H-UCL (Log ROS)	12.73		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-6.736	KM Geo Mean	0.00119
KM SD (logged)	2.799	95% Critical H Value (KM-Log)	5.544
KM Standard Error of Mean (logged)	0.748	95% H-UCL (KM -Log)	1.915
KM SD (logged)	2.799	95% Critical H Value (KM-Log)	5.544

KM Standard Error of Mean (logged)	0.748		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.822	Mean in Log Scale	-4.289
SD in Original Scale	2.874	SD in Log Scale	3.18
95% t UCL (Assumes normality)	1.904	95% H-Stat UCL	181.4

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	2.071		

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | trans-1,2-dichloroethene | 156-60-5)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

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 C (soil | trans-1,2-dichloroethene | 156-60-5) was not processed!

C (soil | trans-1,4-dichloro-2-butene | 110-57-6)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	11
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	11

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 C (soil | trans-1,4-dichloro-2-butene | 110-57-6) was not processed!

C (soil | trichloroethene | 79-01-6)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

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 C (soil | trichloroethene | 79-01-6) was not processed!

C (soil | trichlorofluoromethane | 75-69-4)

General Statistics

Total Number of Observations	11	Number of Distinct Observations	10
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (soil | trichlorofluoromethane | 75-69-4) was not processed!

C (soil | vanadium | 7440-62-2)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	20
		Number of Missing Observations	0
Minimum	15	Mean	32.42
Maximum	110	Median	27.08
SD	20.53	Std. Error of Mean	4.59
Coefficient of Variation	0.633	Skewness	3.187

Normal GOF Test

Shapiro Wilk Test Statistic	0.593	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.868	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.365	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.223	Data Not Normal at 1% Significance Level
	Data Not Normal at 1% Significance Level	

Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	40.36	95% Adjusted-CLT UCL (Chen-1995)	43.46
		95% Modified-t UCL (Johnson-1978)	40.9

Gamma GOF Test			
A-D Test Statistic	1.884	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.745	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.309	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.195	Data Not Gamma Distributed at 5% Significance Level	
Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	4.724	k star (bias corrected MLE)	4.048
Theta hat (MLE)	6.863	Theta star (bias corrected MLE)	8.008
nu hat (MLE)	188.9	nu star (bias corrected)	161.9
MLE Mean (bias corrected)	32.42	MLE Sd (bias corrected)	16.11
		Approximate Chi Square Value (0.05)	133.5
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	131.5

Assuming Gamma Distribution			
95% Approximate Gamma UCL	39.32	95% Adjusted Gamma UCL	39.93

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.825	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.92	Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.27	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.176	Data Not Lognormal at 10% Significance Level	
Data Not Lognormal at 10% Significance Level			

Lognormal Statistics			
Minimum of Logged Data	2.708	Mean of logged Data	3.369
Maximum of Logged Data	4.7	SD of logged Data	0.426

Assuming Lognormal Distribution			
95% H-UCL	38.51	90% Chebyshev (MVUE) UCL	40.97
95% Chebyshev (MVUE) UCL	45.18	97.5% Chebyshev (MVUE) UCL	51.03
99% Chebyshev (MVUE) UCL	62.52		

Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution			

Nonparametric Distribution Free UCLs			
95% CLT UCL	39.97	95% BCA Bootstrap UCL	44.3
95% Standard Bootstrap UCL	39.73	95% Bootstrap-t UCL	50.33
95% Hall's Bootstrap UCL	67.5	95% Percentile Bootstrap UCL	40.68
90% Chebyshev(Mean, Sd) UCL	46.19	95% Chebyshev(Mean, Sd) UCL	52.43
97.5% Chebyshev(Mean, Sd) UCL	61.08	99% Chebyshev(Mean, Sd) UCL	78.09

Suggested UCL to Use			
95% Student's-t UCL	40.36		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | vinyl chloride | 75-01-4)

General Statistics			
Total Number of Observations	11	Number of Distinct Observations	10
Number of Detects	0	Number of Non-Detects	11
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (soil | vinyl chloride | 75-01-4) was not processed!

C (soil | xylenes (total) | 1330-20-7)

General Statistics			
Total Number of Observations	21	Number of Distinct Observations	21
Number of Detects	10	Number of Non-Detects	11
Number of Distinct Detects	10	Number of Distinct Non-Detects	11
Minimum Detect	0.003	Minimum Non-Detect	7.5333E-4
Maximum Detect	19.5	Maximum Non-Detect	0.34
Variance Detects	36.01	Percent Non-Detects	52.38%
Mean Detects	2.82	SD Detects	6.001
Median Detects	0.715	CV Detects	2.128
Skewness Detects	2.917	Kurtosis Detects	8.737
Mean of Logged Detects	-0.843	SD of Logged Detects	2.499

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.518	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.781	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.394	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.304	Detected Data Not Normal at 1% Significance Level	
Detected Data Not Normal at 1% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	1.345	KM Standard Error of Mean	0.96
90KM SD	4.173	95% KM (BCA) UCL	3.185
95% KM (t) UCL	3	95% KM (Percentile Bootstrap) UCL	3.128
95% KM (z) UCL	2.924	95% KM Bootstrap t UCL	14.23
90% KM Chebyshev UCL	4.224	95% KM Chebyshev UCL	5.528
97.5% KM Chebyshev UCL	7.339	99% KM Chebyshev UCL	10.89

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.41	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.803	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.221	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.286	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.357	k star (bias corrected MLE)	0.316
Theta hat (MLE)	7.909	Theta star (bias corrected MLE)	8.917
nu hat (MLE)	7.132	nu star (bias corrected)	6.326
Mean (detects)	2.82		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.003	Mean	1.348
Maximum	19.5	Median	0.01
SD	4.275	CV	3.17
k hat (MLE)	0.231	k star (bias corrected MLE)	0.23
Theta hat (MLE)	5.834	Theta star (bias corrected MLE)	5.866
nu hat (MLE)	9.706	nu star (bias corrected)	9.653
Adjusted Level of Significance (β)	0.0383		
Approximate Chi Square Value (9.65, α)	3.726	Adjusted Chi Square Value (9.65, β)	3.447
95% Gamma Approximate UCL	3.493	95% Gamma Adjusted UCL	3.775
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	1.345	SD (KM)	4.173
Variance (KM)	17.41	SE of Mean (KM)	0.96
k hat (KM)	0.104	k star (KM)	0.121
nu hat (KM)	4.363	nu star (KM)	5.073
theta hat (KM)	12.95	theta star (KM)	11.13
80% gamma percentile (KM)	1.188	90% gamma percentile (KM)	3.817
95% gamma percentile (KM)	7.668	99% gamma percentile (KM)	19.4
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (5.07, α)	1.186	Adjusted Chi Square Value (5.07, β)	1.05
95% KM Approximate Gamma UCL	5.752	95% KM Adjusted Gamma UCL	6.496
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.955	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.869	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.221	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.241	Detected Data appear Lognormal at 10% Significance Level	
Detected Data appear Lognormal at 10% Significance Level			

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	1.344	Mean in Log Scale	-3.865
SD in Original Scale	4.276	SD in Log Scale	3.434
95% t UCL (assumes normality of ROS data)	2.953	95% Percentile Bootstrap UCL	3.084
95% BCA Bootstrap UCL	4.23	95% Bootstrap t UCL	14.13
95% H-UCL (Log ROS)	1298		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-3.782	KM Geo Mean	0.0228
KM SD (logged)	3.313	95% Critical H Value (KM-Log)	6.474
KM Standard Error of Mean (logged)	0.812	95% H-UCL (KM -Log)	667.2
KM SD (logged)	3.313	95% Critical H Value (KM-Log)	6.474
KM Standard Error of Mean (logged)	0.812		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	1.357	Mean in Log Scale	-3.383
SD in Original Scale	4.272	SD in Log Scale	3.282
95% t UCL (Assumes normality)	2.965	95% H-Stat UCL	822.7

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	6.496		

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (soil | zinc | 7440-66-6)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	20
		Number of Missing Observations	0
Minimum	25	Mean	44.02
Maximum	84.5	Median	41.67
SD	14.6	Std. Error of Mean	3.265
Coefficient of Variation	0.332	Skewness	1.322

Normal GOF Test

Shapiro Wilk Test Statistic	0.898	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.868	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.164	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.223	Data appear Normal at 1% Significance Level	

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	49.66	95% Adjusted-CLT UCL (Chen-1995)	50.42
		95% Modified-t UCL (Johnson-1978)	49.83

Gamma GOF Test

A-D Test Statistic	0.338	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.742	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.125	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.194	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	11	k star (bias corrected MLE)	9.386
Theta hat (MLE)	4.001	Theta star (bias corrected MLE)	4.69
nu hat (MLE)	440.1	nu star (bias corrected)	375.4
MLE Mean (bias corrected)	44.02	MLE Sd (bias corrected)	14.37
		Approximate Chi Square Value (0.05)	331.5
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	328.3

Assuming Gamma Distribution

95% Approximate Gamma UCL	49.85	95% Adjusted Gamma UCL	50.34

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.974	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.92	Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.105	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.176	Data appear Lognormal at 10% Significance Level

Data appear Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	3.219	Mean of logged Data	3.739
Maximum of Logged Data	4.437	SD of logged Data	0.304

Assuming Lognormal Distribution

95% H-UCL	50.11	90% Chebyshev (MVUE) UCL	53.02
95% Chebyshev (MVUE) UCL	57.14	97.5% Chebyshev (MVUE) UCL	62.86
99% Chebyshev (MVUE) UCL	74.09		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	49.39	95% BCA Bootstrap UCL	50.44
95% Standard Bootstrap UCL	49.28	95% Bootstrap-t UCL	51.4
95% Hall's Bootstrap UCL	52.11	95% Percentile Bootstrap UCL	49.47
90% Chebyshev(Mean, Sd) UCL	53.81	95% Chebyshev(Mean, Sd) UCL	58.25
97.5% Chebyshev(Mean, Sd) UCL	64.41	99% Chebyshev(Mean, Sd) UCL	76.5

Suggested UCL to Use

95% Student's-t UCL	49.66	

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

ATTACHMENT 2-2
GROUNDWATER PROUCL RESULTS

UCL Statistics for Data Sets with Non-Detects		

User Selected Options		
Date/Time of Computation	ProUCL 5.2 10/11/2023 10:05:27 PM	
From File	ProUCL_Export_GW_AVG_20231011.xls	
Full Precision	OFF	
Confidence Coefficient	95%	
Number of Bootstrap Operations	10000	

C (groundwater | 1,1,1,2-tetrachloroethane | 630-20-6)

General Statistics			
Total Number of Observations	13	Number of Distinct Observations	3
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	3

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 C (groundwater | 1,1,1,2-tetrachloroethane | 630-20-6) was not processed!

C (groundwater | 1,1,1-trichloroethane | 71-55-6)

General Statistics			
Total Number of Observations	36	Number of Distinct Observations	4
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	4

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 C (groundwater | 1,1,1-trichloroethane | 71-55-6) was not processed!

C (groundwater | 1,1,2,2-tetrachloroethane | 79-34-5)

General Statistics			
Total Number of Observations	36	Number of Distinct Observations	4
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	4

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 C (groundwater | 1,1,2,2-tetrachloroethane | 79-34-5) was not processed!

C (groundwater | 1,1,2-trichloro-1,2,2-trifluoroethane | 76-13-1)

General Statistics

Total Number of Observations	36	Number of Distinct Observations	4
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	4

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 C (groundwater | 1,1,2-trichloro-1,2,2-trifluoroethane | 76-13-1) was not processed!

C (groundwater | 1,1,2-trichloroethane | 79-00-5)

General Statistics

Total Number of Observations	36	Number of Distinct Observations	4
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	4

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 C (groundwater | 1,1,2-trichloroethane | 79-00-5) was not processed!

C (groundwater | 1,1-biphenyl | 92-52-4)

General Statistics

Total Number of Observations	31	Number of Distinct Observations	11
Number of Detects	4	Number of Non-Detects	27
Number of Distinct Detects	4	Number of Distinct Non-Detects	7
Minimum Detect	4.6000E-5	Minimum Non-Detect	9.9333E-5
Maximum Detect	5.0000E-4	Maximum Non-Detect	0.05
Variance Detects	3.6397E-8	Percent Non-Detects	87.1%
Mean Detects	2.3400E-4	SD Detects	1.9078E-4
Median Detects	1.9500E-4	CV Detects	0.815
Skewness Detects	1.157	Kurtosis Detects	2.253
Mean of Logged Detects	-8.668	SD of Logged Detects	0.985

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.901	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Level

Lilliefors Test Statistic	0.321	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.413	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.5343E-4	KM Standard Error of Mean	6.7970E-5
90KM SD	1.5574E-4	95% KM (BCA) UCL	N/A
95% KM (t) UCL	2.6879E-4	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	2.6523E-4	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	3.5734E-4	95% KM Chebyshev UCL	4.4970E-4
97.5% KM Chebyshev UCL	5.7790E-4	99% KM Chebyshev UCL	8.2972E-4

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.307	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.661	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.246	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.399	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	1.771	k star (bias corrected MLE)	0.609
Theta hat (MLE)	1.3214E-4	Theta star (bias corrected MLE)	3.8399E-4
nu hat (MLE)	14.17	nu star (bias corrected)	4.875
Mean (detects)	2.3400E-4		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	4.6000E-5	Mean	0.00874
Maximum	0.01	Median	0.01
SD	0.00333	CV	0.381
k hat (MLE)	1.427	k star (bias corrected MLE)	1.311
Theta hat (MLE)	0.00612	Theta star (bias corrected MLE)	0.00667
nu hat (MLE)	88.48	nu star (bias corrected)	81.25
Adjusted Level of Significance (β)	0.0413		
Approximate Chi Square Value (81.25, α)	61.48	Adjusted Chi Square Value (81.25, β)	60.52
95% Gamma Approximate UCL	0.0116	95% Gamma Adjusted UCL	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.5343E-4	SD (KM)	1.5574E-4
Variance (KM)	2.4255E-8	SE of Mean (KM)	6.7970E-5
k hat (KM)	0.971	k star (KM)	0.898
nu hat (KM)	60.17	nu star (KM)	55.68

theta hat (KM)	1.5808E-4	theta star (KM)	1.7083E-4
80% gamma percentile (KM)	2.4894E-4	90% gamma percentile (KM)	3.6273E-4
95% gamma percentile (KM)	4.7751E-4	99% gamma percentile (KM)	7.4616E-4

Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (55.68, α)	39.53	Adjusted Chi Square Value (55.68, β)	38.78
95% KM Approximate Gamma UCL	2.1610E-4	95% KM Adjusted Gamma UCL	2.2032E-4

Lognormal GOF Test on Detected Observations Only		
Shapiro Wilk Test Statistic	0.933	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.792	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.29	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.346	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	1.5079E-4	Mean in Log Scale	-9.269
SD in Original Scale	1.6218E-4	SD in Log Scale	0.993
95% t UCL (assumes normality of ROS data)	2.0023E-4	95% Percentile Bootstrap UCL	2.0141E-4
95% BCA Bootstrap UCL	2.1055E-4	95% Bootstrap t UCL	2.2295E-4
95% H-UCL (Log ROS)	2.3914E-4		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-9.233	KM Geo Mean	9.7717E-5
KM SD (logged)	0.917	95% Critical H Value (KM-Log)	2.329
KM Standard Error of Mean (logged)	0.4	95% H-UCL (KM -Log)	2.1986E-4
KM SD (logged)	0.917	95% Critical H Value (KM-Log)	2.329
KM Standard Error of Mean (logged)	0.4		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.00478	Mean in Log Scale	-6.087
SD in Original Scale	0.00443	SD in Log Scale	1.772
95% t UCL (Assumes normality)	0.00613	95% H-Stat UCL	0.0336

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use		
95% KM (t) UCL	2.6879E-4	

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | 1,1-dichloroethane | 75-34-3)

General Statistics			
Total Number of Observations	36	Number of Distinct Observations	4
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	4

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 C (groundwater | 1,1-dichloroethane | 75-34-3) was not processed!

C (groundwater | 1,1-dichloroethene | 75-35-4)

General Statistics			
Total Number of Observations	36	Number of Distinct Observations	5
Number of Detects	1	Number of Non-Detects	35
Number of Distinct Detects	1	Number of Distinct Non-Detects	4

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 C (groundwater | 1,1-dichloroethene | 75-35-4) was not processed!

C (groundwater | 1,1-dichloropropene | 563-58-6)

General Statistics			
Total Number of Observations	13	Number of Distinct Observations	3
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	3

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 C (groundwater | 1,1-dichloropropene | 563-58-6) was not processed!

C (groundwater | 1,2,3-trichlorobenzene | 87-61-6)

General Statistics			
Total Number of Observations	13	Number of Distinct Observations	3
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	3

The data set for variable C (groundwater | 1,2,3-trichlorobenzene | 87-61-6) was not processed!

C (groundwater | 1,2,3-trichloropropane | 96-18-4)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	3
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	3

The data set for variable C (groundwater | 1,2,3-trichloropropane | 96-18-4) was not processed!

C (groundwater | 1,2,4,5-tetrachlorobenzene | 95-94-3)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	6
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	6

The data set for variable C (groundwater | 1,2,4,5-tetrachlorobenzene | 95-94-3) was not processed!

C (groundwater | 1,2,4-trichlorobenzene | 120-82-1)

General Statistics

Total Number of Observations	36	Number of Distinct Observations	5
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	5

The data set for variable C (groundwater | 1,2,4-trichlorobenzene | 120-82-1) was not processed!

C (groundwater | 1,2,4-trimethylbenzene | 95-63-6)

General Statistics			
Total Number of Observations	13	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

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 C (groundwater | 1,2,4-trimethylbenzene | 95-63-6) was not processed!

C (groundwater | 1,2-dibromo-3-chloropropane | 96-12-8)

General Statistics			
Total Number of Observations	36	Number of Distinct Observations	4
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	4

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 C (groundwater | 1,2-dibromo-3-chloropropane | 96-12-8) was not processed!

C (groundwater | 1,2-dibromoethane | 106-93-4)

General Statistics			
Total Number of Observations	43	Number of Distinct Observations	9
Number of Detects	1	Number of Non-Detects	42
Number of Distinct Detects	1	Number of Distinct Non-Detects	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 C (groundwater | 1,2-dibromoethane | 106-93-4) was not processed!

C (groundwater | 1,2-dichlorobenzene | 95-50-1)

General Statistics			
Total Number of Observations	36	Number of Distinct Observations	5
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	5

C (groundwater | 1,2-dichloroethane | 107-06-2)

General Statistics

Total Number of Observations	43	Number of Distinct Observations	9
Number of Detects	0	Number of Non-Detects	43
Number of Distinct Detects	0	Number of Distinct Non-Detects	9

C (groundwater | 1,2-dichloropropane | 78-87-5)

General Statistics

Total Number of Observations	36	Number of Distinct Observations	4
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	4

C (groundwater | 1,2-diphenylhydrazine | 122-66-7)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	6
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	6

C (groundwater | 1,3,5-trichlorobenzene | 108-70-3)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

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 C (groundwater | 1,3,5-trichlorobenzene | 108-70-3) was not processed!

C (groundwater | 1,3,5-trimethylbenzene | 108-67-8)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

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 C (groundwater | 1,3,5-trimethylbenzene | 108-67-8) was not processed!

C (groundwater | 1,3-dichlorobenzene | 541-73-1)

General Statistics

Total Number of Observations	36	Number of Distinct Observations	5
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	5

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 C (groundwater | 1,3-dichlorobenzene | 541-73-1) was not processed!

C (groundwater | 1,3-dichloropropane | 142-28-9)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	3

Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	3

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 C (groundwater | 1,3-dichloropropane | 142-28-9) was not processed!

C (groundwater | 1,3-dichloropropene (total) | 542-75-6)

General Statistics

Total Number of Observations	36	Number of Distinct Observations	4
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	4

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 C (groundwater | 1,3-dichloropropene (total) | 542-75-6) was not processed!

C (groundwater | 1,4-dichlorobenzene | 106-46-7)

General Statistics

Total Number of Observations	36	Number of Distinct Observations	5
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	5

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 C (groundwater | 1,4-dichlorobenzene | 106-46-7) was not processed!

C (groundwater | 1,4-dioxane | 123-91-1)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

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).

C (groundwater | 1-methylnaphthalene | 90-12-0)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	14
Number of Detects	5	Number of Non-Detects	15
Number of Distinct Detects	5	Number of Distinct Non-Detects	9
Minimum Detect	2.5000E-5	Minimum Non-Detect	9.2167E-5
Maximum Detect	0.002	Maximum Non-Detect	0.0056
Variance Detects	6.8810E-7	Percent Non-Detects	75%
Mean Detects	5.9550E-4	SD Detects	8.2952E-4
Median Detects	2.2500E-4	CV Detects	1.393
Skewness Detects	1.725	Kurtosis Detects	2.854
Mean of Logged Detects	-8.524	SD of Logged Detects	1.854

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.784	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.686	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.272	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.396	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	4.3464E-4	KM Standard Error of Mean	2.8596E-4
90KM SD	6.7669E-4	95% KM (BCA) UCL	9.9464E-4
95% KM (t) UCL	9.2911E-4	95% KM (Percentile Bootstrap) UCL	9.4722E-4
95% KM (z) UCL	9.0501E-4	95% KM Bootstrap t UCL	0.00298
90% KM Chebyshev UCL	0.00129	95% KM Chebyshev UCL	0.00168
97.5% KM Chebyshev UCL	0.00222	99% KM Chebyshev UCL	0.00328

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.276	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.708	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.226	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.37	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	0.567	k star (bias corrected MLE)	0.36
Theta hat (MLE)	0.00105	Theta star (bias corrected MLE)	0.00165
nu hat (MLE)	5.675	nu star (bias corrected)	3.603
Mean (detects)	5.9550E-4		

Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	2.5000E-5	Mean	0.00765
Maximum	0.01	Median	0.01
SD	0.0042	CV	0.548
k hat (MLE)	0.83	k star (bias corrected MLE)	0.739
Theta hat (MLE)	0.00922	Theta star (bias corrected MLE)	0.0104
nu hat (MLE)	33.2	nu star (bias corrected)	29.55
Adjusted Level of Significance (β)	0.038		
Approximate Chi Square Value (29.55, α)	18.14	Adjusted Chi Square Value (29.55, β)	17.43
95% Gamma Approximate UCL	0.0125	95% Gamma Adjusted UCL	0.013
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	4.3464E-4	SD (KM)	6.7669E-4
Variance (KM)	4.5790E-7	SE of Mean (KM)	2.8596E-4
k hat (KM)	0.413	k star (KM)	0.384
nu hat (KM)	16.5	nu star (KM)	15.36
theta hat (KM)	0.00105	theta star (KM)	0.00113
80% gamma percentile (KM)	6.9793E-4	90% gamma percentile (KM)	0.00124
95% gamma percentile (KM)	0.00183	99% gamma percentile (KM)	0.00333
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (15.36, α)	7.513	Adjusted Chi Square Value (15.36, β)	7.082
95% KM Approximate Gamma UCL	8.8864E-4	95% KM Adjusted Gamma UCL	9.4278E-4
Note: KM UCLs may be biased low with this dataset. Other substitution method recommended			
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.942	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.806	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.206	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.319	Detected Data appear Lognormal at 10% Significance Level	
Detected Data appear Lognormal at 10% Significance Level			
Note GOF tests may be unreliable for small sample sizes			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	2.7043E-4	Mean in Log Scale	-9.069
SD in Original Scale	4.5626E-4	SD in Log Scale	1.283
95% t UCL (assumes normality of ROS data)	4.4684E-4	95% Percentile Bootstrap UCL	4.5635E-4
95% BCA Bootstrap UCL	5.5078E-4	95% Bootstrap t UCL	6.9185E-4
95% H-UCL (Log ROS)	6.4711E-4		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-9.049	KM Geo Mean	1.1751E-4

KM SD (logged)	1.634	95% Critical H Value (KM-Log)	3.656
KM Standard Error of Mean (logged)	0.695	95% H-UCL (KM -Log)	0.00176
KM SD (logged)	1.634	95% Critical H Value (KM-Log)	3.656
KM Standard Error of Mean (logged)	0.695		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

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DL/2 Statistics

</div>

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00181	Mean in Log Scale	-7.004
SD in Original Scale	0.00112	SD in Log Scale	1.719
95% t UCL (Assumes normality)	0.00224	95% H-Stat UCL	0.0178

DL/2 is not a recommended method, provided for comparisons and historical reasons

<div align="center">

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

</div>

95% KM (t) UCL	9.2911E-4		

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The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

</div>

C (groundwater | 2,2-dichloropropane | 594-20-7)

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General Statistics

</div>

Total Number of Observations	13	Number of Distinct Observations	3
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	3

<div align="center">

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 C (groundwater | 2,2-dichloropropane | 594-20-7) was not processed!

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C (groundwater | 2,2'-oxybis(1-chloropropane) | 108-60-1)

<div align="center">

General Statistics

</div>

Total Number of Observations	42	Number of Distinct Observations	9
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	9

C (groundwater | 2,4,5-trichlorophenol | 95-95-4)

General Statistics

Total Number of Observations	42	Number of Distinct Observations	9
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	9

C (groundwater | 2,4,6-trichlorophenol | 88-06-2)

General Statistics

Total Number of Observations	42	Number of Distinct Observations	9
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	9

C (groundwater | 2,4-dichlorophenol | 120-83-2)

General Statistics

Total Number of Observations	42	Number of Distinct Observations	9
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	9

C (groundwater | 2,4-dimethylphenol | 105-67-9)

General Statistics			
Total Number of Observations	42	Number of Distinct Observations	10
Number of Detects	1	Number of Non-Detects	41
Number of Distinct Detects	1	Number of Distinct Non-Detects	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 C (groundwater | 2,4-dimethylphenol | 105-67-9) was not processed!

C (groundwater | 2,4-dinitrophenol | 51-28-5)

General Statistics			
Total Number of Observations	42	Number of Distinct Observations	12
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	12

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 C (groundwater | 2,4-dinitrophenol | 51-28-5) was not processed!

C (groundwater | 2,4-dinitrotoluene | 121-14-2)

General Statistics			
Total Number of Observations	42	Number of Distinct Observations	9
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (groundwater | 2,4-dinitrotoluene | 121-14-2) was not processed!

C (groundwater | 2,6-dinitrotoluene | 606-20-2)

General Statistics			
Total Number of Observations	42	Number of Distinct Observations	9
Number of Detects	0	Number of Non-Detects	42

Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (groundwater | 2,6-dinitrotoluene | 606-20-2) was not processed!

C (groundwater | 2-butanone | 78-93-3)

General Statistics

Total Number of Observations	36	Number of Distinct Observations	6
Number of Detects	3	Number of Non-Detects	33
Number of Distinct Detects	2	Number of Distinct Non-Detects	5
Minimum Detect	0.001	Minimum Non-Detect	0.01
Maximum Detect	0.012	Maximum Non-Detect	0.05
Variance Detects	4.0333E-5	Percent Non-Detects	91.67%
Mean Detects	0.00467	SD Detects	0.00635
Median Detects	0.001	CV Detects	1.361
Skewness Detects	1.732	Kurtosis Detects	N/A
Mean of Logged Detects	-6.079	SD of Logged Detects	1.435

Warning: Data set has only 3 Detected Values.

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

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.75	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.753	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.385	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.429	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Approximate Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.00152	KM Standard Error of Mean	6.2607E-4
90KM SD	0.00234	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.00258	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.00255	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0034	95% KM Chebyshev UCL	0.00425
97.5% KM Chebyshev UCL	0.00543	99% KM Chebyshev UCL	0.00775

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.612	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.642	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.432	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.442	Detected data appear Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only

k hat (MLE)	0.829	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00563	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	4.977	nu star (bias corrected)	N/A
Mean (detects)	0.00467		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.001	Mean	0.00956
Maximum	0.012	Median	0.01
SD	0.00213	CV	0.223
k hat (MLE)	6.623	k star (bias corrected MLE)	6.089
Theta hat (MLE)	0.00144	Theta star (bias corrected MLE)	0.00157
nu hat (MLE)	476.8	nu star (bias corrected)	438.4
Adjusted Level of Significance (β)	0.0428		
Approximate Chi Square Value (438.43, α)	390.9	Adjusted Chi Square Value (438.43, β)	388.9
95% Gamma Approximate UCL	0.0107	95% Gamma Adjusted UCL	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.00152	SD (KM)	0.00234
Variance (KM)	5.4875E-6	SE of Mean (KM)	6.2607E-4
k hat (KM)	0.423	k star (KM)	0.406
nu hat (KM)	30.47	nu star (KM)	29.26
theta hat (KM)	0.0036	theta star (KM)	0.00375
80% gamma percentile (KM)	0.00246	90% gamma percentile (KM)	0.00429
95% gamma percentile (KM)	0.0063	99% gamma percentile (KM)	0.0113

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (29.26, α)	17.91	Adjusted Chi Square Value (29.26, β)	17.51
95% KM Approximate Gamma UCL	0.00249	95% KM Adjusted Gamma UCL	0.00255

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.75	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.789	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.385	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.389	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Approximate Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.00179	Mean in Log Scale	-6.739
SD in Original Scale	0.00213	SD in Log Scale	0.886

95% t UCL (assumes normality of ROS data)	0.00239	95% Percentile Bootstrap UCL	0.00242
95% BCA Bootstrap UCL	0.00266	95% Bootstrap t UCL	0.00287
95% H-UCL (Log ROS)	0.00246		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-6.789	KM Geo Mean	0.00113
KM SD (logged)	0.529	95% Critical H Value (KM-Log)	1.932
KM Standard Error of Mean (logged)	0.141	95% H-UCL (KM -Log)	0.00154
KM SD (logged)	0.529	95% Critical H Value (KM-Log)	1.932
KM Standard Error of Mean (logged)	0.141		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0084	Mean in Log Scale	-4.987
SD in Original Scale	0.00585	SD in Log Scale	0.684
95% t UCL (Assumes normality)	0.01	95% H-Stat UCL	0.0109

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.00258		

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

When a data set follows an approximate distribution passing only one of the GOF tests,

it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | 2-chloronaphthalene | 91-58-7)

General Statistics

Total Number of Observations	42	Number of Distinct Observations	10
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (groundwater | 2-chloronaphthalene | 91-58-7) was not processed!

C (groundwater | 2-chlorophenol | 95-57-8)

General Statistics

Total Number of Observations	42	Number of Distinct Observations	9
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (groundwater | 2-chlorophenol | 95-57-8) was not processed!

C (groundwater | 2-chlorotoluene | 95-49-8)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	3
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	3

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 C (groundwater | 2-chlorotoluene | 95-49-8) was not processed!

C (groundwater | 2-hexanone | 591-78-6)

General Statistics

Total Number of Observations	36	Number of Distinct Observations	4
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	4

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 C (groundwater | 2-hexanone | 591-78-6) was not processed!

C (groundwater | 2-methylnaphthalene | 91-57-6)

General Statistics

Total Number of Observations	43		Number of Distinct Observations	20
Number of Detects	5		Number of Non-Detects	38
Number of Distinct Detects	5		Number of Distinct Non-Detects	15
Minimum Detect	1.1200E-4		Minimum Non-Detect	1.3842E-4
Maximum Detect	0.004		Maximum Non-Detect	0.0056
Variance Detects	2.8276E-6		Percent Non-Detects	88.37%
Mean Detects	0.00101		SD Detects	0.00168
Median Detects	2.0000E-4		CV Detects	1.661
Skewness Detects	2.164		Kurtosis Detects	4.718
Mean of Logged Detects	-7.872		SD of Logged Detects	1.459

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.641	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.686	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.397	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.396	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	2.7421E-4	KM Standard Error of Mean	1.3844E-4
90KM SD	6.8642E-4	95% KM (BCA) UCL	6.1083E-4
95% KM (t) UCL	5.0707E-4	95% KM (Percentile Bootstrap) UCL	5.2225E-4
95% KM (z) UCL	5.0193E-4	95% KM Bootstrap t UCL	0.00152
90% KM Chebyshev UCL	6.8954E-4	95% KM Chebyshev UCL	8.7767E-4
97.5% KM Chebyshev UCL	0.00114	99% KM Chebyshev UCL	0.00165

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.633	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.704	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.313	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.369	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	0.629	k star (bias corrected MLE)	0.385
Theta hat (MLE)	0.00161	Theta star (bias corrected MLE)	0.00263
nu hat (MLE)	6.285	nu star (bias corrected)	3.847
Mean (detects)	0.00101		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	1.1200E-4	Mean	0.00895

Maximum	0.01		Median	0.01
SD	0.00296		CV	0.331
k hat (MLE)	2.006		k star (bias corrected MLE)	1.882
Theta hat (MLE)	0.00446		Theta star (bias corrected MLE)	0.00476
nu hat (MLE)	172.5		nu star (bias corrected)	161.8
Adjusted Level of Significance (β)	0.0444			
Approximate Chi Square Value (161.83, α)	133.4		Adjusted Chi Square Value (161.83, β)	132.5
95% Gamma Approximate UCL	0.0109		95% Gamma Adjusted UCL	0.0109

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.7421E-4		SD (KM)	6.8642E-4
Variance (KM)	4.7117E-7		SE of Mean (KM)	1.3844E-4
k hat (KM)	0.16		k star (KM)	0.164
nu hat (KM)	13.72		nu star (KM)	14.1
theta hat (KM)	0.00172		theta star (KM)	0.00167
80% gamma percentile (KM)	3.1962E-4		90% gamma percentile (KM)	8.2153E-4
95% gamma percentile (KM)	0.00148		99% gamma percentile (KM)	0.00336

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (14.10, α)	6.64		Adjusted Chi Square Value (14.10, β)	6.462
95% KM Approximate Gamma UCL	5.8230E-4		95% KM Adjusted Gamma UCL	5.9836E-4

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.863	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.806	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.271	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.319	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	2.3540E-4		Mean in Log Scale	-9.039
SD in Original Scale	6.0032E-4		SD in Log Scale	0.946
95% t UCL (assumes normality of ROS data)	3.8938E-4		95% Percentile Bootstrap UCL	4.0930E-4
95% BCA Bootstrap UCL	5.3473E-4		95% Bootstrap t UCL	9.1847E-4
95% H-UCL (Log ROS)	2.5994E-4			

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-8.786		KM Geo Mean	1.5286E-4
KM SD (logged)	0.692		95% Critical H Value (KM-Log)	2.056
KM Standard Error of Mean (logged)	0.161		95% H-UCL (KM -Log)	2.4183E-4
KM SD (logged)	0.692		95% Critical H Value (KM-Log)	2.056
KM Standard Error of Mean (logged)	0.161			

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal	**DL/2 Log-Transformed**

Mean in Original Scale	0.00103	Mean in Log Scale	-7.612
SD in Original Scale	0.00114	SD in Log Scale	1.26
95% t UCL (Assumes normality)	0.00132	95% H-Stat UCL	0.00184

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	5.9836E-4

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | 2-methylphenol | 95-48-7)

General Statistics

Total Number of Observations	42	Number of Distinct Observations	13
Number of Detects	5	Number of Non-Detects	37
Number of Distinct Detects	5	Number of Distinct Non-Detects	9
Minimum Detect	6.0000E-4	Minimum Non-Detect	0.002
Maximum Detect	0.006	Maximum Non-Detect	0.011
Variance Detects	5.3780E-6	Percent Non-Detects	88.1%
Mean Detects	0.00186	SD Detects	0.00232
Median Detects	9.0000E-4	CV Detects	1.247
Skewness Detects	2.213	Kurtosis Detects	4.92
Mean of Logged Detects	-6.717	SD of Logged Detects	0.915

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.615	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.686	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.445	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.396	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.001	KM Standard Error of Mean	2.1167E-4
90KM SD	9.5538E-4	95% KM (BCA) UCL	0.0014
95% KM (t) UCL	0.00136	95% KM (Percentile Bootstrap) UCL	0.00139
95% KM (z) UCL	0.00135	95% KM Bootstrap t UCL	0.00186
90% KM Chebyshev UCL	0.00164	95% KM Chebyshev UCL	0.00193
97.5% KM Chebyshev UCL	0.00233	99% KM Chebyshev UCL	0.00311

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended		

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.918	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.688	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.431	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.363	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.304	k star (bias corrected MLE)	0.655
Theta hat (MLE)	0.00143	Theta star (bias corrected MLE)	0.00284
nu hat (MLE)	13.04	nu star (bias corrected)	6.549
Mean (detects)	0.00186		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	6.0000E-4	Mean	0.00903
Maximum	0.01	Median	0.01
SD	0.00276	CV	0.306
k hat (MLE)	3.502	k star (bias corrected MLE)	3.268
Theta hat (MLE)	0.00258	Theta star (bias corrected MLE)	0.00276
nu hat (MLE)	294.2	nu star (bias corrected)	274.5
Adjusted Level of Significance (β)	0.0443		
Approximate Chi Square Value (274.50, α)	237.1	Adjusted Chi Square Value (274.50, β)	235.9
95% Gamma Approximate UCL	0.0105	95% Gamma Adjusted UCL	0.0105

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.001	SD (KM)	9.5538E-4
Variance (KM)	9.1275E-7	SE of Mean (KM)	2.1167E-4
k hat (KM)	1.103	k star (KM)	1.04
nu hat (KM)	92.67	nu star (KM)	87.38
theta hat (KM)	9.0961E-4	theta star (KM)	9.6463E-4
80% gamma percentile (KM)	0.00161	90% gamma percentile (KM)	0.00229
95% gamma percentile (KM)	0.00296	99% gamma percentile (KM)	0.00453

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (87.38, α)	66.83	Adjusted Chi Square Value (87.38, β)	66.19
95% KM Approximate Gamma UCL	0.00131	95% KM Adjusted Gamma UCL	0.00132

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.749	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.806	Detected Data Not Lognormal at 10% Significance Level

Lilliefors Test Statistic	0.382	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.319	Detected Data Not Lognormal at 10% Significance Level	

<p style="color:red; text-align:center">**Detected Data Not Lognormal at 10% Significance Level**</p>

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.00111	Mean in Log Scale	-6.999
SD in Original Scale	9.3028E-4	SD in Log Scale	0.593
95% t UCL (assumes normality of ROS data)	0.00135	95% Percentile Bootstrap UCL	0.00136
95% BCA Bootstrap UCL	0.00148	95% Bootstrap t UCL	0.00155
95% H-UCL (Log ROS)	0.00131		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-7.049	KM Geo Mean	8.6865E-4
KM SD (logged)	0.411	95% Critical H Value (KM-Log)	1.838
KM Standard Error of Mean (logged)	0.128	95% H-UCL (KM -Log)	0.00106
KM SD (logged)	0.411	95% Critical H Value (KM-Log)	1.838
KM Standard Error of Mean (logged)	0.128		

<p style="color:red; text-align:center">**Note: KM UCLs may be biased low with this dataset. Other substitution method recommended**</p>

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.00243	Mean in Log Scale	-6.341
SD in Original Scale	0.00197	SD in Log Scale	0.795
95% t UCL (Assumes normality)	0.00294	95% H-Stat UCL	0.00316

<p style="color:red; text-align:center">**DL/2 is not a recommended method, provided for comparisons and historical reasons**</p>

Nonparametric Distribution Free UCL Statistics

<p style="color:blue; text-align:center">**Data do not follow a Discernible Distribution**</p>

Suggested UCL to Use

95% KM (t) UCL	0.00136		

<p style="color:red; text-align:center">**The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.**</p>

<p style="color:red; text-align:center">**Please verify the data were collected from random locations.**</p>

<p style="color:red; text-align:center">**If the data were collected using judgmental or other non-random methods,**</p>

<p style="color:red; text-align:center">**then contact a statistician to correctly calculate UCLs.**</p>

<p style="color:blue; text-align:center">Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.</p>

<p style="color:blue; text-align:center">Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.</p>

<p style="color:blue; text-align:center">However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.</p>

C (groundwater | 2-nitroaniline | 88-74-4)

General Statistics

Total Number of Observations	42	Number of Distinct Observations	11
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	11

The data set for variable C (groundwater | 2-nitroaniline | 88-74-4) was not processed!

C (groundwater | 2-nitrophenol | 88-75-5)

General Statistics

Total Number of Observations	42	Number of Distinct Observations	9
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	9

The data set for variable C (groundwater | 2-nitrophenol | 88-75-5) was not processed!

C (groundwater | 3&4-methylphenol | 65794-96-9)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	6
Number of Detects	1	Number of Non-Detects	12
Number of Distinct Detects	1	Number of Distinct Non-Detects	5

The data set for variable C (groundwater | 3&4-methylphenol | 65794-96-9) was not processed!

C (groundwater | 3,3'-dichlorobenzidine | 91-94-1)

General Statistics

Total Number of Observations	42	Number of Distinct Observations	9
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	9

The data set for variable C (groundwater | 3,3'-dichlorobenzidine | 91-94-1) was not processed!

C (groundwater | 3-nitroaniline | 99-09-2)

<table>
<tr><td colspan="4" align="center">General Statistics</td></tr>
<tr><td>Total Number of Observations</td><td>42</td><td>Number of Distinct Observations</td><td>11</td></tr>
<tr><td>Number of Detects</td><td>0</td><td>Number of Non-Detects</td><td>42</td></tr>
<tr><td>Number of Distinct Detects</td><td>0</td><td>Number of Distinct Non-Detects</td><td>11</td></tr>
</table>

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 C (groundwater | 3-nitroaniline | 99-09-2) was not processed!

C (groundwater | 4,6-dinitro-2-methylphenol | 534-52-1)

<table>
<tr><td colspan="4" align="center">General Statistics</td></tr>
<tr><td>Total Number of Observations</td><td>42</td><td>Number of Distinct Observations</td><td>12</td></tr>
<tr><td>Number of Detects</td><td>0</td><td>Number of Non-Detects</td><td>42</td></tr>
<tr><td>Number of Distinct Detects</td><td>0</td><td>Number of Distinct Non-Detects</td><td>12</td></tr>
</table>

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 C (groundwater | 4,6-dinitro-2-methylphenol | 534-52-1) was not processed!

C (groundwater | 4-bromophenyl-phenyl ether | 101-55-3)

<table>
<tr><td colspan="4" align="center">General Statistics</td></tr>
<tr><td>Total Number of Observations</td><td>42</td><td>Number of Distinct Observations</td><td>9</td></tr>
<tr><td>Number of Detects</td><td>0</td><td>Number of Non-Detects</td><td>42</td></tr>
<tr><td>Number of Distinct Detects</td><td>0</td><td>Number of Distinct Non-Detects</td><td>9</td></tr>
</table>

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 C (groundwater | 4-bromophenyl-phenyl ether | 101-55-3) was not processed!

C (groundwater | 4-chloro-3-methylphenol | 59-50-7)

<table>
<tr><td colspan="4" align="center">General Statistics</td></tr>
<tr><td>Total Number of Observations</td><td>42</td><td>Number of Distinct Observations</td><td>9</td></tr>
<tr><td>Number of Detects</td><td>0</td><td>Number of Non-Detects</td><td>42</td></tr>
<tr><td>Number of Distinct Detects</td><td>0</td><td>Number of Distinct Non-Detects</td><td>9</td></tr>
</table>

The data set for variable C (groundwater | 4-chloro-3-methylphenol | 59-50-7) was not processed!

C (groundwater | 4-chloroaniline | 106-47-8)

General Statistics

Total Number of Observations	42	Number of Distinct Observations	9
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	9

The data set for variable C (groundwater | 4-chloroaniline | 106-47-8) was not processed!

C (groundwater | 4-chlorophenyl-phenyl ether | 7005-72-3)

General Statistics

Total Number of Observations	42	Number of Distinct Observations	9
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	9

The data set for variable C (groundwater | 4-chlorophenyl-phenyl ether | 7005-72-3) was not processed!

C (groundwater | 4-chlorotoluene | 106-43-4)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	3
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	3

The data set for variable C (groundwater | 4-chlorotoluene | 106-43-4) was not processed!

C (groundwater | 4-methyl-2-pentanone | 108-10-1)

General Statistics			
Total Number of Observations	36	Number of Distinct Observations	4
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	4

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 C (groundwater | 4-methyl-2-pentanone | 108-10-1) was not processed!

C (groundwater | 4-methylphenol | 106-44-5)

General Statistics			
Total Number of Observations	30	Number of Distinct Observations	4
Number of Detects	1	Number of Non-Detects	29
Number of Distinct Detects	1	Number of Distinct Non-Detects	3

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 C (groundwater | 4-methylphenol | 106-44-5) was not processed!

C (groundwater | 4-nitroaniline | 100-01-6)

General Statistics			
Total Number of Observations	42	Number of Distinct Observations	10
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (groundwater | 4-nitroaniline | 100-01-6) was not processed!

C (groundwater | 4-nitrophenol | 100-02-7)

General Statistics			
Total Number of Observations	42	Number of Distinct Observations	12
Number of Detects	0	Number of Non-Detects	42

Number of Distinct Detects	0		Number of Distinct Non-Detects	12

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 C (groundwater | 4-nitrophenol | 100-02-7) was not processed!

C (groundwater | acenaphthene | 83-32-9)

General Statistics

Total Number of Observations	43		Number of Distinct Observations	21
Number of Detects	10		Number of Non-Detects	33
Number of Distinct Detects	10		Number of Distinct Non-Detects	12
Minimum Detect	2.6333E-5		Minimum Non-Detect	9.2167E-5
Maximum Detect	0.002		Maximum Non-Detect	0.0056
Variance Detects	4.2352E-7		Percent Non-Detects	76.74%
Mean Detects	7.8725E-4		SD Detects	6.5078E-4
Median Detects	6.5000E-4		CV Detects	0.827
Skewness Detects	0.925		Kurtosis Detects	0.15
Mean of Logged Detects	-7.672		SD of Logged Detects	1.359

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.899	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.781	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.204	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.304	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	3.4127E-4	KM Standard Error of Mean	1.0534E-4
90KM SD	4.9054E-4	95% KM (BCA) UCL	5.3426E-4
95% KM (t) UCL	5.1844E-4	95% KM (Percentile Bootstrap) UCL	5.2677E-4
95% KM (z) UCL	5.1454E-4	95% KM Bootstrap t UCL	5.8010E-4
90% KM Chebyshev UCL	6.5729E-4	95% KM Chebyshev UCL	8.0044E-4
97.5% KM Chebyshev UCL	9.9912E-4	99% KM Chebyshev UCL	0.00139

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.369	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.747	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.187	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.273	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.089	k star (bias corrected MLE)	0.829

Theta hat (MLE)	7.2304E-4	Theta star (bias corrected MLE)	9.4983E-4
nu hat (MLE)	21.78	nu star (bias corrected)	16.58
Mean (detects)	7.8725E-4		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	2.6333E-5	Mean	0.00786
Maximum	0.01	Median	0.01
SD	0.00395	CV	0.503
k hat (MLE)	1.198	k star (bias corrected MLE)	1.13
Theta hat (MLE)	0.00656	Theta star (bias corrected MLE)	0.00695
nu hat (MLE)	103.1	nu star (bias corrected)	97.2
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (97.20, α)	75.46	Adjusted Chi Square Value (97.20, β)	74.79
95% Gamma Approximate UCL	0.0101	95% Gamma Adjusted UCL	0.0102

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	3.4127E-4	SD (KM)	4.9054E-4
Variance (KM)	2.4063E-7	SE of Mean (KM)	1.0534E-4
k hat (KM)	0.484	k star (KM)	0.466
nu hat (KM)	41.62	nu star (KM)	40.05
theta hat (KM)	7.0512E-4	theta star (KM)	7.3277E-4
80% gamma percentile (KM)	5.5834E-4	90% gamma percentile (KM)	9.3672E-4
95% gamma percentile (KM)	0.00134	99% gamma percentile (KM)	0.00235

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (40.05, α)	26.55	Adjusted Chi Square Value (40.05, β)	26.17
95% KM Approximate Gamma UCL	5.1478E-4	95% KM Adjusted Gamma UCL	5.2231E-4

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.857	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.869	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.259	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.241	Detected Data Not Lognormal at 10% Significance Level	

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	2.7680E-4	Mean in Log Scale	-8.961
SD in Original Scale	4.2336E-4	SD in Log Scale	1.241
95% t UCL (assumes normality of ROS data)	3.8539E-4	95% Percentile Bootstrap UCL	3.8821E-4
95% BCA Bootstrap UCL	4.1771E-4	95% Bootstrap t UCL	4.5628E-4
95% H-UCL (Log ROS)	4.6043E-4		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-8.964	KM Geo Mean	1.2790E-4
KM SD (logged)	1.429	95% Critical H Value (KM-Log)	2.879
KM Standard Error of Mean (logged)	0.453	95% H-UCL (KM -Log)	6.6929E-4
KM SD (logged)	1.429	95% Critical H Value (KM-Log)	2.879
KM Standard Error of Mean (logged)	0.453		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.00101	Mean in Log Scale	-7.533
SD in Original Scale	0.00101	SD in Log Scale	1.26
95% t UCL (Assumes normality)	0.00127	95% H-Stat UCL	0.00199

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	5.1844E-4		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | acenaphthylene | 208-96-8)

General Statistics			
Total Number of Observations	43	Number of Distinct Observations	18
Number of Detects	3	Number of Non-Detects	40
Number of Distinct Detects	3	Number of Distinct Non-Detects	15
Minimum Detect	6.8667E-5	Minimum Non-Detect	8.9350E-5
Maximum Detect	7.9000E-4	Maximum Non-Detect	0.0056
Variance Detects	1.7154E-7	Percent Non-Detects	93.02%
Mean Detects	3.1178E-4	SD Detects	4.1417E-4
Median Detects	7.6667E-5	CV Detects	1.328
Skewness Detects	1.731	Kurtosis Detects	N/A
Mean of Logged Detects	-8.735	SD of Logged Detects	1.38

Warning: Data set has only 3 Detected Values.

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

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.758	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.753	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.382	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.429	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level			
Note GOF tests may be unreliable for small sample sizes			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	9.8286E-5	KM Standard Error of Mean	3.0992E-5
90KM SD	1.3318E-4	95% KM (BCA) UCL	N/A
95% KM (t) UCL	1.5041E-4	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	1.4926E-4	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	1.9126E-4	95% KM Chebyshev UCL	2.3338E-4
97.5% KM Chebyshev UCL	2.9183E-4	99% KM Chebyshev UCL	4.0665E-4
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.576	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.642	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.421	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.442	Detected data appear Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.885	k star (bias corrected MLE)	N/A
Theta hat (MLE)	3.5233E-4	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	5.309	nu star (bias corrected)	N/A
Mean (detects)	3.1178E-4		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	6.8667E-5	Mean	0.00932
Maximum	0.01	Median	0.01
SD	0.0025	CV	0.268
k hat (MLE)	2.446	k star (bias corrected MLE)	2.291
Theta hat (MLE)	0.00381	Theta star (bias corrected MLE)	0.00407
nu hat (MLE)	210.3	nu star (bias corrected)	197
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (196.99, α)	165.5	Adjusted Chi Square Value (196.99, β)	164.5
95% Gamma Approximate UCL	0.0111	95% Gamma Adjusted UCL	N/A
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	9.8286E-5	SD (KM)	1.3318E-4
Variance (KM)	1.7736E-8	SE of Mean (KM)	3.0992E-5
k hat (KM)	0.545	k star (KM)	0.522
nu hat (KM)	46.84	nu star (KM)	44.9
theta hat (KM)	1.8046E-4	theta star (KM)	1.8823E-4
80% gamma percentile (KM)	1.6169E-4	90% gamma percentile (KM)	2.6351E-4
95% gamma percentile (KM)	3.7176E-4	99% gamma percentile (KM)	6.3690E-4

Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (44.90, α)	30.53	Adjusted Chi Square Value (44.90, β)	30.12
95% KM Approximate Gamma UCL	1.4455E-4	95% KM Adjusted Gamma UCL	1.4652E-4

Lognormal GOF Test on Detected Observations Only		
Shapiro Wilk Test Statistic	0.784	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.789	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.371	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.389	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Approximate Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	1.1134E-4	Mean in Log Scale	-9.402
SD in Original Scale	1.2403E-4	SD in Log Scale	0.727
95% t UCL (assumes normality of ROS data)	1.4315E-4	95% Percentile Bootstrap UCL	1.4532E-4
95% BCA Bootstrap UCL	1.6116E-4	95% Bootstrap t UCL	1.7477E-4
95% H-UCL (Log ROS)	1.3586E-4		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-9.446	KM Geo Mean	7.9015E-5
KM SD (logged)	0.446	95% Critical H Value (KM-Log)	1.864
KM Standard Error of Mean (logged)	0.112	95% H-UCL (KM -Log)	9.9249E-5
KM SD (logged)	0.446	95% Critical H Value (KM-Log)	1.864
KM Standard Error of Mean (logged)	0.112		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	9.3969E-4	Mean in Log Scale	-7.73
SD in Original Scale	0.00105	SD in Log Scale	1.317
95% t UCL (Assumes normality)	0.00121	95% H-Stat UCL	0.00182

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use		
95% KM (t) UCL	1.5041E-4	

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

C (groundwater | acetone | 67-64-1)

General Statistics

Total Number of Observations	36	Number of Distinct Observations	13
Number of Detects	12	Number of Non-Detects	24
Number of Distinct Detects	9	Number of Distinct Non-Detects	4
Minimum Detect	0.001	Minimum Non-Detect	0.02
Maximum Detect	0.028	Maximum Non-Detect	0.1
Variance Detects	5.4745E-5	Percent Non-Detects	66.67%
Mean Detects	0.00552	SD Detects	0.0074
Median Detects	0.0032	CV Detects	1.341
Skewness Detects	2.979	Kurtosis Detects	9.47
Mean of Logged Detects	-5.669	SD of Logged Detects	0.922

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.582	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.805	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.331	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.281	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.00449	KM Standard Error of Mean	0.00123
90KM SD	0.00533	95% KM (BCA) UCL	0.00669
95% KM (t) UCL	0.00657	95% KM (Percentile Bootstrap) UCL	0.00661
95% KM (z) UCL	0.00652	95% KM Bootstrap t UCL	0.00892
90% KM Chebyshev UCL	0.00818	95% KM Chebyshev UCL	0.00985
97.5% KM Chebyshev UCL	0.0122	99% KM Chebyshev UCL	0.0167

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.745	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.752	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.259	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.251	Detected Data Not Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.206	k star (bias corrected MLE)	0.96
Theta hat (MLE)	0.00457	Theta star (bias corrected MLE)	0.00575
nu hat (MLE)	28.95	nu star (bias corrected)	23.04
Mean (detects)	0.00552		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.001	Mean	0.00867
Maximum	0.028	Median	0.01
SD	0.00478	CV	0.551
k hat (MLE)	2.685	k star (bias corrected MLE)	2.48
Theta hat (MLE)	0.00323	Theta star (bias corrected MLE)	0.0035
nu hat (MLE)	193.3	nu star (bias corrected)	178.6
Adjusted Level of Significance (β)	0.0428		
Approximate Chi Square Value (178.55, α)	148.6	Adjusted Chi Square Value (178.55, β)	147.4
95% Gamma Approximate UCL	0.0104	95% Gamma Adjusted UCL	0.0105
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.00449	SD (KM)	0.00533
Variance (KM)	2.8442E-5	SE of Mean (KM)	0.00123
k hat (KM)	0.71	k star (KM)	0.67
nu hat (KM)	51.14	nu star (KM)	48.21
theta hat (KM)	0.00633	theta star (KM)	0.00671
80% gamma percentile (KM)	0.0074	90% gamma percentile (KM)	0.0114
95% gamma percentile (KM)	0.0155	99% gamma percentile (KM)	0.0255
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (48.21, α)	33.27	Adjusted Chi Square Value (48.21, β)	32.71
95% KM Approximate Gamma UCL	0.00651	95% KM Adjusted Gamma UCL	0.00662
Note: KM UCLs may be biased low with this dataset. Other substitution method recommended			
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.934	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.883	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.187	Lilliefors GOF Test	
10% Lilliefors Critical Value	0.223	Detected Data appear Lognormal at 10% Significance Level	
Detected Data appear Lognormal at 10% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00436	Mean in Log Scale	-5.755
SD in Original Scale	0.00472	SD in Log Scale	0.765
95% t UCL (assumes normality of ROS data)	0.00569	95% Percentile Bootstrap UCL	0.00576
95% BCA Bootstrap UCL	0.00639	95% Bootstrap t UCL	0.00684
95% H-UCL (Log ROS)	0.00559		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-5.764	KM Geo Mean	0.00314
KM SD (logged)	0.779	95% Critical H Value (KM-Log)	2.15
KM Standard Error of Mean (logged)	0.218	95% H-UCL (KM -Log)	0.00565
KM SD (logged)	0.779	95% Critical H Value (KM-Log)	2.15
KM Standard Error of Mean (logged)	0.218		
Note: KM UCLs may be biased low with this dataset. Other substitution method recommended			

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0157	Mean in Log Scale	-4.588
SD in Original Scale	0.0136	SD in Log Scale	1.047
95% t UCL (Assumes normality)	0.0195	95% H-Stat UCL	0.0271

<p style="color:red; text-align:center">DL/2 is not a recommended method, provided for comparisons and historical reasons</p>

Nonparametric Distribution Free UCL Statistics

<p style="color:blue; text-align:center">Detected Data appear Approximate Gamma Distributed at 5% Significance Level</p>

Suggested UCL to Use

95% KM Adjusted Gamma UCL	0.00662		

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

When a data set follows an approximate distribution passing only one of the GOF tests,

it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | acetophenone | 98-86-2)

General Statistics

Total Number of Observations	42	Number of Distinct Observations	9
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (groundwater | acetophenone | 98-86-2) was not processed!

C (groundwater | acrylonitrile | 107-13-1)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

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

C (groundwater | aluminum | 7429-90-5)

General Statistics

Total Number of Observations	12	Number of Distinct Observations	11
Number of Detects	10	Number of Non-Detects	2
Number of Distinct Detects	10	Number of Distinct Non-Detects	1
Minimum Detect	0.072	Minimum Non-Detect	0.05
Maximum Detect	9.534	Maximum Non-Detect	0.05
Variance Detects	8.68	Percent Non-Detects	16.67%
Mean Detects	1.329	SD Detects	2.946
Median Detects	0.23	CV Detects	2.217
Skewness Detects	2.938	Kurtosis Detects	8.827
Mean of Logged Detects	-1.124	SD of Logged Detects	1.549

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.492	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.781	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.413	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.304	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.116	KM Standard Error of Mean	0.79
90KM SD	2.596	95% KM (BCA) UCL	2.633
95% KM (t) UCL	2.534	95% KM (Percentile Bootstrap) UCL	2.556
95% KM (z) UCL	2.415	95% KM Bootstrap t UCL	20.81
90% KM Chebyshev UCL	3.485	95% KM Chebyshev UCL	4.558
97.5% KM Chebyshev UCL	6.048	99% KM Chebyshev UCL	8.974

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.24	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.785	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.329	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.282	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.457	k star (bias corrected MLE)	0.387
Theta hat (MLE)	2.905	Theta star (bias corrected MLE)	3.435
nu hat (MLE)	9.148	nu star (bias corrected)	7.737
Mean (detects)	1.329		

Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.01	Mean	1.109
Maximum	9.534	Median	0.17
SD	2.714	CV	2.447
k hat (MLE)	0.369	k star (bias corrected MLE)	0.332
Theta hat (MLE)	3.007	Theta star (bias corrected MLE)	3.338
nu hat (MLE)	8.852	nu star (bias corrected)	7.973
Adjusted Level of Significance (β)	0.029		
Approximate Chi Square Value (7.97, α)	2.719	Adjusted Chi Square Value (7.97, β)	2.274
95% Gamma Approximate UCL	3.252	95% Gamma Adjusted UCL	3.889

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	1.116	SD (KM)	2.596
Variance (KM)	6.737	SE of Mean (KM)	0.79
k hat (KM)	0.185	k star (KM)	0.194
nu hat (KM)	4.434	nu star (KM)	4.659
theta hat (KM)	6.039	theta star (KM)	5.747
80% gamma percentile (KM)	1.447	90% gamma percentile (KM)	3.373
95% gamma percentile (KM)	5.793	99% gamma percentile (KM)	12.49

Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (4.66, α)	0.998	Adjusted Chi Square Value (4.66, β)	0.769
95% KM Approximate Gamma UCL	5.208	95% KM Adjusted Gamma UCL	6.763

Lognormal GOF Test on Detected Observations Only		
Shapiro Wilk Test Statistic	0.862	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.869	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.201	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.241	Detected Data appear Lognormal at 10% Significance Level
Detected Data appear Approximate Lognormal at 10% Significance Level		

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	1.109	Mean in Log Scale	-1.729
SD in Original Scale	2.714	SD in Log Scale	1.997
95% t UCL (assumes normality of ROS data)	2.516	95% Percentile Bootstrap UCL	2.559
95% BCA Bootstrap UCL	3.441	95% Bootstrap t UCL	19.72
95% H-UCL (Log ROS)	25.76		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-1.436	KM Geo Mean	0.238
KM SD (logged)	1.512	95% Critical H Value (KM-Log)	3.922
KM Standard Error of Mean (logged)	0.46	95% H-UCL (KM -Log)	4.464
KM SD (logged)	1.512	95% Critical H Value (KM-Log)	3.922

KM Standard Error of Mean (logged)	0.46		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	1.112	Mean in Log Scale	-1.551
SD in Original Scale	2.713	SD in Log Scale	1.721
95% t UCL (Assumes normality)	2.518	95% H-Stat UCL	8.945

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 10% Significance Level

Suggested UCL to Use

KM (t) UCL	2.534		

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | aniline | 62-53-3)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	7
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	7

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 C (groundwater | aniline | 62-53-3) was not processed!

C (groundwater | anthracene | 120-12-7)

General Statistics

Total Number of Observations	43	Number of Distinct Observations	18
Number of Detects	5	Number of Non-Detects	38
Number of Distinct Detects	5	Number of Distinct Non-Detects	13
Minimum Detect	3.4250E-5	Minimum Non-Detect	8.9350E-5
Maximum Detect	1.6240E-4	Maximum Non-Detect	0.0056
Variance Detects	2.7907E-9	Percent Non-Detects	88.37%
Mean Detects	7.4230E-5	SD Detects	5.2827E-5

Median Detects	4.8000E-5	CV Detects	N/A
Skewness Detects	1.618	Kurtosis Detects	2.35
Mean of Logged Detects	-9.68	SD of Logged Detects	0.628

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.812	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.686	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.29	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.396	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	6.7932E-5	KM Standard Error of Mean	1.8670E-5
90KM SD	4.2392E-5	95% KM (BCA) UCL	1.0245E-4
95% KM (t) UCL	9.9333E-5	95% KM (Percentile Bootstrap) UCL	1.0284E-4
95% KM (z) UCL	9.8641E-5	95% KM Bootstrap t UCL	2.2840E-4
90% KM Chebyshev UCL	1.2394E-4	95% KM Chebyshev UCL	1.4931E-4
97.5% KM Chebyshev UCL	1.8452E-4	99% KM Chebyshev UCL	2.5369E-4

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.418	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.683	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.296	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.359	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	3.062	k star (bias corrected MLE)	1.358
Theta hat (MLE)	2.4246E-5	Theta star (bias corrected MLE)	5.4663E-5
nu hat (MLE)	30.62	nu star (bias corrected)	13.58
Mean (detects)	7.4230E-5		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	3.4250E-5	Mean	0.00885
Maximum	0.01	Median	0.01
SD	0.00322	CV	0.364
k hat (MLE)	1.209	k star (bias corrected MLE)	1.14
Theta hat (MLE)	0.00732	Theta star (bias corrected MLE)	0.00776
nu hat (MLE)	104	nu star (bias corrected)	98.05
Adjusted Level of Significance (β)	0.0444		

Approximate Chi Square Value (98.05, α)	76.21	Adjusted Chi Square Value (98.05, β)	75.54
95% Gamma Approximate UCL	0.0114	95% Gamma Adjusted UCL	0.0115

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	6.7932E-5	SD (KM)	4.2392E-5
Variance (KM)	1.7970E-9	SE of Mean (KM)	1.8670E-5
k hat (KM)	2.568	k star (KM)	2.404
nu hat (KM)	220.8	nu star (KM)	206.8
theta hat (KM)	2.6453E-5	theta star (KM)	2.8254E-5
80% gamma percentile (KM)	9.9500E-5	90% gamma percentile (KM)	1.2660E-4
95% gamma percentile (KM)	1.5219E-4	99% gamma percentile (KM)	2.0834E-4

Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (206.77, α)	174.5	Adjusted Chi Square Value (206.77, β)	173.5
95% KM Approximate Gamma UCL	8.0497E-5	95% KM Adjusted Gamma UCL	8.0973E-5

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Lognormal GOF Test on Detected Observations Only		
Shapiro Wilk Test Statistic	0.91	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.806	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.263	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.319	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	6.4908E-5	Mean in Log Scale	-9.761
SD in Original Scale	3.4708E-5	SD in Log Scale	0.485
95% t UCL (assumes normality of ROS data)	7.3811E-5	95% Percentile Bootstrap UCL	7.3892E-5
95% BCA Bootstrap UCL	7.5191E-5	95% Bootstrap t UCL	7.5874E-5
95% H-UCL (Log ROS)	7.4720E-5		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-9.749	KM Geo Mean	5.8372E-5
KM SD (logged)	0.518	95% Critical H Value (KM-Log)	1.914
KM Standard Error of Mean (logged)	0.237	95% H-UCL (KM -Log)	7.7808E-5
KM SD (logged)	0.518	95% Critical H Value (KM-Log)	1.914
KM Standard Error of Mean (logged)	0.237		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	9.2428E-4	Mean in Log Scale	-7.785
SD in Original Scale	0.00106	SD in Log Scale	1.353
95% t UCL (Assumes normality)	0.0012	95% H-Stat UCL	0.00186

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level		

C (groundwater | antimony | 7440-36-0)

General Statistics			
Total Number of Observations	41	Number of Distinct Observations	6
Number of Detects	2	Number of Non-Detects	39
Number of Distinct Detects	2	Number of Distinct Non-Detects	4
Minimum Detect	4.1000E-4	Minimum Non-Detect	0.001
Maximum Detect	5.5000E-4	Maximum Non-Detect	0.05
Variance Detects	9.8000E-9	Percent Non-Detects	95.12%
Mean Detects	4.8000E-4	SD Detects	9.8995E-5
Median Detects	4.8000E-4	CV Detects	0.206
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-7.652	SD of Logged Detects	0.208

Warning: Data set has only 2 Detected Values.		
This is not enough to compute meaningful or reliable statistics and estimates.		

Normal GOF Test on Detects Only		
Not Enough Data to Perform GOF Test		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	4.8000E-4	KM Standard Error of Mean	7.0000E-5
90KM SD	7.0000E-5	95% KM (BCA) UCL	N/A
95% KM (t) UCL	5.9787E-4	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	5.9514E-4	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	6.9000E-4	95% KM Chebyshev UCL	7.8512E-4
97.5% KM Chebyshev UCL	9.1715E-4	99% KM Chebyshev UCL	0.00118

Gamma GOF Tests on Detected Observations Only		
Not Enough Data to Perform GOF Test		

Gamma Statistics on Detected Data Only			
k hat (MLE)	46.68	k star (bias corrected MLE)	N/A
Theta hat (MLE)	1.0282E-5	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	186.7	nu star (bias corrected)	N/A
Mean (detects)	4.8000E-4		

Estimates of Gamma Parameters using KM Estimates		

Mean (KM)	4.8000E-4	SD (KM)	7.0000E-5
Variance (KM)	4.9000E-9	SE of Mean (KM)	7.0000E-5
k hat (KM)	47.02	k star (KM)	43.6
nu hat (KM)	3856	nu star (KM)	3575
theta hat (KM)	1.0208E-5	theta star (KM)	1.1010E-5
80% gamma percentile (KM)	5.3987E-4	90% gamma percentile (KM)	5.7520E-4
95% gamma percentile (KM)	6.0550E-4	99% gamma percentile (KM)	6.6511E-4

Gamma Kaplan-Meier (KM) Statistics

		Adjusted Level of Significance (β)	0.0441
Approximate Chi Square Value (N/A, α)	3437	Adjusted Chi Square Value (N/A, β)	3432
95% KM Approximate Gamma UCL	4.9926E-4	95% KM Adjusted Gamma UCL	4.9998E-4

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	4.9432E-4	Mean in Log Scale	-7.652
SD in Original Scale	1.4338E-4	SD in Log Scale	0.287
95% t UCL (assumes normality of ROS data)	5.3203E-4	95% Percentile Bootstrap UCL	5.3213E-4
95% BCA Bootstrap UCL	5.3260E-4	95% Bootstrap t UCL	5.3451E-4
95% H-UCL (Log ROS)	5.3623E-4		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-7.652	KM Geo Mean	4.7487E-4
KM SD (logged)	0.147	95% Critical H Value (KM-Log)	1.706
KM Standard Error of Mean (logged)	0.147	95% H-UCL (KM -Log)	4.9942E-4
KM SD (logged)	0.147	95% Critical H Value (KM-Log)	1.706
KM Standard Error of Mean (logged)	0.147		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0181	Mean in Log Scale	-4.74
SD in Original Scale	0.011	SD in Log Scale	1.727
95% t UCL (Assumes normality)	0.021	95% H-Stat UCL	0.0946

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	5.9787E-4

Warning: Recommended UCL exceeds the maximum observation

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | arsenic | 7440-38-2)

General Statistics

Total Number of Observations	41	Number of Distinct Observations	13
Number of Detects	11	Number of Non-Detects	30
Number of Distinct Detects	11	Number of Distinct Non-Detects	2
Minimum Detect	7.1000E-4	Minimum Non-Detect	8.0000E-4
Maximum Detect	0.0115	Maximum Non-Detect	0.03
Variance Detects	1.1052E-5	Percent Non-Detects	73.17%
Mean Detects	0.00417	SD Detects	0.00332
Median Detects	0.00425	CV Detects	0.798
Skewness Detects	1.008	Kurtosis Detects	0.942
Mean of Logged Detects	-5.832	SD of Logged Detects	0.946

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.9	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.792	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.149	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.291	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.00388	KM Standard Error of Mean	9.6331E-4
90KM SD	0.00318	95% KM (BCA) UCL	0.00556
95% KM (t) UCL	0.0055	95% KM (Percentile Bootstrap) UCL	0.00549
95% KM (z) UCL	0.00546	95% KM Bootstrap t UCL	0.00615
90% KM Chebyshev UCL	0.00677	95% KM Chebyshev UCL	0.00808
97.5% KM Chebyshev UCL	0.0099	99% KM Chebyshev UCL	0.0135

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.328	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.742	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.161	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.26	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.566	k star (bias corrected MLE)	1.2
Theta hat (MLE)	0.00266	Theta star (bias corrected MLE)	0.00347
nu hat (MLE)	34.46	nu star (bias corrected)	26.39
Mean (detects)	0.00417		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	7.1000E-4	Mean	0.00856
Maximum	0.0139	Median	0.01
SD	0.00323	CV	0.377
k hat (MLE)	3.226	k star (bias corrected MLE)	3.006
Theta hat (MLE)	0.00265	Theta star (bias corrected MLE)	0.00285
nu hat (MLE)	264.5	nu star (bias corrected)	246.5
Adjusted Level of Significance (β)	0.0441		
Approximate Chi Square Value (246.50, α)	211.1	Adjusted Chi Square Value (246.50, β)	210
95% Gamma Approximate UCL	0.00999	95% Gamma Adjusted UCL	0.0101

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.00388	SD (KM)	0.00318
Variance (KM)	1.0123E-5	SE of Mean (KM)	9.6331E-4
k hat (KM)	1.487	k star (KM)	1.395
nu hat (KM)	121.9	nu star (KM)	114.4
theta hat (KM)	0.00261	theta star (KM)	0.00278
80% gamma percentile (KM)	0.00605	90% gamma percentile (KM)	0.00823
95% gamma percentile (KM)	0.0104	99% gamma percentile (KM)	0.0152

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (114.35, α)	90.67	Adjusted Chi Square Value (114.35, β)	89.9
95% KM Approximate Gamma UCL	0.00489	95% KM Adjusted Gamma UCL	0.00494

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.924	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.876	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.198	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.231	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.00409	Mean in Log Scale	-5.963
SD in Original Scale	0.00416	SD in Log Scale	1.013
95% t UCL (assumes normality of ROS data)	0.00519	95% Percentile Bootstrap UCL	0.00523
95% BCA Bootstrap UCL	0.00537	95% Bootstrap t UCL	0.00553
95% H-UCL (Log ROS)	0.00627		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-5.95	KM Geo Mean	0.0026
KM SD (logged)	0.949	95% Critical H Value (KM-Log)	2.297
KM Standard Error of Mean (logged)	0.287	95% H-UCL (KM -Log)	0.00577
KM SD (logged)	0.949	95% Critical H Value (KM-Log)	2.297
KM Standard Error of Mean (logged)	0.287		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0117	Mean in Log Scale	-4.726
SD in Original Scale	0.00543	SD in Log Scale	1.001
95% t UCL (Assumes normality)	0.0132	95% H-Stat UCL	0.0212
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 1% Significance Level			

Suggested UCL to Use			
95% KM (t) UCL	0.0055		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | atrazine | 1912-24-9)

General Statistics			
Total Number of Observations	30	Number of Distinct Observations	4
Number of Detects	0	Number of Non-Detects	30
Number of Distinct Detects	0	Number of Distinct Non-Detects	4

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 C (groundwater | atrazine | 1912-24-9) was not processed!

C (groundwater | barium | 7440-39-3)

General Statistics			
Total Number of Observations	41	Number of Distinct Observations	40
		Number of Missing Observations	0
Minimum	0.0098	Mean	0.0824
Maximum	0.342	Median	0.0495
SD	0.0779	Std. Error of Mean	0.0122
Coefficient of Variation	0.946	Skewness	1.66

Normal GOF Test			
Shapiro Wilk Test Statistic	0.807	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.92	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.19	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.16	Data Not Normal at 1% Significance Level	
Data Not Normal at 1% Significance Level			

Assuming Normal Distribution				
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**		
95% Student's-t UCL	0.103	95% Adjusted-CLT UCL (Chen-1995)		0.106
		95% Modified-t UCL (Johnson-1978)		0.103

Gamma GOF Test			
A-D Test Statistic	0.673	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.769	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.154	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.141	Data Not Gamma Distributed at 5% Significance Level	
Detected data follow Appr. Gamma Distribution at 5% Significance Level			

Gamma Statistics			
k hat (MLE)	1.405	k star (bias corrected MLE)	1.318
Theta hat (MLE)	0.0587	Theta star (bias corrected MLE)	0.0625
nu hat (MLE)	115.2	nu star (bias corrected)	108.1
MLE Mean (bias corrected)	0.0824	MLE Sd (bias corrected)	0.0718
		Approximate Chi Square Value (0.05)	85.08
Adjusted Level of Significance	0.0441	Adjusted Chi Square Value	84.34

Assuming Gamma Distribution			
95% Approximate Gamma UCL	0.105	95% Adjusted Gamma UCL	0.106

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.971	**Shapiro Wilk Lognormal GOF Test**	
10% Shapiro Wilk Critical Value	0.95	Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.111	**Lilliefors Lognormal GOF Test**	
10% Lilliefors Critical Value	0.126	Data appear Lognormal at 10% Significance Level	
Data appear Lognormal at 10% Significance Level			

Lognormal Statistics			
Minimum of Logged Data	-4.625	Mean of logged Data	-2.893
Maximum of Logged Data	-1.073	SD of logged Data	0.913

Assuming Lognormal Distribution			
95% H-UCL	0.116	90% Chebyshev (MVUE) UCL	0.123
95% Chebyshev (MVUE) UCL	0.142	97.5% Chebyshev (MVUE) UCL	0.167
99% Chebyshev (MVUE) UCL	0.217		

Nonparametric Distribution Free UCL Statistics			
Data appear to follow a Discernible Distribution			

Nonparametric Distribution Free UCLs			
95% CLT UCL	0.102	95% BCA Bootstrap UCL	0.107
95% Standard Bootstrap UCL	0.102	95% Bootstrap-t UCL	0.109
95% Hall's Bootstrap UCL	0.108	95% Percentile Bootstrap UCL	0.103
90% Chebyshev(Mean, Sd) UCL	0.119	95% Chebyshev(Mean, Sd) UCL	0.135

97.5% Chebyshev(Mean, Sd) UCL	0.158	99% Chebyshev(Mean, Sd) UCL	0.203

Suggested UCL to Use

95% Adjusted Gamma UCL	0.106		

When a data set follows an approximate distribution passing only one of the GOF tests,

it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | benzaldehyde | 100-52-7)

General Statistics

Total Number of Observations	30	Number of Distinct Observations	4
Number of Detects	0	Number of Non-Detects	30
Number of Distinct Detects	0	Number of Distinct Non-Detects	4

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 C (groundwater | benzaldehyde | 100-52-7) was not processed!

C (groundwater | benzene | 71-43-2)

General Statistics

Total Number of Observations	43	Number of Distinct Observations	16
Number of Detects	9	Number of Non-Detects	34
Number of Distinct Detects	9	Number of Distinct Non-Detects	8
Minimum Detect	2.0000E-4	Minimum Non-Detect	6.7000E-4
Maximum Detect	0.007	Maximum Non-Detect	0.005
Variance Detects	4.9950E-6	Percent Non-Detects	79.07%
Mean Detects	0.00212	SD Detects	0.00223
Median Detects	0.001	CV Detects	1.056
Skewness Detects	1.509	Kurtosis Detects	2.015
Mean of Logged Detects	-6.694	SD of Logged Detects	1.157

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.829	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.764	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.247	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.316	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	8.0293E-4	KM Standard Error of Mean	2.1321E-4
90KM SD	0.0012	95% KM (BCA) UCL	0.00121
95% KM (t) UCL	0.00116	95% KM (Percentile Bootstrap) UCL	0.00119
95% KM (z) UCL	0.00115	95% KM Bootstrap t UCL	0.00137
90% KM Chebyshev UCL	0.00144	95% KM Chebyshev UCL	0.00173
97.5% KM Chebyshev UCL	0.00213	99% KM Chebyshev UCL	0.00292

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.226	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.742	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.192	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.286	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	1.069	k star (bias corrected MLE)	0.787
Theta hat (MLE)	0.00198	Theta star (bias corrected MLE)	0.00269
nu hat (MLE)	19.24	nu star (bias corrected)	14.16
Mean (detects)	0.00212		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	2.0000E-4	Mean	0.00835
Maximum	0.01	Median	0.01
SD	0.00339	CV	0.406
k hat (MLE)	2.098	k star (bias corrected MLE)	1.967
Theta hat (MLE)	0.00398	Theta star (bias corrected MLE)	0.00424
nu hat (MLE)	180.4	nu star (bias corrected)	169.2
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (169.18, α)	140.1	Adjusted Chi Square Value (169.18, β)	139.2
95% Gamma Approximate UCL	0.0101	95% Gamma Adjusted UCL	0.0101

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	8.0293E-4	SD (KM)	0.0012
Variance (KM)	1.4443E-6	SE of Mean (KM)	2.1321E-4
k hat (KM)	0.446	k star (KM)	0.431
nu hat (KM)	38.39	nu star (KM)	37.04
theta hat (KM)	0.0018	theta star (KM)	0.00186
80% gamma percentile (KM)	0.00131	90% gamma percentile (KM)	0.00224
95% gamma percentile (KM)	0.00325	99% gamma percentile (KM)	0.00578

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (37.04, α)	24.11	Adjusted Chi Square Value (37.04, β)	23.75
95% KM Approximate Gamma UCL	0.00123	95% KM Adjusted Gamma UCL	0.00125

Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.981	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.129	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.252	Detected Data appear Lognormal at 10% Significance Level	
Detected Data appear Lognormal at 10% Significance Level			
Note GOF tests may be unreliable for small sample sizes			

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	8.0612E-4	Mean in Log Scale	-7.666
SD in Original Scale	0.00122	SD in Log Scale	0.965
95% t UCL (assumes normality of ROS data)	0.00112	95% Percentile Bootstrap UCL	0.00113
95% BCA Bootstrap UCL	0.00124	95% Bootstrap t UCL	0.00145
95% H-UCL (Log ROS)	0.00105		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-7.591	KM Geo Mean	5.0494E-4
KM SD (logged)	0.82	95% Critical H Value (KM-Log)	2.173
KM Standard Error of Mean (logged)	0.257	95% H-UCL (KM -Log)	9.3040E-4
KM SD (logged)	0.82	95% Critical H Value (KM-Log)	2.173
KM Standard Error of Mean (logged)	0.257		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	9.2234E-4	Mean in Log Scale	-7.361
SD in Original Scale	0.00123	SD in Log Scale	0.713
95% t UCL (Assumes normality)	0.00124	95% H-Stat UCL	0.00103
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 1% Significance Level			

Suggested UCL to Use			
95% KM (t) UCL	**0.00116**		

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | benzidine | 92-87-5)

General Statistics			
Total Number of Observations	13	Number of Distinct Observations	4
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	4

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 C (groundwater | benzidine | 92-87-5) was not processed!

C (groundwater | benzo(a)anthracene | 56-55-3)

General Statistics			
Total Number of Observations	43	Number of Distinct Observations	18
Number of Detects	4	Number of Non-Detects	39
Number of Distinct Detects	4	Number of Distinct Non-Detects	14
Minimum Detect	3.8000E-5	Minimum Non-Detect	9.2167E-5
Maximum Detect	1.1050E-4	Maximum Non-Detect	0.0056
Variance Detects	1.0262E-9	Percent Non-Detects	90.7%
Mean Detects	6.4375E-5	SD Detects	3.2035E-5
Median Detects	5.4500E-5	CV Detects	N/A
Skewness Detects	1.543	Kurtosis Detects	2.536
Mean of Logged Detects	-9.733	SD of Logged Detects	0.455

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.867	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.304	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.413	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	5.9250E-5	KM Standard Error of Mean	1.1901E-5
90KM SD	2.4342E-5	95% KM (BCA) UCL	N/A
95% KM (t) UCL	7.9267E-5	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	7.8825E-5	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	9.4953E-5	95% KM Chebyshev UCL	1.1113E-4
97.5% KM Chebyshev UCL	1.3357E-4	99% KM Chebyshev UCL	1.7766E-4

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.332	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.659	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.265	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.396	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level			
Note GOF tests may be unreliable for small sample sizes			
Gamma Statistics on Detected Data Only			
k hat (MLE)	6.22	k star (bias corrected MLE)	1.722
Theta hat (MLE)	1.0350E-5	Theta star (bias corrected MLE)	3.7391E-5
nu hat (MLE)	49.76	nu star (bias corrected)	13.77
Mean (detects)	6.4375E-5		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	3.8000E-5	Mean	0.00908
Maximum	0.01	Median	0.01
SD	0.00292	CV	0.322
k hat (MLE)	1.46	k star (bias corrected MLE)	1.374
Theta hat (MLE)	0.00622	Theta star (bias corrected MLE)	0.00661
nu hat (MLE)	125.5	nu star (bias corrected)	118.1
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (118.12, α)	94.03	Adjusted Chi Square Value (118.12, β)	93.28
95% Gamma Approximate UCL	0.0114	95% Gamma Adjusted UCL	N/A
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	5.9250E-5	SD (KM)	2.4342E-5
Variance (KM)	5.925E-10	SE of Mean (KM)	1.1901E-5
k hat (KM)	5.925	k star (KM)	5.527
nu hat (KM)	509.5	nu star (KM)	475.3
theta hat (KM)	1.0001E-5	theta star (KM)	1.0720E-5
80% gamma percentile (KM)	7.8768E-5	90% gamma percentile (KM)	9.2966E-5
95% gamma percentile (KM)	1.0585E-4	99% gamma percentile (KM)	1.3296E-4
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (475.31, α)	425.8	Adjusted Chi Square Value (475.31, β)	424.1
95% KM Approximate Gamma UCL	6.6146E-5	95% KM Adjusted Gamma UCL	6.6399E-5
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.947	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.792	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.239	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.346	Detected Data appear Lognormal at 10% Significance Level	
Detected Data appear Lognormal at 10% Significance Level			
Note GOF tests may be unreliable for small sample sizes			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	5.8077E-5	Mean in Log Scale	-9.813

SD in Original Scale	2.1245E-5	SD in Log Scale	0.345
95% t UCL (assumes normality of ROS data)	6.3527E-5	95% Percentile Bootstrap UCL	6.3483E-5
95% BCA Bootstrap UCL	6.4111E-5	95% Bootstrap t UCL	6.4451E-5
95% H-UCL (Log ROS)	6.3947E-5		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-9.803	KM Geo Mean	5.5312E-5
KM SD (logged)	0.353	95% Critical H Value (KM-Log)	1.808
KM Standard Error of Mean (logged)	0.179	95% H-UCL (KM -Log)	6.4975E-5
KM SD (logged)	0.353	95% Critical H Value (KM-Log)	1.808
KM Standard Error of Mean (logged)	0.179		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	9.2365E-4	Mean in Log Scale	-7.782
SD in Original Scale	0.00106	SD in Log Scale	1.34
95% t UCL (Assumes normality)	0.0012	95% H-Stat UCL	0.00182

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use			
95% KM (t) UCL	7.9267E-5		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | benzo(a)pyrene | 50-32-8)

General Statistics			
Total Number of Observations	43	Number of Distinct Observations	18
Number of Detects	7	Number of Non-Detects	36
Number of Distinct Detects	7	Number of Distinct Non-Detects	11
Minimum Detect	2.2000E-5	Minimum Non-Detect	5.0000E-4
Maximum Detect	7.2500E-5	Maximum Non-Detect	0.0056
Variance Detects	3.555E-10	Percent Non-Detects	83.72%
Mean Detects	4.8786E-5	SD Detects	1.8854E-5
Median Detects	5.4000E-5	CV Detects	N/A
Skewness Detects	-0.471	Kurtosis Detects	-1.118
Mean of Logged Detects	-10.01	SD of Logged Detects	0.457

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.93	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.73	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.18	**Lilliefors GOF Test**	

1% Lilliefors Critical Value	0.35	Detected Data appear Normal at 1% Significance Level	

<p style="color:blue; text-align:center">Detected Data appear Normal at 1% Significance Level</p>

<p style="color:red; text-align:center">Note GOF tests may be unreliable for small sample sizes</p>

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	4.8786E-5	KM Standard Error of Mean	7.1263E-6
90KM SD	1.7456E-5	95% KM (BCA) UCL	6.0300E-5
95% KM (t) UCL	6.0772E-5	95% KM (Percentile Bootstrap) UCL	6.0188E-5
95% KM (z) UCL	6.0507E-5	95% KM Bootstrap t UCL	6.0875E-5
90% KM Chebyshev UCL	7.0165E-5	95% KM Chebyshev UCL	7.9848E-5
97.5% KM Chebyshev UCL	9.3289E-5	99% KM Chebyshev UCL	1.1969E-4

<p style="color:red; text-align:center">Note: KM UCLs may be biased low with this dataset. Other substitution method recommended</p>

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.447	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.709	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.224	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.313	Detected data appear Gamma Distributed at 5% Significance Level	

<p style="color:blue; text-align:center">Detected data appear Gamma Distributed at 5% Significance Level</p>

<p style="color:red; text-align:center">Note GOF tests may be unreliable for small sample sizes</p>

Gamma Statistics on Detected Data Only

k hat (MLE)	6.415	k star (bias corrected MLE)	3.761
Theta hat (MLE)	7.6055E-6	Theta star (bias corrected MLE)	1.2973E-5
nu hat (MLE)	89.8	nu star (bias corrected)	52.65
Mean (detects)	4.8786E-5		

Gamma ROS Statistics using Imputed Non-Detects

<p style="color:blue; text-align:center">GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs</p>

<p style="color:blue; text-align:center">GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)</p>

<p style="color:blue; text-align:center">For such situations, GROS method may yield incorrect values of UCLs and BTVs</p>

<p style="color:blue; text-align:center">This is especially true when the sample size is small.</p>

<p style="color:blue; text-align:center">For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates</p>

Minimum	2.2000E-5	Mean	0.00838
Maximum	0.01	Median	0.01
SD	0.00372	CV	0.444
k hat (MLE)	0.839	k star (bias corrected MLE)	0.796
Theta hat (MLE)	0.00999	Theta star (bias corrected MLE)	0.0105
nu hat (MLE)	72.17	nu star (bias corrected)	68.47
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (68.47, α)	50.42	Adjusted Chi Square Value (68.47, β)	49.89
95% Gamma Approximate UCL	0.0114	95% Gamma Adjusted UCL	0.0115

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	4.8786E-5	SD (KM)	1.7456E-5
Variance (KM)	3.047E-10	SE of Mean (KM)	7.1263E-6
k hat (KM)	7.811	k star (KM)	7.282
nu hat (KM)	671.7	nu star (KM)	626.2

theta hat (KM)	6.2458E-6	theta star (KM)	6.6999E-6
80% gamma percentile (KM)	6.2995E-5	90% gamma percentile (KM)	7.2912E-5
95% gamma percentile (KM)	8.1821E-5	99% gamma percentile (KM)	1.0034E-4

Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (626.21, α)	569.2	Adjusted Chi Square Value (626.21, β)	567.3
95% KM Approximate Gamma UCL	5.3676E-5	95% KM Adjusted Gamma UCL	5.3854E-5

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Lognormal GOF Test on Detected Observations Only		
Shapiro Wilk Test Statistic	0.873	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.838	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.233	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.28	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	4.8604E-5	Mean in Log Scale	-10.01
SD in Original Scale	1.9539E-5	SD in Log Scale	0.399
95% t UCL (assumes normality of ROS data)	5.3615E-5	95% Percentile Bootstrap UCL	5.3608E-5
95% BCA Bootstrap UCL	5.4028E-5	95% Bootstrap t UCL	5.4270E-5
95% H-UCL (Log ROS)	5.4589E-5		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-10.01	KM Geo Mean	4.5036E-5
KM SD (logged)	0.423	95% Critical H Value (KM-Log)	1.848
KM Standard Error of Mean (logged)	0.173	95% H-UCL (KM -Log)	5.5577E-5
KM SD (logged)	0.423	95% Critical H Value (KM-Log)	1.848
KM Standard Error of Mean (logged)	0.173		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	9.2131E-4	Mean in Log Scale	-7.827
SD in Original Scale	0.00106	SD in Log Scale	1.413
95% t UCL (Assumes normality)	0.00119	95% H-Stat UCL	0.00202

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use		
95% KM (t) UCL	6.0772E-5	

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | benzo(b)fluoranthene | 205-99-2)

General Statistics			
Total Number of Observations	43	Number of Distinct Observations	18
Number of Detects	1	Number of Non-Detects	42
Number of Distinct Detects	1	Number of Distinct Non-Detects	17

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 C (groundwater | benzo(b)fluoranthene | 205-99-2) was not processed!

C (groundwater | benzo(e)pyrene | 192-97-2)

General Statistics			
Total Number of Observations	7	Number of Distinct Observations	7
Number of Detects	2	Number of Non-Detects	5
Number of Distinct Detects	2	Number of Distinct Non-Detects	5
Minimum Detect	3.0000E-5	Minimum Non-Detect	9.2167E-5
Maximum Detect	1.2300E-4	Maximum Non-Detect	1.0917E-4
Variance Detects	4.3245E-9	Percent Non-Detects	71.43%
Mean Detects	7.6500E-5	SD Detects	6.5761E-5
Median Detects	7.6500E-5	CV Detects	N/A
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-9.709	SD of Logged Detects	0.998

Warning: Data set has only 2 Detected Values.

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

Note: Sample size is small (e.g., <10), if data are collected using incremental sampling methodology (ISM) approach,

refer also to ITRC Tech Reg Guide on ISM (ITRC 2020 and ITRC 2012) for additional guidance,

but note that ITRC may recommend the t-UCL or the Chebyshev UCL for small sample sizes (n < 7).

The Chebyshev UCL often results in gross overestimates of the mean.

Refer to the ProUCL 5.2 Technical Guide for a discussion of the Chebyshev UCL.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	4.3286E-5	KM Standard Error of Mean	1.7395E-5
90KM SD	3.2543E-5	95% KM (BCA) UCL	N/A
95% KM (t) UCL	7.7087E-5	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	7.1898E-5	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	9.5471E-5	95% KM Chebyshev UCL	1.1911E-4
97.5% KM Chebyshev UCL	1.5192E-4	99% KM Chebyshev UCL	2.1636E-4

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	2.321	k star (bias corrected MLE)	N/A
Theta hat (MLE)	3.2956E-5	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	9.285	nu star (bias corrected)	N/A
Mean (detects)	7.6500E-5		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	4.3286E-5	SD (KM)	3.2543E-5
Variance (KM)	1.0591E-9	SE of Mean (KM)	1.7395E-5
k hat (KM)	1.769	k star (KM)	1.106
nu hat (KM)	24.77	nu star (KM)	15.49
theta hat (KM)	2.4467E-5	theta star (KM)	3.9130E-5
80% gamma percentile (KM)	6.9064E-5	90% gamma percentile (KM)	9.7217E-5
95% gamma percentile (KM)	1.2515E-4	99% gamma percentile (KM)	1.8954E-4

Gamma Kaplan-Meier (KM) Statistics

		Adjusted Level of Significance (β)	0.0158
Approximate Chi Square Value (15.49, α)	7.601	Adjusted Chi Square Value (15.49, β)	6.012
95% KM Approximate Gamma UCL	8.8189E-5	95% KM Adjusted Gamma UCL	1.1150E-4

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	4.3286E-5	Mean in Log Scale	-10.21
SD in Original Scale	3.5151E-5	SD in Log Scale	0.533
95% t UCL (assumes normality of ROS data)	6.9102E-5	95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A	95% Bootstrap t UCL	N/A
95% H-UCL (Log ROS)	7.3415E-5		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-10.21	KM Geo Mean	3.6700E-5
KM SD (logged)	0.494	95% Critical H Value (KM-Log)	2.45
KM Standard Error of Mean (logged)	0.264	95% H-UCL (KM -Log)	6.7934E-5
KM SD (logged)	0.494	95% Critical H Value (KM-Log)	2.45
KM Standard Error of Mean (logged)	0.264		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	5.8969E-5	Mean in Log Scale	-9.822
SD in Original Scale	2.9526E-5	SD in Log Scale	0.418
95% t UCL (Assumes normality)	8.0654E-5	95% H-Stat UCL	8.7801E-5

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics			
Data do not follow a Discernible Distribution			

Suggested UCL to Use			
Recommendation cannot be provided			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | benzo(g,h,i)perylene | 191-24-2)

General Statistics			
Total Number of Observations	43	Number of Distinct Observations	18
Number of Detects	2	Number of Non-Detects	41
Number of Distinct Detects	2	Number of Distinct Non-Detects	16
Minimum Detect	7.7000E-5	Minimum Non-Detect	1.3842E-4
Maximum Detect	1.1000E-4	Maximum Non-Detect	0.0056
Variance Detects	5.445E-10	Percent Non-Detects	95.35%
Mean Detects	9.3500E-5	SD Detects	2.3335E-5
Median Detects	9.3500E-5	CV Detects	N/A
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-9.293	SD of Logged Detects	0.252

Warning: Data set has only 2 Detected Values.

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

Normal GOF Test on Detects Only			
Not Enough Data to Perform GOF Test			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	9.3500E-5	KM Standard Error of Mean	1.6500E-5
90KM SD	1.6500E-5	95% KM (BCA) UCL	N/A
95% KM (t) UCL	1.2125E-4	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	1.2064E-4	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	1.4300E-4	95% KM Chebyshev UCL	1.6542E-4
97.5% KM Chebyshev UCL	1.9654E-4	99% KM Chebyshev UCL	2.5767E-4

Gamma GOF Tests on Detected Observations Only			
Not Enough Data to Perform GOF Test			

Gamma Statistics on Detected Data Only			
k hat (MLE)	31.77	k star (bias corrected MLE)	N/A
Theta hat (MLE)	2.9426E-6	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	127.1	nu star (bias corrected)	N/A
Mean (detects)	9.3500E-5		

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	9.3500E-5	SD (KM)	1.6500E-5
Variance (KM)	2.723E-10	SE of Mean (KM)	1.6500E-5
k hat (KM)	32.11	k star (KM)	29.89
nu hat (KM)	2762	nu star (KM)	2570
theta hat (KM)	2.9118E-6	theta star (KM)	3.1285E-6
80% gamma percentile (KM)	1.0751E-4	90% gamma percentile (KM)	1.1598E-4
95% gamma percentile (KM)	1.2330E-4	99% gamma percentile (KM)	1.3782E-4

Gamma Kaplan-Meier (KM) Statistics			
		Adjusted Level of Significance (β)	0.0444
Approximate Chi Square Value (N/A, α)	2453	Adjusted Chi Square Value (N/A, β)	2449
95% KM Approximate Gamma UCL	9.7951E-5	95% KM Adjusted Gamma UCL	9.8108E-5

Lognormal GOF Test on Detected Observations Only
Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	9.5535E-5	Mean in Log Scale	-9.293
SD in Original Scale	2.7194E-5	SD in Log Scale	0.276
95% t UCL (assumes normality of ROS data)	1.0251E-4	95% Percentile Bootstrap UCL	1.0244E-4
95% BCA Bootstrap UCL	1.0330E-4	95% Bootstrap t UCL	1.0344E-4
95% H-UCL (Log ROS)	1.0303E-4		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-9.293	KM Geo Mean	9.2033E-5
KM SD (logged)	0.178	95% Critical H Value (KM-Log)	1.701
KM Standard Error of Mean (logged)	0.178	95% H-UCL (KM -Log)	9.7989E-5
KM SD (logged)	0.178	95% Critical H Value (KM-Log)	1.701
KM Standard Error of Mean (logged)	0.178		
Note: KM UCLs may be biased low with this dataset. Other substitution method recommended			

DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	9.2735E-4	Mean in Log Scale	-7.725
SD in Original Scale	0.00106	SD in Log Scale	1.253
95% t UCL (Assumes normality)	0.0012	95% H-Stat UCL	0.00162
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution

Suggested UCL to Use			
95% KM (t) UCL	1.2125E-4		
Warning: Recommended UCL exceeds the maximum observation			

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

C (groundwater | benzo(k)fluoranthene | 207-08-9)

General Statistics

Total Number of Observations	43	Number of Distinct Observations	18
Number of Detects	4	Number of Non-Detects	39
Number of Distinct Detects	4	Number of Distinct Non-Detects	14
Minimum Detect	3.6000E-5	Minimum Non-Detect	9.2167E-5
Maximum Detect	9.1500E-5	Maximum Non-Detect	0.0056
Variance Detects	5.758E-10	Percent Non-Detects	90.7%
Mean Detects	5.8250E-5	SD Detects	2.3995E-5
Median Detects	5.2750E-5	CV Detects	N/A
Skewness Detects	1.174	Kurtosis Detects	1.416
Mean of Logged Detects	-9.811	SD of Logged Detects	0.395

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.929	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.246	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.413	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	5.8250E-5	KM Standard Error of Mean	1.1997E-5
90KM SD	2.0780E-5	95% KM (BCA) UCL	N/A
95% KM (t) UCL	7.8429E-5	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	7.7984E-5	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	9.4242E-5	95% KM Chebyshev UCL	1.1055E-4
97.5% KM Chebyshev UCL	1.3317E-4	99% KM Chebyshev UCL	1.7762E-4

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.246	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.658	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.199	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.395	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	8.499	k star (bias corrected MLE)	2.291
Theta hat (MLE)	6.8541E-6	Theta star (bias corrected MLE)	2.5422E-5
nu hat (MLE)	67.99	nu star (bias corrected)	18.33
Mean (detects)	5.8250E-5		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

Minimum	3.6000E-5	Mean	0.00908
Maximum	0.01	Median	0.01
SD	0.00292	CV	0.322
k hat (MLE)	1.435	k star (bias corrected MLE)	1.351
Theta hat (MLE)	0.00632	Theta star (bias corrected MLE)	0.00672
nu hat (MLE)	123.4	nu star (bias corrected)	116.1
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (116.15, α)	92.27	Adjusted Chi Square Value (116.15, β)	91.53
95% Gamma Approximate UCL	0.0114	95% Gamma Adjusted UCL	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	5.8250E-5	SD (KM)	2.0780E-5
Variance (KM)	4.318E-10	SE of Mean (KM)	1.1997E-5
k hat (KM)	7.858	k star (KM)	7.325
nu hat (KM)	675.8	nu star (KM)	630
theta hat (KM)	7.4131E-6	theta star (KM)	7.9522E-6
80% gamma percentile (KM)	7.5170E-5	90% gamma percentile (KM)	8.6970E-5
95% gamma percentile (KM)	9.7567E-5	99% gamma percentile (KM)	1.1959E-4

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (629.95, α)	572.7	Adjusted Chi Square Value (629.95, β)	570.8
95% KM Approximate Gamma UCL	6.4070E-5	95% KM Adjusted Gamma UCL	6.4282E-5

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.983	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.792	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.185	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.346	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	5.8767E-5	Mean in Log Scale	-9.811
SD in Original Scale	2.3066E-5	SD in Log Scale	0.374
95% t UCL (assumes normality of ROS data)	6.4683E-5	95% Percentile Bootstrap UCL	6.4601E-5
95% BCA Bootstrap UCL	6.5296E-5	95% Bootstrap t UCL	6.5707E-5
95% H-UCL (Log ROS)	6.5357E-5		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-9.811	KM Geo Mean	5.4859E-5
KM SD (logged)	0.342	95% Critical H Value (KM-Log)	1.801
KM Standard Error of Mean (logged)	0.197	95% H-UCL (KM -Log)	6.3952E-5
KM SD (logged)	0.342	95% Critical H Value (KM-Log)	1.801
KM Standard Error of Mean (logged)	0.197		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended	

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	9.2308E-4	Mean in Log Scale	-7.789
SD in Original Scale	0.00106	SD in Log Scale	1.35
95% t UCL (Assumes normality)	0.0012	95% H-Stat UCL	0.00184
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	7.8429E-5		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | benzoic acid | 65-85-0)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	6
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	6

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 C (groundwater | benzoic acid | 65-85-0) was not processed!

C (groundwater | beryllium | 7440-41-7)

General Statistics

Total Number of Observations	41	Number of Distinct Observations	12
Number of Detects	10	Number of Non-Detects	31
Number of Distinct Detects	10	Number of Distinct Non-Detects	2
Minimum Detect	6.7000E-5	Minimum Non-Detect	4.0000E-4
Maximum Detect	0.0089	Maximum Non-Detect	0.005
Variance Detects	6.7422E-6	Percent Non-Detects	75.61%
Mean Detects	0.00211	SD Detects	0.0026
Median Detects	0.00135	CV Detects	1.233
Skewness Detects	2.358	Kurtosis Detects	6.099
Mean of Logged Detects	-6.883	SD of Logged Detects	1.49

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.705	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.781	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.332	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.304	Detected Data Not Normal at 1% Significance Level

<p style="color:red; text-align:center; font-weight:bold;">Detected Data Not Normal at 1% Significance Level</p>

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.00109	KM Standard Error of Mean	3.4626E-4
90KM SD	0.00159	95% KM (BCA) UCL	0.00178
95% KM (t) UCL	0.00168	95% KM (Percentile Bootstrap) UCL	0.00171
95% KM (z) UCL	0.00166	95% KM Bootstrap t UCL	0.00193
90% KM Chebyshev UCL	0.00213	95% KM Chebyshev UCL	0.0026
97.5% KM Chebyshev UCL	0.00326	99% KM Chebyshev UCL	0.00454

<p style="color:red; text-align:center; font-weight:bold;">Note: KM UCLs may be biased low with this dataset. Other substitution method recommended</p>

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.431	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.755	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.189	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.275	Detected data appear Gamma Distributed at 5% Significance Level

<p style="color:blue; text-align:center; font-weight:bold;">Detected data appear Gamma Distributed at 5% Significance Level</p>

Gamma Statistics on Detected Data Only

k hat (MLE)	0.821	k star (bias corrected MLE)	0.641
Theta hat (MLE)	0.00257	Theta star (bias corrected MLE)	0.00328
nu hat (MLE)	16.42	nu star (bias corrected)	12.83
Mean (detects)	0.00211		

Gamma ROS Statistics using Imputed Non-Detects

<p style="color:blue; text-align:center;">GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs</p>
<p style="color:blue; text-align:center;">GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)</p>
<p style="color:blue; text-align:center;">For such situations, GROS method may yield incorrect values of UCLs and BTVs</p>
<p style="color:blue; text-align:center;">This is especially true when the sample size is small.</p>
<p style="color:blue; text-align:center;">For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates</p>

Minimum	6.7000E-5	Mean	0.00807
Maximum	0.01	Median	0.01
SD	0.00365	CV	0.452
k hat (MLE)	1.609	k star (bias corrected MLE)	1.508
Theta hat (MLE)	0.00502	Theta star (bias corrected MLE)	0.00536
nu hat (MLE)	132	nu star (bias corrected)	123.6
Adjusted Level of Significance (β)	0.0441		
Approximate Chi Square Value (123.64, α)	98.96	Adjusted Chi Square Value (123.64, β)	98.16
95% Gamma Approximate UCL	0.0101	95% Gamma Adjusted UCL	0.0102

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.00109	SD (KM)	0.00159
Variance (KM)	2.5383E-6	SE of Mean (KM)	3.4626E-4
k hat (KM)	0.471	k star (KM)	0.453

nu hat (KM)	38.65	nu star (KM)	37.16
theta hat (KM)	0.00232	theta star (KM)	0.00241
80% gamma percentile (KM)	0.00179	90% gamma percentile (KM)	0.00302
95% gamma percentile (KM)	0.00435	99% gamma percentile (KM)	0.00766

Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (37.16, α)	24.2	Adjusted Chi Square Value (37.16, β)	23.82
95% KM Approximate Gamma UCL	0.00168	95% KM Adjusted Gamma UCL	0.00171
Note: KM UCLs may be biased low with this dataset. Other substitution method recommended			

Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.887	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.869	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.248	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.241	Detected Data Not Lognormal at 10% Significance Level	
Detected Data appear Approximate Lognormal at 10% Significance Level			

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00109	Mean in Log Scale	-7.724
SD in Original Scale	0.00166	SD in Log Scale	1.434
95% t UCL (assumes normality of ROS data)	0.00152	95% Percentile Bootstrap UCL	0.00155
95% BCA Bootstrap UCL	0.00166	95% Bootstrap t UCL	0.00182
95% H-UCL (Log ROS)	0.00237		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-7.861	KM Geo Mean	3.8552E-4
KM SD (logged)	1.569	95% Critical H Value (KM-Log)	3.046
KM Standard Error of Mean (logged)	0.427	95% H-UCL (KM -Log)	0.00281
KM SD (logged)	1.569	95% Critical H Value (KM-Log)	3.046
KM Standard Error of Mean (logged)	0.427		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.00212	Mean in Log Scale	-6.517
SD in Original Scale	0.00144	SD in Log Scale	1.101
95% t UCL (Assumes normality)	0.0025	95% H-Stat UCL	0.00416
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			

Suggested UCL to Use			
95% KM Adjusted Gamma UCL	0.00171		

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

C (groundwater | bis(2-chloroethoxy)methane | 111-91-1)

General Statistics

Total Number of Observations	42	Number of Distinct Observations	9
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (groundwater | bis(2-chloroethoxy)methane | 111-91-1) was not processed!

C (groundwater | bis(2-chloroethyl) ether | 111-44-4)

General Statistics

Total Number of Observations	42	Number of Distinct Observations	9
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (groundwater | bis(2-chloroethyl) ether | 111-44-4) was not processed!

C (groundwater | bis(2-ethylhexyl)phthalate | 117-81-7)

General Statistics

Total Number of Observations	42	Number of Distinct Observations	10
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (groundwater | bis(2-ethylhexyl)phthalate | 117-81-7) was not processed!

C (groundwater | bromobenzene | 108-86-1)

General Statistics			
Total Number of Observations	13	Number of Distinct Observations	3
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	3

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 C (groundwater | bromobenzene | 108-86-1) was not processed!

C (groundwater | bromochloromethane | 74-97-5)

General Statistics			
Total Number of Observations	13	Number of Distinct Observations	3
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	3

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 C (groundwater | bromochloromethane | 74-97-5) was not processed!

C (groundwater | bromodichloromethane | 75-27-4)

General Statistics			
Total Number of Observations	36	Number of Distinct Observations	4
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	4

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 C (groundwater | bromodichloromethane | 75-27-4) was not processed!

C (groundwater | bromoform | 75-25-2)

General Statistics			
Total Number of Observations	36	Number of Distinct Observations	5
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	5

The data set for variable C (groundwater | bromoform | 75-25-2) was not processed!

C (groundwater | bromomethane | 74-83-9)

General Statistics

Total Number of Observations	36	Number of Distinct Observations	5
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	5

The data set for variable C (groundwater | bromomethane | 74-83-9) was not processed!

C (groundwater | butylbenzylphthalate | 85-68-7)

General Statistics

Total Number of Observations	42	Number of Distinct Observations	9
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	9

The data set for variable C (groundwater | butylbenzylphthalate | 85-68-7) was not processed!

C (groundwater | cadmium | 7440-43-9)

General Statistics

Total Number of Observations	41	Number of Distinct Observations	22
Number of Detects	25	Number of Non-Detects	16
Number of Distinct Detects	22	Number of Distinct Non-Detects	1
Minimum Detect	4.2500E-5	Minimum Non-Detect	0.005
Maximum Detect	0.0115	Maximum Non-Detect	0.005
Variance Detects	6.7907E-6	Percent Non-Detects	39.02%
Mean Detects	0.00218	SD Detects	0.00261
Median Detects	0.0016	CV Detects	1.195
Skewness Detects	2.367	Kurtosis Detects	6.484
Mean of Logged Detects	-6.898	SD of Logged Detects	1.512

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.733	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.886	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.246	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.201	Detected Data Not Normal at 1% Significance Level	
Detected Data Not Normal at 1% Significance Level			

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.00187	KM Standard Error of Mean	3.7082E-4
90KM SD	0.00214	95% KM (BCA) UCL	0.00253
95% KM (t) UCL	0.0025	95% KM (Percentile Bootstrap) UCL	0.00252
95% KM (z) UCL	0.00248	95% KM Bootstrap t UCL	0.00272
90% KM Chebyshev UCL	0.00298	95% KM Chebyshev UCL	0.00349
97.5% KM Chebyshev UCL	0.00419	99% KM Chebyshev UCL	0.00556

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.426	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.782	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.152	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.181	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.775	k star (bias corrected MLE)	0.708
Theta hat (MLE)	0.00281	Theta star (bias corrected MLE)	0.00308
nu hat (MLE)	38.73	nu star (bias corrected)	35.42
Mean (detects)	0.00218		

Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	4.2500E-5	Mean	0.00523
Maximum	0.0115	Median	0.0028
SD	0.00436	CV	0.833
k hat (MLE)	0.792	k star (bias corrected MLE)	0.751
Theta hat (MLE)	0.0066	Theta star (bias corrected MLE)	0.00697
nu hat (MLE)	64.96	nu star (bias corrected)	61.54
Adjusted Level of Significance (β)	0.0441		
Approximate Chi Square Value (61.54, α)	44.5	Adjusted Chi Square Value (61.54, β)	43.97
95% Gamma Approximate UCL	0.00724	95% Gamma Adjusted UCL	0.00732

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.00187	SD (KM)	0.00214
Variance (KM)	4.5964E-6	SE of Mean (KM)	3.7082E-4

k hat (KM)	0.762		k star (KM)	0.723
nu hat (KM)	62.49		nu star (KM)	59.25
theta hat (KM)	0.00246		theta star (KM)	0.00259
80% gamma percentile (KM)	0.00307		90% gamma percentile (KM)	0.00466
95% gamma percentile (KM)	0.0063		99% gamma percentile (KM)	0.0102

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (59.25, α)	42.55		Adjusted Chi Square Value (59.25, β)	42.04
95% KM Approximate Gamma UCL	0.00261		95% KM Adjusted Gamma UCL	0.00264

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.918	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.931	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.22	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.159	Detected Data Not Lognormal at 10% Significance Level	

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.00181		Mean in Log Scale	-7.028
SD in Original Scale	0.00221		SD in Log Scale	1.371
95% t UCL (assumes normality of ROS data)	0.00239		95% Percentile Bootstrap UCL	0.00241
95% BCA Bootstrap UCL	0.00253		95% Bootstrap t UCL	0.00266
95% H-UCL (Log ROS)	0.00416			

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-7.005		KM Geo Mean	9.0762E-4
KM SD (logged)	1.442		95% Critical H Value (KM-Log)	2.88
KM Standard Error of Mean (logged)	0.291		95% H-UCL (KM -Log)	0.00495
KM SD (logged)	1.442		95% Critical H Value (KM-Log)	2.88
KM Standard Error of Mean (logged)	0.291			

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00231	Mean in Log Scale	-6.544
SD in Original Scale	0.00202	SD in Log Scale	1.254
95% t UCL (Assumes normality)	0.00284	95% H-Stat UCL	0.00533

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	0.00264

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

C (groundwater | caprolactam | 105-60-2)

General Statistics

Total Number of Observations	30	Number of Distinct Observations	5
Number of Detects	0	Number of Non-Detects	30
Number of Distinct Detects	0	Number of Distinct Non-Detects	5

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 C (groundwater | caprolactam | 105-60-2) was not processed!

C (groundwater | carbazole | 86-74-8)

General Statistics

Total Number of Observations	42	Number of Distinct Observations	11
Number of Detects	2	Number of Non-Detects	40
Number of Distinct Detects	2	Number of Distinct Non-Detects	9
Minimum Detect	8.0000E-4	Minimum Non-Detect	0.002
Maximum Detect	9.0000E-4	Maximum Non-Detect	0.011
Variance Detects	5.0000E-9	Percent Non-Detects	95.24%
Mean Detects	8.5000E-4	SD Detects	7.0711E-5
Median Detects	8.5000E-4	CV Detects	0.0832
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-7.072	SD of Logged Detects	0.0833

Warning: Data set has only 2 Detected Values.

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

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	8.5000E-4	KM Standard Error of Mean	5.0000E-5
90KM SD	5.0000E-5	95% KM (BCA) UCL	N/A
95% KM (t) UCL	9.3414E-4	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	9.3224E-4	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.001	95% KM Chebyshev UCL	0.00107
97.5% KM Chebyshev UCL	0.00116	99% KM Chebyshev UCL	0.00135

Gamma GOF Tests on Detected Observations Only			
Not Enough Data to Perform GOF Test			

Gamma Statistics on Detected Data Only			
k hat (MLE)	288.7	k star (bias corrected MLE)	N/A
Theta hat (MLE)	2.9446E-6	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	1155	nu star (bias corrected)	N/A
Mean (detects)	8.5000E-4		

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	8.5000E-4	SD (KM)	5.0000E-5
Variance (KM)	2.5000E-9	SE of Mean (KM)	5.0000E-5
k hat (KM)	289	k star (KM)	268.4
nu hat (KM)	24276	nu star (KM)	22543
theta hat (KM)	2.9412E-6	theta star (KM)	3.1672E-6
80% gamma percentile (KM)	8.9333E-4	90% gamma percentile (KM)	9.1714E-4
95% gamma percentile (KM)	9.3711E-4	99% gamma percentile (KM)	9.7534E-4

Gamma Kaplan-Meier (KM) Statistics			
		Adjusted Level of Significance (β)	0.0443
Approximate Chi Square Value (N/A, α)	22195	Adjusted Chi Square Value (N/A, β)	22183
95% KM Approximate Gamma UCL	8.6333E-4	95% KM Adjusted Gamma UCL	8.6381E-4

Lognormal GOF Test on Detected Observations Only			
Not Enough Data to Perform GOF Test			

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	8.5300E-4	Mean in Log Scale	-7.072
SD in Original Scale	8.8712E-5	SD in Log Scale	0.104
95% t UCL (assumes normality of ROS data)	8.7603E-4	95% Percentile Bootstrap UCL	8.7545E-4
95% BCA Bootstrap UCL	8.7610E-4	95% Bootstrap t UCL	8.7771E-4
95% H-UCL (Log ROS)	8.7681E-4		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-7.072	KM Geo Mean	8.4853E-4
KM SD (logged)	0.0589	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0589	95% H-UCL (KM -Log)	N/A
KM SD (logged)	0.0589	95% Critical H Value (KM-Log)	N/A
KM Standard Error of Mean (logged)	0.0589		

DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00232	Mean in Log Scale	-6.371
SD in Original Scale	0.0019	SD in Log Scale	0.763
95% t UCL (Assumes normality)	0.00281	95% H-Stat UCL	0.00294
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics			

Data do not follow a Discernible Distribution
Suggested UCL to Use
95% KM (t) UCL	9.3414E-4		
Warning: Recommended UCL exceeds the maximum observation
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | carbon disulfide | 75-15-0)

General Statistics			
Total Number of Observations	36	Number of Distinct Observations	3
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	3

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 C (groundwater | carbon disulfide | 75-15-0) was not processed!

C (groundwater | carbon tetrachloride | 56-23-5)

General Statistics			
Total Number of Observations	36	Number of Distinct Observations	4
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	4

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 C (groundwater | carbon tetrachloride | 56-23-5) was not processed!

C (groundwater | chlorobenzene | 108-90-7)

General Statistics			
Total Number of Observations	36	Number of Distinct Observations	4
Number of Detects	1	Number of Non-Detects	35
Number of Distinct Detects	1	Number of Distinct Non-Detects	4

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).

C (groundwater | chloroethane | 75-00-3)

General Statistics

Total Number of Observations	36	Number of Distinct Observations	5
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	5

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 C (groundwater | chloroethane | 75-00-3) was not processed!

C (groundwater | chloroform | 67-66-3)

General Statistics

Total Number of Observations	36	Number of Distinct Observations	5
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	5

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 C (groundwater | chloroform | 67-66-3) was not processed!

C (groundwater | chloromethane | 74-87-3)

General Statistics

Total Number of Observations	36	Number of Distinct Observations	5
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	5

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 C (groundwater | chloromethane | 74-87-3) was not processed!

C (groundwater | chromium (total) | 7440-47-3)

General Statistics

Total Number of Observations	41	Number of Distinct Observations	18
Number of Detects	19	Number of Non-Detects	22
Number of Distinct Detects	15	Number of Distinct Non-Detects	3
Minimum Detect	9.6000E-4	Minimum Non-Detect	0.001
Maximum Detect	0.036	Maximum Non-Detect	0.015
Variance Detects	6.1573E-5	Percent Non-Detects	53.66%
Mean Detects	0.00405	SD Detects	0.00785
Median Detects	0.0021	CV Detects	1.937
Skewness Detects	4.169	Kurtosis Detects	17.77
Mean of Logged Detects	-6.053	SD of Logged Detects	0.807

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.364	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.863	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.402	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.229	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.00285	KM Standard Error of Mean	8.8194E-4
90KM SD	0.00539	95% KM (BCA) UCL	0.00457
95% KM (t) UCL	0.00433	95% KM (Percentile Bootstrap) UCL	0.00444
95% KM (z) UCL	0.0043	95% KM Bootstrap t UCL	0.00911
90% KM Chebyshev UCL	0.00549	95% KM Chebyshev UCL	0.00669
97.5% KM Chebyshev UCL	0.00835	99% KM Chebyshev UCL	0.0116

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	2.862	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.768	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.313	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.204	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.054	k star (bias corrected MLE)	0.923
Theta hat (MLE)	0.00384	Theta star (bias corrected MLE)	0.00439
nu hat (MLE)	40.05	nu star (bias corrected)	35.06
Mean (detects)	0.00405		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	9.6000E-4	Mean	0.00728
Maximum	0.036	Median	0.01

SD	0.00609	CV	0.835
k hat (MLE)	1.573	k star (bias corrected MLE)	1.474
Theta hat (MLE)	0.00463	Theta star (bias corrected MLE)	0.00494
nu hat (MLE)	129	nu star (bias corrected)	120.9
Adjusted Level of Significance (β)	0.0441		
Approximate Chi Square Value (120.88, α)	96.49	Adjusted Chi Square Value (120.88, β)	95.69
95% Gamma Approximate UCL	0.00913	95% Gamma Adjusted UCL	0.0092

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.00285	SD (KM)	0.00539
Variance (KM)	2.9039E-5	SE of Mean (KM)	8.8194E-4
k hat (KM)	0.279	k star (KM)	0.275
nu hat (KM)	22.89	nu star (KM)	22.55
theta hat (KM)	0.0102	theta star (KM)	0.0104
80% gamma percentile (KM)	0.00426	90% gamma percentile (KM)	0.00848
95% gamma percentile (KM)	0.0134	99% gamma percentile (KM)	0.0263

Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (22.55, α)	12.75	Adjusted Chi Square Value (22.55, β)	12.48
95% KM Approximate Gamma UCL	0.00503	95% KM Adjusted Gamma UCL	0.00514

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Lognormal GOF Test on Detected Observations Only		
Shapiro Wilk Test Statistic	0.767	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.917	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.247	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.18	Detected Data Not Lognormal at 10% Significance Level

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00287	Mean in Log Scale	-6.311
SD in Original Scale	0.00547	SD in Log Scale	0.786
95% t UCL (assumes normality of ROS data)	0.00431	95% Percentile Bootstrap UCL	0.00452
95% BCA Bootstrap UCL	0.00552	95% Bootstrap t UCL	0.00817
95% H-UCL (Log ROS)	0.00322		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-6.271	KM Geo Mean	0.00189
KM SD (logged)	0.679	95% Critical H Value (KM-Log)	2.037
KM Standard Error of Mean (logged)	0.129	95% H-UCL (KM -Log)	0.00296
KM SD (logged)	0.679	95% Critical H Value (KM-Log)	2.037
KM Standard Error of Mean (logged)	0.129		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.00506	Mean in Log Scale	-5.74
SD in Original Scale	0.00576	SD in Log Scale	1.008

95% t UCL (Assumes normality)	0.00658	95% H-Stat UCL	0.00779

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.00433		

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | chrysene | 218-01-9)

General Statistics

Total Number of Observations	43	Number of Distinct Observations	18
Number of Detects	4	Number of Non-Detects	39
Number of Distinct Detects	4	Number of Distinct Non-Detects	14
Minimum Detect	4.3000E-5	Minimum Non-Detect	9.2167E-5
Maximum Detect	1.1300E-4	Maximum Non-Detect	0.0056
Variance Detects	1.0020E-9	Percent Non-Detects	90.7%
Mean Detects	6.7000E-5	SD Detects	3.1654E-5
Median Detects	5.6000E-5	CV Detects	N/A
Skewness Detects	1.649	Kurtosis Detects	2.746
Mean of Logged Detects	-9.684	SD of Logged Detects	0.424

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.836	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.687	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.313	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.413	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	6.1889E-5	KM Standard Error of Mean	1.1623E-5
90KM SD	2.3953E-5	95% KM (BCA) UCL	N/A
95% KM (t) UCL	8.1439E-5	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	8.1008E-5	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	9.6759E-5	95% KM Chebyshev UCL	1.1255E-4
97.5% KM Chebyshev UCL	1.3448E-4	99% KM Chebyshev UCL	1.7754E-4

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.399	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.658	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.28	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.395	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		
Note GOF tests may be unreliable for small sample sizes		

Gamma Statistics on Detected Data Only

k hat (MLE)	7.035	k star (bias corrected MLE)	1.925
Theta hat (MLE)	9.5241E-6	Theta star (bias corrected MLE)	3.4799E-5
nu hat (MLE)	56.28	nu star (bias corrected)	15.4
Mean (detects)	6.7000E-5		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	4.3000E-5	Mean	0.00908
Maximum	0.01	Median	0.01
SD	0.00292	CV	0.322
k hat (MLE)	1.476	k star (bias corrected MLE)	1.389
Theta hat (MLE)	0.00615	Theta star (bias corrected MLE)	0.00654
nu hat (MLE)	127	nu star (bias corrected)	119.4
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (119.43, α)	95.2	Adjusted Chi Square Value (119.43, β)	94.45
95% Gamma Approximate UCL	0.0114	95% Gamma Adjusted UCL	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	6.1889E-5	SD (KM)	2.3953E-5
Variance (KM)	5.738E-10	SE of Mean (KM)	1.1623E-5
k hat (KM)	6.676	k star (KM)	6.225
nu hat (KM)	574.1	nu star (KM)	535.4
theta hat (KM)	9.2709E-6	theta star (KM)	9.9414E-6
80% gamma percentile (KM)	8.1229E-5	90% gamma percentile (KM)	9.5039E-5
95% gamma percentile (KM)	1.0752E-4	99% gamma percentile (KM)	1.3363E-4

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (535.38, α)	482.7	Adjusted Chi Square Value (535.38, β)	481
95% KM Approximate Gamma UCL	6.8641E-5	95% KM Adjusted Gamma UCL	6.8888E-5

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.907	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.792	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.255	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.346	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level			
Note GOF tests may be unreliable for small sample sizes			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	6.0891E-5	Mean in Log Scale	-9.757
SD in Original Scale	2.0552E-5	SD in Log Scale	0.319
95% t UCL (assumes normality of ROS data)	6.6163E-5	95% Percentile Bootstrap UCL	6.6124E-5
95% BCA Bootstrap UCL	6.6716E-5	95% Bootstrap t UCL	6.7009E-5
95% H-UCL (Log ROS)	6.6503E-5		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-9.75	KM Geo Mean	5.8310E-5
KM SD (logged)	0.326	95% Critical H Value (KM-Log)	1.792
KM Standard Error of Mean (logged)	0.163	95% H-UCL (KM -Log)	6.7296E-5
KM SD (logged)	0.326	95% Critical H Value (KM-Log)	1.792
KM Standard Error of Mean (logged)	0.163		
Note: KM UCLs may be biased low with this dataset. Other substitution method recommended			
DL/2 Statistics			
DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	9.2390E-4	Mean in Log Scale	-7.777
SD in Original Scale	0.00106	SD in Log Scale	1.333
95% t UCL (Assumes normality)	0.0012	95% H-Stat UCL	0.0018
DL/2 is not a recommended method, provided for comparisons and historical reasons			
Nonparametric Distribution Free UCL Statistics			
Detected Data appear Normal Distributed at 1% Significance Level			
Suggested UCL to Use			
95% KM (t) UCL	8.1439E-5		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | cis-1,2-dichloroethene | 156-59-2)

General Statistics			
Total Number of Observations	36	Number of Distinct Observations	4
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	4

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 C (groundwater | cis-1,2-dichloroethene | 156-59-2) was not processed!

C (groundwater | cobalt | 7440-48-4)

General Statistics				
Total Number of Observations	41	Number of Distinct Observations	35
Number of Detects	35	Number of Non-Detects	6
Number of Distinct Detects	34	Number of Distinct Non-Detects	1
Minimum Detect	0.0024	Minimum Non-Detect	0.005
Maximum Detect	0.805	Maximum Non-Detect	0.005
Variance Detects	0.0315	Percent Non-Detects	14.63%
Mean Detects	0.108	SD Detects	0.178
Median Detects	0.024	CV Detects	1.651
Skewness Detects	2.532	Kurtosis Detects	6.804
Mean of Logged Detects	-3.443	SD of Logged Detects	1.659

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.64	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.91	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.277	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.172	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0923	KM Standard Error of Mean	0.0263
90KM SD	0.166	95% KM (BCA) UCL	0.142
95% KM (t) UCL	0.137	95% KM (Percentile Bootstrap) UCL	0.138
95% KM (z) UCL	0.136	95% KM Bootstrap t UCL	0.159
90% KM Chebyshev UCL	0.171	95% KM Chebyshev UCL	0.207
97.5% KM Chebyshev UCL	0.256	99% KM Chebyshev UCL	0.354

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.215	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.81	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.161	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.157	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.52	k star (bias corrected MLE)	0.495
Theta hat (MLE)	0.207	Theta star (bias corrected MLE)	0.217
nu hat (MLE)	36.43	nu star (bias corrected)	34.64
Mean (detects)	0.108		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates				
Minimum	0.0024		Mean	0.0933
Maximum	0.805		Median	0.0182
SD	0.167		CV	1.794
k hat (MLE)	0.51		k star (bias corrected MLE)	0.489
Theta hat (MLE)	0.183		Theta star (bias corrected MLE)	0.191
nu hat (MLE)	41.85		nu star (bias corrected)	40.12
Adjusted Level of Significance (β)	0.0441			
Approximate Chi Square Value (40.12, α)	26.6		Adjusted Chi Square Value (40.12, β)	26.2
95% Gamma Approximate UCL	0.141		95% Gamma Adjusted UCL	0.143
Estimates of Gamma Parameters using KM Estimates				
Mean (KM)	0.0923		SD (KM)	0.166
Variance (KM)	0.0275		SE of Mean (KM)	0.0263
k hat (KM)	0.31		k star (KM)	0.304
nu hat (KM)	25.43		nu star (KM)	24.9
theta hat (KM)	0.298		theta star (KM)	0.304
80% gamma percentile (KM)	0.142		90% gamma percentile (KM)	0.272
95% gamma percentile (KM)	0.421		99% gamma percentile (KM)	0.807
Gamma Kaplan-Meier (KM) Statistics				
Approximate Chi Square Value (24.90, α)	14.53		Adjusted Chi Square Value (24.90, β)	14.24
95% KM Approximate Gamma UCL	0.158		95% KM Adjusted Gamma UCL	0.161
Lognormal GOF Test on Detected Observations Only				
Shapiro Wilk Test Statistic	0.942		**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.944		Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.132		**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.136		Detected Data appear Lognormal at 10% Significance Level	
Detected Data appear Approximate Lognormal at 10% Significance Level				
Lognormal ROS Statistics Using Imputed Non-Detects				
Mean in Original Scale	0.0922		Mean in Log Scale	-3.852
SD in Original Scale	0.168		SD in Log Scale	1.846
95% t UCL (assumes normality of ROS data)	0.136		95% Percentile Bootstrap UCL	0.138
95% BCA Bootstrap UCL	0.148		95% Bootstrap t UCL	0.16
95% H-UCL (Log ROS)	0.317			
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution				
KM Mean (logged)	-3.771		KM Geo Mean	0.023
KM SD (logged)	1.708		95% Critical H Value (KM-Log)	3.235
KM Standard Error of Mean (logged)	0.272		95% H-UCL (KM -Log)	0.238
KM SD (logged)	1.708		95% Critical H Value (KM-Log)	3.235
KM Standard Error of Mean (logged)	0.272			
DL/2 Statistics				
DL/2 Normal			**DL/2 Log-Transformed**	
Mean in Original Scale	0.0922		Mean in Log Scale	-3.816

SD in Original Scale	0.168		SD in Log Scale	1.781
95% t UCL (Assumes normality)	0.136		95% H-Stat UCL	0.275

<p style="color:red; text-align:center">DL/2 is not a recommended method, provided for comparisons and historical reasons</p>

<p style="text-align:center">Nonparametric Distribution Free UCL Statistics</p>

<p style="color:blue; text-align:center">Detected Data appear Approximate Lognormal Distributed at 10% Significance Level</p>

<p style="text-align:center">Suggested UCL to Use</p>

KM H-UCL	0.238		

<p style="color:red; text-align:center">The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.</p>

<p style="color:red; text-align:center">Please verify the data were collected from random locations.</p>

<p style="color:red; text-align:center">If the data were collected using judgmental or other non-random methods,</p>

<p style="color:red; text-align:center">then contact a statistician to correctly calculate UCLs.</p>

<p style="color:blue; text-align:center">Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.</p>

<p style="color:blue; text-align:center">Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.</p>

<p style="color:blue; text-align:center">However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.</p>

C (groundwater | copper | 7440-50-8)

<p style="text-align:center">General Statistics</p>

Total Number of Observations	41		Number of Distinct Observations	17
Number of Detects	16		Number of Non-Detects	25
Number of Distinct Detects	16		Number of Distinct Non-Detects	1
Minimum Detect	6.6500E-4		Minimum Non-Detect	0.02
Maximum Detect	0.11		Maximum Non-Detect	0.02
Variance Detects	7.5242E-4		Percent Non-Detects	60.98%
Mean Detects	0.0184		SD Detects	0.0274
Median Detects	0.0106		CV Detects	1.488
Skewness Detects	2.771		Kurtosis Detects	8.804
Mean of Logged Detects	-4.883		SD of Logged Detects	1.454

<p style="text-align:center">Normal GOF Test on Detects Only</p>

Shapiro Wilk Test Statistic	0.645	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.844	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.301	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.248	Detected Data Not Normal at 1% Significance Level	

<p style="color:red; text-align:center">Detected Data Not Normal at 1% Significance Level</p>

<p style="text-align:center">Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs</p>

KM Mean	0.0112		KM Standard Error of Mean	0.00317
90KM SD	0.0181		95% KM (BCA) UCL	0.0169
95% KM (t) UCL	0.0166		95% KM (Percentile Bootstrap) UCL	0.0168
95% KM (z) UCL	0.0165		95% KM Bootstrap t UCL	0.0198
90% KM Chebyshev UCL	0.0208		95% KM Chebyshev UCL	0.0251
97.5% KM Chebyshev UCL	0.0311		99% KM Chebyshev UCL	0.0428

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.457	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.78	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.157	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.224	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.682	k star (bias corrected MLE)	0.596
Theta hat (MLE)	0.027	Theta star (bias corrected MLE)	0.0309
nu hat (MLE)	21.83	nu star (bias corrected)	19.07
Mean (detects)	0.0184		

Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	6.6500E-4	Mean	0.015
Maximum	0.11	Median	0.01
SD	0.0176	CV	1.171
k hat (MLE)	1.379	k star (bias corrected MLE)	1.294
Theta hat (MLE)	0.0109	Theta star (bias corrected MLE)	0.0116
nu hat (MLE)	113.1	nu star (bias corrected)	106.1
Adjusted Level of Significance (β)	0.0441		
Approximate Chi Square Value (106.12, α)	83.34	Adjusted Chi Square Value (106.12, β)	82.61
95% Gamma Approximate UCL	0.0192	95% Gamma Adjusted UCL	0.0193

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0112	SD (KM)	0.0181
Variance (KM)	3.2763E-4	SE of Mean (KM)	0.00317
k hat (KM)	0.386	k star (KM)	0.374
nu hat (KM)	31.62	nu star (KM)	30.64
theta hat (KM)	0.0291	theta star (KM)	0.0301
80% gamma percentile (KM)	0.018	90% gamma percentile (KM)	0.0321
95% gamma percentile (KM)	0.0478	99% gamma percentile (KM)	0.0875

Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (30.64, α)	19	Adjusted Chi Square Value (30.64, β)	18.66
95% KM Approximate Gamma UCL	0.0181	95% KM Adjusted Gamma UCL	0.0185

Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.963	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.906	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.16	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.196	Detected Data appear Lognormal at 10% Significance Level	
Detected Data appear Lognormal at 10% Significance Level			

Lognormal ROS Statistics Using Imputed Non-Detects				
Mean in Original Scale	0.0111	Mean in Log Scale	-5.276	
SD in Original Scale	0.0184	SD in Log Scale	1.254	
95% t UCL (assumes normality of ROS data)	0.0159	95% Percentile Bootstrap UCL	0.0163	
95% BCA Bootstrap UCL	0.0183	95% Bootstrap t UCL	0.0206	
95% H-UCL (Log ROS)	0.019			

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution				
KM Mean (logged)	-5.252	KM Geo Mean	0.00524	
KM SD (logged)	1.236	95% Critical H Value (KM-Log)	2.624	
KM Standard Error of Mean (logged)	0.305	95% H-UCL (KM -Log)	0.0188	
KM SD (logged)	1.236	95% Critical H Value (KM-Log)	2.624	
KM Standard Error of Mean (logged)	0.305			

DL/2 Statistics				
DL/2 Normal		**DL/2 Log-Transformed**		
Mean in Original Scale	0.0133	Mean in Log Scale	-4.714	
SD in Original Scale	0.0173	SD in Log Scale	0.901	
95% t UCL (Assumes normality)	0.0178	95% H-Stat UCL	0.0185	

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	0.0185		

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | cumene | 98-82-8)

General Statistics				
Total Number of Observations	36	Number of Distinct Observations	7	
Number of Detects	5	Number of Non-Detects	31	
Number of Distinct Detects	4	Number of Distinct Non-Detects	4	
Minimum Detect	4.0000E-4	Minimum Non-Detect	0.001	
Maximum Detect	0.002	Maximum Non-Detect	0.025	
Variance Detects	3.4800E-7	Percent Non-Detects	86.11%	
Mean Detects	0.00104	SD Detects	5.8992E-4	
Median Detects	0.001	CV Detects	0.567	

Skewness Detects	1.235		Kurtosis Detects	2.533
Mean of Logged Detects	-6.997		SD of Logged Detects	0.577

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.888	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.686	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.327	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.396	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	7.2941E-4	KM Standard Error of Mean	1.5995E-4
90KM SD	3.8770E-4	95% KM (BCA) UCL	N/A
95% KM (t) UCL	9.9967E-4	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	9.9251E-4	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.00121	95% KM Chebyshev UCL	0.00143
97.5% KM Chebyshev UCL	0.00173	99% KM Chebyshev UCL	0.00232

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.321	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.681	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.265	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.358	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	4.051	k star (bias corrected MLE)	1.754
Theta hat (MLE)	2.5673E-4	Theta star (bias corrected MLE)	5.9304E-4
nu hat (MLE)	40.51	nu star (bias corrected)	17.54
Mean (detects)	0.00104		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	4.0000E-4	Mean	0.00876
Maximum	0.01	Median	0.01
SD	0.00315	CV	0.36
k hat (MLE)	2.664	k star (bias corrected MLE)	2.46
Theta hat (MLE)	0.00329	Theta star (bias corrected MLE)	0.00356
nu hat (MLE)	191.8	nu star (bias corrected)	177.1
Adjusted Level of Significance (β)	0.0428		
Approximate Chi Square Value (177.13, α)	147.4	Adjusted Chi Square Value (177.13, β)	146.1
95% Gamma Approximate UCL	0.0105	95% Gamma Adjusted UCL	0.0106

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	7.2941E-4	SD (KM)	3.8770E-4
Variance (KM)	1.5031E-7	SE of Mean (KM)	1.5995E-4
k hat (KM)	3.54	k star (KM)	3.263
nu hat (KM)	254.9	nu star (KM)	234.9
theta hat (KM)	2.0607E-4	theta star (KM)	2.2353E-4
80% gamma percentile (KM)	0.00103	90% gamma percentile (KM)	0.00127
95% gamma percentile (KM)	0.00149	99% gamma percentile (KM)	0.00198

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (234.95, α)	200.5	Adjusted Chi Square Value (234.95, β)	199
95% KM Approximate Gamma UCL	8.5488E-4	95% KM Adjusted Gamma UCL	8.6108E-4

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.949	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.806	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.238	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.319	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	6.7728E-4	Mean in Log Scale	-7.407
SD in Original Scale	3.4937E-4	SD in Log Scale	0.468
95% t UCL (assumes normality of ROS data)	7.7566E-4	95% Percentile Bootstrap UCL	7.7619E-4
95% BCA Bootstrap UCL	7.9448E-4	95% Bootstrap t UCL	8.0077E-4
95% H-UCL (Log ROS)	7.8590E-4		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-7.336	KM Geo Mean	6.5155E-4
KM SD (logged)	0.459	95% Critical H Value (KM-Log)	1.881
KM Standard Error of Mean (logged)	0.243	95% H-UCL (KM -Log)	8.3783E-4
KM SD (logged)	0.459	95% Critical H Value (KM-Log)	1.881
KM Standard Error of Mean (logged)	0.243		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00272	Mean in Log Scale	-6.499
SD in Original Scale	0.00362	SD in Log Scale	1.051
95% t UCL (Assumes normality)	0.00374	95% H-Stat UCL	0.00404

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	9.9967E-4		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | cyclohexane | 110-82-7)

General Statistics			
Total Number of Observations	24	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	24
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

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 C (groundwater | cyclohexane | 110-82-7) was not processed!

C (groundwater | dibenz(a,h)anthracene | 53-70-3)

General Statistics			
Total Number of Observations	43	Number of Distinct Observations	18
Number of Detects	5	Number of Non-Detects	38
Number of Distinct Detects	5	Number of Distinct Non-Detects	13
Minimum Detect	2.4000E-5	Minimum Non-Detect	1.0620E-4
Maximum Detect	5.2500E-5	Maximum Non-Detect	0.0056
Variance Detects	1.327E-10	Percent Non-Detects	88.37%
Mean Detects	3.6700E-5	SD Detects	1.1520E-5
Median Detects	3.4000E-5	CV Detects	N/A
Skewness Detects	0.493	Kurtosis Detects	-1.275
Mean of Logged Detects	-10.25	SD of Logged Detects	0.314

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.959	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.686	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.193	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.396	Detected Data appear Normal at 1% Significance Level
Detected Data appear Normal at 1% Significance Level		
Note GOF tests may be unreliable for small sample sizes		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	3.6700E-5	KM Standard Error of Mean	5.1517E-6
90KM SD	1.0303E-5	95% KM (BCA) UCL	4.5750E-5
95% KM (t) UCL	4.5365E-5	95% KM (Percentile Bootstrap) UCL	4.6125E-5
95% KM (z) UCL	4.5174E-5	95% KM Bootstrap t UCL	5.4440E-5
90% KM Chebyshev UCL	5.2155E-5	95% KM Chebyshev UCL	5.9156E-5

97.5% KM Chebyshev UCL	6.8872E-5	99% KM Chebyshev UCL	8.7959E-5

<p style="color:red; text-align:center;">Note: KM UCLs may be biased low with this dataset. Other substitution method recommended</p>

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.213	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.679	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.177	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.357	Detected data appear Gamma Distributed at 5% Significance Level	

<p style="color:blue; text-align:center;">Detected data appear Gamma Distributed at 5% Significance Level</p>

<p style="color:red; text-align:center;">Note GOF tests may be unreliable for small sample sizes</p>

Gamma Statistics on Detected Data Only

k hat (MLE)	12.84	k star (bias corrected MLE)	5.271
Theta hat (MLE)	2.8574E-6	Theta star (bias corrected MLE)	6.9628E-6
nu hat (MLE)	128.4	nu star (bias corrected)	52.71
Mean (detects)	3.6700E-5		

Gamma ROS Statistics using Imputed Non-Detects

<p style="color:blue; text-align:center;">GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs</p>

<p style="color:blue; text-align:center;">GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)</p>

<p style="color:blue; text-align:center;">For such situations, GROS method may yield incorrect values of UCLs and BTVs</p>

<p style="color:blue; text-align:center;">This is especially true when the sample size is small.</p>

<p style="color:blue; text-align:center;">For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates</p>

Minimum	2.4000E-5	Mean	0.00884
Maximum	0.01	Median	0.01
SD	0.00323	CV	0.366
k hat (MLE)	1.073	k star (bias corrected MLE)	1.014
Theta hat (MLE)	0.00824	Theta star (bias corrected MLE)	0.00872
nu hat (MLE)	92.3	nu star (bias corrected)	87.19
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (87.19, α)	66.66	Adjusted Chi Square Value (87.19, β)	66.04
95% Gamma Approximate UCL	0.0116	95% Gamma Adjusted UCL	0.0117

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	3.6700E-5	SD (KM)	1.0303E-5
Variance (KM)	1.062E-10	SE of Mean (KM)	5.1517E-6
k hat (KM)	12.69	k star (KM)	11.82
nu hat (KM)	1091	nu star (KM)	1016
theta hat (KM)	2.8926E-6	theta star (KM)	3.1055E-6
80% gamma percentile (KM)	4.5253E-5	90% gamma percentile (KM)	5.0873E-5
95% gamma percentile (KM)	5.5841E-5	99% gamma percentile (KM)	6.5979E-5

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (N/A, α)	943.3	Adjusted Chi Square Value (N/A, β)	940.9
95% KM Approximate Gamma UCL	3.9540E-5	95% KM Adjusted Gamma UCL	3.9642E-5

<p style="color:red; text-align:center;">Note: KM UCLs may be biased low with this dataset. Other substitution method recommended</p>

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.976	Shapiro Wilk GOF Test	
10% Shapiro Wilk Critical Value	0.806	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.159	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.319	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	3.6786E-5	Mean in Log Scale	-10.25
SD in Original Scale	1.1018E-5	SD in Log Scale	0.292
95% t UCL (assumes normality of ROS data)	3.9612E-5	95% Percentile Bootstrap UCL	3.9575E-5
95% BCA Bootstrap UCL	3.9894E-5	95% Bootstrap t UCL	3.9899E-5
95% H-UCL (Log ROS)	3.9878E-5		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-10.25	KM Geo Mean	3.5281E-5
KM SD (logged)	0.281	95% Critical H Value (KM-Log)	1.759
KM Standard Error of Mean (logged)	0.141	95% H-UCL (KM -Log)	3.9613E-5
KM SD (logged)	0.281	95% Critical H Value (KM-Log)	1.759
KM Standard Error of Mean (logged)	0.141		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	9.2086E-4	Mean in Log Scale	-7.837
SD in Original Scale	0.00106	SD in Log Scale	1.427
95% t UCL (Assumes normality)	0.00119	95% H-Stat UCL	0.00206

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	4.5365E-5		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | dibenzofuran | 132-64-9)

General Statistics

Total Number of Observations	43	Number of Distinct Observations	18
Number of Detects	5	Number of Non-Detects	38
Number of Distinct Detects	5	Number of Distinct Non-Detects	13
Minimum Detect	2.0000E-5	Minimum Non-Detect	9.2167E-5
Maximum Detect	4.3200E-4	Maximum Non-Detect	0.01
Variance Detects	2.7998E-8	Percent Non-Detects	88.37%

Mean Detects	1.3913E-4	SD Detects	1.6733E-4
Median Detects	9.8667E-5	CV Detects	1.203
Skewness Detects	1.998	Kurtosis Detects	4.185
Mean of Logged Detects	-9.402	SD of Logged Detects	1.139

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.736	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.686	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.392	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.396	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.1249E-4	KM Standard Error of Mean	5.7106E-5
90KM SD	1.3422E-4	95% KM (BCA) UCL	2.2600E-4
95% KM (t) UCL	2.0854E-4	95% KM (Percentile Bootstrap) UCL	2.1630E-4
95% KM (z) UCL	2.0642E-4	95% KM Bootstrap t UCL	4.1738E-4
90% KM Chebyshev UCL	2.8380E-4	95% KM Chebyshev UCL	3.6141E-4
97.5% KM Chebyshev UCL	4.6911E-4	99% KM Chebyshev UCL	6.8069E-4

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.372	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.69	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.299	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.364	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	1.095	k star (bias corrected MLE)	0.571
Theta hat (MLE)	1.2710E-4	Theta star (bias corrected MLE)	2.4358E-4
nu hat (MLE)	10.95	nu star (bias corrected)	5.712
Mean (detects)	1.3913E-4		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	2.0000E-5	Mean	0.00885
Maximum	0.01	Median	0.01
SD	0.0032	CV	0.361
k hat (MLE)	1.288	k star (bias corrected MLE)	1.214
Theta hat (MLE)	0.00687	Theta star (bias corrected MLE)	0.00729
nu hat (MLE)	110.8	nu star (bias corrected)	104.4

Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (104.37, α)	81.8	Adjusted Chi Square Value (104.37, β)	81.1
95% Gamma Approximate UCL	0.0113	95% Gamma Adjusted UCL	0.0114

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.1249E-4	SD (KM)	1.3422E-4
Variance (KM)	1.8014E-8	SE of Mean (KM)	5.7106E-5
k hat (KM)	0.702	k star (KM)	0.669
nu hat (KM)	60.41	nu star (KM)	57.52
theta hat (KM)	1.6015E-4	theta star (KM)	1.6817E-4
80% gamma percentile (KM)	1.8514E-4	90% gamma percentile (KM)	2.8538E-4
95% gamma percentile (KM)	3.8920E-4	99% gamma percentile (KM)	6.3800E-4

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (57.52, α)	41.09	Adjusted Chi Square Value (57.52, β)	40.61
95% KM Approximate Gamma UCL	1.5748E-4	95% KM Adjusted Gamma UCL	1.5935E-4

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.963	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.806	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.233	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.319	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	9.4765E-5	Mean in Log Scale	-9.656
SD in Original Scale	1.0160E-4	SD in Log Scale	0.879
95% t UCL (assumes normality of ROS data)	1.2083E-4	95% Percentile Bootstrap UCL	1.2159E-4
95% BCA Bootstrap UCL	1.2717E-4	95% Bootstrap t UCL	1.3298E-4
95% H-UCL (Log ROS)	1.2749E-4		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-9.623	KM Geo Mean	6.6203E-5
KM SD (logged)	0.983	95% Critical H Value (KM-Log)	2.343
KM Standard Error of Mean (logged)	0.442	95% H-UCL (KM -Log)	1.5308E-4
KM SD (logged)	0.983	95% Critical H Value (KM-Log)	2.343
KM Standard Error of Mean (logged)	0.442		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00142	Mean in Log Scale	-7.01
SD in Original Scale	0.00103	SD in Log Scale	1.271
95% t UCL (Assumes normality)	0.00169	95% H-Stat UCL	0.00343

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics		
Detected Data appear Normal Distributed at 1% Significance Level		
Suggested UCL to Use		
95% KM (t) UCL	2.0854E-4	
The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.		
Please verify the data were collected from random locations.		
If the data were collected using judgmental or other non-random methods,		
then contact a statistician to correctly calculate UCLs.		
Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.		
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.		
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.		

C (groundwater | dibenzothiophene | 132-65-0)

General Statistics			
Total Number of Observations	3	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	3
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

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 C (groundwater | dibenzothiophene | 132-65-0) was not processed!

C (groundwater | dibromochloromethane | 124-48-1)

General Statistics			
Total Number of Observations	36	Number of Distinct Observations	4
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	4

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 C (groundwater | dibromochloromethane | 124-48-1) was not processed!

C (groundwater | dibromomethane | 74-95-3)

General Statistics			
Total Number of Observations	13	Number of Distinct Observations	3
Number of Detects	0	Number of Non-Detects	13

Number of Distinct Detects	0	Number of Distinct Non-Detects	3

The data set for variable C (groundwater | dibromomethane | 74-95-3) was not processed!

C (groundwater | dichlorodifluoromethane | 75-71-8)

General Statistics

Total Number of Observations	36	Number of Distinct Observations	5
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	5

The data set for variable C (groundwater | dichlorodifluoromethane | 75-71-8) was not processed!

C (groundwater | diethyl ether | 60-29-7)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

The data set for variable C (groundwater | diethyl ether | 60-29-7) was not processed!

C (groundwater | diethylphthalate | 84-66-2)

General Statistics

Total Number of Observations	42	Number of Distinct Observations	9
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	9

C (groundwater | diisopropyl ether | 108-20-3)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	5
Number of Detects	2	Number of Non-Detects	11
Number of Distinct Detects	2	Number of Distinct Non-Detects	3
Minimum Detect	4.6000E-4	Minimum Non-Detect	4.0500E-4
Maximum Detect	0.0028	Maximum Non-Detect	0.001
Variance Detects	2.7378E-6	Percent Non-Detects	84.62%
Mean Detects	0.00163	SD Detects	0.00165
Median Detects	0.00163	CV Detects	1.015
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-6.781	SD of Logged Detects	1.277

Warning: Data set has only 2 Detected Values.

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

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	6.1462E-4	KM Standard Error of Mean	2.4874E-4
90KM SD	6.3142E-4	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.00106	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.00102	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.00136	95% KM Chebyshev UCL	0.0017
97.5% KM Chebyshev UCL	0.00217	99% KM Chebyshev UCL	0.00309

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	1.526	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00107	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	6.105	nu star (bias corrected)	N/A
Mean (detects)	0.00163		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	6.1462E-4	SD (KM)	6.3142E-4
Variance (KM)	3.9869E-7	SE of Mean (KM)	2.4874E-4
k hat (KM)	0.947	k star (KM)	0.78
nu hat (KM)	24.63	nu star (KM)	20.28
theta hat (KM)	6.4868E-4	theta star (KM)	7.8785E-4
80% gamma percentile (KM)	0.00101	90% gamma percentile (KM)	0.0015

95% gamma percentile (KM)	0.00201	99% gamma percentile (KM)	0.00321

Gamma Kaplan-Meier (KM) Statistics

		Adjusted Level of Significance (β)	0.0301
Approximate Chi Square Value (20.28, α)	11.06	Adjusted Chi Square Value (20.28, β)	10.1
95% KM Approximate Gamma UCL	0.00113	95% KM Adjusted Gamma UCL	0.00123

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	4.7364E-4	Mean in Log Scale	-8.368
SD in Original Scale	7.3935E-4	SD in Log Scale	1.197
95% t UCL (assumes normality of ROS data)	8.3911E-4	95% Percentile Bootstrap UCL	8.3957E-4
95% BCA Bootstrap UCL	0.00105	95% Bootstrap t UCL	0.0016
95% H-UCL (Log ROS)	0.00143		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-7.604	KM Geo Mean	4.9839E-4
KM SD (logged)	0.502	95% Critical H Value (KM-Log)	2.114
KM Standard Error of Mean (logged)	0.204	95% H-UCL (KM -Log)	7.6799E-4
KM SD (logged)	0.502	95% Critical H Value (KM-Log)	2.114
KM Standard Error of Mean (logged)	0.204		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	4.7788E-4	Mean in Log Scale	-8.024
SD in Original Scale	7.0334E-4	SD in Log Scale	0.694
95% t UCL (Assumes normality)	8.2556E-4	95% H-Stat UCL	6.6923E-4

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.00106		

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | dimethylphthalate | 131-11-3)

General Statistics			
Total Number of Observations	42	Number of Distinct Observations	9
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (groundwater | dimethylphthalate | 131-11-3) was not processed!

C (groundwater | di-n-butylphthalate | 84-74-2)

General Statistics			
Total Number of Observations	42	Number of Distinct Observations	10
Number of Detects	1	Number of Non-Detects	41
Number of Distinct Detects	1	Number of Distinct Non-Detects	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 C (groundwater | di-n-butylphthalate | 84-74-2) was not processed!

C (groundwater | di-n-octylphthalate | 117-84-0)

General Statistics			
Total Number of Observations	42	Number of Distinct Observations	10
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (groundwater | di-n-octylphthalate | 117-84-0) was not processed!

C (groundwater | ethanol | 64-17-5)

General Statistics			
Total Number of Observations	6	Number of Distinct Observations	1
Number of Detects	0	Number of Non-Detects	6
Number of Distinct Detects	0	Number of Distinct Non-Detects	1

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!

C (groundwater | ethyl benzene | 100-41-4)

General Statistics

Total Number of Observations	43	Number of Distinct Observations	10
Number of Detects	4	Number of Non-Detects	39
Number of Distinct Detects	2	Number of Distinct Non-Detects	9
Minimum Detect	0.001	Minimum Non-Detect	6.5000E-4
Maximum Detect	0.002	Maximum Non-Detect	0.005
Variance Detects	2.5000E-7	Percent Non-Detects	90.7%
Mean Detects	0.00175	SD Detects	5.0000E-4
Median Detects	0.002	CV Detects	0.286
Skewness Detects	-2	Kurtosis Detects	4
Mean of Logged Detects	-6.388	SD of Logged Detects	0.347

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.63	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.687	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.441	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.413	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	7.6308E-4	KM Standard Error of Mean	6.6853E-5
90KM SD	3.6144E-4	95% KM (BCA) UCL	N/A
95% KM (t) UCL	8.7552E-4	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	8.7304E-4	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	9.6363E-4	95% KM Chebyshev UCL	0.00105
97.5% KM Chebyshev UCL	0.00118	99% KM Chebyshev UCL	0.00143

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.962	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.657	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.469	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.395	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	12.74	k star (bias corrected MLE)	3.352
Theta hat (MLE)	1.3735E-4	Theta star (bias corrected MLE)	5.2208E-4
nu hat (MLE)	101.9	nu star (bias corrected)	26.82
Mean (detects)	0.00175		

Gamma ROS Statistics using Imputed Non-Detects

Minimum	0.001	Mean	0.00923
Maximum	0.01	Median	0.01
SD	0.00243	CV	0.263
k hat (MLE)	5.977	k star (bias corrected MLE)	5.575
Theta hat (MLE)	0.00154	Theta star (bias corrected MLE)	0.00166
nu hat (MLE)	514	nu star (bias corrected)	479.5
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (479.46, α)	429.7	Adjusted Chi Square Value (479.46, β)	428.1
95% Gamma Approximate UCL	0.0103	95% Gamma Adjusted UCL	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	7.6308E-4	SD (KM)	3.6144E-4
Variance (KM)	1.3064E-7	SE of Mean (KM)	6.6853E-5
k hat (KM)	4.457	k star (KM)	4.162
nu hat (KM)	383.3	nu star (KM)	357.9
theta hat (KM)	1.7120E-4	theta star (KM)	1.8335E-4
80% gamma percentile (KM)	0.00105	90% gamma percentile (KM)	0.00126
95% gamma percentile (KM)	0.00146	99% gamma percentile (KM)	0.00189

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (357.92, α)	315.1	Adjusted Chi Square Value (357.92, β)	313.7
95% KM Approximate Gamma UCL	8.6684E-4	95% KM Adjusted Gamma UCL	8.7068E-4

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.63	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.792	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.441	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.346	Detected Data Not Lognormal at 10% Significance Level
Detected Data Not Lognormal at 10% Significance Level		

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	5.3833E-4	Mean in Log Scale	-7.795
SD in Original Scale	4.6723E-4	SD in Log Scale	0.718
95% t UCL (assumes normality of ROS data)	6.5817E-4	95% Percentile Bootstrap UCL	6.6125E-4
95% BCA Bootstrap UCL	6.8635E-4	95% Bootstrap t UCL	7.0789E-4
95% H-UCL (Log ROS)	6.7076E-4		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-7.241	KM Geo Mean	7.1679E-4
KM SD (logged)	0.304	95% Critical H Value (KM-Log)	1.778
KM Standard Error of Mean (logged)	0.0563	95% H-UCL (KM -Log)	8.1607E-4
KM SD (logged)	0.304	95% Critical H Value (KM-Log)	1.778
KM Standard Error of Mean (logged)	0.0563		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	7.8746E-4	Mean in Log Scale	-7.377
SD in Original Scale	6.8348E-4	SD in Log Scale	0.602
95% t UCL (Assumes normality)	9.6277E-4	95% H-Stat UCL	9.0124E-4

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution

Suggested UCL to Use		
95% KM (t) UCL	8.7552E-4	

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | ethyl tert-butyl ether | 637-92-3)

General Statistics			
Total Number of Observations	13	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

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 C (groundwater | ethyl tert-butyl ether | 637-92-3) was not processed!

C (groundwater | ethylene glycol | 107-21-1)

General Statistics			
Total Number of Observations	6	Number of Distinct Observations	1
Number of Detects	0	Number of Non-Detects	6
Number of Distinct Detects	0	Number of Distinct Non-Detects	1

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 C (groundwater | ethylene glycol | 107-21-1) was not processed!

C (groundwater | fluoranthene | 206-44-0)

General Statistics				
Total Number of Observations	43	Number of Distinct Observations		19
Number of Detects	7	Number of Non-Detects		36
Number of Distinct Detects	7	Number of Distinct Non-Detects		12
Minimum Detect	5.4000E-5	Minimum Non-Detect		9.2167E-5
Maximum Detect	2.0000E-4	Maximum Non-Detect		0.0056
Variance Detects	2.9294E-9	Percent Non-Detects		83.72%
Mean Detects	1.0458E-4	SD Detects		5.4124E-5
Median Detects	9.2500E-5	CV Detects		0.518
Skewness Detects	0.904	Kurtosis Detects		0.0106
Mean of Logged Detects	-9.277	SD of Logged Detects		0.506

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.887	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.73	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.224	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.35	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs				
KM Mean	9.8736E-5	KM Standard Error of Mean		1.8857E-5
90KM SD	4.9366E-5	95% KM (BCA) UCL		1.3343E-4
95% KM (t) UCL	1.3045E-4	95% KM (Percentile Bootstrap) UCL		1.3158E-4
95% KM (z) UCL	1.2975E-4	95% KM Bootstrap t UCL		1.5130E-4
90% KM Chebyshev UCL	1.5531E-4	95% KM Chebyshev UCL		1.8093E-4
97.5% KM Chebyshev UCL	2.1650E-4	99% KM Chebyshev UCL		2.8636E-4

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.384	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.71	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.254	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.313	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only				
k hat (MLE)	4.663	k star (bias corrected MLE)		2.76
Theta hat (MLE)	2.2428E-5	Theta star (bias corrected MLE)		3.7895E-5
nu hat (MLE)	65.28	nu star (bias corrected)		38.64
Mean (detects)	1.0458E-4			

Gamma ROS Statistics using Imputed Non-Detects
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	5.4000E-5	Mean	0.00839
Maximum	0.01	Median	0.01
SD	0.0037	CV	0.441
k hat (MLE)	0.988	k star (bias corrected MLE)	0.935
Theta hat (MLE)	0.00849	Theta star (bias corrected MLE)	0.00897
nu hat (MLE)	85	nu star (bias corrected)	80.4
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (80.40, α)	60.74	Adjusted Chi Square Value (80.40, β)	60.15
95% Gamma Approximate UCL	0.0111	95% Gamma Adjusted UCL	0.0112
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	9.8736E-5	SD (KM)	4.9366E-5
Variance (KM)	2.4370E-9	SE of Mean (KM)	1.8857E-5
k hat (KM)	4	k star (KM)	3.737
nu hat (KM)	344	nu star (KM)	321.4
theta hat (KM)	2.4682E-5	theta star (KM)	2.6423E-5
80% gamma percentile (KM)	1.3722E-4	90% gamma percentile (KM)	1.6721E-4
95% gamma percentile (KM)	1.9491E-4	99% gamma percentile (KM)	2.5426E-4
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (321.37, α)	280.8	Adjusted Chi Square Value (321.37, β)	279.5
95% KM Approximate Gamma UCL	1.1299E-4	95% KM Adjusted Gamma UCL	1.1352E-4
Note: KM UCLs may be biased low with this dataset. Other substitution method recommended			
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.909	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.838	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.239	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.28	Detected Data appear Lognormal at 10% Significance Level	
Detected Data appear Lognormal at 10% Significance Level			
Note GOF tests may be unreliable for small sample sizes			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	9.6034E-5	Mean in Log Scale	-9.337
SD in Original Scale	4.2248E-5	SD in Log Scale	0.417
95% t UCL (assumes normality of ROS data)	1.0687E-4	95% Percentile Bootstrap UCL	1.0686E-4
95% BCA Bootstrap UCL	1.0781E-4	95% Bootstrap t UCL	1.0838E-4
95% H-UCL (Log ROS)	1.0823E-4		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-9.337	KM Geo Mean	8.8110E-5
KM SD (logged)	0.466	95% Critical H Value (KM-Log)	1.877
KM Standard Error of Mean (logged)	0.178	95% H-UCL (KM -Log)	1.1244E-4
KM SD (logged)	0.466	95% Critical H Value (KM-Log)	1.877
KM Standard Error of Mean (logged)	0.178		
Note: KM UCLs may be biased low with this dataset. Other substitution method recommended			

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	9.2565E-4	Mean in Log Scale	-7.747
SD in Original Scale	0.00106	SD in Log Scale	1.288
95% t UCL (Assumes normality)	0.0012	95% H-Stat UCL	0.00169

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	1.3045E-4		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | fluorene | 86-73-7)

General Statistics

Total Number of Observations	43	Number of Distinct Observations	22
Number of Detects	11	Number of Non-Detects	32
Number of Distinct Detects	9	Number of Distinct Non-Detects	13
Minimum Detect	5.0000E-5	Minimum Non-Detect	9.2167E-5
Maximum Detect	0.002	Maximum Non-Detect	0.0056
Variance Detects	2.8738E-7	Percent Non-Detects	74.42%
Mean Detects	6.1312E-4	SD Detects	5.3608E-4
Median Detects	6.0000E-4	CV Detects	0.874
Skewness Detects	1.825	Kurtosis Detects	4.509
Mean of Logged Detects	-7.798	SD of Logged Detects	1.066

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.828	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.792	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.205	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.291	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	3.4217E-4	KM Standard Error of Mean	8.6287E-5
90KM SD	3.9744E-4	95% KM (BCA) UCL	4.9845E-4
95% KM (t) UCL	4.8731E-4	95% KM (Percentile Bootstrap) UCL	4.9051E-4
95% KM (z) UCL	4.8410E-4	95% KM Bootstrap t UCL	5.3413E-4
90% KM Chebyshev UCL	6.0104E-4	95% KM Chebyshev UCL	7.1829E-4
97.5% KM Chebyshev UCL	8.8104E-4	99% KM Chebyshev UCL	0.0012

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.308	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.744	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.148	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.26	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.389	k star (bias corrected MLE)	1.071
Theta hat (MLE)	4.4134E-4	Theta star (bias corrected MLE)	5.7250E-4
nu hat (MLE)	30.56	nu star (bias corrected)	23.56
Mean (detects)	6.1312E-4		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	5.0000E-5	Mean	0.0076
Maximum	0.01	Median	0.01
SD	0.00415	CV	0.546
k hat (MLE)	1.058	k star (bias corrected MLE)	0.999
Theta hat (MLE)	0.00718	Theta star (bias corrected MLE)	0.0076
nu hat (MLE)	90.96	nu star (bias corrected)	85.95
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (85.95, α)	65.58	Adjusted Chi Square Value (85.95, β)	64.96
95% Gamma Approximate UCL	0.00996	95% Gamma Adjusted UCL	0.0101

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	3.4217E-4	SD (KM)	3.9744E-4
Variance (KM)	1.5796E-7	SE of Mean (KM)	8.6287E-5
k hat (KM)	0.741	k star (KM)	0.705
nu hat (KM)	63.75	nu star (KM)	60.63
theta hat (KM)	4.6164E-4	theta star (KM)	4.8535E-4
80% gamma percentile (KM)	5.6233E-4	90% gamma percentile (KM)	8.5748E-4
95% gamma percentile (KM)	0.00116	99% gamma percentile (KM)	0.00189

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (60.63, α)	43.72	Adjusted Chi Square Value (60.63, β)	43.23
95% KM Approximate Gamma UCL	4.7448E-4	95% KM Adjusted Gamma UCL	4.7996E-4

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.915	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.876	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.203	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.231	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	2.9156E-4	Mean in Log Scale	-8.545
SD in Original Scale	3.3666E-4	SD in Log Scale	0.884
95% t UCL (assumes normality of ROS data)	3.7791E-4	95% Percentile Bootstrap UCL	3.8007E-4
95% BCA Bootstrap UCL	4.1749E-4	95% Bootstrap t UCL	4.3823E-4
95% H-UCL (Log ROS)	3.9007E-4		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-8.549	KM Geo Mean	1.9372E-4
KM SD (logged)	1.09	95% Critical H Value (KM-Log)	2.463
KM Standard Error of Mean (logged)	0.313	95% H-UCL (KM -Log)	5.3089E-4
KM SD (logged)	1.09	95% Critical H Value (KM-Log)	2.463
KM Standard Error of Mean (logged)	0.313		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00104	Mean in Log Scale	-7.496
SD in Original Scale	0.00103	SD in Log Scale	1.229
95% t UCL (Assumes normality)	0.0013	95% H-Stat UCL	0.00194

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	4.8731E-4		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | hexachlorobenzene | 118-74-1)

General Statistics

Total Number of Observations	42	Number of Distinct Observations	10
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (groundwater | hexachlorobenzene | 118-74-1) was not processed!

C (groundwater | hexachlorobutadiene | 87-68-3)

General Statistics			
Total Number of Observations	42	Number of Distinct Observations	6
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	6

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 C (groundwater | hexachlorobutadiene | 87-68-3) was not processed!

C (groundwater | hexachlorocyclopentadiene | 77-47-4)

General Statistics			
Total Number of Observations	42	Number of Distinct Observations	10
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (groundwater | hexachlorocyclopentadiene | 77-47-4) was not processed!

C (groundwater | hexachloroethane | 67-72-1)

General Statistics			
Total Number of Observations	42	Number of Distinct Observations	9
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (groundwater | hexachloroethane | 67-72-1) was not processed!

C (groundwater | indeno(1,2,3-cd)pyrene | 193-39-5)

General Statistics			
Total Number of Observations	43	Number of Distinct Observations	18
Number of Detects	2	Number of Non-Detects	41
Number of Distinct Detects	2	Number of Distinct Non-Detects	16
Minimum Detect	8.6000E-5	Minimum Non-Detect	1.9225E-4

Maximum Detect	1.1000E-4	Maximum Non-Detect	0.0056
Variance Detects	2.880E-10	Percent Non-Detects	95.35%
Mean Detects	9.8000E-5	SD Detects	1.6971E-5
Median Detects	9.8000E-5	CV Detects	N/A
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-9.238	SD of Logged Detects	0.174

Warning: Data set has only 2 Detected Values.

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

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	9.8000E-5	KM Standard Error of Mean	1.2000E-5
90KM SD	1.2000E-5	95% KM (BCA) UCL	N/A
95% KM (t) UCL	1.1818E-4	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	1.1774E-4	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	1.3400E-4	95% KM Chebyshev UCL	1.5031E-4
97.5% KM Chebyshev UCL	1.7294E-4	99% KM Chebyshev UCL	2.1740E-4

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	66.36	k star (bias corrected MLE)	N/A
Theta hat (MLE)	1.4768E-6	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	265.4	nu star (bias corrected)	N/A
Mean (detects)	9.8000E-5		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	9.8000E-5	SD (KM)	1.2000E-5
Variance (KM)	1.440E-10	SE of Mean (KM)	1.2000E-5
k hat (KM)	66.69	k star (KM)	62.06
nu hat (KM)	5736	nu star (KM)	5337
theta hat (KM)	1.4694E-6	theta star (KM)	1.5792E-6
80% gamma percentile (KM)	1.0829E-4	90% gamma percentile (KM)	1.1424E-4
95% gamma percentile (KM)	1.1932E-4	99% gamma percentile (KM)	1.2924E-4

Gamma Kaplan-Meier (KM) Statistics

		Adjusted Level of Significance (β)	0.0444
Approximate Chi Square Value (N/A, α)	5168	Adjusted Chi Square Value (N/A, β)	5162
95% KM Approximate Gamma UCL	1.0120E-4	95% KM Adjusted Gamma UCL	1.0131E-4

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	9.9005E-5	Mean in Log Scale	-9.238
SD in Original Scale	1.9142E-5	SD in Log Scale	0.19
95% t UCL (assumes normality of ROS data)	1.0391E-4	95% Percentile Bootstrap UCL	1.0382E-4
95% BCA Bootstrap UCL	1.0428E-4	95% Bootstrap t UCL	1.0434E-4
95% H-UCL (Log ROS)	1.0413E-4		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-9.238	KM Geo Mean	9.7263E-5
KM SD (logged)	0.123	95% Critical H Value (KM-Log)	1.691
KM Standard Error of Mean (logged)	0.123	95% H-UCL (KM -Log)	1.0120E-4
KM SD (logged)	0.123	95% Critical H Value (KM-Log)	1.691
KM Standard Error of Mean (logged)	0.123		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	9.3080E-4	Mean in Log Scale	-7.687
SD in Original Scale	0.00106	SD in Log Scale	1.204
95% t UCL (Assumes normality)	0.0012	95% H-Stat UCL	0.00153

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution

Suggested UCL to Use			
95% KM (t) UCL	1.1818E-4		

Warning: Recommended UCL exceeds the maximum observation

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | iron | 7439-89-6)

General Statistics			
Total Number of Observations	28	Number of Distinct Observations	28
		Number of Missing Observations	0
Minimum	0.16	Mean	53.54
Maximum	178.3	Median	46.98
SD	47.61	Std. Error of Mean	8.997
Coefficient of Variation	0.889	Skewness	0.795

Normal GOF Test			
Shapiro Wilk Test Statistic	0.911	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.896	Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.132	**Lilliefors GOF Test**	

1% Lilliefors Critical Value	0.191	Data appear Normal at 1% Significance Level

Data appear Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	68.86	95% Adjusted-CLT UCL (Chen-1995)	69.78
		95% Modified-t UCL (Johnson-1978)	69.09

Gamma GOF Test

A-D Test Statistic	0.961	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.795	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.151	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.173	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.648	k star (bias corrected MLE)	0.603
Theta hat (MLE)	82.56	Theta star (bias corrected MLE)	88.82
nu hat (MLE)	36.31	nu star (bias corrected)	33.76
MLE Mean (bias corrected)	53.54	MLE Sd (bias corrected)	68.96
		Approximate Chi Square Value (0.05)	21.47
Adjusted Level of Significance	0.0404	Adjusted Chi Square Value	20.86

Assuming Gamma Distribution

95% Approximate Gamma UCL	84.18	95% Adjusted Gamma UCL	86.63

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.818	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.936	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.234	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.151	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.833	Mean of logged Data	3.038
Maximum of Logged Data	5.184	SD of logged Data	2.017

Assuming Lognormal Distribution

95% H-UCL	728.2	90% Chebyshev (MVUE) UCL	333.1
95% Chebyshev (MVUE) UCL	424.1	97.5% Chebyshev (MVUE) UCL	550.3
99% Chebyshev (MVUE) UCL	798.3		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	68.34	95% BCA Bootstrap UCL	69.75
95% Standard Bootstrap UCL	68.04	95% Bootstrap-t UCL	70.81

95% Hall's Bootstrap UCL	70.11	95% Percentile Bootstrap UCL	68.65
90% Chebyshev(Mean, Sd) UCL	80.53	95% Chebyshev(Mean, Sd) UCL	92.75
97.5% Chebyshev(Mean, Sd) UCL	109.7	99% Chebyshev(Mean, Sd) UCL	143.1

Suggested UCL to Use

95% Student's-t UCL	68.86		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | isophorone | 78-59-1)

General Statistics

Total Number of Observations	42	Number of Distinct Observations	9
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (groundwater | isophorone | 78-59-1) was not processed!

C (groundwater | isopropanol | 67-63-0)

General Statistics

Total Number of Observations	6	Number of Distinct Observations	1
Number of Detects	0	Number of Non-Detects	6
Number of Distinct Detects	0	Number of Distinct Non-Detects	1

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 C (groundwater | isopropanol | 67-63-0) was not processed!

C (groundwater | lead | 7439-92-1)

General Statistics

Total Number of Observations	41	Number of Distinct Observations	18
Number of Detects	17	Number of Non-Detects	24
Number of Distinct Detects	17	Number of Distinct Non-Detects	2
Minimum Detect	1.6000E-4	Minimum Non-Detect	5.0000E-4
Maximum Detect	0.025	Maximum Non-Detect	0.015
Variance Detects	7.8870E-5	Percent Non-Detects	58.54%

Mean Detects	0.00767	SD Detects	0.00888
Median Detects	0.0016	CV Detects	1.158
Skewness Detects	0.845	Kurtosis Detects	-0.591
Mean of Logged Detects	-6.168	SD of Logged Detects	1.987

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.806	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.851	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.282	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.241	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.00489	KM Standard Error of Mean	0.00139
90KM SD	0.00691	95% KM (BCA) UCL	0.00731
95% KM (t) UCL	0.00724	95% KM (Percentile Bootstrap) UCL	0.00721
95% KM (z) UCL	0.00718	95% KM Bootstrap t UCL	0.00778
90% KM Chebyshev UCL	0.00907	95% KM Chebyshev UCL	0.011
97.5% KM Chebyshev UCL	0.0136	99% KM Chebyshev UCL	0.0188

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.086	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.8	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.212	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.221	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.491	k star (bias corrected MLE)	0.443
Theta hat (MLE)	0.0156	Theta star (bias corrected MLE)	0.0173
nu hat (MLE)	16.69	nu star (bias corrected)	15.08
Mean (detects)	0.00767		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	1.6000E-4	Mean	0.00907
Maximum	0.025	Median	0.01
SD	0.00575	CV	0.634
k hat (MLE)	1.049	k star (bias corrected MLE)	0.989
Theta hat (MLE)	0.00864	Theta star (bias corrected MLE)	0.00917
nu hat (MLE)	86.04	nu star (bias corrected)	81.08
Adjusted Level of Significance (β)	0.0441		
Approximate Chi Square Value (81.08, α)	61.33	Adjusted Chi Square Value (81.08, β)	60.7

95% Gamma Approximate UCL	0.012		95% Gamma Adjusted UCL	0.0121

Estimates of Gamma Parameters using KM Estimates				
Mean (KM)	0.00489		SD (KM)	0.00691
Variance (KM)	4.7704E-5		SE of Mean (KM)	0.00139
k hat (KM)	0.501		k star (KM)	0.48
nu hat (KM)	41.06		nu star (KM)	39.39
theta hat (KM)	0.00976		theta star (KM)	0.0102
80% gamma percentile (KM)	0.00801		90% gamma percentile (KM)	0.0133
95% gamma percentile (KM)	0.019		99% gamma percentile (KM)	0.0331

Gamma Kaplan-Meier (KM) Statistics				
Approximate Chi Square Value (39.39, α)	26.01		Adjusted Chi Square Value (39.39, β)	25.62
95% KM Approximate Gamma UCL	0.0074		95% KM Adjusted Gamma UCL	0.00752

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.847	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.91	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.234	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.19	Detected Data Not Lognormal at 10% Significance Level	

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects				
Mean in Original Scale	0.00415		Mean in Log Scale	-6.77
SD in Original Scale	0.00656		SD in Log Scale	1.72
95% t UCL (assumes normality of ROS data)	0.00588		95% Percentile Bootstrap UCL	0.00592
95% BCA Bootstrap UCL	0.00617		95% Bootstrap t UCL	0.00643
95% H-UCL (Log ROS)	0.0122			

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution				
KM Mean (logged)	-6.754		KM Geo Mean	0.00117
KM SD (logged)	1.811		95% Critical H Value (KM-Log)	3.376
KM Standard Error of Mean (logged)	0.421		95% H-UCL (KM -Log)	0.0158
KM SD (logged)	1.811		95% Critical H Value (KM-Log)	3.376
KM Standard Error of Mean (logged)	0.421			

DL/2 Statistics				
DL/2 Normal			**DL/2 Log-Transformed**	
Mean in Original Scale	0.00722		Mean in Log Scale	-5.588
SD in Original Scale	0.00584		SD in Log Scale	1.534
95% t UCL (Assumes normality)	0.00875		95% H-Stat UCL	0.0252

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	0.00752			

C (groundwater | manganese | 7439-96-5)

General Statistics

Total Number of Observations	28	Number of Distinct Observations	27
		Number of Missing Observations	0
Minimum	0.032	Mean	8.402
Maximum	28.1	Median	5.61
SD	7.941	Std. Error of Mean	1.501
Coefficient of Variation	0.945	Skewness	1.286

Normal GOF Test

Shapiro Wilk Test Statistic	0.842	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.896	Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.211	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.191	Data Not Normal at 1% Significance Level
Data Not Normal at 1% Significance Level		

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	10.96	95% Adjusted-CLT UCL (Chen-1995)	11.26
		95% Modified-t UCL (Johnson-1978)	11.02

Gamma GOF Test

A-D Test Statistic	0.21	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.776	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0806	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.171	Detected data appear Gamma Distributed at 5% Significance Level
Detected data appear Gamma Distributed at 5% Significance Level		

Gamma Statistics

k hat (MLE)	0.956	k star (bias corrected MLE)	0.878
Theta hat (MLE)	8.786	Theta star (bias corrected MLE)	9.574
nu hat (MLE)	53.55	nu star (bias corrected)	49.15

MLE Mean (bias corrected)	8.402	MLE Sd (bias corrected)	8.969
		Approximate Chi Square Value (0.05)	34.05
Adjusted Level of Significance	0.0404	Adjusted Chi Square Value	33.28

Assuming Gamma Distribution

95% Approximate Gamma UCL	12.13	95% Adjusted Gamma UCL	12.41

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.877	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk Critical Value	0.936	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.155	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.151	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	-3.442	Mean of logged Data	1.522
Maximum of Logged Data	3.336	SD of logged Data	1.442

Assuming Lognormal Distribution

95% H-UCL	30.14	90% Chebyshev (MVUE) UCL	24.33
95% Chebyshev (MVUE) UCL	29.88	97.5% Chebyshev (MVUE) UCL	37.58
99% Chebyshev (MVUE) UCL	52.71		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	10.87	95% BCA Bootstrap UCL	11.27
95% Standard Bootstrap UCL	10.84	95% Bootstrap-t UCL	11.59
95% Hall's Bootstrap UCL	11.29	95% Percentile Bootstrap UCL	10.94
90% Chebyshev(Mean, Sd) UCL	12.9	95% Chebyshev(Mean, Sd) UCL	14.94
97.5% Chebyshev(Mean, Sd) UCL	17.77	99% Chebyshev(Mean, Sd) UCL	23.33

Suggested UCL to Use

95% Adjusted Gamma UCL	12.41		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | mercury | 7439-97-6)

General Statistics

Total Number of Observations	41	Number of Distinct Observations	7
Number of Detects	5	Number of Non-Detects	36
Number of Distinct Detects	4	Number of Distinct Non-Detects	3
Minimum Detect	5.3000E-5	Minimum Non-Detect	1.0000E-4
Maximum Detect	2.2000E-4	Maximum Non-Detect	2.0000E-4

Variance Detects	5.0977E-9	Percent Non-Detects	87.8%
Mean Detects	9.2800E-5	SD Detects	7.1398E-5
Median Detects	6.0000E-5	CV Detects	N/A
Skewness Detects	2.191	Kurtosis Detects	4.835
Mean of Logged Detects	-9.452	SD of Logged Detects	0.585

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.633	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.686	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.42	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.396	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	6.4878E-5	KM Standard Error of Mean	5.5394E-6
90KM SD	2.5339E-5	95% KM (BCA) UCL	N/A
95% KM (t) UCL	7.4205E-5	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	7.3989E-5	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	8.1496E-5	95% KM Chebyshev UCL	8.9024E-5
97.5% KM Chebyshev UCL	9.9471E-5	99% KM Chebyshev UCL	1.1999E-4

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.941	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.682	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.403	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.359	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	3.144	k star (bias corrected MLE)	1.391
Theta hat (MLE)	2.9518E-5	Theta star (bias corrected MLE)	6.6720E-5
nu hat (MLE)	31.44	nu star (bias corrected)	13.91
Mean (detects)	9.2800E-5		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	5.3000E-5	Mean	0.00879
Maximum	0.01	Median	0.01
SD	0.00328	CV	0.373
k hat (MLE)	1.221	k star (bias corrected MLE)	1.148
Theta hat (MLE)	0.0072	Theta star (bias corrected MLE)	0.00766
nu hat (MLE)	100.1	nu star (bias corrected)	94.14
Adjusted Level of Significance (β)	0.0441		
Approximate Chi Square Value (94.14, α)	72.76	Adjusted Chi Square Value (94.14, β)	72.08

| 95% Gamma Approximate UCL | 0.0114 | 95% Gamma Adjusted UCL | 0.0115 |

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	6.4878E-5	SD (KM)	2.5339E-5
Variance (KM)	6.421E-10	SE of Mean (KM)	5.5394E-6
k hat (KM)	6.556	k star (KM)	6.092
nu hat (KM)	537.6	nu star (KM)	499.6
theta hat (KM)	9.8964E-6	theta star (KM)	1.0649E-5
80% gamma percentile (KM)	8.5348E-5	90% gamma percentile (KM)	1.0001E-4
95% gamma percentile (KM)	1.1327E-4	99% gamma percentile (KM)	1.4105E-4

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (499.57, α)	448.7	Adjusted Chi Square Value (499.57, β)	447
95% KM Approximate Gamma UCL	7.2227E-5	95% KM Adjusted Gamma UCL	7.2510E-5

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.71	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.806	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.368	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.319	Detected Data Not Lognormal at 10% Significance Level

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	7.0891E-5	Mean in Log Scale	-9.641
SD in Original Scale	3.3907E-5	SD in Log Scale	0.408
95% t UCL (assumes normality of ROS data)	7.9808E-5	95% Percentile Bootstrap UCL	8.0355E-5
95% BCA Bootstrap UCL	8.1899E-5	95% Bootstrap t UCL	8.2897E-5
95% H-UCL (Log ROS)	7.9498E-5		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-9.679	KM Geo Mean	6.2604E-5
KM SD (logged)	0.224	95% Critical H Value (KM-Log)	1.737
KM Standard Error of Mean (logged)	0.0665	95% H-UCL (KM -Log)	6.8258E-5
KM SD (logged)	0.224	95% Critical H Value (KM-Log)	1.737
KM Standard Error of Mean (logged)	0.0665		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	8.8268E-5	Mean in Log Scale	-9.39
SD in Original Scale	3.0427E-5	SD in Log Scale	0.337
95% t UCL (Assumes normality)	9.6270E-5	95% H-Stat UCL	9.7340E-5

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	7.4205E-5		

C (groundwater | methanol | 67-56-1)

General Statistics

Total Number of Observations	6	Number of Distinct Observations	1
Number of Detects	0	Number of Non-Detects	6
Number of Distinct Detects	0	Number of Distinct Non-Detects	1

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 C (groundwater | methanol | 67-56-1) was not processed!

C (groundwater | methyl acetate | 79-20-9)

General Statistics

Total Number of Observations	36	Number of Distinct Observations	4
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	4

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 C (groundwater | methyl acetate | 79-20-9) was not processed!

C (groundwater | methyl tert-butyl ether | 1634-04-4)

General Statistics

Total Number of Observations	43	Number of Distinct Observations	8
Number of Detects	0	Number of Non-Detects	43
Number of Distinct Detects	0	Number of Distinct Non-Detects	8

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 C (groundwater | methyl tert-butyl ether | 1634-04-4) was not processed!

C (groundwater | methylcyclohexane | 108-87-2)

		General Statistics			
Total Number of Observations	36		Number of Distinct Observations	5	
Number of Detects	1		Number of Non-Detects	35	
Number of Distinct Detects	1		Number of Distinct Non-Detects	4	

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 C (groundwater | methylcyclohexane | 108-87-2) was not processed!

C (groundwater | methylene chloride | 75-09-2)

		General Statistics			
Total Number of Observations	36		Number of Distinct Observations	4	
Number of Detects	0		Number of Non-Detects	36	
Number of Distinct Detects	0		Number of Distinct Non-Detects	4	

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 C (groundwater | methylene chloride | 75-09-2) was not processed!

C (groundwater | molybdenum | 7439-98-7)

		General Statistics			
Total Number of Observations	31		Number of Distinct Observations	2	
Number of Detects	0		Number of Non-Detects	31	
Number of Distinct Detects	0		Number of Distinct Non-Detects	2	

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 C (groundwater | molybdenum | 7439-98-7) was not processed!

C (groundwater | naphthalene | 91-20-3)

		General Statistics			
Total Number of Observations	50		Number of Distinct Observations	36	
Number of Detects	15		Number of Non-Detects	35	
Number of Distinct Detects	15		Number of Distinct Non-Detects	22	
Minimum Detect	1.9000E-4		Minimum Non-Detect	2.5883E-4	

Maximum Detect	0.036	Maximum Non-Detect	0.002
Variance Detects	8.6181E-5	Percent Non-Detects	70%
Mean Detects	0.00515	SD Detects	0.00928
Median Detects	0.0014	CV Detects	1.802
Skewness Detects	2.999	Kurtosis Detects	9.739
Mean of Logged Detects	-6.35	SD of Logged Detects	1.514

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.573	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.835	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.307	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.255	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.00175	KM Standard Error of Mean	7.9084E-4
90KM SD	0.0054	95% KM (BCA) UCL	0.00327
95% KM (t) UCL	0.00308	95% KM (Percentile Bootstrap) UCL	0.00314
95% KM (z) UCL	0.00305	95% KM Bootstrap t UCL	0.00589
90% KM Chebyshev UCL	0.00412	95% KM Chebyshev UCL	0.0052
97.5% KM Chebyshev UCL	0.00669	99% KM Chebyshev UCL	0.00962

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.645	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.788	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.178	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.233	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.575	k star (bias corrected MLE)	0.504
Theta hat (MLE)	0.00896	Theta star (bias corrected MLE)	0.0102
nu hat (MLE)	17.25	nu star (bias corrected)	15.13
Mean (detects)	0.00515		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	1.9000E-4	Mean	0.00855
Maximum	0.036	Median	0.01
SD	0.00545	CV	0.637
k hat (MLE)	1.51	k star (bias corrected MLE)	1.433
Theta hat (MLE)	0.00566	Theta star (bias corrected MLE)	0.00596
nu hat (MLE)	151	nu star (bias corrected)	143.3
Adjusted Level of Significance (β)	0.0452		

Approximate Chi Square Value (143.28, α)	116.6	Adjusted Chi Square Value (143.28, β)	115.9
95% Gamma Approximate UCL	0.0105	95% Gamma Adjusted UCL	0.0106

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.00175	SD (KM)	0.0054
Variance (KM)	2.9121E-5	SE of Mean (KM)	7.9084E-4
k hat (KM)	0.105	k star (KM)	0.112
nu hat (KM)	10.53	nu star (KM)	11.23
theta hat (KM)	0.0166	theta star (KM)	0.0156
80% gamma percentile (KM)	0.00142	90% gamma percentile (KM)	0.00486
95% gamma percentile (KM)	0.0101	99% gamma percentile (KM)	0.0262

Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (11.23, α)	4.725	Adjusted Chi Square Value (11.23, β)	4.599
95% KM Approximate Gamma UCL	0.00416	95% KM Adjusted Gamma UCL	0.00428

Lognormal GOF Test on Detected Observations Only		
Shapiro Wilk Test Statistic	0.972	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.901	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0952	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.202	Detected Data appear Lognormal at 10% Significance Level
Detected Data appear Lognormal at 10% Significance Level		

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.00172	Mean in Log Scale	-7.951
SD in Original Scale	0.00546	SD in Log Scale	1.484
95% t UCL (assumes normality of ROS data)	0.00301	95% Percentile Bootstrap UCL	0.00313
95% BCA Bootstrap UCL	0.00396	95% Bootstrap t UCL	0.00577
95% H-UCL (Log ROS)	0.00197		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-7.708	KM Geo Mean	4.4916E-4
KM SD (logged)	1.266	95% Critical H Value (KM-Log)	2.647
KM Standard Error of Mean (logged)	0.209	95% H-UCL (KM -Log)	0.00161
KM SD (logged)	1.266	95% Critical H Value (KM-Log)	2.647
KM Standard Error of Mean (logged)	0.209		
Note: KM UCLs may be biased low with this dataset. Other substitution method recommended			

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.00193	Mean in Log Scale	-7.284
SD in Original Scale	0.00541	SD in Log Scale	1.141
95% t UCL (Assumes normality)	0.00321	95% H-Stat UCL	0.00198
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics
Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use			
95% KM Approximate Gamma UCL	0.00416		

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | n-butylbenzene | 104-51-8)

General Statistics			
Total Number of Observations	13	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

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 C (groundwater | n-butylbenzene | 104-51-8) was not processed!

C (groundwater | nickel | 7440-02-0)

General Statistics			
Total Number of Observations	41	Number of Distinct Observations	41
Number of Detects	40	Number of Non-Detects	1
Number of Distinct Detects	40	Number of Distinct Non-Detects	1
Minimum Detect	0.0024	Minimum Non-Detect	0.01
Maximum Detect	0.299	Maximum Non-Detect	0.01
Variance Detects	0.00449	Percent Non-Detects	2.439%
Mean Detects	0.0515	SD Detects	0.067
Median Detects	0.025	CV Detects	1.301
Skewness Detects	2.165	Kurtosis Detects	4.722
Mean of Logged Detects	-3.747	SD of Logged Detects	1.348

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.717	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.919	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.245	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.162	Detected Data Not Normal at 1% Significance Level
Detected Data Not Normal at 1% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0504	KM Standard Error of Mean	0.0104
90KM SD	0.0658	95% KM (BCA) UCL	0.0685
95% KM (t) UCL	0.0679	95% KM (Percentile Bootstrap) UCL	0.0682
95% KM (z) UCL	0.0675	95% KM Bootstrap t UCL	0.0739
90% KM Chebyshev UCL	0.0816	95% KM Chebyshev UCL	0.0957
97.5% KM Chebyshev UCL	0.115	99% KM Chebyshev UCL	0.154

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.684	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.789	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.118	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.145	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.764	k star (bias corrected MLE)	0.723
Theta hat (MLE)	0.0675	Theta star (bias corrected MLE)	0.0713
nu hat (MLE)	61.1	nu star (bias corrected)	57.85
Mean (detects)	0.0515		

Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	0.0024	Mean	0.0505
Maximum	0.299	Median	0.0247
SD	0.0665	CV	1.316
k hat (MLE)	0.763	k star (bias corrected MLE)	0.723
Theta hat (MLE)	0.0662	Theta star (bias corrected MLE)	0.0698
nu hat (MLE)	62.56	nu star (bias corrected)	59.31
Adjusted Level of Significance (β)	0.0441		
Approximate Chi Square Value (59.31, α)	42.6	Adjusted Chi Square Value (59.31, β)	42.09
95% Gamma Approximate UCL	0.0703	95% Gamma Adjusted UCL	0.0712

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0504	SD (KM)	0.0658
Variance (KM)	0.00432	SE of Mean (KM)	0.0104
k hat (KM)	0.587	k star (KM)	0.561
nu hat (KM)	48.17	nu star (KM)	45.98
theta hat (KM)	0.0858	theta star (KM)	0.0899
80% gamma percentile (KM)	0.083	90% gamma percentile (KM)	0.133
95% gamma percentile (KM)	0.186	99% gamma percentile (KM)	0.314

Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (45.98, α)	31.42	Adjusted Chi Square Value (45.98, β)	30.98
95% KM Approximate Gamma UCL	0.0737	95% KM Adjusted Gamma UCL	0.0748

Lognormal GOF Test on Detected Observations Only		
Shapiro Wilk Test Statistic	0.955	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.949	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.102	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.128	Detected Data appear Lognormal at 10% Significance Level
Detected Data appear Lognormal at 10% Significance Level		

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0504	Mean in Log Scale	-3.783
SD in Original Scale	0.0666	SD in Log Scale	1.35
95% t UCL (assumes normality of ROS data)	0.0679	95% Percentile Bootstrap UCL	0.0684
95% BCA Bootstrap UCL	0.0717	95% Bootstrap t UCL	0.0744
95% H-UCL (Log ROS)	0.102		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.787	KM Geo Mean	0.0227
KM SD (logged)	1.34	95% Critical H Value (KM-Log)	2.752
KM Standard Error of Mean (logged)	0.212	95% H-UCL (KM -Log)	0.0997
KM SD (logged)	1.34	95% Critical H Value (KM-Log)	2.752
KM Standard Error of Mean (logged)	0.212		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0504	Mean in Log Scale	-3.785
SD in Original Scale	0.0666	SD in Log Scale	1.353
95% t UCL (Assumes normality)	0.0679	95% H-Stat UCL	0.102
DL/2 is not a recommended method, provided for comparisons and historical reasons			

Nonparametric Distribution Free UCL Statistics			
Detected Data appear Gamma Distributed at 5% Significance Level			

Suggested UCL to Use			
95% KM Adjusted Gamma UCL	0.0748		

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | nitrobenzene | 98-95-3)

General Statistics			
Total Number of Observations	42	Number of Distinct Observations	9

Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (groundwater | nitrobenzene | 98-95-3) was not processed!

C (groundwater | n-nitrosodimethylamine | 62-75-9)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	6
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	6

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 C (groundwater | n-nitrosodimethylamine | 62-75-9) was not processed!

C (groundwater | n-nitroso-di-n-propylamine | 621-64-7)

General Statistics

Total Number of Observations	42	Number of Distinct Observations	10
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (groundwater | n-nitroso-di-n-propylamine | 621-64-7) was not processed!

C (groundwater | n-nitrosodiphenylamine | 86-30-6)

General Statistics

Total Number of Observations	42	Number of Distinct Observations	10
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	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).

C (groundwater | n-propylbenzene | 103-65-1)

General Statistics			
Total Number of Observations	13	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

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 C (groundwater | n-propylbenzene | 103-65-1) was not processed!

C (groundwater | pcbs (total) | 1336-36-3)

General Statistics			
Total Number of Observations	1	Number of Distinct Observations	1
Number of Detects	0	Number of Non-Detects	1
Number of Distinct Detects	0	Number of Distinct Non-Detects	1

Warning: This data set only has 1 observations!

Data set is too small to compute reliable and meaningful statistics and estimates!

The data set for variable C (groundwater | pcbs (total) | 1336-36-3) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!

If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

C (groundwater | p-cymene | 99-87-6)

General Statistics			
Total Number of Observations	13	Number of Distinct Observations	5
Number of Detects	2	Number of Non-Detects	11
Number of Distinct Detects	2	Number of Distinct Non-Detects	3
Minimum Detect	0.0022	Minimum Non-Detect	7.0500E-4
Maximum Detect	0.00525	Maximum Non-Detect	0.002
Variance Detects	4.6513E-6	Percent Non-Detects	84.62%
Mean Detects	0.00373	SD Detects	0.00216
Median Detects	0.00373	CV Detects	0.579
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-5.684	SD of Logged Detects	0.615

Warning: Data set has only 2 Detected Values.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.00117	KM Standard Error of Mean	4.8755E-4
90KM SD	0.00124	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.00204	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.00197	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.00263	95% KM Chebyshev UCL	0.00329
97.5% KM Chebyshev UCL	0.00421	99% KM Chebyshev UCL	0.00602

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	5.612	k star (bias corrected MLE)	N/A
Theta hat (MLE)	6.6370E-4	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	22.45	nu star (bias corrected)	N/A
Mean (detects)	0.00373		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.00117	SD (KM)	0.00124
Variance (KM)	1.5451E-6	SE of Mean (KM)	4.8755E-4
k hat (KM)	0.885	k star (KM)	0.732
nu hat (KM)	23.02	nu star (KM)	19.04
theta hat (KM)	0.00132	theta star (KM)	0.0016
80% gamma percentile (KM)	0.00192	90% gamma percentile (KM)	0.0029
95% gamma percentile (KM)	0.00392	99% gamma percentile (KM)	0.00632

Gamma Kaplan-Meier (KM) Statistics

		Adjusted Level of Significance (β)	0.0301
Approximate Chi Square Value (19.04, α)	10.15	Adjusted Chi Square Value (19.04, β)	9.235
95% KM Approximate Gamma UCL	0.00219	95% KM Adjusted Gamma UCL	0.00241

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	6.8769E-4	Mean in Log Scale	-9.074
SD in Original Scale	0.00149	SD in Log Scale	2.011
95% t UCL (assumes normality of ROS data)	0.00143	95% Percentile Bootstrap UCL	0.00143
95% BCA Bootstrap UCL	0.00182	95% Bootstrap t UCL	0.00588
95% H-UCL (Log ROS)	0.0143		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-7.015	KM Geo Mean	8.9801E-4
KM SD (logged)	0.593	95% Critical H Value (KM-Log)	2.225
KM Standard Error of Mean (logged)	0.232	95% H-UCL (KM -Log)	0.00157
KM SD (logged)	0.593	95% Critical H Value (KM-Log)	2.225
KM Standard Error of Mean (logged)	0.232		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00102	Mean in Log Scale	-7.28
SD in Original Scale	0.00136	SD in Log Scale	0.763
95% t UCL (Assumes normality)	0.0017	95% H-Stat UCL	0.00159

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	0.00204		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | pentachloronitrobenzene | 82-68-8)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	6
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	6

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 C (groundwater | pentachloronitrobenzene | 82-68-8) was not processed!

C (groundwater | pentachlorophenol | 87-86-5)

General Statistics

Total Number of Observations	42	Number of Distinct Observations	9
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (groundwater | pentachlorophenol | 87-86-5) was not processed!

C (groundwater | perylene | 198-55-0)

General Statistics

Total Number of Observations	7	Number of Distinct Observations	7
Number of Detects	0	Number of Non-Detects	7
Number of Distinct Detects	0	Number of Distinct Non-Detects	7

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 C (groundwater | perylene | 198-55-0) was not processed!

C (groundwater | phenanthrene | 85-01-8)

General Statistics

Total Number of Observations	43	Number of Distinct Observations	18
Number of Detects	5	Number of Non-Detects	38
Number of Distinct Detects	5	Number of Distinct Non-Detects	13
Minimum Detect	7.0000E-5	Minimum Non-Detect	1.6175E-4
Maximum Detect	3.1000E-4	Maximum Non-Detect	0.0056
Variance Detects	1.2413E-8	Percent Non-Detects	88.37%
Mean Detects	1.7889E-4	SD Detects	1.1141E-4
Median Detects	1.6644E-4	CV Detects	0.623
Skewness Detects	0.199	Kurtosis Detects	-2.75
Mean of Logged Detects	-8.814	SD of Logged Detects	0.708

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.873	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.686	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.229	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.396	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.5160E-4	KM Standard Error of Mean	4.1275E-5
90KM SD	9.6112E-5	95% KM (BCA) UCL	2.3441E-4
95% KM (t) UCL	2.2102E-4	95% KM (Percentile Bootstrap) UCL	2.2947E-4
95% KM (z) UCL	2.1949E-4	95% KM Bootstrap t UCL	2.4601E-4
90% KM Chebyshev UCL	2.7542E-4	95% KM Chebyshev UCL	3.3151E-4
97.5% KM Chebyshev UCL	4.0936E-4	99% KM Chebyshev UCL	5.6228E-4

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.438	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.683	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.266	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.36	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Note GOF tests may be unreliable for small sample sizes			
Gamma Statistics on Detected Data Only			
k hat (MLE)	2.853	k star (bias corrected MLE)	1.275
Theta hat (MLE)	6.2702E-5	Theta star (bias corrected MLE)	1.4036E-4
nu hat (MLE)	28.53	nu star (bias corrected)	12.75
Mean (detects)	1.7889E-4		
Gamma ROS Statistics using Imputed Non-Detects			
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
For such situations, GROS method may yield incorrect values of UCLs and BTVs			
This is especially true when the sample size is small.			
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
Minimum	7.0000E-5	Mean	0.00886
Maximum	0.01	Median	0.01
SD	0.00319	CV	0.36
k hat (MLE)	1.503	k star (bias corrected MLE)	1.414
Theta hat (MLE)	0.00589	Theta star (bias corrected MLE)	0.00627
nu hat (MLE)	129.3	nu star (bias corrected)	121.6
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (121.58, α)	97.12	Adjusted Chi Square Value (121.58, β)	96.36
95% Gamma Approximate UCL	0.0111	95% Gamma Adjusted UCL	0.0112
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	1.5160E-4	SD (KM)	9.6112E-5
Variance (KM)	9.2374E-9	SE of Mean (KM)	4.1275E-5
k hat (KM)	2.488	k star (KM)	2.33
nu hat (KM)	214	nu star (KM)	200.4
theta hat (KM)	6.0934E-5	theta star (KM)	6.5068E-5
80% gamma percentile (KM)	2.2288E-4	90% gamma percentile (KM)	2.8457E-4
95% gamma percentile (KM)	3.4290E-4	99% gamma percentile (KM)	4.7113E-4
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (200.36, α)	168.6	Adjusted Chi Square Value (200.36, β)	167.6
95% KM Approximate Gamma UCL	1.8014E-4	95% KM Adjusted Gamma UCL	1.8123E-4
Note: KM UCLs may be biased low with this dataset. Other substitution method recommended			
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.855	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.806	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.242	**Lilliefors GOF Test**	

10% Lilliefors Critical Value	0.319	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	1.4461E-4	Mean in Log Scale	-8.996
SD in Original Scale	8.6808E-5	SD in Log Scale	0.559
95% t UCL (assumes normality of ROS data)	1.6687E-4	95% Percentile Bootstrap UCL	1.6708E-4
95% BCA Bootstrap UCL	1.7004E-4	95% Bootstrap t UCL	1.7174E-4
95% H-UCL (Log ROS)	1.7132E-4		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-8.993	KM Geo Mean	1.2427E-4
KM SD (logged)	0.624	95% Critical H Value (KM-Log)	1.996
KM Standard Error of Mean (logged)	0.272	95% H-UCL (KM -Log)	1.8290E-4
KM SD (logged)	0.624	95% Critical H Value (KM-Log)	1.996
KM Standard Error of Mean (logged)	0.272		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	9.3818E-4	Mean in Log Scale	-7.658
SD in Original Scale	0.00105	SD in Log Scale	1.192
95% t UCL (Assumes normality)	0.00121	95% H-Stat UCL	0.00155

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	2.2102E-4		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | phenol | 108-95-2)

General Statistics

Total Number of Observations	42	Number of Distinct Observations	9
Number of Detects	0	Number of Non-Detects	42
Number of Distinct Detects	0	Number of Distinct Non-Detects	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 C (groundwater | phenol | 108-95-2) was not processed!

C (groundwater | propylene glycol | 57-55-6)

General Statistics

Total Number of Observations	6	Number of Distinct Observations	1
Number of Detects	0	Number of Non-Detects	6
Number of Distinct Detects	0	Number of Distinct Non-Detects	1

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 C (groundwater | propylene glycol | 57-55-6) was not processed!

C (groundwater | pyrene | 129-00-0)

General Statistics

Total Number of Observations	43	Number of Distinct Observations	22
Number of Detects	13	Number of Non-Detects	30
Number of Distinct Detects	12	Number of Distinct Non-Detects	11
Minimum Detect	7.5250E-5	Minimum Non-Detect	5.0000E-4
Maximum Detect	0.001	Maximum Non-Detect	0.0056
Variance Detects	9.2363E-8	Percent Non-Detects	69.77%
Mean Detects	3.4651E-4	SD Detects	3.0391E-4
Median Detects	2.0000E-4	CV Detects	0.877
Skewness Detects	1.351	Kurtosis Detects	0.843
Mean of Logged Detects	-8.297	SD of Logged Detects	0.839

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.811	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.814	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.224	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.271	Detected Data appear Normal at 1% Significance Level
Detected Data appear Approximate Normal at 1% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	2.6969E-4	KM Standard Error of Mean	5.1233E-5
90KM SD	2.2571E-4	95% KM (BCA) UCL	3.6028E-4
95% KM (t) UCL	3.5586E-4	95% KM (Percentile Bootstrap) UCL	3.5668E-4
95% KM (z) UCL	3.5396E-4	95% KM Bootstrap t UCL	3.7786E-4
90% KM Chebyshev UCL	4.2339E-4	95% KM Chebyshev UCL	4.9301E-4
97.5% KM Chebyshev UCL	5.8964E-4	99% KM Chebyshev UCL	7.7945E-4

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.454	**Anderson-Darling GOF Test**

5% A-D Critical Value	0.748	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.186	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.24	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.665	k star (bias corrected MLE)	1.332
Theta hat (MLE)	2.0809E-4	Theta star (bias corrected MLE)	2.6011E-4
nu hat (MLE)	43.29	nu star (bias corrected)	34.64
Mean (detects)	3.4651E-4		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	7.5250E-5	Mean	0.00708
Maximum	0.01	Median	0.01
SD	0.00449	CV	0.634
k hat (MLE)	0.773	k star (bias corrected MLE)	0.735
Theta hat (MLE)	0.00916	Theta star (bias corrected MLE)	0.00964
nu hat (MLE)	66.5	nu star (bias corrected)	63.19
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (63.19, α)	45.9	Adjusted Chi Square Value (63.19, β)	45.39
95% Gamma Approximate UCL	0.00975	95% Gamma Adjusted UCL	0.00986

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.6969E-4	SD (KM)	2.2571E-4
Variance (KM)	5.0947E-8	SE of Mean (KM)	5.1233E-5
k hat (KM)	1.428	k star (KM)	1.344
nu hat (KM)	122.8	nu star (KM)	115.5
theta hat (KM)	1.8891E-4	theta star (KM)	2.0073E-4
80% gamma percentile (KM)	4.2221E-4	90% gamma percentile (KM)	5.7735E-4
95% gamma percentile (KM)	7.2914E-4	99% gamma percentile (KM)	0.00107

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (115.54, α)	91.73	Adjusted Chi Square Value (115.54, β)	90.99
95% KM Approximate Gamma UCL	3.3972E-4	95% KM Adjusted Gamma UCL	3.4247E-4

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.948	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.889	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.142	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.215	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	2.5075E-4	Mean in Log Scale	-8.49
SD in Original Scale	1.9111E-4	SD in Log Scale	0.612
95% t UCL (assumes normality of ROS data)	2.9977E-4	95% Percentile Bootstrap UCL	3.0020E-4
95% BCA Bootstrap UCL	3.1169E-4	95% Bootstrap t UCL	3.2376E-4
95% H-UCL (Log ROS)	2.9893E-4		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-8.485	KM Geo Mean	2.0651E-4
KM SD (logged)	0.701	95% Critical H Value (KM-Log)	2.065
KM Standard Error of Mean (logged)	0.186	95% H-UCL (KM -Log)	3.2995E-4
KM SD (logged)	0.701	95% Critical H Value (KM-Log)	2.065
KM Standard Error of Mean (logged)	0.186		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	9.8325E-4	Mean in Log Scale	-7.549
SD in Original Scale	0.00103	SD in Log Scale	1.154
95% t UCL (Assumes normality)	0.00125	95% H-Stat UCL	0.00161

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Approximate Normal Distributed at 1% Significance Level

Suggested UCL to Use			
95% KM (t) UCL	3.5586E-4		

When a data set follows an approximate distribution passing only one of the GOF tests,

it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | pyridine | 110-86-1)

General Statistics			
Total Number of Observations	13	Number of Distinct Observations	7
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	7

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 C (groundwater | pyridine | 110-86-1) was not processed!

C (groundwater | sec-butylbenzene | 135-98-8)

	General Statistics		
Total Number of Observations	13	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

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 C (groundwater | sec-butylbenzene | 135-98-8) was not processed!

C (groundwater | selenium | 7782-49-2)

	General Statistics		
Total Number of Observations	41	Number of Distinct Observations	13
Number of Detects	10	Number of Non-Detects	31
Number of Distinct Detects	10	Number of Distinct Non-Detects	3
Minimum Detect	9.4000E-4	Minimum Non-Detect	0.005
Maximum Detect	0.018	Maximum Non-Detect	0.05
Variance Detects	3.6956E-5	Percent Non-Detects	75.61%
Mean Detects	0.00613	SD Detects	0.00608
Median Detects	0.0037	CV Detects	0.992
Skewness Detects	1.119	Kurtosis Detects	0.0255
Mean of Logged Detects	-5.583	SD of Logged Detects	1.069

	Normal GOF Test on Detects Only	
Shapiro Wilk Test Statistic	0.822	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.781	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.257	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.304	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs		
KM Mean	0.00571	KM Standard Error of Mean	0.0018
90KM SD	0.00566	95% KM (BCA) UCL	0.00895
95% KM (t) UCL	0.00874	95% KM (Percentile Bootstrap) UCL	0.00876
95% KM (z) UCL	0.00867	95% KM Bootstrap t UCL	0.0108
90% KM Chebyshev UCL	0.0111	95% KM Chebyshev UCL	0.0135
97.5% KM Chebyshev UCL	0.0169	99% KM Chebyshev UCL	0.0236

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

	Gamma GOF Tests on Detected Observations Only	
A-D Test Statistic	0.543	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.745	Detected data appear Gamma Distributed at 5% Significance Level

K-S Test Statistic	0.266	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.273	Detected data appear Gamma Distributed at 5% Significance Level	

<p style="text-align:center;color:blue;">Detected data appear Gamma Distributed at 5% Significance Level</p>

Gamma Statistics on Detected Data Only

k hat (MLE)	1.162	k star (bias corrected MLE)	0.88
Theta hat (MLE)	0.00527	Theta star (bias corrected MLE)	0.00696
nu hat (MLE)	23.24	nu star (bias corrected)	17.6
Mean (detects)	0.00613		

Gamma ROS Statistics using Imputed Non-Detects

<p style="text-align:center;color:blue;">GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs</p>
<p style="text-align:center;color:blue;">GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)</p>
<p style="text-align:center;color:blue;">For such situations, GROS method may yield incorrect values of UCLs and BTVs</p>
<p style="text-align:center;color:blue;">This is especially true when the sample size is small.</p>
<p style="text-align:center;color:blue;">For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates</p>

Minimum	9.4000E-4	Mean	0.00989
Maximum	0.0234	Median	0.01
SD	0.00444	CV	0.448
k hat (MLE)	3.156	k star (bias corrected MLE)	2.942
Theta hat (MLE)	0.00313	Theta star (bias corrected MLE)	0.00336
nu hat (MLE)	258.8	nu star (bias corrected)	241.2
Adjusted Level of Significance (β)	0.0441		
Approximate Chi Square Value (241.21, α)	206.3	Adjusted Chi Square Value (241.21, β)	205.1
95% Gamma Approximate UCL	0.0116	95% Gamma Adjusted UCL	0.0116

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.00571	SD (KM)	0.00566
Variance (KM)	3.2012E-5	SE of Mean (KM)	0.0018
k hat (KM)	1.018	k star (KM)	0.96
nu hat (KM)	83.49	nu star (KM)	78.71
theta hat (KM)	0.00561	theta star (KM)	0.00595
80% gamma percentile (KM)	0.00922	90% gamma percentile (KM)	0.0133
95% gamma percentile (KM)	0.0174	99% gamma percentile (KM)	0.0268

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (78.71, α)	59.27	Adjusted Chi Square Value (78.71, β)	58.65
95% KM Approximate Gamma UCL	0.00758	95% KM Adjusted Gamma UCL	0.00766

<p style="text-align:center;color:red;">Note: KM UCLs may be biased low with this dataset. Other substitution method recommended</p>

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.905	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.869	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.239	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.241	Detected Data appear Lognormal at 10% Significance Level	

<p style="text-align:center;color:blue;">Detected Data appear Lognormal at 10% Significance Level</p>

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.00577	Mean in Log Scale	-5.665
SD in Original Scale	0.00631	SD in Log Scale	1.04
95% t UCL (assumes normality of ROS data)	0.00742	95% Percentile Bootstrap UCL	0.00749
95% BCA Bootstrap UCL	0.0077	95% Bootstrap t UCL	0.00789
95% H-UCL (Log ROS)	0.00882		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-5.669	KM Geo Mean	0.00345
KM SD (logged)	1.007	95% Critical H Value (KM-Log)	2.359
KM Standard Error of Mean (logged)	0.321	95% H-UCL (KM -Log)	0.00834
KM SD (logged)	1.007	95% Critical H Value (KM-Log)	2.359
KM Standard Error of Mean (logged)	0.321		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0196	Mean in Log Scale	-4.222
SD in Original Scale	0.00911	SD in Log Scale	1.002
95% t UCL (Assumes normality)	0.022	95% H-Stat UCL	0.0352

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.00874		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | silver | 7440-22-4)

General Statistics

Total Number of Observations	41	Number of Distinct Observations	9
Number of Detects	5	Number of Non-Detects	36
Number of Distinct Detects	5	Number of Distinct Non-Detects	4
Minimum Detect	2.7000E-5	Minimum Non-Detect	2.0000E-4
Maximum Detect	3.7000E-4	Maximum Non-Detect	0.01
Variance Detects	2.2716E-8	Percent Non-Detects	87.8%
Mean Detects	1.0060E-4	SD Detects	1.5072E-4
Median Detects	3.3000E-5	CV Detects	1.498
Skewness Detects	2.227	Kurtosis Detects	4.968
Mean of Logged Detects	-9.842	SD of Logged Detects	1.098

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.588	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.686	Detected Data Not Normal at 1% Significance Level	

Lilliefors Test Statistic	0.449	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.396	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	6.6925E-5	KM Standard Error of Mean	3.5846E-5
90KM SD	1.0119E-4	95% KM (BCA) UCL	1.4689E-4
95% KM (t) UCL	1.2728E-4	95% KM (Percentile Bootstrap) UCL	1.3462E-4
95% KM (z) UCL	1.2589E-4	95% KM Bootstrap t UCL	0.00101
90% KM Chebyshev UCL	1.7446E-4	95% KM Chebyshev UCL	2.2317E-4
97.5% KM Chebyshev UCL	2.9078E-4	99% KM Chebyshev UCL	4.2359E-4

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.033	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.694	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.434	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.365	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.915	k star (bias corrected MLE)	0.499
Theta hat (MLE)	1.0993E-4	Theta star (bias corrected MLE)	2.0145E-4
nu hat (MLE)	9.151	nu star (bias corrected)	4.994
Mean (detects)	1.0060E-4		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	2.7000E-5	Mean	0.00879
Maximum	0.01	Median	0.01
SD	0.00328	CV	0.373
k hat (MLE)	1.118	k star (bias corrected MLE)	1.052
Theta hat (MLE)	0.00787	Theta star (bias corrected MLE)	0.00836
nu hat (MLE)	91.65	nu star (bias corrected)	86.28
Adjusted Level of Significance (β)	0.0441		
Approximate Chi Square Value (86.28, α)	65.86	Adjusted Chi Square Value (86.28, β)	65.21
95% Gamma Approximate UCL	0.0115	95% Gamma Adjusted UCL	0.0116

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	6.6925E-5	SD (KM)	1.0119E-4
Variance (KM)	1.0239E-8	SE of Mean (KM)	3.5846E-5
k hat (KM)	0.437	k star (KM)	0.422
nu hat (KM)	35.87	nu star (KM)	34.58
theta hat (KM)	1.5299E-4	theta star (KM)	1.5870E-4

80% gamma percentile (KM)	1.0862E-4	90% gamma percentile (KM)	1.8724E-4
95% gamma percentile (KM)	2.7301E-4	99% gamma percentile (KM)	4.8752E-4

Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (34.58, α)	22.13	Adjusted Chi Square Value (34.58, β)	21.76
95% KM Approximate Gamma UCL	1.0458E-4	95% KM Adjusted Gamma UCL	1.0634E-4

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Lognormal GOF Test on Detected Observations Only		
Shapiro Wilk Test Statistic	0.692	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.806	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.377	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.319	Detected Data Not Lognormal at 10% Significance Level

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	6.4923E-5	Mean in Log Scale	-10.05
SD in Original Scale	7.2519E-5	SD in Log Scale	0.88
95% t UCL (assumes normality of ROS data)	8.3994E-5	95% Percentile Bootstrap UCL	8.5252E-5
95% BCA Bootstrap UCL	9.0000E-5	95% Bootstrap t UCL	9.4301E-5
95% H-UCL (Log ROS)	8.6912E-5		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-10.08	KM Geo Mean	4.1728E-5
KM SD (logged)	0.746	95% Critical H Value (KM-Log)	2.096
KM Standard Error of Mean (logged)	0.271	95% H-UCL (KM -Log)	7.0544E-5
KM SD (logged)	0.746	95% Critical H Value (KM-Log)	2.096
KM Standard Error of Mean (logged)	0.271		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.00364	Mean in Log Scale	-6.395
SD in Original Scale	0.00217	SD in Log Scale	1.869
95% t UCL (Assumes normality)	0.00421	95% H-Stat UCL	0.0266

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution

Suggested UCL to Use		
95% KM (t) UCL	1.2728E-4	

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

C (groundwater | styrene | 100-42-5)

General Statistics

Total Number of Observations	36	Number of Distinct Observations	5
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	5

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 C (groundwater | styrene | 100-42-5) was not processed!

C (groundwater | t-amyl methyl ether | 994-05-8)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

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 C (groundwater | t-amyl methyl ether | 994-05-8) was not processed!

C (groundwater | tert-butyl alcohol | 75-65-0)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	6
Number of Detects	0	Number of Non-Detects	20
Number of Distinct Detects	0	Number of Distinct Non-Detects	6

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 C (groundwater | tert-butyl alcohol | 75-65-0) was not processed!

C (groundwater | tert-butylbenzene | 98-06-6)

General Statistics			
Total Number of Observations	13	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

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 C (groundwater | tert-butylbenzene | 98-06-6) was not processed!

C (groundwater | tetrachloroethene | 127-18-4)

General Statistics			
Total Number of Observations	36	Number of Distinct Observations	6
Number of Detects	3	Number of Non-Detects	33
Number of Distinct Detects	3	Number of Distinct Non-Detects	3
Minimum Detect	2.5000E-4	Minimum Non-Detect	0.001
Maximum Detect	8.8000E-4	Maximum Non-Detect	0.005
Variance Detects	1.0363E-7	Percent Non-Detects	91.67%
Mean Detects	6.0333E-4	SD Detects	3.2192E-4
Median Detects	6.8000E-4	CV Detects	0.534
Skewness Detects	-1.011	Kurtosis Detects	N/A
Mean of Logged Detects	-7.541	SD of Logged Detects	0.665

Warning: Data set has only 3 Detected Values.

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

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.957	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.753	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.261	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.429	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	6.0333E-4	KM Standard Error of Mean	1.8586E-4
90KM SD	2.6285E-4	95% KM (BCA) UCL	N/A
95% KM (t) UCL	9.1736E-4	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	9.0905E-4	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.00116	95% KM Chebyshev UCL	0.00141
97.5% KM Chebyshev UCL	0.00176	99% KM Chebyshev UCL	0.00245

Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	0.365	**Anderson-Darling GOF Test**	

5% A-D Critical Value	0.637	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.326	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.434	Detected data appear Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	4.066	k star (bias corrected MLE)	N/A
Theta hat (MLE)	1.4838E-4	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	24.4	nu star (bias corrected)	N/A
Mean (detects)	6.0333E-4		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	2.5000E-4	Mean	0.00922
Maximum	0.01	Median	0.01
SD	0.00264	CV	0.286
k hat (MLE)	3.222	k star (bias corrected MLE)	2.972
Theta hat (MLE)	0.00286	Theta star (bias corrected MLE)	0.0031
nu hat (MLE)	232	nu star (bias corrected)	214
Adjusted Level of Significance (β)	0.0428		
Approximate Chi Square Value (214.01, α)	181.2	Adjusted Chi Square Value (214.01, β)	179.8
95% Gamma Approximate UCL	0.0109	95% Gamma Adjusted UCL	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	6.0333E-4	SD (KM)	2.6285E-4
Variance (KM)	6.9089E-8	SE of Mean (KM)	1.8586E-4
k hat (KM)	5.269	k star (KM)	4.848
nu hat (KM)	379.3	nu star (KM)	349.1
theta hat (KM)	1.1451E-4	theta star (KM)	1.2444E-4
80% gamma percentile (KM)	8.1380E-4	90% gamma percentile (KM)	9.7025E-4
95% gamma percentile (KM)	0.00111	99% gamma percentile (KM)	0.00142

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (349.07, α)	306.8	Adjusted Chi Square Value (349.07, β)	305
95% KM Approximate Gamma UCL	6.8651E-4	95% KM Adjusted Gamma UCL	6.9055E-4

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.896	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.789	Detected Data appear Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.312	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.389	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	7.1328E-4	Mean in Log Scale	-7.541
SD in Original Scale	5.9699E-4	SD in Log Scale	0.79
95% t UCL (assumes normality of ROS data)	8.8139E-4	95% Percentile Bootstrap UCL	8.8394E-4
95% BCA Bootstrap UCL	9.1374E-4	95% Bootstrap t UCL	9.3394E-4
95% H-UCL (Log ROS)	9.6756E-4		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-7.541	KM Geo Mean	5.3086E-4
KM SD (logged)	0.543	95% Critical H Value (KM-Log)	1.942
KM Standard Error of Mean (logged)	0.384	95% H-UCL (KM -Log)	7.3509E-4
KM SD (logged)	0.543	95% Critical H Value (KM-Log)	1.942
KM Standard Error of Mean (logged)	0.384		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	7.3778E-4	Mean in Log Scale	-7.406
SD in Original Scale	6.3845E-4	SD in Log Scale	0.536
95% t UCL (Assumes normality)	9.1756E-4	95% H-Stat UCL	8.3606E-4

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use			
95% KM (t) UCL	9.1736E-4		

Warning: Recommended UCL exceeds the maximum observation

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | tetrahydrofuran | 109-99-9)

General Statistics			
Total Number of Observations	13	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

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 C (groundwater | tetrahydrofuran | 109-99-9) was not processed!

C (groundwater | thallium | 7440-28-0)

General Statistics

Total Number of Observations	41	Number of Distinct Observations	7
Number of Detects	2	Number of Non-Detects	39
Number of Distinct Detects	2	Number of Distinct Non-Detects	5
Minimum Detect	9.2500E-5	Minimum Non-Detect	2.0000E-4
Maximum Detect	2.7000E-4	Maximum Non-Detect	0.15
Variance Detects	1.5753E-8	Percent Non-Detects	95.12%
Mean Detects	1.8125E-4	SD Detects	1.2551E-4
Median Detects	1.8125E-4	CV Detects	0.692
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-8.753	SD of Logged Detects	0.757

Warning: Data set has only 2 Detected Values.

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

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.1025E-4	KM Standard Error of Mean	2.3814E-5
90KM SD	5.3250E-5	95% KM (BCA) UCL	N/A
95% KM (t) UCL	1.5035E-4	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	1.4942E-4	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	1.8169E-4	95% KM Chebyshev UCL	2.1405E-4
97.5% KM Chebyshev UCL	2.5897E-4	99% KM Chebyshev UCL	3.4720E-4

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	3.807	k star (bias corrected MLE)	N/A
Theta hat (MLE)	4.7614E-5	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	15.23	nu star (bias corrected)	N/A
Mean (detects)	1.8125E-4		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.1025E-4	SD (KM)	5.3250E-5
Variance (KM)	2.8356E-9	SE of Mean (KM)	2.3814E-5
k hat (KM)	4.287	k star (KM)	3.989
nu hat (KM)	351.5	nu star (KM)	327.1
theta hat (KM)	2.5719E-5	theta star (KM)	2.7637E-5
80% gamma percentile (KM)	1.5206E-4	90% gamma percentile (KM)	1.8424E-4
95% gamma percentile (KM)	2.1386E-4	99% gamma percentile (KM)	2.7714E-4

Gamma Kaplan-Meier (KM) Statistics

		Adjusted Level of Significance (β)	0.0441

Approximate Chi Square Value (327.12, α)	286.2	Adjusted Chi Square Value (327.12, β)	284.8
95% KM Approximate Gamma UCL	1.2601E-4	95% KM Adjusted Gamma UCL	1.2662E-4

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	1.1341E-4	Mean in Log Scale	-9.209
SD in Original Scale	5.9900E-5	SD in Log Scale	0.504
95% t UCL (assumes normality of ROS data)	1.2916E-4	95% Percentile Bootstrap UCL	1.2945E-4
95% BCA Bootstrap UCL	1.3084E-4	95% Bootstrap t UCL	1.3178E-4
95% H-UCL (Log ROS)	1.3226E-4		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-9.181	KM Geo Mean	1.0296E-4
KM SD (logged)	0.321	95% Critical H Value (KM-Log)	1.784
KM Standard Error of Mean (logged)	0.144	95% H-UCL (KM -Log)	1.1870E-4
KM SD (logged)	0.321	95% Critical H Value (KM-Log)	1.784
KM Standard Error of Mean (logged)	0.144		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0167	Mean in Log Scale	-5.307
SD in Original Scale	0.0204	SD in Log Scale	2.277
95% t UCL (Assumes normality)	0.0221	95% H-Stat UCL	0.283

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	1.5035E-4		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | toluene | 108-88-3)

General Statistics

Total Number of Observations	43	Number of Distinct Observations	13
Number of Detects	6	Number of Non-Detects	37
Number of Distinct Detects	5	Number of Distinct Non-Detects	8
Minimum Detect	2.0000E-4	Minimum Non-Detect	6.8000E-4
Maximum Detect	8.5000E-4	Maximum Non-Detect	0.005
Variance Detects	6.6417E-8	Percent Non-Detects	86.05%
Mean Detects	4.4167E-4	SD Detects	2.5771E-4

Median Detects	4.0000E-4	CV Detects	0.584
Skewness Detects	0.722	Kurtosis Detects	-0.59
Mean of Logged Detects	-7.873	SD of Logged Detects	0.602

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.903	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.713	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.209	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.373	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	4.0083E-4	KM Standard Error of Mean	8.4606E-5
90KM SD	2.0625E-4	95% KM (BCA) UCL	5.4667E-4
95% KM (t) UCL	5.4314E-4	95% KM (Percentile Bootstrap) UCL	5.5000E-4
95% KM (z) UCL	5.4000E-4	95% KM Bootstrap t UCL	5.7616E-4
90% KM Chebyshev UCL	6.5465E-4	95% KM Chebyshev UCL	7.6962E-4
97.5% KM Chebyshev UCL	9.2919E-4	99% KM Chebyshev UCL	0.00124

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.333	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.701	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.204	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.334	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Note GOF tests may be unreliable for small sample sizes

Gamma Statistics on Detected Data Only

k hat (MLE)	3.543	k star (bias corrected MLE)	1.883
Theta hat (MLE)	1.2464E-4	Theta star (bias corrected MLE)	2.3457E-4
nu hat (MLE)	42.52	nu star (bias corrected)	22.59
Mean (detects)	4.4167E-4		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	2.0000E-4	Mean	0.00867
Maximum	0.01	Median	0.01
SD	0.00335	CV	0.387
k hat (MLE)	1.747	k star (bias corrected MLE)	1.64
Theta hat (MLE)	0.00496	Theta star (bias corrected MLE)	0.00528
nu hat (MLE)	150.2	nu star (bias corrected)	141.1
Adjusted Level of Significance (β)	0.0444		

Approximate Chi Square Value (141.07, α)	114.6	Adjusted Chi Square Value (141.07, β)	113.8
95% Gamma Approximate UCL	0.0107	95% Gamma Adjusted UCL	0.0107

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	4.0083E-4	SD (KM)	2.0625E-4
Variance (KM)	4.2541E-8	SE of Mean (KM)	8.4606E-5
k hat (KM)	3.777	k star (KM)	3.529
nu hat (KM)	324.8	nu star (KM)	303.5
theta hat (KM)	1.0613E-4	theta star (KM)	1.1359E-4
80% gamma percentile (KM)	5.6081E-4	90% gamma percentile (KM)	6.8694E-4
95% gamma percentile (KM)	8.0370E-4	99% gamma percentile (KM)	0.00105

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (303.47, α)	264.1	Adjusted Chi Square Value (303.47, β)	262.8
95% KM Approximate Gamma UCL	4.6056E-4	95% KM Adjusted Gamma UCL	4.6279E-4

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.909	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.826	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.191	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.298	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Note GOF tests may be unreliable for small sample sizes

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	3.8519E-4	Mean in Log Scale	-7.975
SD in Original Scale	1.9410E-4	SD in Log Scale	0.481
95% t UCL (assumes normality of ROS data)	4.3498E-4	95% Percentile Bootstrap UCL	4.3458E-4
95% BCA Bootstrap UCL	4.3952E-4	95% Bootstrap t UCL	4.4267E-4
95% H-UCL (Log ROS)	4.4392E-4		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-7.953	KM Geo Mean	3.5165E-4
KM SD (logged)	0.511	95% Critical H Value (KM-Log)	1.909
KM Standard Error of Mean (logged)	0.221	95% H-UCL (KM -Log)	4.6586E-4
KM SD (logged)	0.511	95% Critical H Value (KM-Log)	1.909
KM Standard Error of Mean (logged)	0.221		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	6.6711E-4	Mean in Log Scale	-7.517
SD in Original Scale	6.0345E-4	SD in Log Scale	0.554
95% t UCL (Assumes normality)	8.2189E-4	95% H-Stat UCL	7.4826E-4

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use			
95% KM (t) UCL	5.4314E-4		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | trans-1,2-dichloroethene | 156-60-5)

General Statistics			
Total Number of Observations	36	Number of Distinct Observations	4
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	4

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 C (groundwater | trans-1,2-dichloroethene | 156-60-5) was not processed!

C (groundwater | trans-1,4-dichloro-2-butene | 110-57-6)

General Statistics			
Total Number of Observations	13	Number of Distinct Observations	2
Number of Detects	0	Number of Non-Detects	13
Number of Distinct Detects	0	Number of Distinct Non-Detects	2

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 C (groundwater | trans-1,4-dichloro-2-butene | 110-57-6) was not processed!

C (groundwater | trichloroethene | 79-01-6)

General Statistics			
Total Number of Observations	36	Number of Distinct Observations	4
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	4

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 C (groundwater | trichloroethene | 79-01-6) was not processed!

C (groundwater | trichlorofluoromethane | 75-69-4)

General Statistics

Total Number of Observations	36	Number of Distinct Observations	5
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	5

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 C (groundwater \| trichlorofluoromethane \| 75-69-4) was not processed!

C (groundwater | vanadium | 7440-62-2)

General Statistics

Total Number of Observations	41	Number of Distinct Observations	22
Number of Detects	18	Number of Non-Detects	23
Number of Distinct Detects	18	Number of Distinct Non-Detects	4
Minimum Detect	0.0022	Minimum Non-Detect	0.00445
Maximum Detect	0.064	Maximum Non-Detect	0.01
Variance Detects	1.9459E-4	Percent Non-Detects	56.1%
Mean Detects	0.00993	SD Detects	0.0139
Median Detects	0.00665	CV Detects	1.404
Skewness Detects	3.801	Kurtosis Detects	15.34
Mean of Logged Detects	-5.011	SD of Logged Detects	0.792

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.481	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.858	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.33	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.235	Detected Data Not Normal at 1% Significance Level
Detected Data Not Normal at 1% Significance Level		

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.00659	KM Standard Error of Mean	0.00156
90KM SD	0.00955	95% KM (BCA) UCL	0.00971
95% KM (t) UCL	0.00921	95% KM (Percentile Bootstrap) UCL	0.00947
95% KM (z) UCL	0.00915	95% KM Bootstrap t UCL	0.0131
90% KM Chebyshev UCL	0.0113	95% KM Chebyshev UCL	0.0134
97.5% KM Chebyshev UCL	0.0163	99% KM Chebyshev UCL	0.0221

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.17	**Anderson-Darling GOF Test**

5% A-D Critical Value	0.758	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.209	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.208	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.395	k star (bias corrected MLE)	1.199
Theta hat (MLE)	0.00712	Theta star (bias corrected MLE)	0.00828
nu hat (MLE)	50.21	nu star (bias corrected)	43.17
Mean (detects)	0.00993		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0022	Mean	0.0101
Maximum	0.064	Median	0.01
SD	0.00911	CV	0.906
k hat (MLE)	2.99	k star (bias corrected MLE)	2.787
Theta hat (MLE)	0.00336	Theta star (bias corrected MLE)	0.00361
nu hat (MLE)	245.2	nu star (bias corrected)	228.6
Adjusted Level of Significance (β)	0.0441		
Approximate Chi Square Value (228.55, α)	194.6	Adjusted Chi Square Value (228.55, β)	193.4
95% Gamma Approximate UCL	0.0118	95% Gamma Adjusted UCL	0.0119

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.00659	SD (KM)	0.00955
Variance (KM)	9.1182E-5	SE of Mean (KM)	0.00156
k hat (KM)	0.476	k star (KM)	0.457
nu hat (KM)	39	nu star (KM)	37.48
theta hat (KM)	0.0138	theta star (KM)	0.0144
80% gamma percentile (KM)	0.0108	90% gamma percentile (KM)	0.0181
95% gamma percentile (KM)	0.0261	99% gamma percentile (KM)	0.0459

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (37.48, α)	24.46	Adjusted Chi Square Value (37.48, β)	24.08
95% KM Approximate Gamma UCL	0.0101	95% KM Adjusted Gamma UCL	0.0103

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.91	**Shapiro Wilk GOF Test**	
10% Shapiro Wilk Critical Value	0.914	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.13	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.185	Detected Data appear Lognormal at 10% Significance Level	

Detected Data appear Approximate Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.00663	Mean in Log Scale	-5.355
SD in Original Scale	0.00968	SD in Log Scale	0.703
95% t UCL (assumes normality of ROS data)	0.00918	95% Percentile Bootstrap UCL	0.0095
95% BCA Bootstrap UCL	0.0111	95% Bootstrap t UCL	0.0137
95% H-UCL (Log ROS)	0.0076		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-5.346	KM Geo Mean	0.00477
KM SD (logged)	0.653	95% Critical H Value (KM-Log)	2.014
KM Standard Error of Mean (logged)	0.123	95% H-UCL (KM -Log)	0.00726
KM SD (logged)	0.653	95% Critical H Value (KM-Log)	2.014
KM Standard Error of Mean (logged)	0.123		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00652	Mean in Log Scale	-5.351
SD in Original Scale	0.00964	SD in Log Scale	0.654
95% t UCL (Assumes normality)	0.00905	95% H-Stat UCL	0.00723

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 10% Significance Level

Suggested UCL to Use

KM H-UCL	0.00726		

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.

Please verify the data were collected from random locations.

If the data were collected using judgmental or other non-random methods,

then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

C (groundwater | vinyl acetate | 108-05-4)

General Statistics

Total Number of Observations	1	Number of Distinct Observations	1
Number of Detects	0	Number of Non-Detects	1
Number of Distinct Detects	0	Number of Distinct Non-Detects	1

Warning: This data set only has 1 observations!

Data set is too small to compute reliable and meaningful statistics and estimates!

The data set for variable C (groundwater | vinyl acetate | 108-05-4) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!

If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

C (groundwater | vinyl chloride | 75-01-4)

General Statistics			
Total Number of Observations	36	Number of Distinct Observations	5
Number of Detects	0	Number of Non-Detects	36
Number of Distinct Detects	0	Number of Distinct Non-Detects	5

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 C (groundwater | vinyl chloride | 75-01-4) was not processed!

C (groundwater | xylenes (total) | 1330-20-7)

General Statistics			
Total Number of Observations	43	Number of Distinct Observations	12
Number of Detects	3	Number of Non-Detects	40
Number of Distinct Detects	3	Number of Distinct Non-Detects	10
Minimum Detect	5.0000E-4	Minimum Non-Detect	0.00136
Maximum Detect	0.006	Maximum Non-Detect	0.025
Variance Detects	8.0833E-6	Percent Non-Detects	93.02%
Mean Detects	0.00283	SD Detects	0.00284
Median Detects	0.002	CV Detects	1.003
Skewness Detects	1.206	Kurtosis Detects	N/A
Mean of Logged Detects	-6.311	SD of Logged Detects	1.245

Warning: Data set has only 3 Detected Values.

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

Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.936	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.753	Detected Data appear Normal at 1% Significance Level	
Lilliefors Test Statistic	0.282	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.429	Detected Data appear Normal at 1% Significance Level	

Detected Data appear Normal at 1% Significance Level

Note GOF tests may be unreliable for small sample sizes

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	7.4542E-4	KM Standard Error of Mean	2.0767E-4
90KM SD	9.3381E-4	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.00109	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.00109	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.00137	95% KM Chebyshev UCL	0.00165

97.5% KM Chebyshev UCL	0.00204	99% KM Chebyshev UCL	0.00281

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.247	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.64	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.227	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.439	Detected data appear Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only			
k hat (MLE)	1.266	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00224	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	7.598	nu star (bias corrected)	N/A
Mean (detects)	0.00283		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	5.0000E-4	Mean	0.0095
Maximum	0.01	Median	0.01
SD	0.00195	CV	0.205
k hat (MLE)	7.55	k star (bias corrected MLE)	7.039
Theta hat (MLE)	0.00126	Theta star (bias corrected MLE)	0.00135
nu hat (MLE)	649.3	nu star (bias corrected)	605.3
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (605.34, α)	549.3	Adjusted Chi Square Value (605.34, β)	547.4
95% Gamma Approximate UCL	0.0105	95% Gamma Adjusted UCL	N/A

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	7.4542E-4	SD (KM)	9.3381E-4
Variance (KM)	8.7200E-7	SE of Mean (KM)	2.0767E-4
k hat (KM)	0.637	k star (KM)	0.608
nu hat (KM)	54.8	nu star (KM)	52.31
theta hat (KM)	0.00117	theta star (KM)	0.00123
80% gamma percentile (KM)	0.00123	90% gamma percentile (KM)	0.00193
95% gamma percentile (KM)	0.00267	99% gamma percentile (KM)	0.00445

Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (52.31, α)	36.7	Adjusted Chi Square Value (52.31, β)	36.24
95% KM Approximate Gamma UCL	0.00106	95% KM Adjusted Gamma UCL	0.00108

Lognormal GOF Test on Detected Observations Only		
Shapiro Wilk Test Statistic	0.996	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.789	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.197	**Lilliefors GOF Test**

10% Lilliefors Critical Value	0.389	Detected Data appear Lognormal at 10% Significance Level	

<p style="text-align:center">Detected Data appear Lognormal at 10% Significance Level</p>

<p style="text-align:center">Note GOF tests may be unreliable for small sample sizes</p>

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	7.6966E-4	Mean in Log Scale	-7.531
SD in Original Scale	9.4290E-4	SD in Log Scale	0.801
95% t UCL (assumes normality of ROS data)	0.00101	95% Percentile Bootstrap UCL	0.00104
95% BCA Bootstrap UCL	0.00115	95% Bootstrap t UCL	0.00125
95% H-UCL (Log ROS)	9.6483E-4		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-7.441	KM Geo Mean	5.8687E-4
KM SD (logged)	0.516	95% Critical H Value (KM-Log)	1.912
KM Standard Error of Mean (logged)	0.136	95% H-UCL (KM -Log)	7.8081E-4
KM SD (logged)	0.516	95% Critical H Value (KM-Log)	1.912
KM Standard Error of Mean (logged)	0.136		

<p style="text-align:center">Note: KM UCLs may be biased low with this dataset. Other substitution method recommended</p>

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00281	Mean in Log Scale	-6.249
SD in Original Scale	0.00328	SD in Log Scale	0.78
95% t UCL (Assumes normality)	0.00365	95% H-Stat UCL	0.00339

<p style="text-align:center">DL/2 is not a recommended method, provided for comparisons and historical reasons</p>

Nonparametric Distribution Free UCL Statistics

<p style="text-align:center">Detected Data appear Normal Distributed at 1% Significance Level</p>

Suggested UCL to Use

95% KM (t) UCL	0.00109		

<p style="text-align:center">The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.</p>

<p style="text-align:center">Please verify the data were collected from random locations.</p>

<p style="text-align:center">If the data were collected using judgmental or other non-random methods,</p>

<p style="text-align:center">then contact a statistician to correctly calculate UCLs.</p>

<p style="text-align:center">Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.</p>

<p style="text-align:center">Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.</p>

<p style="text-align:center">However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.</p>

C (groundwater | zinc | 7440-66-6)

General Statistics

Total Number of Observations	41	Number of Distinct Observations	34
Number of Detects	32	Number of Non-Detects	9
Number of Distinct Detects	32	Number of Distinct Non-Detects	2
Minimum Detect	0.0047	Minimum Non-Detect	0.01

Maximum Detect	0.422	Maximum Non-Detect	0.02
Variance Detects	0.0151	Percent Non-Detects	21.95%
Mean Detects	0.105	SD Detects	0.123
Median Detects	0.051	CV Detects	1.168
Skewness Detects	1.411	Kurtosis Detects	1.21
Mean of Logged Detects	-3.071	SD of Logged Detects	1.419

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.782	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk Critical Value	0.904	Detected Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.207	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.18	Detected Data Not Normal at 1% Significance Level	

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0842	KM Standard Error of Mean	0.0181
90KM SD	0.114	95% KM (BCA) UCL	0.114
95% KM (t) UCL	0.115	95% KM (Percentile Bootstrap) UCL	0.114
95% KM (z) UCL	0.114	95% KM Bootstrap t UCL	0.124
90% KM Chebyshev UCL	0.139	95% KM Chebyshev UCL	0.163
97.5% KM Chebyshev UCL	0.197	99% KM Chebyshev UCL	0.264

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.867	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.789	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.154	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.162	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.733	k star (bias corrected MLE)	0.685
Theta hat (MLE)	0.144	Theta star (bias corrected MLE)	0.154
nu hat (MLE)	46.91	nu star (bias corrected)	43.85
Mean (detects)	0.105		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0047	Mean	0.0849
Maximum	0.422	Median	0.0254
SD	0.115	CV	1.356
k hat (MLE)	0.67	k star (bias corrected MLE)	0.638
Theta hat (MLE)	0.127	Theta star (bias corrected MLE)	0.133
nu hat (MLE)	54.97	nu star (bias corrected)	52.28
Adjusted Level of Significance (β)	0.0441		

Approximate Chi Square Value (52.28, α)	36.67	Adjusted Chi Square Value (52.28, β)	36.2
95% Gamma Approximate UCL	0.121	95% Gamma Adjusted UCL	0.123

Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0842	SD (KM)	0.114
Variance (KM)	0.013	SE of Mean (KM)	0.0181
k hat (KM)	0.545	k star (KM)	0.521
nu hat (KM)	44.68	nu star (KM)	42.74
theta hat (KM)	0.155	theta star (KM)	0.162
80% gamma percentile (KM)	0.139	90% gamma percentile (KM)	0.226
95% gamma percentile (KM)	0.319	99% gamma percentile (KM)	0.546

Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (42.74, α)	28.75	Adjusted Chi Square Value (42.74, β)	28.33
95% KM Approximate Gamma UCL	0.125	95% KM Adjusted Gamma UCL	0.127

Lognormal GOF Test on Detected Observations Only		
Shapiro Wilk Test Statistic	0.923	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.941	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.142	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.142	Detected Data Not Lognormal at 10% Significance Level

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0847	Mean in Log Scale	-3.418
SD in Original Scale	0.115	SD in Log Scale	1.449
95% t UCL (assumes normality of ROS data)	0.115	95% Percentile Bootstrap UCL	0.116
95% BCA Bootstrap UCL	0.119	95% Bootstrap t UCL	0.123
95% H-UCL (Log ROS)	0.182		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.435	KM Geo Mean	0.0322
KM SD (logged)	1.422	95% Critical H Value (KM-Log)	2.854
KM Standard Error of Mean (logged)	0.228	95% H-UCL (KM -Log)	0.168
KM SD (logged)	1.422	95% Critical H Value (KM-Log)	2.854
KM Standard Error of Mean (logged)	0.228		

DL/2 Statistics			
DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0842	Mean in Log Scale	-3.424
SD in Original Scale	0.115	SD in Log Scale	1.424
95% t UCL (Assumes normality)	0.115	95% H-Stat UCL	0.171

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	0.127		

ATTACHMENT 3
VURAM Results

Attachment 3-1 – Resident

Attachment 3-2 – Construction Worker

Attachment 3-3 - Composite Worker

Attachment 3-4 - Recreator

Attachment 3-5 - Trespasser

ATTACHMENT 3-1
RESIDENT

Virginia Department of Environmental Quality

VURAM

Virginia Unified Risk Assessment Model

VERSION: 3.2.1

Residential Quantitative Risk Assessment Report

Program: **Voluntary Remediation Program (VRP)**

Site Name: **Alexandria**

By submitting this report to the Virginia DEQ, the user confirms that VURAM's default exposure parameters have not been altered, unless a complete unaltered VURAM analysis is provided and all modifications are detailed explicitly in an accompanying narrative or documentation that shows DEQ's prior concurrence with specific changes.

Chemical Specific Notes Displayed as Applicable

Lead

VURAM does not perform an evaluation for lead exposure. Use other approved models for lead modeling.

All Report Pages are Required for Risk Assessment Submission

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

Soil

Analyte: Acenaphthene

CAS: 83-32-9

Concentration mg/kg :	2.06E-01
RfDo (mg/kg-day):	6.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	4.12E-06	Ingestion:	4.39E-05	Ingestion:	
Dermal:	2.26E-06	Dermal:	1.35E-05	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**6.37E-06**	**Total:**	**5.74E-05**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk   0.00%   0.00%   0.00%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Analyte: Acenaphthylene

CAS: 208-96-8

Concentration mg/kg :	1.40E-01
RfDo (mg/kg-day):	3.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	5.59E-06	Ingestion:	5.97E-05	Ingestion:	
Dermal:	3.07E-06	Dermal:	1.84E-05	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**8.66E-06**	**Total:**	**7.81E-05**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk   0.00%   0.00%   0.00%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Analyte: Acetone

CAS: 67-64-1

Concentration mg/kg :	1.72E+00
RfDo (mg/kg-day):	9.00E-01
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	2.29E-06	Ingestion:	2.44E-05	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**2.29E-06**	**Total:**	**2.44E-05**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk   0.00%   0.00%   0.00%

Program: Voluntary Remediation Program (VRP)

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

Soil

	mg/kg	*Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*	*N/A*

Analyte: Acetophenone

CAS: 98-86-2

Concentration mg/kg :	1.51E-01	
RfDo (mg/kg-day):	1.00E-01	
RfCi (mg/m3):		
SFO (mg/kg-day)-1:		
IUR (µg/m3)-1:		
Mutagen:		
VOC:	Y	

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	1.81E-06	Ingestion:	1.93E-05	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**1.81E-06**	**Total:**	**1.93E-05**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk   0.00%   0.00%   0.00%

	mg/kg	*Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*	*N/A*

Analyte: Aluminum

CAS: 7429-90-5

Concentration mg/kg :	9.23E+03	
RfDo (mg/kg-day):	1.00E+00	
RfCi (mg/m3):	5.00E-03	
SFO (mg/kg-day)-1:		
IUR (µg/m3)-1:		
Mutagen:		
VOC:		

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	1.11E-02	Ingestion:	1.18E-01	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	1.30E-03	Inhalation:	1.30E-03	Inhalation:	
Total:	**1.24E-02**	**Total:**	**1.19E-01**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk   4.11%   4.74%   0.00%

	mg/kg	*Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*	*N/A*

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

Soil

Analyte: Anthracene

CAS: 120-12-7

Concentration mg/kg :	2.53E-01
RfDo (mg/kg-day):	3.00E-01
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	1.01E-06	Ingestion:	1.08E-05	Ingestion:	
Dermal:	5.55E-07	Dermal:	3.33E-06	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**1.57E-06**	**Total:**	**1.41E-05**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk   0.00%   0.00%   0.00%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Analyte: Antimony (metallic)

CAS: 7440-36-0

Concentration mg/kg :	1.34E+00
RfDo (mg/kg-day):	4.00E-04
RfCi (mg/m3):	3.00E-04
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	4.02E-03	Ingestion:	4.29E-02	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	3.16E-06	Inhalation:	3.16E-06	Inhalation:	
Total:	**4.03E-03**	**Total:**	**4.29E-02**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk   1.34%   1.71%   0.00%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Analyte: Arsenic, Inorganic

CAS: 7440-38-2

Concentration mg/kg :	8.80E+00
RfDo (mg/kg-day):	3.00E-04
RfCi (mg/m3):	1.50E-05
SFO (mg/kg-day)-1:	1.50E+00
IUR (µg/m3)-1:	4.30E-03
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	2.11E-02	Ingestion:	2.25E-01	Ingestion:	1.14E-05
Dermal:	4.45E-03	Dermal:	2.67E-02	Dermal:	1.60E-06
Inhalation:	4.14E-04	Inhalation:	4.14E-04	Inhalation:	9.91E-09
Total:	**2.60E-02**	**Total:**	**2.52E-01**	**Total:**	**1.30E-05**

% Contribution to Media Hazard/Risk   8.62%   10.02%   63.08%

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

Soil

	mg/kg	Non-Cancer Adult	Non-Cancer Child	Cancer
Exceeds Risk!				
Recommended Acceptable Concentration		*N/A*	*N/A*	*6.77E-01*

Analyte: Barium

CAS: 7440-39-3

Concentration mg/kg :	7.27E+01
RfDo (mg/kg-day):	2.00E-01
RfCi (mg/m3):	5.00E-04
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	4.36E-04	Ingestion:	4.65E-03	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	1.03E-04	Inhalation:	1.03E-04	Inhalation:	
Total:	**5.38E-04**	**Total:**	**4.75E-03**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk   0.18%   0.19%   0.00%

	mg/kg	Non-Cancer Adult	Non-Cancer Child	Cancer
Recommended Acceptable Concentration		*N/A*	*N/A*	*N/A*

Analyte: Benz[a]anthracene

CAS: 56-55-3

Concentration mg/kg :	4.82E-01
RfDo (mg/kg-day):	
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	1.00E-01
IUR (µg/m3)-1:	6.00E-05
Mutagen:	Y
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:		Ingestion:		Ingestion:	3.15E-07
Dermal:		Dermal:		Dermal:	1.05E-07
Inhalation:		Inhalation:		Inhalation:	6.49E-09
Total:	**0.00E+00**	**Total:**	**0.00E+00**	**Total:**	**4.26E-07**

% Contribution to Media Hazard/Risk   0.00%   0.00%   2.07%

	mg/kg	Non-Cancer Adult	Non-Cancer Child	Cancer
Recommended Acceptable Concentration		*N/A*	*N/A*	*N/A*

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

Soil

Analyte: Benzene

CAS: 71-43-2

Concentration mg/kg :	5.00E-01
RfDo (mg/kg-day):	4.00E-03
RfCi (mg/m3):	3.00E-02
SFO (mg/kg-day)-1:	5.50E-02
IUR (µg/m3)-1:	7.80E-06
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	1.50E-04	Ingestion:	1.60E-03	Ingestion:	3.96E-08
Dermal:		Dermal:		Dermal:	
Inhalation:	4.51E-03	Inhalation:	4.51E-03	Inhalation:	3.92E-07
Total:	**4.66E-03**	**Total:**	**6.11E-03**	**Total:**	**4.32E-07**

% Contribution to Media Hazard/Risk   1.55%   0.24%   2.10%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Analyte: Benzo(g,h,i)perylene

CAS: 191-24-2

Concentration mg/kg :	2.47E-01
RfDo (mg/kg-day):	3.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	9.87E-06	Ingestion:	1.05E-04	Ingestion:	
Dermal:	5.42E-06	Dermal:	3.25E-05	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**1.53E-05**	**Total:**	**1.38E-04**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk   0.01%   0.01%   0.00%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Analyte: Benzo[a]pyrene

CAS: 50-32-8

Concentration mg/kg :	3.36E-01
RfDo (mg/kg-day):	3.00E-04
RfCi (mg/m3):	2.00E-06
SFO (mg/kg-day)-1:	1.00E+00
IUR (µg/m3)-1:	6.00E-04
Mutagen:	Y
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	1.34E-03	Ingestion:	1.43E-02	Ingestion:	2.19E-06
Dermal:	7.37E-04	Dermal:	4.42E-03	Dermal:	7.32E-07
Inhalation:	1.18E-04	Inhalation:	1.18E-04	Inhalation:	1.46E-10
Total:	**2.20E-03**	**Total:**	**1.89E-02**	**Total:**	**2.93E-06**

% Contribution to Media Hazard/Risk   0.73%   0.75%   14.20%

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

Soil

	Exceeds Risk!	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*	*1.15E-01*

Analyte: Benzo[b]fluoranthene

CAS: 205-99-2

		Calculated Hazard/Risk		
Concentration mg/kg :	6.65E-01			
RfDo (mg/kg-day):		**Non-Cancer Adult**	**Non-Cancer Child**	**Cancer**
RfCi (mg/m3):		Ingestion:	Ingestion:	Ingestion: 4.34E-07
SFO (mg/kg-day)-1:	1.00E-01	Dermal:	Dermal:	Dermal: 1.45E-07
IUR (µg/m3)-1:	6.00E-05	Inhalation:	Inhalation:	Inhalation: 2.89E-11
Mutagen:	Y	**Total: 0.00E+00**	**Total: 0.00E+00**	**Total: 5.79E-07**
VOC:				

	% Contribution to Media Hazard/Risk	0.00%	0.00%	2.81%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Analyte: Benzo[k]fluoranthene

CAS: 207-08-9

		Calculated Hazard/Risk		
Concentration mg/kg :	3.61E-01			
RfDo (mg/kg-day):		**Non-Cancer Adult**	**Non-Cancer Child**	**Cancer**
RfCi (mg/m3):		Ingestion:	Ingestion:	Ingestion: 2.36E-08
SFO (mg/kg-day)-1:	1.00E-02	Dermal:	Dermal:	Dermal: 7.87E-09
IUR (µg/m3)-1:	6.00E-06	Inhalation:	Inhalation:	Inhalation: 1.57E-12
Mutagen:	Y	**Total: 0.00E+00**	**Total: 0.00E+00**	**Total: 3.14E-08**
VOC:				

	% Contribution to Media Hazard/Risk	0.00%	0.00%	0.15%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Program: Voluntary Remediation Program (VRP)

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

Soil

Analyte: Benzoic Acid

CAS: 65-85-0

Concentration mg/kg :	1.20E+00
RfDo (mg/kg-day):	4.00E+00
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	3.60E-07	Ingestion:	3.84E-06	Ingestion:	
Dermal:	1.52E-07	Dermal:	9.10E-07	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**5.11E-07**	**Total:**	**4.75E-06**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk   0.00%   0.00%   0.00%

	mg/kg Non-Cancer Adult	Non-Cancer Child	Cancer
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Analyte: Beryllium and compounds

CAS: 7440-41-7

Concentration mg/kg :	9.00E-01
RfDo (mg/kg-day):	2.00E-03
RfCi (mg/m3):	2.00E-05
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	2.40E-03
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	5.39E-04	Ingestion:	5.75E-03	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	3.17E-05	Inhalation:	3.17E-05	Inhalation:	5.66E-10
Total:	**5.71E-04**	**Total:**	**5.79E-03**	**Total:**	**5.66E-10**

% Contribution to Media Hazard/Risk   0.19%   0.23%   0.00%

	mg/kg Non-Cancer Adult	Non-Cancer Child	Cancer
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Analyte: Bis(2-ethylhexyl)phthalate

CAS: 117-81-7

Concentration mg/kg :	2.31E-01
RfDo (mg/kg-day):	2.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	1.40E-02
IUR (µg/m3)-1:	2.40E-06
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	1.38E-05	Ingestion:	1.48E-04	Ingestion:	4.65E-09
Dermal:	5.85E-06	Dermal:	3.50E-05	Dermal:	1.31E-09
Inhalation:		Inhalation:		Inhalation:	1.45E-13
Total:	**1.97E-05**	**Total:**	**1.83E-04**	**Total:**	**5.96E-09**

% Contribution to Media Hazard/Risk   0.01%   0.01%   0.03%

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

Soil

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Analyte: Butylbenzene, n-

CAS: 104-51-8

Concentration mg/kg :	1.40E-01
RfDo (mg/kg-day):	5.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	3.36E-06	Ingestion:	3.58E-05	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**3.36E-06**	**Total:**	**3.58E-05**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk   0.00%   0.00%   0.00%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Analyte: Cadmium (Diet)

CAS: 7440-43-9-Diet

Concentration mg/kg :	3.33E-01
RfDo (mg/kg-day):	1.00E-04
RfCi (mg/m3):	1.00E-05
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	1.80E-03
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	3.99E-03	Ingestion:	4.26E-02	Ingestion:	
Dermal:	6.74E-04	Dermal:	4.04E-03	Dermal:	
Inhalation:	2.35E-05	Inhalation:	2.35E-05	Inhalation:	1.57E-10
Total:	**4.69E-03**	**Total:**	**4.66E-02**	**Total:**	**1.57E-10**

% Contribution to Media Hazard/Risk   1.56%   1.85%   0.00%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

Soil

Analyte: Carbazole

CAS: 86-74-8

Concentration mg/kg :	2.42E-01
RfDo (mg/kg-day):	
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

	Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:		Ingestion:		Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**0.00E+00**	**Total:**	**0.00E+00**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk   0.00%   0.00%   0.00%

	mg/kg	*Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*	*N/A*

Analyte: Chromium(III), Insoluble Salts

CAS: 16065-83-1

Concentration mg/kg :	2.06E+02
RfDo (mg/kg-day):	1.50E+00
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

	Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	1.65E-04	Ingestion:	1.76E-03	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**1.65E-04**	**Total:**	**1.76E-03**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk   0.05%   0.07%   0.00%

	mg/kg	*Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*	*N/A*

Analyte: Chrysene

CAS: 218-01-9

Concentration mg/kg :	6.91E-01
RfDo (mg/kg-day):	
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	1.00E-03
IUR (µg/m3)-1:	6.00E-07
Mutagen:	Y
VOC:	

Calculated Hazard/Risk

	Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:		Ingestion:		Ingestion:	4.51E-09
Dermal:		Dermal:		Dermal:	1.51E-09
Inhalation:		Inhalation:		Inhalation:	3.01E-13
Total:	**0.00E+00**	**Total:**	**0.00E+00**	**Total:**	**6.02E-09**

% Contribution to Media Hazard/Risk   0.00%   0.00%   0.03%

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

Soil

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Analyte: Cobalt

CAS: 7440-48-4

Concentration mg/kg :	1.04E+01
RfDo (mg/kg-day):	3.00E-04
RfCi (mg/m3):	6.00E-06
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	9.00E-03
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	4.14E-02	Ingestion:	4.42E-01	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	1.22E-03	Inhalation:	1.22E-03	Inhalation:	2.44E-08
Total:	**4.27E-02**	**Total:**	**4.43E-01**	**Total:**	**2.44E-08**

% Contribution to Media Hazard/Risk	14.17%	17.62%	0.12%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Analyte: Copper

CAS: 7440-50-8

Concentration mg/kg :	1.55E+02
RfDo (mg/kg-day):	4.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	4.64E-03	Ingestion:	4.95E-02	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**4.64E-03**	**Total:**	**4.95E-02**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk	1.54%	1.97%	0.00%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Program: Voluntary Remediation Program (VRP)

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

Soil

Analyte: Cresol, o-

CAS: 95-48-7

Concentration mg/kg :	1.30E-01
RfDo (mg/kg-day):	5.00E-02
RfCi (mg/m3):	6.00E-01
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	3.12E-06	Ingestion:	3.32E-05	Ingestion:	
Dermal:	1.32E-06	Dermal:	7.89E-06	Dermal:	
Inhalation:	1.53E-10	Inhalation:	1.53E-10	Inhalation:	
Total:	**4.43E-06**	**Total:**	**4.11E-05**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk   0.00%   0.00%   0.00%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Analyte: Cresol, p-chloro-m-

CAS: 59-50-7

Concentration mg/kg :	1.19E-01
RfDo (mg/kg-day):	1.00E-01
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	1.43E-06	Ingestion:	1.52E-05	Ingestion:	
Dermal:	6.02E-07	Dermal:	3.61E-06	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**2.03E-06**	**Total:**	**1.88E-05**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk   0.00%   0.00%   0.00%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Analyte: Cumene

CAS: 98-82-8

Concentration mg/kg :	1.68E-01
RfDo (mg/kg-day):	1.00E-01
RfCi (mg/m3):	4.00E-01
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	2.01E-06	Ingestion:	2.15E-05	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	6.49E-05	Inhalation:	6.49E-05	Inhalation:	
Total:	**6.69E-05**	**Total:**	**8.63E-05**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk   0.02%   0.00%   0.00%

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

Soil

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Analyte: Cyanide (CN-)

CAS: 57-12-5

		Calculated Hazard/Risk				
Concentration mg/kg :	8.26E-01					
RfDo (mg/kg-day):	6.00E-04	**Non-Cancer Adult**		**Non-Cancer Child**		**Cancer**
RfCi (mg/m3):	8.00E-04	Ingestion:	1.65E-03	Ingestion:	1.76E-02	Ingestion:
SFO (mg/kg-day)-1:		Dermal:		Dermal:		Dermal:
IUR (µg/m3)-1:		Inhalation:	1.86E-02	Inhalation:	1.86E-02	Inhalation:
Mutagen:		**Total:**	**2.02E-02**	**Total:**	**3.62E-02**	**Total:** **0.00E+00**
VOC:	Y					

% Contribution to Media Hazard/Risk   6.72%   1.44%   0.00%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Analyte: Dibenz[a,h]anthracene

CAS: 53-70-3

		Calculated Hazard/Risk				
Concentration mg/kg :	1.98E-01					
RfDo (mg/kg-day):		**Non-Cancer Adult**		**Non-Cancer Child**		**Cancer**
RfCi (mg/m3):		Ingestion:		Ingestion:		Ingestion: 1.29E-06
SFO (mg/kg-day)-1:	1.00E+00	Dermal:		Dermal:		Dermal: 4.31E-07
IUR (µg/m3)-1:	6.00E-04	Inhalation:		Inhalation:		Inhalation: 8.62E-11
Mutagen:	Y	**Total:**	**0.00E+00**	**Total:**	**0.00E+00**	**Total: 1.72E-06**
VOC:						

% Contribution to Media Hazard/Risk   0.00%   0.00%   8.37%

	Exceeds Risk! mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*1.15E-01*

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

Soil

Analyte: Dimethylphenol, 2,4-

CAS: 105-67-9

		Calculated Hazard/Risk		
Concentration mg/kg :	2.00E-01			
RfDo (mg/kg-day):	2.00E-02	**Non-Cancer Adult**	**Non-Cancer Child**	**Cancer**
RfCi (mg/m3):		Ingestion: 1.20E-05	Ingestion: 1.28E-04	Ingestion:
SFO (mg/kg-day)-1:		Dermal: 5.06E-06	Dermal: 3.03E-05	Dermal:
IUR (µg/m3)-1:		Inhalation:	Inhalation:	Inhalation:
Mutagen:		**Total: 1.70E-05**	**Total: 1.58E-04**	**Total: 0.00E+00**
VOC:				

	% Contribution to Media Hazard/Risk	0.01%	0.01%	0.00%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Analyte: Ethylbenzene

CAS: 100-41-4

		Calculated Hazard/Risk		
Concentration mg/kg :	3.42E-01			
RfDo (mg/kg-day):	5.00E-02	**Non-Cancer Adult**	**Non-Cancer Child**	**Cancer**
RfCi (mg/m3):	1.00E+00	Ingestion: 8.20E-06	Ingestion: 8.75E-05	Ingestion: 5.41E-09
SFO (mg/kg-day)-1:	1.10E-02	Dermal:	Dermal:	Dermal:
IUR (µg/m3)-1:	2.50E-06	Inhalation: 5.78E-05	Inhalation: 5.78E-05	Inhalation: 5.37E-08
Mutagen:		**Total: 6.60E-05**	**Total: 1.45E-04**	**Total: 5.91E-08**
VOC:	Y			

	% Contribution to Media Hazard/Risk	0.02%	0.01%	0.29%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Analyte: Fluoranthene

CAS: 206-44-0

		Calculated Hazard/Risk		
Concentration mg/kg :	8.95E-01			
RfDo (mg/kg-day):	4.00E-02	**Non-Cancer Adult**	**Non-Cancer Child**	**Cancer**
RfCi (mg/m3):		Ingestion: 2.68E-05	Ingestion: 2.86E-04	Ingestion:
SFO (mg/kg-day)-1:		Dermal: 1.47E-05	Dermal: 8.83E-05	Dermal:
IUR (µg/m3)-1:		Inhalation:	Inhalation:	Inhalation:
Mutagen:		**Total: 4.15E-05**	**Total: 3.74E-04**	**Total: 0.00E+00**
VOC:				

	% Contribution to Media Hazard/Risk	0.01%	0.01%	0.00%

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

Soil

	mg/kg	*Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*	*N/A*

Analyte: Fluorene

CAS: 86-73-7

Concentration mg/kg :	2.30E-01
RfDo (mg/kg-day):	4.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (μg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	6.89E-06	Ingestion:	7.35E-05	Ingestion:	
Dermal:	3.78E-06	Dermal:	2.27E-05	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**1.07E-05**	**Total:**	**9.62E-05**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk	0.00%	0.00%	0.00%

	mg/kg	*Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*	*N/A*

Analyte: Indeno[1,2,3-cd]pyrene

CAS: 193-39-5

Concentration mg/kg :	2.82E-01
RfDo (mg/kg-day):	
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	1.00E-01
IUR (μg/m3)-1:	6.00E-05
Mutagen:	Y
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:		Ingestion:		Ingestion:	1.84E-07
Dermal:		Dermal:		Dermal:	6.14E-08
Inhalation:		Inhalation:		Inhalation:	1.23E-11
Total:	**0.00E+00**	**Total:**	**0.00E+00**	**Total:**	**2.46E-07**

% Contribution to Media Hazard/Risk	0.00%	0.00%	1.19%

	mg/kg	*Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*	*N/A*

Program: Voluntary Remediation Program (VRP)

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

Soil

Analyte: Iron

CAS: 7439-89-6

Concentration mg/kg :	6.57E+04
RfDo (mg/kg-day):	7.00E-01
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	1.12E-01	Ingestion:	1.20E+00	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**1.12E-01**	**Total:**	**1.20E+00**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk   37.38%   47.70%   0.00%

Exceeds Hazard!	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*5.48E+04*	*N/A*

Analyte: isopropyltoluene

CAS: 99-87-6

Concentration mg/kg :	9.93E-02
RfDo (mg/kg-day):	1.00E-01
RfCi (mg/m3):	4.00E-01
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	1.19E-06	Ingestion:	1.27E-05	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	2.48E-05	Inhalation:	2.48E-05	Inhalation:	
Total:	**2.60E-05**	**Total:**	**3.75E-05**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk   0.01%   0.00%   0.00%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Analyte: Lead and Compounds

CAS: 7439-92-1

Concentration mg/kg :	2.05E+01
RfDo (mg/kg-day):	
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:		Ingestion:		Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**0.00E+00**	**Total:**	**0.00E+00**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk   0.00%   0.00%   0.00%

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

Soil

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Analyte: **Manganese (Diet)**

CAS: **7439-96-5-Diet**

Concentration mg/kg :	5.16E+02
RfDo (mg/kg-day):	1.40E-01
RfCi (mg/m3):	5.00E-05
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	4.42E-03	Ingestion:	4.72E-02	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	7.28E-03	Inhalation:	7.28E-03	Inhalation:	
Total:	**1.17E-02**	**Total:**	**5.44E-02**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk	3.89%	2.16%	0.00%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Analyte: **Mercury (elemental)**

CAS: **7439-97-6**

Concentration mg/kg :	5.07E-02
RfDo (mg/kg-day):	
RfCi (mg/m3):	3.00E-04
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:		Ingestion:		Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	4.67E-03	Inhalation:	4.67E-03	Inhalation:	
Total:	**4.67E-03**	**Total:**	**4.67E-03**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk	1.55%	0.19%	0.00%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

Soil

Analyte: Methyl Ethyl Ketone (2-Butanone)

CAS: 78-93-3

Concentration mg/kg :	5.73E-01
RfDo (mg/kg-day):	6.00E-01
RfCi (mg/m3):	5.00E+00
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	1.14E-06	Ingestion:	1.22E-05	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	9.01E-06	Inhalation:	9.01E-06	Inhalation:	
Total:	**1.02E-05**	**Total:**	**2.12E-05**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk   0.00%   0.00%   0.00%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Analyte: Methylcyclohexane

CAS: 108-87-2

Concentration mg/kg :	7.39E+00
RfDo (mg/kg-day):	
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:		Ingestion:		Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**0.00E+00**	**Total:**	**0.00E+00**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk   0.00%   0.00%   0.00%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Analyte: Methylene Chloride

CAS: 75-09-2

Concentration mg/kg :	6.90E-04
RfDo (mg/kg-day):	6.00E-03
RfCi (mg/m3):	6.00E-01
SFO (mg/kg-day)-1:	2.00E-03
IUR (µg/m3)-1:	1.00E-08
Mutagen:	Y
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	1.38E-07	Ingestion:	1.47E-06	Ingestion:	9.01E-12
Dermal:		Dermal:		Dermal:	
Inhalation:	5.04E-07	Inhalation:	5.04E-07	Inhalation:	3.11E-12
Total:	**6.41E-07**	**Total:**	**1.97E-06**	**Total:**	**1.21E-11**

% Contribution to Media Hazard/Risk   0.00%   0.00%   0.00%

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

Soil

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	N/A	N/A	N/A

Analyte: Methylnaphthalene, 1-

CAS: 90-12-0

		Calculated Hazard/Risk					
Concentration mg/kg :	2.18E+00	**Non-Cancer Adult**		**Non-Cancer Child**		**Cancer**	
RfDo (mg/kg-day):	7.00E-02						
RfCi (mg/m3):		Ingestion:	3.73E-05	Ingestion:	3.98E-04	Ingestion:	9.09E-08
SFO (mg/kg-day)-1:	2.90E-02	Dermal:	2.05E-05	Dermal:	1.23E-04	Dermal:	3.32E-08
IUR (µg/m3)-1:		Inhalation:		Inhalation:		Inhalation:	
Mutagen:		**Total:**	**5.78E-05**	**Total:**	**5.21E-04**	**Total:**	**1.24E-07**
VOC:	Y						

% Contribution to Media Hazard/Risk   0.02%   0.02%   0.60%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	N/A	N/A	N/A

Analyte: Methylnaphthalene, 2-

CAS: 91-57-6

		Calculated Hazard/Risk					
Concentration mg/kg :	3.51E+00	**Non-Cancer Adult**		**Non-Cancer Child**		**Cancer**	
RfDo (mg/kg-day):	4.00E-03						
RfCi (mg/m3):		Ingestion:	1.05E-03	Ingestion:	1.12E-02	Ingestion:	
SFO (mg/kg-day)-1:		Dermal:	5.78E-04	Dermal:	3.46E-03	Dermal:	
IUR (µg/m3)-1:		Inhalation:		Inhalation:		Inhalation:	
Mutagen:		**Total:**	**1.63E-03**	**Total:**	**1.47E-02**	**Total:**	**0.00E+00**
VOC:	Y						

% Contribution to Media Hazard/Risk   0.54%   0.58%   0.00%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	N/A	N/A	N/A

Program: Voluntary Remediation Program (VRP)

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

Soil

Analyte: Naphthalene

CAS: 91-20-3

Concentration mg/kg :	2.05E+00
RfDo (mg/kg-day):	2.00E-02
RfCi (mg/m3):	3.00E-03
SFO (mg/kg-day)-1:	1.20E-01
IUR (µg/m3)-1:	3.40E-05
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	1.23E-04	Ingestion:	1.31E-03	Ingestion:	3.53E-07
Dermal:	6.73E-05	Dermal:	4.03E-04	Dermal:	1.29E-07
Inhalation:	1.41E-02	Inhalation:	1.41E-02	Inhalation:	5.35E-07
Total:	**1.43E-02**	**Total:**	**1.58E-02**	**Total:**	**1.02E-06**

% Contribution to Media Hazard/Risk   4.76%   0.63%   4.94%

Exceeds Risk!	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*2.01E+00*

Analyte: Nickel Soluble Salts

CAS: 7440-02-0

Concentration mg/kg :	1.11E+02
RfDo (mg/kg-day):	2.00E-02
RfCi (mg/m3):	9.00E-05
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	2.60E-04
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	6.65E-03	Ingestion:	7.09E-02	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	8.69E-04	Inhalation:	8.69E-04	Inhalation:	7.55E-09
Total:	**7.52E-03**	**Total:**	**7.18E-02**	**Total:**	**7.55E-09**

% Contribution to Media Hazard/Risk   2.50%   2.85%   0.04%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Analyte: Phenanthrene

CAS: 85-01-8

Concentration mg/kg :	1.70E+00
RfDo (mg/kg-day):	3.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	6.78E-05	Ingestion:	7.23E-04	Ingestion:	
Dermal:	3.72E-05	Dermal:	2.23E-04	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**1.05E-04**	**Total:**	**9.46E-04**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk   0.03%   0.04%   0.00%

Program: Voluntary Remediation Program (VRP)

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

Soil

	mg/kg	*Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*	*N/A*

Analyte: Pyrene

CAS: 129-00-0

Concentration mg/kg :	8.78E-01
RfDo (mg/kg-day):	3.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	3.51E-05	Ingestion:	3.74E-04	Ingestion:	
Dermal:	1.93E-05	Dermal:	1.15E-04	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**5.43E-05**	**Total:**	**4.90E-04**	**Total:**	**0.00E+00**

	% Contribution to Media Hazard/Risk	0.02%	0.02%	0.00%

	mg/kg	*Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*	*N/A*

Analyte: Toluene

CAS: 108-88-3

Concentration mg/kg :	2.07E+00
RfDo (mg/kg-day):	8.00E-02
RfCi (mg/m3):	5.00E+00
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	3.10E-05	Ingestion:	3.31E-04	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	9.26E-05	Inhalation:	9.26E-05	Inhalation:	
Total:	**1.24E-04**	**Total:**	**4.24E-04**	**Total:**	**0.00E+00**

	% Contribution to Media Hazard/Risk	0.04%	0.02%	0.00%

	mg/kg	*Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*	*N/A*

Program: Voluntary Remediation Program (VRP)

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

Soil

Analyte: Trimethylbenzene, 1,2,4-

CAS: 95-63-6

Concentration mg/kg :	1.47E+00
RfDo (mg/kg-day):	1.00E-02
RfCi (mg/m3):	6.00E-02
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	1.76E-04	Ingestion:	1.88E-03	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	2.96E-03	Inhalation:	2.96E-03	Inhalation:	
Total:	**3.14E-03**	**Total:**	**4.84E-03**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk   1.04%   0.19%   0.00%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Analyte: Trimethylbenzene, 1,3,5-

CAS: 108-67-8

Concentration mg/kg :	4.37E-01
RfDo (mg/kg-day):	1.00E-02
RfCi (mg/m3):	6.00E-02
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	5.24E-05	Ingestion:	5.59E-04	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	1.06E-03	Inhalation:	1.06E-03	Inhalation:	
Total:	**1.11E-03**	**Total:**	**1.62E-03**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk   0.37%   0.06%   0.00%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*	*N/A*

Analyte: Vanadium and Compounds

CAS: 7440-62-2

Concentration mg/kg :	4.04E+01
RfDo (mg/kg-day):	5.00E-03
RfCi (mg/m3):	1.00E-04
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	9.68E-03	Ingestion:	1.03E-01	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	2.85E-04	Inhalation:	2.85E-04	Inhalation:	
Total:	**9.96E-03**	**Total:**	**1.03E-01**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk   3.31%   4.11%   0.00%

Program: Voluntary Remediation Program (VRP)

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

Soil

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	N/A	N/A	N/A

Analyte: Xylenes

CAS: 1330-20-7

Concentration mg/kg :	6.50E+00		
RfDo (mg/kg-day):	2.00E-01		
RfCi (mg/m3):	1.00E-01		
SFO (mg/kg-day)-1:			
IUR (µg/m3)-1:			
Mutagen:			
VOC:	Y		

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	3.89E-05	Ingestion:	4.15E-04	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	1.09E-02	Inhalation:	1.09E-02	Inhalation:	
Total:	**1.09E-02**	**Total:**	**1.13E-02**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk   3.62%   0.45%   0.00%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	N/A	N/A	N/A

Analyte: Zinc and Compounds

CAS: 7440-66-6

Concentration mg/kg :	4.97E+01	
RfDo (mg/kg-day):	3.00E-01	
RfCi (mg/m3):		
SFO (mg/kg-day)-1:		
IUR (µg/m3)-1:		
Mutagen:		
VOC:		

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	1.98E-04	Ingestion:	2.12E-03	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**1.98E-04**	**Total:**	**2.12E-03**	**Total:**	**0.00E+00**

% Contribution to Media Hazard/Risk   0.07%   0.08%   0.00%

	mg/kg *Non-Cancer Adult*	*Non-Cancer Child*	*Cancer*
Recommended Acceptable Concentration	N/A	N/A	N/A

Total Calculated Hazard Index/Risk for Soil

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	2.26E-01	Ingestion:	2.41E+00	Ingestion:	1.63E-05
Dermal:	6.63E-03	Dermal:	3.97E-02	Dermal:	3.25E-06
Inhalation:	6.87E-02	Inhalation:	6.87E-02	Inhalation:	1.03E-06
Total:	**3.01E-01**	**Total:**	**2.52E+00**	**Total:**	**2.06E-05**

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

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Summary Report Follows

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

Report Summary

Hazard/risk values of zero (0.00+00) are reflective of non-calculated values. Hazard/risk for zero value analytes must be evaluated outside of quantitative risk assessment.

Hazard/Risk Summary for Soil

Analyte	CAS	Hazard Adult	Hazard Child	Risk
Acenaphthene	83-32-9	6.37E-06	5.74E-05	0.00E+00
Acenaphthylene	208-96-8	8.66E-06	7.81E-05	0.00E+00
Acetone	67-64-1	2.29E-06	2.44E-05	0.00E+00
Acetophenone	98-86-2	1.81E-06	1.93E-05	0.00E+00
Aluminum	7429-90-5	1.24E-02	1.19E-01	0.00E+00
Anthracene	120-12-7	1.57E-06	1.41E-05	0.00E+00
Antimony (metallic)	7440-36-0	4.03E-03	4.29E-02	0.00E+00
Arsenic, Inorganic	7440-38-2	2.60E-02	2.52E-01	1.30E-05
Barium	7440-39-3	5.38E-04	4.75E-03	0.00E+00
Benz[a]anthracene	56-55-3	0.00E+00	0.00E+00	4.26E-07
Benzene	71-43-2	4.66E-03	6.11E-03	4.32E-07
Benzo(g,h,i)perylene	191-24-2	1.53E-05	1.38E-04	0.00E+00
Benzo[a]pyrene	50-32-8	2.20E-03	1.89E-02	2.93E-06
Benzo[b]fluoranthene	205-99-2	0.00E+00	0.00E+00	5.79E-07
Benzo[k]fluoranthene	207-08-9	0.00E+00	0.00E+00	3.14E-08
Benzoic Acid	65-85-0	5.11E-07	4.75E-06	0.00E+00
Beryllium and compounds	7440-41-7	5.71E-04	5.79E-03	5.66E-10
Bis(2-ethylhexyl)phthalate	117-81-7	1.97E-05	1.83E-04	5.96E-09
Butylbenzene, n-	104-51-8	3.36E-06	3.58E-05	0.00E+00
Cadmium (Diet)	7440-43-9-Diet	4.69E-03	4.66E-02	1.57E-10
Carbazole	86-74-8	0.00E+00	0.00E+00	0.00E+00
Chromium(III), Insoluble Salts	16065-83-1	1.65E-04	1.76E-03	0.00E+00
Chrysene	218-01-9	0.00E+00	0.00E+00	6.02E-09
Cobalt	7440-48-4	4.27E-02	4.43E-01	2.44E-08
Copper	7440-50-8	4.64E-03	4.95E-02	0.00E+00
Cresol, o-	95-48-7	4.43E-06	4.11E-05	0.00E+00
Cresol, p-chloro-m-	59-50-7	2.03E-06	1.88E-05	0.00E+00
Cumene	98-82-8	6.69E-05	8.63E-05	0.00E+00
Cyanide (CN-)	57-12-5	2.02E-02	3.62E-02	0.00E+00
Dibenz[a,h]anthracene	53-70-3	0.00E+00	0.00E+00	1.72E-06
Dimethylphenol, 2,4-	105-67-9	1.70E-05	1.58E-04	0.00E+00
Ethylbenzene	100-41-4	6.60E-05	1.45E-04	5.91E-08

Program: Voluntary Remediation Program (VRP)

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

Hazard/Risk Summary for Soil

Analyte	CAS	Hazard Adult	Hazard Child	Risk
Fluoranthene	206-44-0	4.15E-05	3.74E-04	0.00E+00
Fluorene	86-73-7	1.07E-05	9.62E-05	0.00E+00
Indeno[1,2,3-cd]pyrene	193-39-5	0.00E+00	0.00E+00	2.46E-07
Iron	7439-89-6	1.12E-01	1.20E+00	0.00E+00
isopropyltoluene	99-87-6	2.60E-05	3.75E-05	0.00E+00
Lead and Compounds	7439-92-1	0.00E+00	0.00E+00	0.00E+00
Manganese (Diet)	7439-96-5-Diet	1.17E-02	5.44E-02	0.00E+00
Mercury (elemental)	7439-97-6	4.67E-03	4.67E-03	0.00E+00
Methyl Ethyl Ketone (2-Butanone)	78-93-3	1.02E-05	2.12E-05	0.00E+00
Methylcyclohexane	108-87-2	0.00E+00	0.00E+00	0.00E+00
Methylene Chloride	75-09-2	6.41E-07	1.97E-06	1.21E-11
Methylnaphthalene, 1-	90-12-0	5.78E-05	5.21E-04	1.24E-07
Methylnaphthalene, 2-	91-57-6	1.63E-03	1.47E-02	0.00E+00
Naphthalene	91-20-3	1.43E-02	1.58E-02	1.02E-06
Nickel Soluble Salts	7440-02-0	7.52E-03	7.18E-02	7.55E-09
Phenanthrene	85-01-8	1.05E-04	9.46E-04	0.00E+00
Pyrene	129-00-0	5.43E-05	4.90E-04	0.00E+00
Toluene	108-88-3	1.24E-04	4.24E-04	0.00E+00
Trimethylbenzene, 1,2,4-	95-63-6	3.14E-03	4.84E-03	0.00E+00
Trimethylbenzene, 1,3,5-	108-67-8	1.11E-03	1.62E-03	0.00E+00
Vanadium and Compounds	7440-62-2	9.96E-03	1.03E-01	0.00E+00
Xylenes	1330-20-7	1.09E-02	1.13E-02	0.00E+00
Zinc and Compounds	7440-66-6	1.98E-04	2.12E-03	0.00E+00

Total Hazard Index/Risk for All Media

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	2.26E-01	Ingestion:	2.41E+00	Ingestion:	1.63E-05
Dermal:	6.63E-03	Dermal:	3.97E-02	Dermal:	3.25E-06
Inhalation:	6.87E-02	Inhalation:	6.87E-02	Inhalation:	1.03E-06
Total:	**3.01E-01**	**Total:**	**2.52E+00**	**Total:**	**2.06E-05**

does not exceed hazard index	*Exceeds Hazard Index!*	*does not exceed cumulative risk*

Site Name: Alexandria

Program: Voluntary Remediation Program (VRP)

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

Residential Exposure Default Values

Symbol	Description	Value	Units
AF0-02	Soil Adherence Factor - age segment 0-2	0.2	(mg/cm2)
AF02-06	Soil Adherence Factor - age segment 2-6	0.2	(mg/cm2)
AF06-16	Soil Adherence Factor - age segment 6-16	0.07	(mg/cm2)
AF16-26	Soil Adherence Factor - age segment 16-26	0.07	(mg/cm2)
AFres-a	Resident Soil Adherence Factor - adult	0.07	(mg/cm2)
AFres-c	Resident Soil Adherence Factor - child	0.2	(mg/cm2)
ATr	Resident Averaging Time	365	(days/yr)
ATres	Resident Averaging Time: 365 x LT	25550	(days)
ATres-a	Resident Averaging Time - adult: 365 x EDres	9490	(days)
ATres-c	Resident Averaging Time - child: 365 x EDres-c	2190	(days)
BW0-02	Body Weight - age segment 0-2	15	(kg)
BW02-06	Body Weight - age segment 2-6	15	(kg)
BW06-16	Body Weight - age segment 6-16	80	(kg)
BW16-26	Body Weight - age segment 16-26	80	(kg)
BWres-a	Resident Body Weight - adult	80	(kg)
BWres-c	Resident Body Weight - child	15	(kg)
DFSMres-adj	Resident Soil Mutagenic Dermal Contact Factor - age adjusted	428260	(mg/kg)
DFSres-adj	Resident Soil Dermal Contact Factor - age adjusted	103390	(mg/kg)
DFWMres-adj	Resident Groundwater Mutagenic Dermal Contact Factor - age adjusted	8191633.33333333	(cm2-event/kg)
DFWres-adj	Resident Groundwater Dermal Contact Factor - age adjusted	2610650	(cm2-event/kg)
ED0-02	Exposure Duration - age segment 0-2	2	(yrs)
ED02-06	Exposure Duration - age segment 2-6	4	(yrs)
ED06-16	Exposure Duration -age segment 6-16	10	(yrs)
ED16-26	Exposure Duration -age segment 16-26	10	(yrs)

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

EDres	Resident Total Exposure Duration	26	(yrs)
EDres-a	Resident Exposure Duration - adult	20	(yrs)
EDres-c	Resident Exposure Duration - child	6	(yrs)
EFres	Resident Exposure Frequency	350	(days/yr)
EFres0-02	Resident Exposure Frequency - age segment 0-2	350	(days/yr)
EFres02-06	Resident Exposure Frequency - age segment 2-6	350	(days/yr)
EFres06-16	Resident Exposure Frequency - age segment 6-16	350	(days/yr)
EFres16-26	Resident Exposure Frequency - age segment 16-26	350	(days/yr)
EFres-a	Resident Exposure Frequency - adult	350	(days/yr)
EFres-c	Resident Exposure Frequency - child	350	(days/yr)
ETevent-res(0-02)	Resident Water Exposure Time - age segment 0-2	0.54	(hrs/event)
ETevent-res(02-06)	Resident Water Exposure Time - age segment 2-6	0.54	(hrs/event)
ETevent-res(06-16)	Resident Water Exposure Time - age segment 6-16	0.71	(hrs/event)
ETevent-res(16-26)	Resident Water Exposure Time - age segment 16-26	0.71	(hrs/event)
ETevent-res-a	Resident Groundwater Exposure Time -adult	0.71	(hrs/event)
ETevent-res-adj	Resident Water Exposure Time -age adjusted	0.670769230769231	(hrs/event)
ETevent-res-c	Resident Groundwater Exposure Time - child	0.54	(hrs/event)
ETevent-res-madj	Resident Water Exposure Time - mutagen age adjusted	0.670769230769231	(hrs/event)
ETrai	Resident Air Inhalation Exposure Time	24	(hrs/day)
ETres	Resident Soil Exposure Time	24	(hrs/day)
ETres0-02	Resident Exposure Time - age segment 0-2	24	(hrs/day)
ETres02-06	Resident Exposure Time - age segment 2-6	24	(hrs/day)
ETres06-16	Resident Exposure Time - age segment 6-16	24	(hrs/day)
ETres16-26	Resident Exposure Time - age segment 16-26	24	(hrs/day)
ETres-a	Resident Exposure Time - adult	24	(hrs/day)
ETres-c	Resident Exposure Time - child	24	(hrs/day)

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

ETres-gwi	Resident Groundwater Inhalation Exposure Time	24	(hrs/day)
EVres-a	Resident Groundwater Events - adult	1	(events/day)
EVres-c	Resident Groundwater Events - child	1	(events/day)
IFSMres-adj	Resident Mutagenic Soil Ingestion Rate - age adjusted	166833.333333333	(mg/kg)
IFSres-adj	Resident Soil Ingestion Rate - age adjusted	36750	(mg/kg)
IFWMres-adj	Resident Mutagenic Drinking Groundwater Ingestion Rate - age adjusted	1019.9	(L/kg)
IFWres-adj	Resident Drinking Groundwater Ingestion Rate - age adjusted	327.95	(L/kg)
INHMres-ai-adj	Resident Air Inhalation Exposure Duration Mutagen - age adjusted	604800	(hrs)
INHMres-gw-adj	Resident Groundwater Inhalation Exposure Duration Mutagen - age adjusted	25200	(days)
INHMres-s-adj	Resident Soil Inhalation Exposure Duration Mutagen - age adjusted	25200	(days)
IREres-a	Resident Food Eggs Ingestion Rate - Virginia DEQ	150000	(mg/day)
IRFres-a	Resident Food Fish/Shellfish Ingestion Rate - Exposure Defaults Handbook	54000	(mg/day)
IRFVres-a	Resident Food Fruit/Vegetables Ingestion Rate - Exposure Defaults Handbook	122000	(mg/day)
IRMDres-a	Resident Food Meat/Dairy - Virginia DEQ	280000	(mg/day)
IRS0-02	Soil/Sediment Ingestion Rate - age segment 0-2	200	(mg/day)
IRS02-06	Soil/Sediment Ingestion Rate - age segment 2-6	200	(mg/day)
IRS06-16	Soil/Sediment Ingestion Rate - age segment 6-16	100	(mg/day)
IRS16-26	Soil/Sediment Ingestion Rate - age segment 16-26	100	(mg/day)
IRSres-a	Resident Soil Ingestion Rate - adult	100	(mg/day)
IRSres-c	Resident Soil Ingestion Rate - child	200	(mg/day)
IRW0-02	Drinking Water Ingestion Rate - age segment 0-2	0.78	(L/day)
IRW02-06	Drinking Water Ingestion Rate - age segment 2-6	0.78	(L/day)
IRW06-16	Drinking Water Ingestion Rate - age segment 6-16	2.5	(L/day)
IRW16-26	Drinking Water Ingestion Rate - age segment 16-26	2.5	(L/day)
IRWres-a	Resident Drinking Groundwater Ingestion Rate - adult	2.5	(L/day)
IRWres-c	Resident Drinking Groundwater Ingestion Rate - child	0.78	(L/day)

Site Name: Alexandria

Program: Voluntary Remediation Program (VRP)

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk (All Chemicals)
1	1.00E-06	1.00E-04

SAres-a	Resident Soil Surface Area - adult	6032	(cm2/day)
SAres-a	Resident Water Surface Area - adult	19652	(cm2)
SAres-c	Resident Water Surface Area - child	6365	(cm2)
SAres-c	Resident Soil Surface Area - child	2373	(cm2/day)
SAs0-02	Surface Area Soil/Sediment - age segment 0-2	2373	(cm2/day)
SAs02-06	Surface Area Soil/Sediment - age segment 2-6	2373	(cm2/day)
SAs06-16	Surface Area Soil/Sediment - age segment 6-16	6032	(cm2/day)
SAs16-26	Surface Area Soil/Sediment - age segment 16-26	6032	(cm2/day)
SAw0-02	Surface Area Water - age segment 0-2	6365	(cm2)
SAw02-06	Surface Area Water - age segment 2-6	6365	(cm2)
SAw06-16	Surface Area Water - age segment 6- 16	19652	(cm2)
SAw16-26	Surface Area Water - age segment 16- 26	19652	(cm2)

END OF REPORT

ATTACHMENT 3-2
CONSTRUCTION WORKER

Virginia Department of Environmental Quality

VURAM

Virginia Unified Risk Assessment Model

VERSION: 3.2.1

Construction Worker Quantitative Risk Assessment Report

Site Name: Alexandria

Program: Voluntary Remediation Program

Contact Depth to Groundwater: Direct Less than 15ft

By submitting this report to the Virginia DEQ, the user confirms that VURAM's default exposure parameters have not been altered, unless a complete unaltered VURAM analysis is provided and all modifications are detailed explicitly in an accompanying narrative or documentation that shows DEQ's prior concurrence with specific changes.

Chemical Specific Notes displayed as applicable

Lead

VURAM does not perform an evaluation for lead exposure. Use other approved models for lead modeling.

All Report Pages are Required for Risk Assessment Submission

Risk Based Performance Criteria

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Soil

Analyte: **Acenaphthene**

CAS: **83-32-9**

Concentration mg/kg:	2.06E-01
RfDo:	2.00E-01
RfCi:	
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Cancer	
Ingestion:	1.52E-06	Ingestion:	
Dermal:	6.32E-07	Dermal:	
Inhalation:		Inhalation:	
Total:	**2.15E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Analyte: **Acenaphthylene**

CAS: **208-96-8**

Concentration mg/kg:	1.40E-01
RfDo:	3.00E-01
RfCi:	
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Cancer	
Ingestion:	6.87E-07	Ingestion:	
Dermal:	2.87E-07	Dermal:	
Inhalation:		Inhalation:	
Total:	**9.74E-07**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Analyte: **Acetone**

CAS: **67-64-1**

Concentration mg/kg:	1.72E+00
RfDo:	1.00E+00
RfCi:	3.09E+01
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Cancer	
Ingestion:	2.53E-06	Ingestion:	
Dermal:		Dermal:	
Inhalation:	5.24E-12	Inhalation:	
Total:	**2.53E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Soil

Analyte: **Acetophenone**

CAS: **98-86-2**

Concentration mg/kg:	1.51E-01
RfDo:	8.00E-01
RfCi:	
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Cancer	
Ingestion:	2.78E-07	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**2.78E-07**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Analyte: **Aluminum**

CAS: **7429-90-5**

Concentration mg/kg:	9.23E+03
RfDo:	1.00E+00
RfCi:	5.00E-03
SFO:	
IUR:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Cancer	
Ingestion:	1.36E-02	Ingestion:	
Dermal:		Dermal:	
Inhalation:	1.73E-04	Inhalation:	
Total:	**1.38E-02**	**Total:**	**0.00E+00**

% Contribution to Media Risk   5.66%   0.00%

Analyte: **Anthracene**

CAS: **120-12-7**

Concentration mg/kg:	2.53E-01
RfDo:	1.00E+00
RfCi:	1.00E-02
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Cancer	
Ingestion:	3.73E-07	Ingestion:	
Dermal:	1.55E-07	Dermal:	
Inhalation:	2.38E-09	Inhalation:	
Total:	**5.30E-07**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Program: **Voluntary Remediation Program**

<u>Risk Based Performance Criteria</u>

Default Hazard Index   Default Risk Individual Chemical   Default Cumulative Risk-All Chemicals
            1   1.00E-06   1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Soil

Analyte: **Antimony (metallic)**

CAS: **7440-36-0**

Concentration mg/kg:	1.34E+00
RfDo:	4.00E-04
RfCi:	1.00E-03
SFO:	
IUR:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	4.95E-03	Ingestion:	
Dermal:		Dermal:	
Inhalation:	1.26E-07	Inhalation:	
Total:	**4.95E-03**	**Total:**	**0.00E+00**

% Contribution to Media Risk   2.03%   0.00%

Analyte: **Arsenic, Inorganic**

CAS: **7440-38-2**

Concentration mg/kg:	8.80E+00
RfDo:	3.00E-04
RfCi:	1.50E-05
SFO:	1.50E+00
IUR:	4.30E-03
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	2.59E-02	Ingestion:	2.66E-07
Dermal:	4.16E-03	Dermal:	2.56E-08
Inhalation:	5.51E-05	Inhalation:	4.87E-11
Total:	**3.01E-02**	**Total:**	**2.92E-07**

% Contribution to Media Risk   12.38%   90.91%

Analyte: **Barium**

CAS: **7440-39-3**

Concentration mg/kg:	7.27E+01
RfDo:	2.00E-01
RfCi:	5.00E-03
SFO:	
IUR:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	5.36E-04	Ingestion:	
Dermal:		Dermal:	
Inhalation:	1.37E-06	Inhalation:	
Total:	**5.37E-04**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.22%   0.00%

<u>Risk Based Performance Criteria</u>

Default Hazard Index   Default Risk Individual Chemical   Default Cumulative Risk-All Chemicals

1   1.00E-06   1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Soil

Analyte: **Benz[a]anthracene**

CAS: **56-55-3**

Concentration mg/kg:	4.82E-01
RfDo:	
RfCi:	
SFO:	1.00E-01
IUR:	6.00E-05
Mutagen:	Y
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:		Ingestion:	9.73E-10
Dermal:		Dermal:	4.05E-10
Inhalation:		Inhalation:	3.72E-14
Total:	**0.00E+00**	**Total:**	**1.38E-09**

% Contribution to Media Risk   0.00%   0.43%

Analyte: **Benzene**

CAS: **71-43-2**

Concentration mg/kg:	5.00E-01
RfDo:	1.00E-02
RfCi:	8.00E-02
SFO:	5.50E-02
IUR:	7.80E-06
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	7.37E-05	Ingestion:	5.55E-10
Dermal:		Dermal:	
Inhalation:	5.87E-10	Inhalation:	5.02E-15
Total:	**7.37E-05**	**Total:**	**5.55E-10**

% Contribution to Media Risk   0.03%   0.17%

Analyte: **Benzo(g,h,i)perylene**

CAS: **191-24-2**

Concentration mg/kg:	2.47E-01
RfDo:	3.00E-01
RfCi:	
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	1.21E-06	Ingestion:	
Dermal:	5.06E-07	Dermal:	
Inhalation:		Inhalation:	
Total:	**1.72E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

<u>Risk Based Performance Criteria</u>

Default Hazard Index   Default Risk Individual Chemical   Default Cumulative Risk-All Chemicals
1   1.00E-06   1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Soil

Analyte: **Benzo[a]pyrene**
CAS: **50-32-8**

Concentration mg/kg:	3.36E-01
RfDo:	3.00E-04
RfCi:	2.00E-06
SFO:	1.00E+00
IUR:	6.00E-04
Mutagen:	Y
VOC:	

Calculated Hazard/Risk

	Non-Cancer Adult			**Cancer**
Ingestion:	1.65E-03		Ingestion:	6.78E-09
Dermal:	6.88E-04		Dermal:	2.83E-09
Inhalation:	1.58E-05		Inhalation:	2.60E-13
Total:	**2.35E-03**		**Total:**	**9.61E-09**

% Contribution to Media Risk   0.97%   2.99%

Analyte: **Benzo[b]fluoranthene**
CAS: **205-99-2**

Concentration mg/kg:	6.65E-01
RfDo:	
RfCi:	
SFO:	1.00E-01
IUR:	6.00E-05
Mutagen:	Y
VOC:	

Calculated Hazard/Risk

	Non-Cancer Adult			**Cancer**
Ingestion:			Ingestion:	1.34E-09
Dermal:			Dermal:	5.59E-10
Inhalation:			Inhalation:	5.14E-14
Total:	**0.00E+00**		**Total:**	**1.90E-09**

% Contribution to Media Risk   0.00%   0.59%

Analyte: **Benzo[k]fluoranthene**
CAS: **207-08-9**

Concentration mg/kg:	3.61E-01
RfDo:	
RfCi:	
SFO:	1.00E-02
IUR:	6.00E-06
Mutagen:	Y
VOC:	

Calculated Hazard/Risk

	Non-Cancer Adult			**Cancer**
Ingestion:			Ingestion:	7.29E-11
Dermal:			Dermal:	3.04E-11
Inhalation:			Inhalation:	2.79E-15
Total:	**0.00E+00**		**Total:**	**1.03E-10**

% Contribution to Media Risk   0.00%   0.03%

Program: **Voluntary Remediation Program**

Risk Based Performance Criteria

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Soil

Analyte: **Benzoic Acid**

CAS: **65-85-0**

		Calculated Hazard/Risk		
Concentration mg/kg:	1.20E+00			
RfDo:	4.00E+00	**Non-Cancer Adult**		**Cancer**
RfCi:	2.00E-03	Ingestion: 4.42E-07		Ingestion:
SFO:		Dermal: 1.42E-07		Dermal:
IUR:		Inhalation: 5.64E-08		Inhalation:
Mutagen:		**Total:** **6.40E-07**		**Total:** **0.00E+00**
VOC:				

% Contribution to Media Risk   0.00%   0.00%

Analyte: **Beryllium and compounds**

CAS: **7440-41-7**

		Calculated Hazard/Risk		
Concentration mg/kg:	9.00E-01			
RfDo:	5.00E-03	**Non-Cancer Adult**		**Cancer**
RfCi:	2.00E-05	Ingestion: 2.65E-04		Ingestion:
SFO:		Dermal:		Dermal:
IUR:	2.40E-03	Inhalation: 4.23E-06		Inhalation: 2.78E-12
Mutagen:		**Total:** **2.69E-04**		**Total:** **2.78E-12**
VOC:				

% Contribution to Media Risk   0.11%   0.00%

Analyte: **Bis(2-ethylhexyl)phthalate**

CAS: **117-81-7**

		Calculated Hazard/Risk		
Concentration mg/kg:	2.31E-01			
RfDo:	2.00E-02	**Non-Cancer Adult**		**Cancer**
RfCi:	1.17E-01	Ingestion: 1.70E-05		Ingestion: 6.53E-11
SFO:	1.40E-02	Dermal: 5.46E-06		Dermal: 2.09E-11
IUR:	2.40E-06	Inhalation: 1.86E-10		Inhalation: 7.14E-16
Mutagen:		**Total:** **2.25E-05**		**Total:** **8.62E-11**
VOC:				

% Contribution to Media Risk   0.01%   0.03%

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Soil

Analyte: **Butylbenzene, n-**

CAS: **104-51-8**

Concentration mg/kg:	1.40E-01
RfDo:	1.00E-01
RfCi:	
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	2.06E-06	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**2.06E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Analyte: **Cadmium (Diet)**

CAS: **7440-43-9-Diet**

Concentration mg/kg:	3.33E-01
RfDo:	5.00E-04
RfCi:	1.00E-05
SFO:	
IUR:	1.80E-03
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	9.81E-04	Ingestion:	
Dermal:	1.26E-04	Dermal:	
Inhalation:	3.13E-06	Inhalation:	7.72E-13
Total:	**1.11E-03**	**Total:**	**7.72E-13**

% Contribution to Media Risk   0.46%   0.00%

Analyte: **Carbazole**

CAS: **86-74-8**

Concentration mg/kg:	2.42E-01
RfDo:	
RfCi:	
SFO:	
IUR:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:		Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**0.00E+00**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Site Name: Alexandria
Program: Voluntary Remediation Program

<u>Risk Based Performance Criteria</u>

Default Hazard Index   Default Risk Individual Chemical   Default Cumulative Risk-All Chemicals
1   1.00E-06   1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Soil

Analyte: Chromium(III), Insoluble Salts
CAS: 16065-83-1

Concentration mg/kg:	2.06E+02
RfDo:	1.50E+00
RfCi:	5.00E-03
SFO:	
IUR:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	2.02E-04	Ingestion:	
Dermal:		Dermal:	
Inhalation:	3.87E-06	Inhalation:	
Total:	**2.06E-04**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.08%   0.00%

Analyte: Chrysene
CAS: 218-01-9

Concentration mg/kg:	6.91E-01
RfDo:	1.50E+00
RfCi:	5.00E-03
SFO:	1.00E-03
IUR:	6.00E-07
Mutagen:	Y
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	6.79E-07	Ingestion:	1.39E-11
Dermal:	2.83E-07	Dermal:	5.81E-12
Inhalation:	1.30E-08	Inhalation:	5.34E-16
Total:	**9.75E-07**	**Total:**	**1.98E-11**

% Contribution to Media Risk   0.00%   0.01%

Analyte: Cobalt
CAS: 7440-48-4

Concentration mg/kg:	1.04E+01
RfDo:	3.00E-03
RfCi:	2.00E-05
SFO:	
IUR:	9.00E-03
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	5.09E-03	Ingestion:	
Dermal:		Dermal:	
Inhalation:	4.87E-05	Inhalation:	1.20E-10
Total:	**5.14E-03**	**Total:**	**1.20E-10**

% Contribution to Media Risk   2.11%   0.04%

Program: **Voluntary Remediation Program**

<u>Risk Based Performance Criteria</u>

Default Hazard Index   Default Risk Individual Chemical   Default Cumulative Risk-All Chemicals

1   1.00E-06   1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Soil

Analyte: **Copper**

CAS: **7440-50-8**

Concentration mg/kg:	1.55E+02
RfDo:	1.00E-02
RfCi:	
SFO:	
IUR:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Cancer	
Ingestion:	2.28E-02	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**2.28E-02**	**Total:**	**0.00E+00**

% Contribution to Media Risk   9.38%   0.00%

Analyte: **Cresol, o-**

CAS: **95-48-7**

Concentration mg/kg:	1.30E-01
RfDo:	2.00E-01
RfCi:	6.00E-01
SFO:	
IUR:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Cancer	
Ingestion:	9.58E-07	Ingestion:	
Dermal:	3.07E-07	Dermal:	
Inhalation:	2.04E-11	Inhalation:	
Total:	**1.26E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Analyte: **Cresol, p-chloro-m-**

CAS: **59-50-7**

Concentration mg/kg:	1.19E-01
RfDo:	1.00E-01
RfCi:	
SFO:	
IUR:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Cancer	
Ingestion:	1.75E-06	Ingestion:	
Dermal:	5.62E-07	Dermal:	
Inhalation:		Inhalation:	
Total:	**2.32E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Risk Based Performance Criteria

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Soil

Analyte: **Cumene**
CAS: **98-82-8**

Concentration mg/kg:	1.68E-01
RfDo:	4.00E-01
RfCi:	9.00E-02
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Cancer	
Ingestion:	6.19E-07	Ingestion:	
Dermal:		Dermal:	
Inhalation:	1.75E-10	Inhalation:	
Total:	**6.19E-07**	**Total:**	**0.00E+00**

% Contribution to Media Risk 0.00% 0.00%

Analyte: **Cyanide (CN-)**
CAS: **57-12-5**

Concentration mg/kg:	8.26E-01
RfDo:	2.00E-02
RfCi:	8.00E-04
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Cancer	
Ingestion:	6.08E-05	Ingestion:	
Dermal:		Dermal:	
Inhalation:	5.85E-04	Inhalation:	
Total:	**6.46E-04**	**Total:**	**0.00E+00**

% Contribution to Media Risk 0.27% 0.00%

Analyte: **Dibenz[a,h]anthracene**
CAS: **53-70-3**

Concentration mg/kg:	1.98E-01
RfDo:	
RfCi:	
SFO:	1.00E+00
IUR:	6.00E-04
Mutagen:	Y
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Cancer	
Ingestion:		Ingestion:	4.00E-09
Dermal:		Dermal:	1.67E-09
Inhalation:		Inhalation:	1.53E-13
Total:	**0.00E+00**	**Total:**	**5.66E-09**

% Contribution to Media Risk 0.00% 1.76%

<u>Risk Based Performance Criteria</u>

Default Hazard Index   Default Risk Individual Chemical   Default Cumulative Risk-All Chemicals

1   1.00E-06   1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Soil

Analyte: **Dimethylphenol, 2,4-**

CAS: **105-67-9**

		Calculated Hazard/Risk	
Concentration mg/kg:	2.00E-01		
RfDo:	5.00E-02	**Non-Cancer Adult**	**Cancer**
RfCi:		Ingestion: 5.89E-06	Ingestion:
SFO:		Dermal: 1.89E-06	Dermal:
IUR:		Inhalation:	Inhalation:
Mutagen:		**Total: 7.78E-06**	**Total: 0.00E+00**
VOC:			

% Contribution to Media Risk   0.00%   0.00%

Analyte: **Ethylbenzene**

CAS: **100-41-4**

		Calculated Hazard/Risk	
Concentration mg/kg:	3.42E-01		
RfDo:	5.00E-02	**Non-Cancer Adult**	**Cancer**
RfCi:	9.00E+00	Ingestion: 1.01E-05	Ingestion: 7.59E-11
SFO:	1.10E-02	Dermal:	Dermal:
IUR:	2.50E-06	Inhalation: 3.57E-12	Inhalation: 1.10E-15
Mutagen:		**Total: 1.01E-05**	**Total: 7.59E-11**
VOC:	Y		

% Contribution to Media Risk   0.00%   0.02%

Analyte: **Fluoranthene**

CAS: **206-44-0**

		Calculated Hazard/Risk	
Concentration mg/kg:	8.95E-01		
RfDo:	1.00E-01	**Non-Cancer Adult**	**Cancer**
RfCi:		Ingestion: 1.32E-05	Ingestion:
SFO:		Dermal: 5.50E-06	Dermal:
IUR:		Inhalation:	Inhalation:
Mutagen:		**Total: 1.87E-05**	**Total: 0.00E+00**
VOC:			

% Contribution to Media Risk   0.01%   0.00%

Site Name: **Alexandria**
Program: **Voluntary Remediation Program**

Risk Based Performance Criteria

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Soil

Analyte: **Fluorene**
CAS: **86-73-7**

Concentration mg/kg:	2.30E-01
RfDo:	4.00E-01
RfCi:	
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Cancer	
Ingestion:	8.47E-07	Ingestion:	
Dermal:	3.53E-07	Dermal:	
Inhalation:		Inhalation:	
Total:	**1.20E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Analyte: **Indeno[1,2,3-cd]pyrene**
CAS: **193-39-5**

Concentration mg/kg:	2.82E-01
RfDo:	4.00E-01
RfCi:	
SFO:	1.00E-01
IUR:	6.00E-05
Mutagen:	Y
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Cancer	
Ingestion:	1.04E-06	Ingestion:	5.69E-10
Dermal:	4.33E-07	Dermal:	2.37E-10
Inhalation:		Inhalation:	2.18E-14
Total:	**1.47E-06**	**Total:**	**8.06E-10**

% Contribution to Media Risk   0.00%   0.25%

Analyte: **Iron**
CAS: **7439-89-6**

Concentration mg/kg:	6.57E+04
RfDo:	7.00E-01
RfCi:	
SFO:	
IUR:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Cancer	
Ingestion:	1.38E-01	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**1.38E-01**	**Total:**	**0.00E+00**

% Contribution to Media Risk   56.81%   0.00%

Site Name: **Alexandria**
Program: **Voluntary Remediation Program**

<u>Risk Based Performance Criteria</u>

Default Hazard Index | Default Risk Individual Chemical | Default Cumulative Risk-All Chemicals
1 | 1.00E-06 | 1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Soil

Analyte: **isopropyltoluene**
CAS: **99-87-6**

		Calculated Hazard/Risk	
Concentration mg/kg:	9.93E-02	**Non-Cancer Adult**	**Cancer**
RfDo:	4.00E-01		
RfCi:	9.00E-02	Ingestion: 3.66E-07	Ingestion:
SFO:		Dermal:	Dermal:
IUR:		Inhalation: 5.05E-06	Inhalation:
Mutagen:		**Total:** **5.42E-06**	**Total:** **0.00E+00**
VOC:	Y		

% Contribution to Media Risk | 0.00% | 0.00%

Analyte: **Lead and Compounds**
CAS: **7439-92-1**

		Calculated Hazard/Risk	
Concentration mg/kg:	2.05E+01	**Non-Cancer Adult**	**Cancer**
RfDo:			
RfCi:		Ingestion:	Ingestion:
SFO:		Dermal:	Dermal:
IUR:		Inhalation:	Inhalation:
Mutagen:		**Total:** **0.00E+00**	**Total:** **0.00E+00**
VOC:			

% Contribution to Media Risk | 0.00% | 0.00%

Analyte: **Manganese (Diet)**
CAS: **7439-96-5-Diet**

		Calculated Hazard/Risk	
Concentration mg/kg:	5.16E+02	**Non-Cancer Adult**	**Cancer**
RfDo:	1.40E-01		
RfCi:	5.00E-05	Ingestion: 5.43E-03	Ingestion:
SFO:		Dermal:	Dermal:
IUR:		Inhalation: 9.71E-04	Inhalation:
Mutagen:		**Total:** **6.40E-03**	**Total:** **0.00E+00**
VOC:			

% Contribution to Media Risk | 2.63% | 0.00%

<u>Risk Based Performance Criteria</u>

Default Hazard Index   Default Risk Individual Chemical   Default Cumulative Risk-All Chemicals

1   1.00E-06   1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Soil

Analyte: **Mercury (elemental)**

CAS: **7439-97-6**

		Calculated Hazard/Risk	
Concentration mg/kg:	5.07E-02		
RfDo:		**Non-Cancer Adult**	**Cancer**
RfCi:	3.00E-04	Ingestion:	Ingestion:
SFO:		Dermal:	Dermal:
IUR:		Inhalation: 1.25E-04	Inhalation:
Mutagen:		**Total:** **1.25E-04**	**Total:** **0.00E+00**
VOC:	Y		

% Contribution to Media Risk   0.05%   0.00%

Analyte: **Methyl Ethyl Ketone (2-Butanone)**

CAS: **78-93-3**

		Calculated Hazard/Risk	
Concentration mg/kg:	5.73E-01		
RfDo:	2.00E+00	**Non-Cancer Adult**	**Cancer**
RfCi:	1.00E+00	Ingestion: 4.22E-07	Ingestion:
SFO:		Dermal:	Dermal:
IUR:		Inhalation: 5.39E-11	Inhalation:
Mutagen:		**Total:** **4.22E-07**	**Total:** **0.00E+00**
VOC:	Y		

% Contribution to Media Risk   0.00%   0.00%

Analyte: **Methylcyclohexane**

CAS: **108-87-2**

		Calculated Hazard/Risk	
Concentration mg/kg:	7.39E+00		
RfDo:		**Non-Cancer Adult**	**Cancer**
RfCi:		Ingestion:	Ingestion:
SFO:		Dermal:	Dermal:
IUR:		Inhalation:	Inhalation:
Mutagen:		**Total:** **0.00E+00**	**Total:** **0.00E+00**
VOC:			

% Contribution to Media Risk   0.00%   0.00%

Program: **Voluntary Remediation Program**

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Soil

Analyte: **Methylene Chloride**

CAS: **75-09-2**

		Calculated Hazard/Risk	
Concentration mg/kg:	6.90E-04		
RfDo:	6.00E-02	**Non-Cancer Adult**	**Cancer**
RfCi:	1.04E+00	Ingestion: 1.69E-08	Ingestion: 2.78E-14
SFO:	2.00E-03	Dermal:	Dermal:
IUR:	1.00E-08	Inhalation: 6.22E-14	Inhalation: 8.88E-21
Mutagen:	Y	**Total: 1.69E-08**	**Total: 2.78E-14**
VOC:	Y		

% Contribution to Media Risk   0.00%   0.00%

Analyte: **Methylnaphthalene, 1-**

CAS: **90-12-0**

		Calculated Hazard/Risk	
Concentration mg/kg:	2.18E+00		
RfDo:	7.00E-02	**Non-Cancer Adult**	**Cancer**
RfCi:	1.04E+00	Ingestion: 4.59E-05	Ingestion: 1.28E-09
SFO:	2.90E-02	Dermal: 1.91E-05	Dermal: 5.32E-10
IUR:		Inhalation: 1.97E-10	Inhalation:
Mutagen:		**Total: 6.50E-05**	**Total: 1.81E-09**
VOC:	Y		

% Contribution to Media Risk   0.03%   0.56%

Analyte: **Methylnaphthalene, 2-**

CAS: **91-57-6**

		Calculated Hazard/Risk	
Concentration mg/kg:	3.51E+00		
RfDo:	4.00E-03	**Non-Cancer Adult**	**Cancer**
RfCi:		Ingestion: 1.29E-03	Ingestion:
SFO:		Dermal: 5.39E-04	Dermal:
IUR:		Inhalation:	Inhalation:
Mutagen:		**Total: 1.83E-03**	**Total: 0.00E+00**
VOC:	Y		

% Contribution to Media Risk   0.75%   0.00%

Site Name: **Alexandria**
Program: **Voluntary Remediation Program**

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Soil

Analyte: **Naphthalene**
CAS: **91-20-3**

Concentration mg/kg:	2.05E+00
RfDo:	6.00E-01
RfCi:	3.00E-03
SFO:	1.20E-01
IUR:	3.40E-05
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	5.02E-06	Ingestion:	4.95E-09
Dermal:	2.09E-06	Dermal:	2.07E-09
Inhalation:	6.41E-08	Inhalation:	8.96E-14
Total:	**7.18E-06**	**Total:**	**7.02E-09**

% Contribution to Media Risk   0.00%   2.19%

Analyte: **Nickel Soluble Salts**
CAS: **7440-02-0**

Concentration mg/kg:	1.11E+02
RfDo:	2.00E-02
RfCi:	2.00E-04
SFO:	
IUR:	2.60E-04
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	8.17E-03	Ingestion:	
Dermal:		Dermal:	
Inhalation:	5.21E-05	Inhalation:	3.71E-11
Total:	**8.22E-03**	**Total:**	**3.71E-11**

% Contribution to Media Risk   3.38%   0.01%

Analyte: **Phenanthrene**
CAS: **85-01-8**

Concentration mg/kg:	1.70E+00
RfDo:	3.00E-01
RfCi:	
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	8.33E-06	Ingestion:	
Dermal:	3.47E-06	Dermal:	
Inhalation:		Inhalation:	
Total:	**1.18E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Risk Based Performance Criteria

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Soil

Analyte: **Pyrene**

CAS: **129-00-0**

Concentration mg/kg:	8.78E-01
RfDo:	3.00E-01
RfCi:	
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	4.31E-06	Ingestion:	
Dermal:	1.80E-06	Dermal:	
Inhalation:		Inhalation:	
Total:	**6.11E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Analyte: **Toluene**

CAS: **108-88-3**

Concentration mg/kg:	2.07E+00
RfDo:	8.00E-01
RfCi:	5.00E+00
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	3.81E-06	Ingestion:	
Dermal:		Dermal:	
Inhalation:	3.89E-11	Inhalation:	
Total:	**3.81E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Analyte: **Trimethylbenzene, 1,2,4-**

CAS: **95-63-6**

Concentration mg/kg:	1.47E+00
RfDo:	4.00E-02
RfCi:	2.00E-01
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	5.40E-05	Ingestion:	
Dermal:		Dermal:	
Inhalation:	6.89E-10	Inhalation:	
Total:	**5.40E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.02%   0.00%

Program: **Voluntary Remediation Program**

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Soil

Analyte: **Trimethylbenzene, 1,3,5-**
CAS: **108-67-8**

Concentration mg/kg:	4.37E-01		**Calculated Hazard/Risk**	
RfDo:	4.00E-02	**Non-Cancer Adult**		**Cancer**
RfCi:	2.00E-01	Ingestion:	1.61E-05	Ingestion:
SFO:		Dermal:		Dermal:
IUR:		Inhalation:	2.05E-10	Inhalation:
Mutagen:		**Total:**	**1.61E-05**	**Total:** **0.00E+00**
VOC:	Y			

% Contribution to Media Risk   0.01%   0.00%

Analyte: **Vanadium and Compounds**
CAS: **7440-62-2**

Concentration mg/kg:	4.04E+01		**Calculated Hazard/Risk**	
RfDo:	1.00E-02	**Non-Cancer Adult**		**Cancer**
RfCi:	1.00E-04	Ingestion:	5.95E-03	Ingestion:
SFO:		Dermal:		Dermal:
IUR:		Inhalation:	3.79E-05	Inhalation:
Mutagen:		**Total:**	**5.98E-03**	**Total:** **0.00E+00**
VOC:				

% Contribution to Media Risk   2.46%   0.00%

Analyte: **Xylenes**
CAS: **1330-20-7**

Concentration mg/kg:	6.50E+00		**Calculated Hazard/Risk**	
RfDo:	4.00E-01	**Non-Cancer Adult**		**Cancer**
RfCi:	4.00E-01	Ingestion:	2.39E-05	Ingestion:
SFO:		Dermal:		Dermal:
IUR:		Inhalation:	1.53E-09	Inhalation:
Mutagen:		**Total:**	**2.39E-05**	**Total:** **0.00E+00**
VOC:	Y			

% Contribution to Media Risk   0.01%   0.00%

<u>Risk Based Performance Criteria</u>

Default Hazard Index   Default Risk Individual Chemical   Default Cumulative Risk-All Chemicals

1   1.00E-06   1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Soil

Analyte: **Zinc and Compounds**

CAS: **7440-66-6**

		Calculated Hazard/Risk		
Concentration mg/kg:	4.97E+01			
RfDo:	3.00E-01	**Non-Cancer Adult**		**Cancer**
RfCi:	7.67E-02	Ingestion: 2.44E-04		Ingestion:
SFO:		Dermal:		Dermal:
IUR:		Inhalation: 6.09E-08		Inhalation:
Mutagen:		**Total:** **2.44E-04**		**Total:** **0.00E+00**
VOC:				

% Contribution to Media Risk   0.10%   0.00%

Total Calculated Hazard Index/Risk for Soil

Non-Cancer Adult		**Cancer**	
Ingestion:	2.36E-01	Ingestion:	2.87E-07
Dermal:	5.55E-03	Dermal:	3.40E-08
Inhalation:	2.08E-03	Inhalation:	2.10E-10
Total:	**2.43E-01**	**Total:**	**3.21E-07**

<u>Risk Based Performance Criteria</u>

Default Hazard Index   Default Risk Individual Chemical   Default Cumulative Risk-All Chemicals

1   1.00E-06   1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Groundwater

Analyte: Acenaphthene

CAS: 83-32-9

Concentration µg/L :	5.18E-01
RfDo:	2.00E-01
RfCi:	
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	2.31E-07	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**2.31E-07**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Analyte: Acenaphthylene

CAS: 208-96-8

Concentration µg/L :	1.50E-01
RfDo:	3.00E-01
RfCi:	
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	4.48E-08	Ingestion:	
Dermal:	4.11E-06	Dermal:	
Inhalation:		Inhalation:	
Total:	**4.16E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Analyte: Acetone

CAS: 67-64-1

Concentration µg/L :	6.62E+00
RfDo:	1.00E+00
RfCi:	3.09E+01
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	5.91E-07	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**5.91E-07**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Groundwater

Analyte: **Aluminum**

CAS: **7429-90-5**

Concentration µg/L :	2.53E+03
RfDo:	1.00E+00
RfCi:	5.00E-03
SFO:	
IUR:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	2.26E-04	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**2.26E-04**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.03%   0.00%

Analyte: **Anthracene**

CAS: **120-12-7**

Concentration µg/L :	9.93E-02
RfDo:	1.00E+00
RfCi:	1.00E-02
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	8.87E-09	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**8.87E-09**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Analyte: **Antimony (metallic)**

CAS: **7440-36-0**

Concentration µg/L :	5.50E-01
RfDo:	4.00E-04
RfCi:	1.00E-03
SFO:	
IUR:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	1.23E-04	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**1.23E-04**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.02%   0.00%

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Groundwater

Analyte: Arsenic, Inorganic

CAS: 7440-38-2

Concentration µg/L :	5.50E+00
RfDo:	3.00E-04
RfCi:	1.50E-05
SFO:	1.50E+00
IUR:	4.30E-03
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	1.64E-03	Ingestion:	1.01E-08
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**1.64E-03**	**Total:**	**1.01E-08**

% Contribution to Media Risk   0.22%   0.52%

Analyte: Barium

CAS: 7440-39-3

Concentration µg/L :	1.06E+02
RfDo:	2.00E-01
RfCi:	5.00E-03
SFO:	
IUR:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	4.73E-05	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**4.73E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.01%   0.00%

Analyte: Benz[a]anthracene

CAS: 56-55-3

Concentration µg/L :	7.93E-02
RfDo:	
RfCi:	
SFO:	1.00E-01
IUR:	6.00E-05
Mutagen:	Y
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:		Ingestion:	9.70E-12
Dermal:		Dermal:	
Inhalation:		Inhalation:	4.05E-09
Total:	**0.00E+00**	**Total:**	**4.06E-09**

% Contribution to Media Risk   0.00%   0.21%

Site Name: **Alexandria**
Program: **Voluntary Remediation Program**

<u>Risk Based Performance Criteria</u>

Default Hazard Index | Default Risk Individual Chemical | Default Cumulative Risk-All Chemicals
1 | 1.00E-06 | 1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Groundwater

Analyte: **Benzene**
CAS: **71-43-2**

Concentration µg/L :	1.16E+00
RfDo:	1.00E-02
RfCi:	8.00E-02
SFO:	5.50E-02
IUR:	7.80E-06
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	1.04E-05	Ingestion:	7.80E-11
Dermal:		Dermal:	
Inhalation:	8.06E-03	Inhalation:	6.89E-08
Total:	**8.07E-03**	**Total:**	**6.90E-08**

% Contribution to Media Risk   1.07%   3.53%

Analyte: **Benzo(g,h,i)perylene**
CAS: **191-24-2**

Concentration µg/L :	1.10E-01
RfDo:	3.00E-01
RfCi:	
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	3.27E-08	Ingestion:	
Dermal:	4.25E-05	Dermal:	
Inhalation:		Inhalation:	
Total:	**4.26E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.01%   0.00%

Analyte: **Benzo[a]pyrene**
CAS: **50-32-8**

Concentration µg/L :	6.08E-02
RfDo:	3.00E-04
RfCi:	2.00E-06
SFO:	1.00E+00
IUR:	6.00E-04
Mutagen:	Y
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	1.81E-05	Ingestion:	7.43E-11
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**1.81E-05**	**Total:**	**7.43E-11**

% Contribution to Media Risk   0.00%   0.00%

Risk Based Performance Criteria

Default Hazard Index   Default Risk Individual Chemical   Default Cumulative Risk-All Chemicals

1   1.00E-06   1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Groundwater

Analyte: Benzo[b]fluoranthene

CAS: 205-99-2

Concentration µg/L :	2.00E-01
RfDo:	
RfCi:	
SFO:	1.00E-01
IUR:	6.00E-05
Mutagen:	Y
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Cancer	
Ingestion:		Ingestion:	2.45E-11
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**0.00E+00**	**Total:**	**2.45E-11**

% Contribution to Media Risk   0.00%   0.00%

Analyte: Benzo[k]fluoranthene

CAS: 207-08-9

Concentration µg/L :	7.84E-02
RfDo:	
RfCi:	
SFO:	1.00E-02
IUR:	6.00E-06
Mutagen:	Y
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Cancer	
Ingestion:		Ingestion:	9.59E-13
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**0.00E+00**	**Total:**	**9.59E-13**

% Contribution to Media Risk   0.00%   0.00%

Analyte: Beryllium and compounds

CAS: 7440-41-7

Concentration µg/L :	1.71E+00
RfDo:	5.00E-03
RfCi:	2.00E-05
SFO:	
IUR:	2.40E-03
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Cancer	
Ingestion:	3.05E-05	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**3.05E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Program: **Voluntary Remediation Program**

<u>Risk Based Performance Criteria</u>

Default Hazard Index | Default Risk Individual Chemical | Default Cumulative Risk-All Chemicals
1 | 1.00E-06 | 1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Groundwater

Analyte: **Cadmium (Water)**

CAS: **7440-43-9-Water**

Concentration µg/L :	2.64E+00
RfDo:	5.00E-04
RfCi:	1.00E-05
SFO:	
IUR:	1.80E-03
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	4.71E-04	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**4.71E-04**	**Total:**	**0.00E+00**

% Contribution to Media Risk 0.06% 0.00%

Analyte: **Carbazole**

CAS: **86-74-8**

Concentration µg/L :	9.00E-01
RfDo:	
RfCi:	
SFO:	
IUR:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:		Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**0.00E+00**	**Total:**	**0.00E+00**

% Contribution to Media Risk 0.00% 0.00%

Analyte: **Chlorobenzene**

CAS: **108-90-7**

Concentration µg/L :	1.00E+00
RfDo:	7.00E-02
RfCi:	5.00E-01
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	1.28E-06	Ingestion:	
Dermal:		Dermal:	
Inhalation:	9.19E-04	Inhalation:	
Total:	**9.21E-04**	**Total:**	**0.00E+00**

% Contribution to Media Risk 0.12% 0.00%

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Groundwater

Analyte: **Chromium(III), Insoluble Salts**

CAS: **16065-83-1**

Concentration µg/L :	4.33E+00
RfDo:	1.50E+00
RfCi:	5.00E-03
SFO:	
IUR:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	2.58E-07	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**2.58E-07**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Analyte: **Chrysene**

CAS: **218-01-9**

Concentration µg/L :	8.14E-02
RfDo:	1.50E+00
RfCi:	5.00E-03
SFO:	1.00E-03
IUR:	6.00E-07
Mutagen:	Y
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	4.85E-09	Ingestion:	9.96E-14
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**4.85E-09**	**Total:**	**9.96E-14**

% Contribution to Media Risk   0.00%   0.00%

Analyte: **Cobalt**

CAS: **7440-48-4**

Concentration µg/L :	2.38E+02
RfDo:	3.00E-03
RfCi:	2.00E-05
SFO:	
IUR:	9.00E-03
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	7.08E-03	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**7.08E-03**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.94%   0.00%

Program: **Voluntary Remediation Program**

<u>Risk Based Performance Criteria</u>

Default Hazard Index   Default Risk Individual Chemical   Default Cumulative Risk-All Chemicals

1   1.00E-06   1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Groundwater

Analyte: **Copper**

CAS: **7440-50-8**

Concentration µg/L :	1.85E+01	
RfDo:	1.00E-02	
RfCi:		
SFO:		
IUR:		
Mutagen:		
VOC:		

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	1.65E-04	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**1.65E-04**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.02%   0.00%

Analyte: **Cresol, o-**

CAS: **95-48-7**

Concentration µg/L :	1.36E+00	
RfDo:	2.00E-01	
RfCi:	6.00E-01	
SFO:		
IUR:		
Mutagen:		
VOC:		

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	6.07E-07	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**6.07E-07**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Analyte: **Cresol, p-**

CAS: **106-44-5**

Concentration µg/L :	6.00E+00	
RfDo:	2.00E-02	
RfCi:	6.00E-01	
SFO:		
IUR:		
Mutagen:		
VOC:		

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	2.68E-05	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**2.68E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Program: **Voluntary Remediation Program**

<u>Risk Based Performance Criteria</u>

Default Hazard Index | Default Risk Individual Chemical | Default Cumulative Risk-All Chemicals
1 | 1.00E-06 | 1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Groundwater

Analyte: **Cresol, p-chloro-m-**

CAS: **59-50-7**

Concentration µg/L :	8.00E-01
RfDo:	1.00E-01
RfCi:	
SFO:	
IUR:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	7.14E-07	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**7.14E-07**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Analyte: **Cumene**

CAS: **98-82-8**

Concentration µg/L :	1.00E+00
RfDo:	4.00E-01
RfCi:	9.00E-02
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	2.23E-07	Ingestion:	
Dermal:		Dermal:	
Inhalation:	5.01E-03	Inhalation:	
Total:	**5.01E-03**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.66%   0.00%

Analyte: **Dibenz[a,h]anthracene**

CAS: **53-70-3**

Concentration µg/L :	4.54E-02
RfDo:	
RfCi:	
SFO:	1.00E+00
IUR:	6.00E-04
Mutagen:	Y
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:		Ingestion:	5.55E-11
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**0.00E+00**	**Total:**	**5.55E-11**

% Contribution to Media Risk   0.00%   0.00%

Program: **Voluntary Remediation Program**

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Groundwater

Analyte: **Dibromoethane, 1,2-**

CAS: **106-93-4**

Concentration µg/L :	4.00E-01
RfDo:	9.00E-03
RfCi:	2.00E-03
SFO:	2.00E+00
IUR:	6.00E-04
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	3.97E-06	Ingestion:	9.78E-10
Dermal:		Dermal:	
Inhalation:	6.70E-02	Inhalation:	1.10E-06
Total:	**6.70E-02**	**Total:**	**1.10E-06**

% Contribution to Media Risk   8.87%   56.39%

Exceeds Risk!

Analyte: **Dibutyl Phthalate**

CAS: **84-74-2**

Concentration µg/L :	3.00E+00
RfDo:	1.00E+00
RfCi:	
SFO:	
IUR:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	2.68E-07	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**2.68E-07**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Analyte: **Dichloroethylene, 1,1-**

CAS: **75-35-4**

Concentration µg/L :	3.70E-01
RfDo:	9.00E-03
RfCi:	2.00E-01
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	3.67E-06	Ingestion:	
Dermal:		Dermal:	
Inhalation:	9.31E-04	Inhalation:	
Total:	**9.35E-04**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.12%   0.00%

<u>Risk Based Performance Criteria</u>

Default Hazard Index | Default Risk Individual Chemical | Default Cumulative Risk-All Chemicals
1 | 1.00E-06 | 1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Groundwater

Analyte: **Diisopropyl Ether**

CAS: **108-20-3**

Concentration µg/L :	1.06E+00
RfDo:	
RfCi:	7.00E-01
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:		Ingestion:	
Dermal:		Dermal:	
Inhalation:	7.28E-04	Inhalation:	
Total:	**7.28E-04**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.10%   0.00%

Analyte: **Dimethylphenol, 2,4-**

CAS: **105-67-9**

Concentration µg/L :	9.00E+00
RfDo:	5.00E-02
RfCi:	
SFO:	
IUR:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	1.61E-05	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**1.61E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Analyte: **Ethylbenzene**

CAS: **100-41-4**

Concentration µg/L :	8.76E-01
RfDo:	5.00E-02
RfCi:	9.00E+00
SFO:	1.10E-02
IUR:	2.50E-06
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	1.56E-06	Ingestion:	1.18E-11
Dermal:		Dermal:	
Inhalation:	4.66E-05	Inhalation:	1.44E-08
Total:	**4.81E-05**	**Total:**	**1.44E-08**

% Contribution to Media Risk   0.01%   0.73%

<u>Risk Based Performance Criteria</u>

Default Hazard Index   Default Risk Individual Chemical   Default Cumulative Risk-All Chemicals

1   1.00E-06   1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Groundwater

Analyte: Fluoranthene

CAS: 206-44-0

Concentration µg/L :	1.30E-01
RfDo:	1.00E-01
RfCi:	
SFO:	
IUR:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	1.16E-07	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**1.16E-07**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Analyte: Fluorene

CAS: 86-73-7

Concentration µg/L :	4.87E-01
RfDo:	4.00E-01
RfCi:	
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	1.09E-07	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**1.09E-07**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Analyte: Indeno[1,2,3-cd]pyrene

CAS: 193-39-5

Concentration µg/L :	1.10E-01
RfDo:	4.00E-01
RfCi:	
SFO:	1.00E-01
IUR:	6.00E-05
Mutagen:	Y
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	2.46E-08	Ingestion:	1.35E-11
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**2.46E-08**	**Total:**	**1.35E-11**

% Contribution to Media Risk   0.00%   0.00%

<u>Risk Based Performance Criteria</u>

Default Hazard Index   Default Risk Individual Chemical   Default Cumulative Risk-All Chemicals
1   1.00E-06   1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Groundwater

Analyte: **Iron**
CAS: **7439-89-6**

Concentration µg/L :	6.89E+04
RfDo:	7.00E-01
RfCi:	
SFO:	
IUR:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	8.78E-03	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**8.78E-03**	**Total:**	**0.00E+00**

% Contribution to Media Risk   1.16%   0.00%

Analyte: **isopropyltoluene**
CAS: **99-87-6**

Concentration µg/L :	2.04E+00
RfDo:	4.00E-01
RfCi:	9.00E-02
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	4.55E-07	Ingestion:	
Dermal:	4.89E-05	Dermal:	
Inhalation:	9.67E-03	Inhalation:	
Total:	**9.72E-03**	**Total:**	**0.00E+00**

% Contribution to Media Risk   1.29%   0.00%

Analyte: **Lead and Compounds**
CAS: **7439-92-1**

Concentration µg/L :	7.52E+00
RfDo:	
RfCi:	
SFO:	
IUR:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:		Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**0.00E+00**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Risk Based Performance Criteria

Default Hazard Index   Default Risk Individual Chemical   Default Cumulative Risk-All Chemicals

1   1.00E-06   1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Groundwater

Analyte: **Manganese (Diet)**

CAS: **7439-96-5-Diet**

Concentration µg/L :	1.24E+04
RfDo:	1.40E-01
RfCi:	5.00E-05
SFO:	
IUR:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Cancer	
Ingestion:	7.91E-03	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**7.91E-03**	**Total:**	**0.00E+00**

% Contribution to Media Risk   1.05%   0.00%

Analyte: **Mercury (elemental)**

CAS: **7439-97-6**

Concentration µg/L :	7.42E-02
RfDo:	
RfCi:	3.00E-04
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Cancer	
Ingestion:		Ingestion:	
Dermal:		Dermal:	
Inhalation:	8.62E-02	Inhalation:	
Total:	**8.62E-02**	**Total:**	**0.00E+00**

% Contribution to Media Risk   11.42%   0.00%

Analyte: **Methyl Ethyl Ketone (2-Butanone)**

CAS: **78-93-3**

Concentration µg/L :	2.58E+00
RfDo:	2.00E+00
RfCi:	1.00E+00
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Cancer	
Ingestion:	1.15E-07	Ingestion:	
Dermal:		Dermal:	
Inhalation:	7.21E-04	Inhalation:	
Total:	**7.21E-04**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.10%   0.00%

<u>Risk Based Performance Criteria</u>

Default Hazard Index   Default Risk Individual Chemical   Default Cumulative Risk-All Chemicals

1   1.00E-06   1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Groundwater

Analyte: **Methylcyclohexane**

CAS: **108-87-2**

Concentration µg/L :	3.00E-01
RfDo:	
RfCi:	
SFO:	
IUR:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:		Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**0.00E+00**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Analyte: **Methylnaphthalene, 1-**

CAS: **90-12-0**

Concentration µg/L :	9.29E-01
RfDo:	7.00E-02
RfCi:	1.04E+00
SFO:	2.90E-02
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	1.19E-06	Ingestion:	3.30E-11
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**1.19E-06**	**Total:**	**3.30E-11**

% Contribution to Media Risk   0.00%   0.00%

Analyte: **Methylnaphthalene, 2-**

CAS: **91-57-6**

Concentration µg/L :	5.98E-01
RfDo:	4.00E-03
RfCi:	
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	1.34E-05	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**1.34E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

<u>Risk Based Performance Criteria</u>

Default Hazard Index   Default Risk Individual Chemical   Default Cumulative Risk-All Chemicals

1   1.00E-06   1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Groundwater

Analyte: Naphthalene

CAS: 91-20-3

Concentration µg/L :	4.16E+00
RfDo:	6.00E-01
RfCi:	3.00E-03
SFO:	1.20E-01
IUR:	3.40E-05
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	6.19E-07	Ingestion:	6.11E-10
Dermal:		Dermal:	
Inhalation:	5.39E-01	Inhalation:	7.53E-07
Total:	**5.39E-01**	**Total:**	**7.54E-07**

% Contribution to Media Risk   71.37%   38.56%

Analyte: Nickel Soluble Salts

CAS: 7440-02-0

Concentration µg/L :	7.48E+01
RfDo:	2.00E-02
RfCi:	2.00E-04
SFO:	
IUR:	2.60E-04
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	3.34E-04	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**3.34E-04**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.04%   0.00%

Analyte: Phenanthrene

CAS: 85-01-8

Concentration µg/L :	2.21E-01
RfDo:	3.00E-01
RfCi:	
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	6.58E-08	Ingestion:	
Dermal:	9.17E-06	Dermal:	
Inhalation:		Inhalation:	
Total:	**9.23E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Program: Voluntary Remediation Program

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Groundwater

Analyte: Pyrene

CAS: 129-00-0

Concentration µg/L :	3.56E-01
RfDo:	3.00E-01
RfCi:	
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Cancer	
Ingestion:	1.06E-07	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**1.06E-07**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Analyte: Selenium

CAS: 7782-49-2

Concentration µg/L :	8.74E+00
RfDo:	5.00E-03
RfCi:	2.00E-02
SFO:	
IUR:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Cancer	
Ingestion:	1.56E-04	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**1.56E-04**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.02%   0.00%

Analyte: Silver

CAS: 7440-22-4

Concentration µg/L :	1.27E-01
RfDo:	5.00E-03
RfCi:	
SFO:	
IUR:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Cancer	
Ingestion:	2.27E-06	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**2.27E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Groundwater

Analyte: **Tetrachloroethylene**
CAS: **127-18-4**

Concentration µg/L :	8.80E-01
RfDo:	8.00E-03
RfCi:	4.07E-02
SFO:	2.10E-03
IUR:	2.60E-07
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	9.82E-06	Ingestion:	2.26E-12
Dermal:		Dermal:	
Inhalation:	8.32E-03	Inhalation:	1.21E-09
Total:	**8.33E-03**	**Total:**	**1.21E-09**

% Contribution to Media Risk   1.10%   0.06%

Analyte: **Toluene**
CAS: **108-88-3**

Concentration µg/L :	5.43E-01
RfDo:	8.00E-01
RfCi:	5.00E+00
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	6.06E-08	Ingestion:	
Dermal:		Dermal:	
Inhalation:	5.57E-05	Inhalation:	
Total:	**5.58E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.01%   0.00%

Analyte: **Vanadium and Compounds**
CAS: **7440-62-2**

Concentration µg/L :	7.26E+00
RfDo:	1.00E-02
RfCi:	1.00E-04
SFO:	
IUR:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	6.48E-05	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**6.48E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.01%   0.00%

<u>Risk Based Performance Criteria</u>

Default Hazard Index   Default Risk Individual Chemical   Default Cumulative Risk-All Chemicals

1   1.00E-06   1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Groundwater

Analyte: **Xylenes**

CAS: **1330-20-7**

Concentration µg/L :	1.09E+00
RfDo:	4.00E-01
RfCi:	4.00E-01
SFO:	
IUR:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	2.43E-07	Ingestion:	
Dermal:		Dermal:	
Inhalation:	1.30E-03	Inhalation:	
Total:	**1.30E-03**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.17%   0.00%

Analyte: **Zinc and Compounds**

CAS: **7440-66-6**

Concentration µg/L :	1.27E+02
RfDo:	3.00E-01
RfCi:	7.67E-02
SFO:	
IUR:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	3.78E-05	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**3.78E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.01%   0.00%

Total Calculated Hazard Index/Risk for Groundwater

Non-Cancer Adult		**Cancer**	
Ingestion:	2.72E-02	Ingestion:	1.20E-08
Dermal:	1.05E-04	Dermal:	0.00E+00
Inhalation:	7.28E-01	Inhalation:	1.94E-06
Total:	**7.55E-01**	**Total:**	**1.96E-06**

Risk Based Performance Criteria

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Report Summary

Hazard/risk values of zero (0.00+00) are reflective of non-calculated values. Hazard/risk for zero value analytes must be evaluated outside of quantitative risk assessment.

Hazard/Risk Summary for Soil

Analyte	CAS	Hazard	Risk
Acenaphthene	83-32-9	2.15E-06	0.00E+00
Acenaphthylene	208-96-8	9.74E-07	0.00E+00
Acetone	67-64-1	2.53E-06	0.00E+00
Acetophenone	98-86-2	2.78E-07	0.00E+00
Aluminum	7429-90-5	1.38E-02	0.00E+00
Anthracene	120-12-7	5.30E-07	0.00E+00
Antimony (metallic)	7440-36-0	4.95E-03	0.00E+00
Arsenic, Inorganic	7440-38-2	3.01E-02	2.92E-07
Barium	7440-39-3	5.37E-04	0.00E+00
Benz[a]anthracene	56-55-3	0.00E+00	1.38E-09
Benzene	71-43-2	7.37E-05	5.55E-10
Benzo(g,h,i)perylene	191-24-2	1.72E-06	0.00E+00
Benzo[a]pyrene	50-32-8	2.35E-03	9.61E-09
Benzo[b]fluoranthene	205-99-2	0.00E+00	1.90E-09
Benzo[k]fluoranthene	207-08-9	0.00E+00	1.03E-10
Benzoic Acid	65-85-0	6.40E-07	0.00E+00
Beryllium and compounds	7440-41-7	2.69E-04	2.78E-12
Bis(2-ethylhexyl)phthalate	117-81-7	2.25E-05	8.62E-11
Butylbenzene, n-	104-51-8	2.06E-06	0.00E+00
Cadmium (Diet)	7440-43-9-Diet	1.11E-03	7.72E-13
Carbazole	86-74-8	0.00E+00	0.00E+00
Chromium(III), Insoluble Salts	16065-83-1	2.06E-04	0.00E+00
Chrysene	218-01-9	9.75E-07	1.98E-11
Cobalt	7440-48-4	5.14E-03	1.20E-10
Copper	7440-50-8	2.28E-02	0.00E+00
Cresol, o-	95-48-7	1.26E-06	0.00E+00
Cresol, p-chloro-m-	59-50-7	2.32E-06	0.00E+00
Cumene	98-82-8	6.19E-07	0.00E+00
Cyanide (CN-)	57-12-5	6.46E-04	0.00E+00
Dibenz[a,h]anthracene	53-70-3	0.00E+00	5.66E-09
Dimethylphenol, 2,4-	105-67-9	7.78E-06	0.00E+00
Ethylbenzene	100-41-4	1.01E-05	7.59E-11

<u>Risk Based Performance Criteria</u>

Default Hazard Index   Default Risk Individual Chemical   Default Cumulative Risk-All Chemicals

1   1.00E-06   1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Hazard/Risk Summary for Soil

Analyte	CAS	Hazard	Risk
Fluoranthene	206-44-0	1.87E-05	0.00E+00
Fluorene	86-73-7	1.20E-06	0.00E+00
Indeno[1,2,3-cd]pyrene	193-39-5	1.47E-06	8.06E-10
Iron	7439-89-6	1.38E-01	0.00E+00
isopropyltoluene	99-87-6	5.42E-06	0.00E+00
Lead and Compounds	7439-92-1	0.00E+00	0.00E+00
Manganese (Diet)	7439-96-5-Diet	6.40E-03	0.00E+00
Mercury (elemental)	7439-97-6	1.25E-04	0.00E+00
Methyl Ethyl Ketone (2-Butanone)	78-93-3	4.22E-07	0.00E+00
Methylcyclohexane	108-87-2	0.00E+00	0.00E+00
Methylene Chloride	75-09-2	1.69E-08	2.78E-14
Methylnaphthalene, 1-	90-12-0	6.50E-05	1.81E-09
Methylnaphthalene, 2-	91-57-6	1.83E-03	0.00E+00
Naphthalene	91-20-3	7.18E-06	7.02E-09
Nickel Soluble Salts	7440-02-0	8.22E-03	3.71E-11
Phenanthrene	85-01-8	1.18E-05	0.00E+00
Pyrene	129-00-0	6.11E-06	0.00E+00
Toluene	108-88-3	3.81E-06	0.00E+00
Trimethylbenzene, 1,2,4-	95-63-6	5.40E-05	0.00E+00
Trimethylbenzene, 1,3,5-	108-67-8	1.61E-05	0.00E+00
Vanadium and Compounds	7440-62-2	5.98E-03	0.00E+00
Xylenes	1330-20-7	2.39E-05	0.00E+00
Zinc and Compounds	7440-66-6	2.44E-04	0.00E+00

Hazard/Risk Summary for Groundwater

Analyte	CAS	Hazard	Risk
Acenaphthene	83-32-9	2.31E-07	0.00E+00
Acenaphthylene	208-96-8	4.16E-06	0.00E+00
Acetone	67-64-1	5.91E-07	0.00E+00
Aluminum	7429-90-5	2.26E-04	0.00E+00
Anthracene	120-12-7	8.87E-09	0.00E+00
Antimony (metallic)	7440-36-0	1.23E-04	0.00E+00
Arsenic, Inorganic	7440-38-2	1.64E-03	1.01E-08
Barium	7440-39-3	4.73E-05	0.00E+00
Benz[a]anthracene	56-55-3	0.00E+00	4.06E-09
Benzene	71-43-2	8.07E-03	6.90E-08
Benzo(g,h,i)perylene	191-24-2	4.26E-05	0.00E+00

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Hazard/Risk Summary for Groundwater

Analyte	CAS	Hazard	Risk
Benzo[a]pyrene	50-32-8	1.81E-05	7.43E-11
Benzo[b]fluoranthene	205-99-2	0.00E+00	2.45E-11
Benzo[k]fluoranthene	207-08-9	0.00E+00	9.59E-13
Beryllium and compounds	7440-41-7	3.05E-05	0.00E+00
Cadmium (Water)	7440-43-9-Water	4.71E-04	0.00E+00
Carbazole	86-74-8	0.00E+00	0.00E+00
Chlorobenzene	108-90-7	9.21E-04	0.00E+00
Chromium(III), Insoluble Salts	16065-83-1	2.58E-07	0.00E+00
Chrysene	218-01-9	4.85E-09	9.96E-14
Cobalt	7440-48-4	7.08E-03	0.00E+00
Copper	7440-50-8	1.65E-04	0.00E+00
Cresol, o-	95-48-7	6.07E-07	0.00E+00
Cresol, p-	106-44-5	2.68E-05	0.00E+00
Cresol, p-chloro-m-	59-50-7	7.14E-07	0.00E+00
Cumene	98-82-8	5.01E-03	0.00E+00
Dibenz[a,h]anthracene	53-70-3	0.00E+00	5.55E-11
Dibromoethane, 1,2-	106-93-4	6.70E-02	1.10E-06
Dibutyl Phthalate	84-74-2	2.68E-07	0.00E+00
Dichloroethylene, 1,1-	75-35-4	9.35E-04	0.00E+00
Diisopropyl Ether	108-20-3	7.28E-04	0.00E+00
Dimethylphenol, 2,4-	105-67-9	1.61E-05	0.00E+00
Ethylbenzene	100-41-4	4.81E-05	1.44E-08
Fluoranthene	206-44-0	1.16E-07	0.00E+00
Fluorene	86-73-7	1.09E-07	0.00E+00
Indeno[1,2,3-cd]pyrene	193-39-5	2.46E-08	1.35E-11
Iron	7439-89-6	8.78E-03	0.00E+00
isopropyltoluene	99-87-6	9.72E-03	0.00E+00
Lead and Compounds	7439-92-1	0.00E+00	0.00E+00
Manganese (Diet)	7439-96-5-Diet	7.91E-03	0.00E+00
Mercury (elemental)	7439-97-6	8.62E-02	0.00E+00
Methyl Ethyl Ketone (2-Butanone)	78-93-3	7.21E-04	0.00E+00
Methylcyclohexane	108-87-2	0.00E+00	0.00E+00
Methylnaphthalene, 1-	90-12-0	1.19E-06	3.30E-11
Methylnaphthalene, 2-	91-57-6	1.34E-05	0.00E+00
Naphthalene	91-20-3	5.39E-01	7.54E-07
Nickel Soluble Salts	7440-02-0	3.34E-04	0.00E+00
Phenanthrene	85-01-8	9.23E-06	0.00E+00

Site Name: **Alexandria**
Program: **Voluntary Remediation Program**

Risk Based Performance Criteria

Default Hazard Index | Default Risk Individual Chemical | Default Cumulative Risk-All Chemicals
1 | 1.00E-06 | 1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

Hazard/Risk Summary for Groundwater

Analyte	CAS	Hazard	Risk
Pyrene	129-00-0	1.06E-07	0.00E+00
Selenium	7782-49-2	1.56E-04	0.00E+00
Silver	7440-22-4	2.27E-06	0.00E+00
Tetrachloroethylene	127-18-4	8.33E-03	1.21E-09
Toluene	108-88-3	5.58E-05	0.00E+00
Vanadium and Compounds	7440-62-2	6.48E-05	0.00E+00
Xylenes	1330-20-7	1.30E-03	0.00E+00
Zinc and Compounds	7440-66-6	3.78E-05	0.00E+00

Total Hazard Index/Risk for All Media

Non-Cancer Adult		**Cancer**	
Ingestion:	2.63E-01	Ingestion:	2.99E-07
Dermal:	5.66E-03	Dermal:	3.40E-08
Inhalation:	7.30E-01	Inhalation:	1.94E-06
Total:	**9.99E-01**	**Total:**	**2.28E-06**
does not exceed hazard index		*does not exceed cumulative risk*	

Construction Exposure Default Values

Symbol	Description	Value	Units
A	Construction Worker Soil Inhalation Dispersion Constant - Philadelphia	14.0111	(unitless)
AFcw	Construction Worker Soil Adherence Factor	0.3	(mg/cm2)
As	Areal extent of the site or contamination	0.5	(acres)
ATcw	Construction Worker Averaging Time: 365 x LT	25550	(days)
ATcw	Construction Worker Averaging Time	365	(days/yr)
ATcw-a	Construction Worker Averaging Time: EWcw x 7 x EDcw	350	(days)
B	Construction Worker Soil Inhalation Dispersion Constant - Philadelphia	19.6154	(unitless)
BWcw	Construction Worker Body Weight	80	(kg)
C	Construction Worker Soil Inhalation Dispersion Constant - Philadelphia	225.3397	(unitless)
DWcw	Construction Worker Days Worked	5	(days/week)

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

EDcw	Construction Worker Exposure Duration	1	(yrs)
EFcw	Construction Worker Exposure Frequency	250	(days/yrs)
EFcw-a	Construction Worker Air Exposure Frequency	250	(days/yr)
EFcw-s	Construction Worker Soil Exposure Frequency	250	(days/yr)
EFcw-vrp	Construction Worker Soil Exposure Frequency - VRP ONLY - Virginia DEQ	125	(days/yr)
ETcw	Construction Worker Exposure Time	8	(hrs/day)
ETcw-s	Construction Worker Soil Exposure Time	8	(hrs/day)
EWcw	Construction Worker Weeks Worked	50	(weeks/yr)
F(x)	Function Dependent on 0.886 × (Ut/Um)	0.194	(unitless)
Fd	Dispersion Correction Factor	0.185	(unitless)
IRcw	Construction Worker Soil Ingestion Rate	330	(mg/day)
n	Total soil porosity: $1-(\rho b/\rho s)$	0.433962264150943	(unitless)
PEFsc	Particulate Emission Factor Subchronic - Virginia DEQ calculated	1266503136.97919	(m3/kg)
Q/C	Inverse of the ratio of the 1-h geometric mean concentration to the emission flux along a straight road segment bisecting a square site - Virginia DEQ calculated	87.3689772162309	(g/m2-s per kg/m)
SAcw	Construction Worker Surface Area	3527	(cm2/day)
Tc	Total time over which construction occurs: EDcw*EWcw*7days/wk*24hrs/day*3600s/hr	30240000	(s)
TR-ACH	Trench Air Changes per Hour - Virginia DEQ	2	(h)-1
TR-ACvad	Trench Advection Coefficient Groundwater greater than 15ft - Virginia DEQ	0.25	(cm3/cm3)
TR-CF1	Trench Conversion Factor-1	0.001	(L/cm3)
TR-CF2	Trench Conversion Factor-2	10000	(cm2/m2)
TR-CF3	Trench Conversion Factor-3	3600	(s/hr)
TR-CF4	Trench Conversion Factor-4	1000000	(cm3/m3)
TR-D-dir	Trench Depth - groundwater less Than 15ft - Virginia DEQ	2.44	(m)
TR-D-ind	Trench Depth - groundwater greater than 15ft - Virginia DEQ	4.57	(m)
TR-Dsg	Trench - Depth to soil gas vapor source - Virginia DEQ	1	(cm)
TR-EFcw	Trench Construction Worker Exposure Frequency - Virginia DEQ	125	(days/yr)

Risk Based Performance Criteria

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Contact Depth to Groundwater: Direct Less than 15ft

TR-ETcw	Trench Construction Worker Exposure Time - Virginia DEQ	4	(hrs/day)
TR-EVcw	Trench Construction Worker Events - Virginia DEQ	1	(events/day)
TR-F	Trench Fraction of floor through which contaminant can enter - Virginia DEQ	1	(unitless)
TR-HV	Trench Thickness of Vadose Zone - groundwater greater than 15 ft - Virginia DEQ	30	(cm)
TR-IRcw	Trench Construction Worker Groundwater Ingestion Rate - Virginia DEQ	0.02	(L/day)
TR-KGH2O	Trench Gas-phase mass transfer coefficient of water vapor at 25deg C - Virginia DEQ	0.833	(cm/s)
TR-KLO2	Trench Liquid-phase mass transfer coefficient of oxygen at 25deg C - Virginia DEQ	0.002	(cm/s)
TR-L	Trench Length - Virginia DEQ	2.44	(m)
TR-Lgw	Trench Depth to groundwater - Virginia DEQ	488	(cm)
TR-MWH2O	Trench Molecular Weight of Water - Virginia DEQ	18	(unitless)
TR-MWO2	Trench Molecular Weight of Oxygen - Virginia DEQ	32	(unitless)
TR-Porvad	Trench Porosity in Vadose Zone - groundwater greater than 15ft - Virginia DEQ	0.44	(cm3/cm3)
TR-R	Trench Ideal Gas Constant - Virginia DEQ	0.000082	(atm-m3/mol-K)
TR-Temp-F	Trench Temperature Fahrenheit - Virginia DEQ	77	(F)
TR-Temp-K	Trench Temperature - Virginia DEQ	298	(K)
TR-W	Trench Width - Virginia DEQ	0.91	(m)
TR-W/D	Trench Width to Depth Ratio - Virginia DEQ	0.38	(unitless)
Um	Mean Annual Wind Speed	4.69	(m/s)
Ut	Equivalent Threshold Value of Wind Speed at 7m	11.32	(m/s)
V	V Fraction of Vegetative Cover	0.5	(unitless)
Θa	Air filled soil porosity: n-Θw	0.133962264150943	(unitless)
Θw	Water filled soil porosity	0.3	(unitless)
ρb	Dry soil bulk density	1.5	(kg/L)
ρs	Soil particle density	2.65	(kg/L)

END OF REPORT

ATTACHMENT 3-3
COMPOSITE WORKER

Virginia Department of Environmental Quality

VURAM

Virginia Unified Risk Assessment Model

VERSION: 3.2.1

Industrial/Commercial Worker Quantitative Risk Assessment Report

Program: Voluntary Remediation Program (VRP)

Site Name:Alexandria

Groundwater Declaration Restricted Use

Restricted use of groundwater is for onsite use ONLY. Potential offsite risks and receptors are evaluated separately. The nature and extent of the groundwater plume is sufficiently characterized. Concentrations along the vertical and horizontal migration of the plume are stable.

No COPCs evaluated in Groundwater

By submitting this report to the Virginia DEQ, the user confirms that VURAM's default exposure parameters have not been altered, unless a complete unaltered VURAM analysis is provided and all modifications are detailed explicitly in an accompanying narrative or documentation that shows DEQ's prior concurrence with specific changes.

Chemical Specific Notes Displayed as Applicable

Lead

VURAM does not perform an evaluation for lead exposure. Use other approved models for lead modeling.

All Report Pages are Required for Risk Assessment Submission

Site Name: Alexandria   **Industrial/Commercial**

Program: Voluntary Remediation Program (VRP)

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: Acenaphthene

CAS: 83-32-9

Concentration mg/kg:	2.06E-01
RfDo (mg/kg-day):	6.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	2.94E-06	Ingestion:	
Dermal:	1.62E-06	Dermal:	
Inhalation:		Inhalation:	
Total:	**4.56E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

	mg/kg *Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*

Analyte: Acenaphthylene

CAS: 208-96-8

Concentration mg/kg:	1.40E-01
RfDo (mg/kg-day):	3.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	4.00E-06	Ingestion:	
Dermal:	2.20E-06	Dermal:	
Inhalation:		Inhalation:	
Total:	**6.19E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

	mg/kg *Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*

Analyte: Acetone

CAS: 67-64-1

Concentration mg/kg:	1.72E+00
RfDo (mg/kg-day):	9.00E-01
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	1.64E-06	Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**1.64E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Analyte: Acetophenone

CAS: 98-86-2

Concentration mg/kg:	1.51E-01	**Calculated Hazard/Risk**			
RfDo (mg/kg-day):	1.00E-01	**Non-Cancer Adult**		**Cancer**	
RfCi (mg/m3):		Ingestion:	1.29E-06	Ingestion:	
SFO (mg/kg-day)-1:		Dermal:		Dermal:	
IUR (µg/m3)-1:		Inhalation:		Inhalation:	
Mutagen:		**Total:**	**1.29E-06**	**Total:**	**0.00E+00**
VOC:	Y				

	% Contribution to Media Risk	0.00%	0.00%

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Analyte: Aluminum

CAS: 7429-90-5

Concentration mg/kg:	9.23E+03	**Calculated Hazard/Risk**			
RfDo (mg/kg-day):	1.00E+00	**Non-Cancer Adult**		**Cancer**	
RfCi (mg/m3):	5.00E-03	Ingestion:	7.90E-03	Ingestion:	
SFO (mg/kg-day)-1:		Dermal:		Dermal:	
IUR (µg/m3)-1:		Inhalation:	3.10E-04	Inhalation:	
Mutagen:		**Total:**	**8.21E-03**	**Total:**	**0.00E+00**
VOC:					

	% Contribution to Media Risk	4.52%	0.00%

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: Anthracene

CAS: 120-12-7

Concentration mg/kg:	2.53E-01
RfDo (mg/kg-day):	3.00E-01
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	7.22E-07	Ingestion:	
Dermal:	3.97E-07	Dermal:	
Inhalation:		Inhalation:	
Total:	**1.12E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

	mg/kg *Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*

Analyte: Antimony (metallic)

CAS: 7440-36-0

Concentration mg/kg:	1.34E+00
RfDo (mg/kg-day):	4.00E-04
RfCi (mg/m3):	3.00E-04
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	2.87E-03	Ingestion:	
Dermal:		Dermal:	
Inhalation:	7.52E-07	Inhalation:	
Total:	**2.88E-03**	**Total:**	**0.00E+00**

% Contribution to Media Risk   1.58%   0.00%

	mg/kg *Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*

Analyte: Arsenic, Inorganic

CAS: 7440-38-2

Concentration mg/kg:	8.80E+00
RfDo (mg/kg-day):	3.00E-04
RfCi (mg/m3):	1.50E-05
SFO (mg/kg-day)-1:	1.50E+00
IUR (µg/m3)-1:	4.30E-03
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	1.51E-02	Ingestion:	2.42E-06
Dermal:	3.19E-03	Dermal:	5.12E-07
Inhalation:	9.85E-05	Inhalation:	2.27E-09
Total:	**1.84E-02**	**Total:**	**2.94E-06**

% Contribution to Media Risk   10.09%   80.46%

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Exceeds Risk!	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*3.00E+00*

Analyte: Barium

CAS: 7440-39-3

		Calculated Hazard/Risk		
Concentration mg/kg:	7.27E+01			
RfDo (mg/kg-day):	2.00E-01	**Non-Cancer Adult**		**Cancer**
RfCi (mg/m3):	5.00E-04	Ingestion:	3.11E-04	Ingestion:
SFO (mg/kg-day)-1:		Dermal:		Dermal:
IUR (µg/m3)-1:		Inhalation:	2.44E-05	Inhalation:
Mutagen:		**Total:**	**3.36E-04**	**Total:** **0.00E+00**
VOC:				

	% Contribution to Media Risk	0.18%	0.00%

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Analyte: Benz[a]anthracene

CAS: 56-55-3

		Calculated Hazard/Risk		
Concentration mg/kg:	4.82E-01			
RfDo (mg/kg-day):		**Non-Cancer Adult**		**Cancer**
RfCi (mg/m3):		Ingestion:		Ingestion: 1.47E-08
SFO (mg/kg-day)-1:	1.00E-01	Dermal:		Dermal: 8.11E-09
IUR (µg/m3)-1:	6.00E-05	Inhalation:		Inhalation: 5.36E-10
Mutagen:	Y	**Total:** **0.00E+00**		**Total:** **2.34E-08**
VOC:	Y			

	% Contribution to Media Risk	0.00%	0.64%

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: Benzene

CAS: 71-43-2

Concentration mg/kg:	5.00E-01
RfDo (mg/kg-day):	4.00E-03
RfCi (mg/m3):	3.00E-02
SFO (mg/kg-day)-1:	5.50E-02
IUR (µg/m3)-1:	7.80E-06
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	1.07E-04	Ingestion:	8.41E-09
Dermal:		Dermal:	
Inhalation:	1.07E-03	Inhalation:	8.98E-08
Total:	**1.18E-03**	**Total:**	**9.82E-08**

% Contribution to Media Risk   0.65%   2.69%

	mg/kg *Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*

Analyte: Benzo(g,h,i)perylene

CAS: 191-24-2

Concentration mg/kg:	2.47E-01
RfDo (mg/kg-day):	3.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	7.05E-06	Ingestion:	
Dermal:	3.88E-06	Dermal:	
Inhalation:		Inhalation:	
Total:	**1.09E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.01%   0.00%

	mg/kg *Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*

Analyte: Benzo[a]pyrene

CAS: 50-32-8

Concentration mg/kg:	3.36E-01
RfDo (mg/kg-day):	3.00E-04
RfCi (mg/m3):	2.00E-06
SFO (mg/kg-day)-1:	1.00E+00
IUR (µg/m3)-1:	6.00E-04
Mutagen:	Y
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	9.59E-04	Ingestion:	1.03E-07
Dermal:	5.28E-04	Dermal:	5.65E-08
Inhalation:	2.82E-05	Inhalation:	1.21E-11
Total:	**1.51E-03**	**Total:**	**1.59E-07**

% Contribution to Media Risk   0.83%   4.37%

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Analyte: Benzo[b]fluoranthene

CAS: 205-99-2

		Calculated Hazard/Risk		
Concentration mg/kg:	6.65E-01			
RfDo (mg/kg-day):		**Non-Cancer Adult**	**Cancer**	
RfCi (mg/m3):		Ingestion:	Ingestion:	2.03E-08
SFO (mg/kg-day)-1:	1.00E-01	Dermal:	Dermal:	1.12E-08
IUR (µg/m3)-1:	6.00E-05	Inhalation:	Inhalation:	2.39E-12
Mutagen:	Y	**Total:** **0.00E+00**	**Total:**	**3.15E-08**
VOC:				

	% Contribution to Media Risk	0.00%		0.86%

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Analyte: Benzo[k]fluoranthene

CAS: 207-08-9

		Calculated Hazard/Risk		
Concentration mg/kg:	3.61E-01			
RfDo (mg/kg-day):		**Non-Cancer Adult**	**Cancer**	
RfCi (mg/m3):		Ingestion:	Ingestion:	1.10E-09
SFO (mg/kg-day)-1:	1.00E-02	Dermal:	Dermal:	6.07E-10
IUR (µg/m3)-1:	6.00E-06	Inhalation:	Inhalation:	1.30E-13
Mutagen:	Y	**Total:** **0.00E+00**	**Total:**	**1.71E-09**
VOC:				

	% Contribution to Media Risk	0.00%		0.05%

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: Benzoic Acid

CAS: 65-85-0

Concentration mg/kg:	1.20E+00
RfDo (mg/kg-day):	4.00E+00
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Cancer	
Ingestion:	2.57E-07	Ingestion:	
Dermal:	1.09E-07	Dermal:	
Inhalation:		Inhalation:	
Total:	**3.66E-07**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Analyte: Beryllium and compounds

CAS: 7440-41-7

Concentration mg/kg:	9.00E-01
RfDo (mg/kg-day):	2.00E-03
RfCi (mg/m3):	2.00E-05
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	2.40E-03
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Cancer	
Ingestion:	3.85E-04	Ingestion:	
Dermal:		Dermal:	
Inhalation:	7.55E-06	Inhalation:	1.30E-10
Total:	**3.93E-04**	**Total:**	**1.30E-10**

% Contribution to Media Risk   0.22%   0.00%

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Analyte: Bis(2-ethylhexyl)phthalate

CAS: 117-81-7

Concentration mg/kg:	2.31E-01
RfDo (mg/kg-day):	2.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	1.40E-02
IUR (µg/m3)-1:	2.40E-06
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Cancer	
Ingestion:	9.89E-06	Ingestion:	9.89E-10
Dermal:	4.19E-06	Dermal:	4.19E-10
Inhalation:		Inhalation:	3.32E-14
Total:	**1.41E-05**	**Total:**	**1.41E-09**

% Contribution to Media Risk   0.01%   0.04%

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Analyte: Butylbenzene, n-
CAS: 104-51-8

Concentration mg/kg:	1.40E-01		**Calculated Hazard/Risk**		
RfDo (mg/kg-day):	5.00E-02	**Non-Cancer Adult**		**Cancer**	
RfCi (mg/m3):		Ingestion:	2.40E-06	Ingestion:	
SFO (mg/kg-day)-1:		Dermal:		Dermal:	
IUR (µg/m3)-1:		Inhalation:		Inhalation:	
Mutagen:		**Total:**	**2.40E-06**	**Total:**	**0.00E+00**
VOC:	Y				

	% Contribution to Media Risk	0.00%	0.00%

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Analyte: Cadmium (Diet)
CAS: 7440-43-9-Diet

Concentration mg/kg:	3.33E-01		**Calculated Hazard/Risk**		
RfDo (mg/kg-day):	1.00E-04	**Non-Cancer Adult**		**Cancer**	
RfCi (mg/m3):	1.00E-05	Ingestion:	2.85E-03	Ingestion:	
SFO (mg/kg-day)-1:		Dermal:	3.02E-07	Dermal:	
IUR (µg/m3)-1:	1.80E-03	Inhalation:	5.59E-06	Inhalation:	3.59E-11
Mutagen:		**Total:**	**2.86E-03**	**Total:**	**3.59E-11**
VOC:					

	% Contribution to Media Risk	1.57%	0.00%

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: Carbazole

CAS: 86-74-8

Concentration mg/kg:	2.42E-01	Calculated Hazard/Risk	

		Non-Cancer Adult		**Cancer**	
RfDo (mg/kg-day):					
RfCi (mg/m3):		Ingestion:		Ingestion:	
SFO (mg/kg-day)-1:		Dermal:		Dermal:	
IUR (µg/m3)-1:		Inhalation:		Inhalation:	
Mutagen:		**Total:**	**0.00E+00**	**Total:**	**0.00E+00**
VOC:					

% Contribution to Media Risk   0.00%   0.00%

	mg/kg *Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*

Analyte: Chromium(III), Insoluble Salts

CAS: 16065-83-1

Concentration mg/kg:	2.06E+02	Calculated Hazard/Risk	

		Non-Cancer Adult		**Cancer**	
RfDo (mg/kg-day):	1.50E+00	Ingestion:	1.18E-04	Ingestion:	
RfCi (mg/m3):		Dermal:		Dermal:	
SFO (mg/kg-day)-1:		Inhalation:		Inhalation:	
IUR (µg/m3)-1:					
Mutagen:		**Total:**	**1.18E-04**	**Total:**	**0.00E+00**
VOC:					

% Contribution to Media Risk   0.06%   0.00%

	mg/kg *Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*

Analyte: Chrysene

CAS: 218-01-9

Concentration mg/kg:	6.91E-01	Calculated Hazard/Risk	

		Non-Cancer Adult		**Cancer**	
RfDo (mg/kg-day):					
RfCi (mg/m3):		Ingestion:		Ingestion:	2.11E-10
SFO (mg/kg-day)-1:	1.00E-03	Dermal:		Dermal:	1.16E-10
IUR (µg/m3)-1:	6.00E-07	Inhalation:		Inhalation:	2.49E-14
Mutagen:	Y	**Total:**	**0.00E+00**	**Total:**	**3.28E-10**
VOC:					

% Contribution to Media Risk   0.00%   0.01%

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Analyte: Cobalt

CAS: 7440-48-4

Concentration mg/kg:	1.04E+01	**Calculated Hazard/Risk**			
RfDo (mg/kg-day):	3.00E-04	**Non-Cancer Adult**		**Cancer**	
RfCi (mg/m3):	6.00E-06	Ingestion:	2.96E-02	Ingestion:	
SFO (mg/kg-day)-1:		Dermal:		Dermal:	
IUR (µg/m3)-1:	9.00E-03	Inhalation:	2.90E-04	Inhalation:	5.60E-09
Mutagen:		**Total:**	**2.99E-02**	**Total:**	**5.60E-09**
VOC:					

% Contribution to Media Risk	16.44%	0.15%

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Analyte: Copper

CAS: 7440-50-8

Concentration mg/kg:	1.55E+02	**Calculated Hazard/Risk**			
RfDo (mg/kg-day):	4.00E-02	**Non-Cancer Adult**		**Cancer**	
RfCi (mg/m3):		Ingestion:	3.32E-03	Ingestion:	
SFO (mg/kg-day)-1:		Dermal:		Dermal:	
IUR (µg/m3)-1:		Inhalation:		Inhalation:	
Mutagen:		**Total:**	**3.32E-03**	**Total:**	**0.00E+00**
VOC:					

% Contribution to Media Risk	1.82%	0.00%

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Risk Based Performance Criteria

Default Hazard Index   Default Risk for Individual Chemical   Default Cumulative Risk-All Chemicals

1   1.00E-06   1.00E-04

Soil

Analyte: Cresol, o-

CAS: 95-48-7

Concentration mg/kg:	1.30E-01
RfDo (mg/kg-day):	5.00E-02
RfCi (mg/m3):	6.00E-01
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	2.23E-06	Ingestion:	
Dermal:	9.42E-07	Dermal:	
Inhalation:	3.64E-11	Inhalation:	
Total:	**3.17E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

	mg/kg *Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*

Analyte: Cresol, p-chloro-m-

CAS: 59-50-7

Concentration mg/kg:	1.19E-01
RfDo (mg/kg-day):	1.00E-01
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	1.02E-06	Ingestion:	
Dermal:	4.31E-07	Dermal:	
Inhalation:		Inhalation:	
Total:	**1.45E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

	mg/kg *Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*

Analyte: Cumene

CAS: 98-82-8

Concentration mg/kg:	1.68E-01
RfDo (mg/kg-day):	1.00E-01
RfCi (mg/m3):	4.00E-01
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	1.44E-06	Ingestion:	
Dermal:		Dermal:	
Inhalation:	1.54E-05	Inhalation:	
Total:	**1.69E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.01%   0.00%

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Analyte: **Cyanide (CN-)**

CAS: **57-12-5**

		Calculated Hazard/Risk	
Concentration mg/kg:	8.26E-01		
RfDo (mg/kg-day):	6.00E-04	**Non-Cancer Adult**	**Cancer**
RfCi (mg/m3):	8.00E-04	Ingestion: 1.18E-03	Ingestion:
SFO (mg/kg-day)-1:		Dermal:	Dermal:
IUR (µg/m3)-1:		Inhalation: 4.42E-03	Inhalation:
Mutagen:		**Total:** **5.60E-03**	**Total:** **0.00E+00**
VOC:	Y		

         % Contribution to Media Risk   3.08%   0.00%

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Analyte: **Dibenz[a,h]anthracene**

CAS: **53-70-3**

		Calculated Hazard/Risk	
Concentration mg/kg:	1.98E-01		
RfDo (mg/kg-day):		**Non-Cancer Adult**	**Cancer**
RfCi (mg/m3):		Ingestion:	Ingestion: 6.05E-08
SFO (mg/kg-day)-1:	1.00E+00	Dermal:	Dermal: 3.33E-08
IUR (µg/m3)-1:	6.00E-04	Inhalation:	Inhalation: 7.12E-12
Mutagen:	Y	**Total:** **0.00E+00**	**Total:** **9.39E-08**
VOC:			

         % Contribution to Media Risk   0.00%   2.57%

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: Dimethylphenol, 2,4-

CAS: 105-67-9

		Calculated Hazard/Risk		
Concentration mg/kg:	2.00E-01			
RfDo (mg/kg-day):	2.00E-02	**Non-Cancer Adult**		**Cancer**
RfCi (mg/m3):		Ingestion: 8.56E-06		Ingestion:
SFO (mg/kg-day)-1:		Dermal: 3.62E-06		Dermal:
IUR (µg/m3)-1:		Inhalation:		Inhalation:
Mutagen:		**Total: 1.22E-05**		**Total: 0.00E+00**
VOC:				

% Contribution to Media Risk   0.01%   0.00%

	mg/kg *Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*

Analyte: Ethylbenzene

CAS: 100-41-4

		Calculated Hazard/Risk		
Concentration mg/kg:	3.42E-01			
RfDo (mg/kg-day):	5.00E-02	**Non-Cancer Adult**		**Cancer**
RfCi (mg/m3):	1.00E+00	Ingestion: 5.86E-06		Ingestion: 1.15E-09
SFO (mg/kg-day)-1:	1.10E-02	Dermal:		Dermal:
IUR (µg/m3)-1:	2.50E-06	Inhalation: 1.38E-05		Inhalation: 1.23E-08
Mutagen:		**Total: 1.96E-05**		**Total: 1.34E-08**
VOC:	Y			

% Contribution to Media Risk   0.01%   0.37%

	mg/kg *Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*

Analyte: Fluoranthene

CAS: 206-44-0

		Calculated Hazard/Risk		
Concentration mg/kg:	8.95E-01			
RfDo (mg/kg-day):	4.00E-02	**Non-Cancer Adult**		**Cancer**
RfCi (mg/m3):		Ingestion: 1.92E-05		Ingestion:
SFO (mg/kg-day)-1:		Dermal: 1.05E-05		Dermal:
IUR (µg/m3)-1:		Inhalation:		Inhalation:
Mutagen:		**Total: 2.97E-05**		**Total: 0.00E+00**
VOC:				

% Contribution to Media Risk   0.02%   0.00%

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Analyte: **Fluorene**

CAS: **86-73-7**

		Calculated Hazard/Risk		
Concentration mg/kg:	2.30E-01			
RfDo (mg/kg-day):	4.00E-02	**Non-Cancer Adult**		**Cancer**
RfCi (mg/m3):		Ingestion: 4.92E-06		Ingestion:
SFO (mg/kg-day)-1:		Dermal: 2.71E-06		Dermal:
IUR (µg/m3)-1:		Inhalation:		Inhalation:
Mutagen:		**Total:** **7.63E-06**		**Total:** **0.00E+00**
VOC:	Y			

       % Contribution to Media Risk   0.00%   0.00%

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Analyte: **Indeno[1,2,3-cd]pyrene**

CAS: **193-39-5**

		Calculated Hazard/Risk		
Concentration mg/kg:	2.82E-01			
RfDo (mg/kg-day):		**Non-Cancer Adult**		**Cancer**
RfCi (mg/m3):		Ingestion:		Ingestion: 8.62E-09
SFO (mg/kg-day)-1:	1.00E-01	Dermal:		Dermal: 4.74E-09
IUR (µg/m3)-1:	6.00E-05	Inhalation:		Inhalation: 1.01E-12
Mutagen:	Y	**Total:** **0.00E+00**		**Total:** **1.34E-08**
VOC:				

       % Contribution to Media Risk   0.00%   0.37%

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: Iron

CAS: 7439-89-6

		Calculated Hazard/Risk		
Concentration mg/kg:	6.57E+04			
RfDo (mg/kg-day):	7.00E-01	**Non-Cancer Adult**		**Cancer**
RfCi (mg/m3):		Ingestion: 8.04E-02		Ingestion:
SFO (mg/kg-day)-1:		Dermal:		Dermal:
IUR (µg/m3)-1:		Inhalation:		Inhalation:
Mutagen:		**Total: 8.04E-02**		**Total: 0.00E+00**
VOC:				

	% Contribution to Media Risk	44.20%	0.00%

	mg/kg *Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*

Analyte: isopropyltoluene

CAS: 99-87-6

		Calculated Hazard/Risk		
Concentration mg/kg:	9.93E-02			
RfDo (mg/kg-day):	1.00E-01	**Non-Cancer Adult**		**Cancer**
RfCi (mg/m3):	4.00E-01	Ingestion: 8.50E-07		Ingestion:
SFO (mg/kg-day)-1:		Dermal:		Dermal:
IUR (µg/m3)-1:		Inhalation: 5.91E-06		Inhalation:
Mutagen:		**Total: 6.76E-06**		**Total: 0.00E+00**
VOC:	Y			

	% Contribution to Media Risk	0.00%	0.00%

	mg/kg *Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*

Analyte: Lead and Compounds

CAS: 7439-92-1

		Calculated Hazard/Risk		
Concentration mg/kg:	2.05E+01			
RfDo (mg/kg-day):		**Non-Cancer Adult**		**Cancer**
RfCi (mg/m3):		Ingestion:		Ingestion:
SFO (mg/kg-day)-1:		Dermal:		Dermal:
IUR (µg/m3)-1:		Inhalation:		Inhalation:
Mutagen:		**Total: 0.00E+00**		**Total: 0.00E+00**
VOC:				

	% Contribution to Media Risk	0.00%	0.00%

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Analyte: Manganese (Diet)

CAS: 7439-96-5-Diet

Concentration mg/kg:	5.16E+02
RfDo (mg/kg-day):	1.40E-01
RfCi (mg/m3):	5.00E-05
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	3.16E-03	Ingestion:	
Dermal:		Dermal:	
Inhalation:	1.73E-03	Inhalation:	
Total:	**4.89E-03**	**Total:**	**0.00E+00**

	% Contribution to Media Risk	2.69%	0.00%

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Analyte: Mercury (elemental)

CAS: 7439-97-6

Concentration mg/kg:	5.07E-02
RfDo (mg/kg-day):	
RfCi (mg/m3):	3.00E-04
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:		Ingestion:	
Dermal:		Dermal:	
Inhalation:	1.11E-03	Inhalation:	
Total:	**1.11E-03**	**Total:**	**0.00E+00**

	% Contribution to Media Risk	0.61%	0.00%

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: Methyl Ethyl Ketone (2-Butanone)

CAS: 78-93-3

Concentration mg/kg:	5.73E-01
RfDo (mg/kg-day):	6.00E-01
RfCi (mg/m3):	5.00E+00
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	8.18E-07	Ingestion:	
Dermal:		Dermal:	
Inhalation:	2.14E-06	Inhalation:	
Total:	**2.96E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

	mg/kg *Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*

Analyte: Methylcyclohexane

CAS: 108-87-2

Concentration mg/kg:	7.39E+00
RfDo (mg/kg-day):	
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:		Ingestion:	
Dermal:		Dermal:	
Inhalation:		Inhalation:	
Total:	**0.00E+00**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%

	mg/kg *Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*

Analyte: Methylene Chloride

CAS: 75-09-2

Concentration mg/kg:	6.90E-04
RfDo (mg/kg-day):	6.00E-03
RfCi (mg/m3):	6.00E-01
SFO (mg/kg-day)-1:	2.00E-03
IUR (µg/m3)-1:	1.00E-08
Mutagen:	Y
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Cancer**	
Ingestion:	9.85E-08	Ingestion:	4.22E-13
Dermal:		Dermal:	
Inhalation:	1.20E-07	Inhalation:	2.57E-13
Total:	**2.18E-07**	**Total:**	**6.79E-13**

% Contribution to Media Risk   0.00%   0.00%

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

	mg/kg	*Non-Cancer Adult*		*Cancer*
Recommended Acceptable Concentration		*N/A*		*N/A*

Analyte: Methylnaphthalene, 1-

CAS: 90-12-0

		Calculated Hazard/Risk		
Concentration mg/kg:	2.18E+00			
RfDo (mg/kg-day):	7.00E-02	**Non-Cancer Adult**		**Cancer**
RfCi (mg/m3):		Ingestion: 2.67E-05		Ingestion: 1.93E-08
SFO (mg/kg-day)-1:	2.90E-02	Dermal: 1.47E-05		Dermal: 1.06E-08
IUR (µg/m3)-1:		Inhalation:		Inhalation:
Mutagen:		**Total: 4.13E-05**		**Total: 3.00E-08**
VOC:	Y			

	% Contribution to Media Risk	0.02%		0.82%

	mg/kg	*Non-Cancer Adult*		*Cancer*
Recommended Acceptable Concentration		*N/A*		*N/A*

Analyte: Methylnaphthalene, 2-

CAS: 91-57-6

		Calculated Hazard/Risk		
Concentration mg/kg:	3.51E+00			
RfDo (mg/kg-day):	4.00E-03	**Non-Cancer Adult**		**Cancer**
RfCi (mg/m3):		Ingestion: 7.51E-04		Ingestion:
SFO (mg/kg-day)-1:		Dermal: 4.13E-04		Dermal:
IUR (µg/m3)-1:		Inhalation:		Inhalation:
Mutagen:		**Total: 1.16E-03**		**Total: 0.00E+00**
VOC:	Y			

	% Contribution to Media Risk	0.64%		0.00%

	mg/kg	*Non-Cancer Adult*		*Cancer*
Recommended Acceptable Concentration		*N/A*		*N/A*

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: Naphthalene

CAS: 91-20-3

		Calculated Hazard/Risk			
Concentration mg/kg:	2.05E+00				
RfDo (mg/kg-day):	2.00E-02	**Non-Cancer Adult**		**Cancer**	
RfCi (mg/m3):	3.00E-03	Ingestion:	8.76E-05	Ingestion:	7.51E-08
SFO (mg/kg-day)-1:	1.20E-01	Dermal:	4.82E-05	Dermal:	4.13E-08
IUR (µg/m3)-1:	3.40E-05	Inhalation:	3.36E-03	Inhalation:	1.23E-07
Mutagen:		**Total:**	**3.50E-03**	**Total:**	**2.39E-07**
VOC:	Y				

	% Contribution to Media Risk	1.92%		6.55%

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Analyte: Nickel Soluble Salts

CAS: 7440-02-0

		Calculated Hazard/Risk			
Concentration mg/kg:	1.11E+02				
RfDo (mg/kg-day):	2.00E-02	**Non-Cancer Adult**		**Cancer**	
RfCi (mg/m3):	9.00E-05	Ingestion:	4.75E-03	Ingestion:	
SFO (mg/kg-day)-1:		Dermal:		Dermal:	
IUR (µg/m3)-1:	2.60E-04	Inhalation:	2.07E-04	Inhalation:	1.73E-09
Mutagen:		**Total:**	**4.95E-03**	**Total:**	**1.73E-09**
VOC:					

	% Contribution to Media Risk	2.72%		0.05%

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Analyte: Phenanthrene

CAS: 85-01-8

		Calculated Hazard/Risk			
Concentration mg/kg:	1.70E+00				
RfDo (mg/kg-day):	3.00E-02	**Non-Cancer Adult**		**Cancer**	
RfCi (mg/m3):		Ingestion:	4.84E-05	Ingestion:	
SFO (mg/kg-day)-1:		Dermal:	2.66E-05	Dermal:	
IUR (µg/m3)-1:		Inhalation:		Inhalation:	
Mutagen:		**Total:**	**7.51E-05**	**Total:**	**0.00E+00**
VOC:	Y				

	% Contribution to Media Risk	0.04%		0.00%

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Analyte: Pyrene

CAS: 129-00-0

Concentration mg/kg:	8.78E-01		**Calculated Hazard/Risk**		
RfDo (mg/kg-day):	3.00E-02	**Non-Cancer Adult**		**Cancer**	
RfCi (mg/m3):		Ingestion:	2.51E-05	Ingestion:	
SFO (mg/kg-day)-1:		Dermal:	1.38E-05	Dermal:	
IUR (µg/m3)-1:		Inhalation:		Inhalation:	
Mutagen:		**Total:**	**3.88E-05**	**Total:**	**0.00E+00**
VOC:	Y				

		% Contribution to Media Risk	0.02%		0.00%

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Analyte: Toluene

CAS: 108-88-3

Concentration mg/kg:	2.07E+00		**Calculated Hazard/Risk**		
RfDo (mg/kg-day):	8.00E-02	**Non-Cancer Adult**		**Cancer**	
RfCi (mg/m3):	5.00E+00	Ingestion:	2.22E-05	Ingestion:	
SFO (mg/kg-day)-1:		Dermal:		Dermal:	
IUR (µg/m3)-1:		Inhalation:	2.20E-05	Inhalation:	
Mutagen:		**Total:**	**4.42E-05**	**Total:**	**0.00E+00**
VOC:	Y				

		% Contribution to Media Risk	0.02%		0.00%

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Program: Voluntary Remediation Program (VRP)

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: Trimethylbenzene, 1,2,4-

CAS: 95-63-6

		Calculated Hazard/Risk	
Concentration mg/kg:	1.47E+00		
RfDo (mg/kg-day):	1.00E-02	**Non-Cancer Adult**	**Cancer**
RfCi (mg/m3):	6.00E-02	Ingestion: 1.26E-04	Ingestion:
SFO (mg/kg-day)-1:		Dermal:	Dermal:
IUR (µg/m3)-1:		Inhalation: 7.06E-04	Inhalation:
Mutagen:		**Total: 8.31E-04**	**Total: 0.00E+00**
VOC:	Y		

% Contribution to Media Risk   0.46%   0.00%

	mg/kg *Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*

Analyte: Trimethylbenzene, 1,3,5-

CAS: 108-67-8

		Calculated Hazard/Risk	
Concentration mg/kg:	4.37E-01		
RfDo (mg/kg-day):	1.00E-02	**Non-Cancer Adult**	**Cancer**
RfCi (mg/m3):	6.00E-02	Ingestion: 3.74E-05	Ingestion:
SFO (mg/kg-day)-1:		Dermal:	Dermal:
IUR (µg/m3)-1:		Inhalation: 2.52E-04	Inhalation:
Mutagen:		**Total: 2.89E-04**	**Total: 0.00E+00**
VOC:	Y		

% Contribution to Media Risk   0.16%   0.00%

	mg/kg *Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration	*N/A*	*N/A*

Analyte: Vanadium and Compounds

CAS: 7440-62-2

		Calculated Hazard/Risk	
Concentration mg/kg:	4.04E+01		
RfDo (mg/kg-day):	5.00E-03	**Non-Cancer Adult**	**Cancer**
RfCi (mg/m3):	1.00E-04	Ingestion: 6.91E-03	Ingestion:
SFO (mg/kg-day)-1:		Dermal:	Dermal:
IUR (µg/m3)-1:		Inhalation: 6.78E-05	Inhalation:
Mutagen:		**Total: 6.98E-03**	**Total: 0.00E+00**
VOC:			

% Contribution to Media Risk   3.84%   0.00%

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Analyte: Xylenes
CAS: 1330-20-7

Concentration mg/kg:	6.50E+00	**Calculated Hazard/Risk**	
RfDo (mg/kg-day):	2.00E-01	**Non-Cancer Adult**	**Cancer**
RfCi (mg/m3):	1.00E-01	Ingestion: 2.78E-05	Ingestion:
SFO (mg/kg-day)-1:		Dermal:	Dermal:
IUR (µg/m3)-1:		Inhalation: 2.58E-03	Inhalation:
Mutagen:		**Total: 2.61E-03**	**Total: 0.00E+00**
VOC:	Y		

  % Contribution to Media Risk   1.44%   0.00%

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Analyte: Zinc and Compounds
CAS: 7440-66-6

Concentration mg/kg:	4.97E+01	**Calculated Hazard/Risk**	
RfDo (mg/kg-day):	3.00E-01	**Non-Cancer Adult**	**Cancer**
RfCi (mg/m3):		Ingestion: 1.42E-04	Ingestion:
SFO (mg/kg-day)-1:		Dermal:	Dermal:
IUR (µg/m3)-1:		Inhalation:	Inhalation:
Mutagen:		**Total: 1.42E-04**	**Total: 0.00E+00**
VOC:			

  % Contribution to Media Risk   0.08%   0.00%

	mg/kg	*Non-Cancer Adult*	*Cancer*
Recommended Acceptable Concentration		*N/A*	*N/A*

Total Calculated Hazard Index/Risk for   Soil

Non-Cancer Adult		**Cancer**	
Ingestion:	1.61E-01	Ingestion:	2.73E-06
Dermal:	4.26E-03	Dermal:	6.79E-07
Inhalation:	1.63E-02	Inhalation:	2.35E-07
Total:	**1.82E-01**	**Total:**	**3.65E-06**

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Report Summary

Hazard/risk values of zero (0.00+00) are reflective of non-calculated values. Hazard/risk for zero value analytes must be evaluated outside of quantitative risk assessment.

Hazard/Risk Summary for Soil

Analyte	CAS	Hazard	Risk
Acenaphthene	83-32-9	4.56E-06	0.00E+00
Acenaphthylene	208-96-8	6.19E-06	0.00E+00
Acetone	67-64-1	1.64E-06	0.00E+00
Acetophenone	98-86-2	1.29E-06	0.00E+00
Aluminum	7429-90-5	8.21E-03	0.00E+00
Anthracene	120-12-7	1.12E-06	0.00E+00
Antimony (metallic)	7440-36-0	2.88E-03	0.00E+00
Arsenic, Inorganic	7440-38-2	1.84E-02	2.94E-06
Barium	7440-39-3	3.36E-04	0.00E+00
Benz[a]anthracene	56-55-3	0.00E+00	2.34E-08
Benzene	71-43-2	1.18E-03	9.82E-08
Benzo(g,h,i)perylene	191-24-2	1.09E-05	0.00E+00
Benzo[a]pyrene	50-32-8	1.51E-03	1.59E-07
Benzo[b]fluoranthene	205-99-2	0.00E+00	3.15E-08
Benzo[k]fluoranthene	207-08-9	0.00E+00	1.71E-09
Benzoic Acid	65-85-0	3.66E-07	0.00E+00
Beryllium and compounds	7440-41-7	3.93E-04	1.30E-10
Bis(2-ethylhexyl)phthalate	117-81-7	1.41E-05	1.41E-09
Butylbenzene, n-	104-51-8	2.40E-06	0.00E+00
Cadmium (Diet)	7440-43-9-Diet	2.86E-03	3.59E-11
Carbazole	86-74-8	0.00E+00	0.00E+00
Chromium(III), Insoluble Salts	16065-83-1	1.18E-04	0.00E+00
Chrysene	218-01-9	0.00E+00	3.28E-10
Cobalt	7440-48-4	2.99E-02	5.60E-09
Copper	7440-50-8	3.32E-03	0.00E+00
Cresol, o-	95-48-7	3.17E-06	0.00E+00
Cresol, p-chloro-m-	59-50-7	1.45E-06	0.00E+00
Cumene	98-82-8	1.69E-05	0.00E+00
Cyanide (CN-)	57-12-5	5.60E-03	0.00E+00
Dibenz[a,h]anthracene	53-70-3	0.00E+00	9.39E-08
Dimethylphenol, 2,4-	105-67-9	1.22E-05	0.00E+00
Ethylbenzene	100-41-4	1.96E-05	1.34E-08

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Hazard/Risk Summary for Soil

Analyte	CAS	Hazard	Risk
Fluoranthene	206-44-0	2.97E-05	0.00E+00
Fluorene	86-73-7	7.63E-06	0.00E+00
Indeno[1,2,3-cd]pyrene	193-39-5	0.00E+00	1.34E-08
Iron	7439-89-6	8.04E-02	0.00E+00
isopropyltoluene	99-87-6	6.76E-06	0.00E+00
Lead and Compounds	7439-92-1	0.00E+00	0.00E+00
Manganese (Diet)	7439-96-5-Diet	4.89E-03	0.00E+00
Mercury (elemental)	7439-97-6	1.11E-03	0.00E+00
Methyl Ethyl Ketone (2-Butanone)	78-93-3	2.96E-06	0.00E+00
Methylcyclohexane	108-87-2	0.00E+00	0.00E+00
Methylene Chloride	75-09-2	2.18E-07	6.79E-13
Methylnaphthalene, 1-	90-12-0	4.13E-05	3.00E-08
Methylnaphthalene, 2-	91-57-6	1.16E-03	0.00E+00
Naphthalene	91-20-3	3.50E-03	2.39E-07
Nickel Soluble Salts	7440-02-0	4.95E-03	1.73E-09
Phenanthrene	85-01-8	7.51E-05	0.00E+00
Pyrene	129-00-0	3.88E-05	0.00E+00
Toluene	108-88-3	4.42E-05	0.00E+00
Trimethylbenzene, 1,2,4-	95-63-6	8.31E-04	0.00E+00
Trimethylbenzene, 1,3,5-	108-67-8	2.89E-04	0.00E+00
Vanadium and Compounds	7440-62-2	6.98E-03	0.00E+00
Xylenes	1330-20-7	2.61E-03	0.00E+00
Zinc and Compounds	7440-66-6	1.42E-04	0.00E+00

Total Hazard Index/Risk for All Media

Non-Cancer Adult		**Cancer**	
Ingestion:	1.61E-01	Ingestion:	2.73E-06
Dermal:	4.26E-03	Dermal:	6.79E-07
Inhalation:	1.63E-02	Inhalation:	2.35E-07
Total:	**1.82E-01**	**Total:**	**3.65E-06**
does not exceed hazard index		*does not exceed cumulative risk*	

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Industrial Exposure Default Values

Symbol	Description	Value	Units
AFw	Composite Worker Soil Adherence Factor	0.12	(mg/cm2)
ATw	Composite Worker Averaging Time	365	(days/yr)
ATw	Composite Worker Averaging Time: 365 x LT	25550	(days)
ATw-a	Composite Worker Averaging Time: 365 x EDw	9125	(days)
BWw	Composite Worker Body Weight	80	(kg)
EDw	Composite Worker Total Exposure Duration	25	(yrs)
EFw	Composite Worker Exposure Frequency	250	(days/yr)
ETw	Composite Worker Exposure Time	8	(hrs/day)
ETw-ai	Composite Worker Air Inhalation Exposure Time	8	(hrs/day)
ETw-si	Composite Worker Soil Inhalation Exposure Time	8	(hrs/day)
IRw	Composite Worker Soil Ingestion Rate	100	(mg/day)
SAw	Composite Worker Soil Surface Area	3527	(cm2/day)

END OF REPORT

Groundwater Declaration Restricted Use

Restricted use of groundwater is for onsite use ONLY. Potential offsite risks and receptors are evaluated separately. The nature and extent of the groundwater plume is sufficiently characterized. Concentrations along the vertical and horizontal migration of the plume are stable.

No COPCs evaluated in Groundwater

ATTACHMENT 3-4
RECREATOR

Virginia Department of Environmental Quality

VURAM

Virginia Unified Risk Assessment Model

VERSION: 3.2.1

Recreator Quantitative Risk Assessment Report

Program: Voluntary Remediation Program (VRP)

Site Name: Alexandria

By submitting this report to the Virginia DEQ, the user confirms that VURAM's default exposure parameters have not been altered, unless a complete unaltered VURAM analysis is provided and all modifications are detailed explicitly in an accompanying narrative or documentation that shows DEQ's prior concurrence with specific changes.

Chemical Specific Notes Displayed as Applicable

Lead

VURAM does not perform an evaluation for lead exposure. Use other approved models for lead modeling.

All Report Pages are Required for Risk Assessment Submission

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Acenaphthene**

CAS: **83-32-9**

Concentration mg/kg :	2.06E-01
RfDo (mg/kg-day):	6.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	2.29E-06	Ingestion:	2.45E-05	Ingestion:	
Dermal:	1.26E-06	Dermal:	7.54E-06	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**3.55E-06**	**Total:**	**3.20E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%   0.00%

Analyte: **Acenaphthylene**

CAS: **208-96-8**

Concentration mg/kg :	1.40E-01
RfDo (mg/kg-day):	3.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	3.12E-06	Ingestion:	3.32E-05	Ingestion:	
Dermal:	1.71E-06	Dermal:	1.03E-05	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**4.83E-06**	**Total:**	**4.35E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%   0.00%

Analyte: **Acetone**

CAS: **67-64-1**

Concentration mg/kg :	1.72E+00
RfDo (mg/kg-day):	9.00E-01
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	1.28E-06	Ingestion:	1.36E-05	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**1.28E-06**	**Total:**	**1.36E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%   0.00%

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Acetophenone**

CAS: **98-86-2**

Concentration mg/kg :	1.51E-01
RfDo (mg/kg-day):	1.00E-01
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	1.01E-06	Ingestion:	1.08E-05	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**1.01E-06**	**Total:**	**1.08E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%   0.00%

Analyte: **Aluminum**

CAS: **7429-90-5**

Concentration mg/kg :	9.23E+03
RfDo (mg/kg-day):	1.00E+00
RfCi (mg/m3):	5.00E-03
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	6.16E-03	Ingestion:	6.57E-02	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	6.04E-05	Inhalation:	6.04E-05	Inhalation:	
Total:	**6.22E-03**	**Total:**	**6.58E-02**	**Total:**	**0.00E+00**

% Contribution to Media Risk   4.69%   4.81%   0.00%

Analyte: **Anthracene**

CAS: **120-12-7**

Concentration mg/kg :	2.53E-01
RfDo (mg/kg-day):	3.00E-01
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	5.63E-07	Ingestion:	6.01E-06	Ingestion:	
Dermal:	3.09E-07	Dermal:	1.85E-06	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**8.72E-07**	**Total:**	**7.86E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%   0.00%

Site Name: **Alexandria**   **Recreator**

Program: **Voluntary Remediation Program (VRP)**

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Antimony (metallic)**

CAS: **7440-36-0**

Concentration mg/kg :	1.34E+00
RfDo (mg/kg-day):	4.00E-04
RfCi (mg/m3):	3.00E-04
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	2.24E-03	Ingestion:	2.39E-02	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	1.47E-07	Inhalation:	1.47E-07	Inhalation:	
Total:	**2.24E-03**	**Total:**	**2.39E-02**	**Total:**	**0.00E+00**

% Contribution to Media Risk   1.69%   1.75%   0.00%

Analyte: **Arsenic, Inorganic**

CAS: **7440-38-2**

Concentration mg/kg :	8.80E+00
RfDo (mg/kg-day):	3.00E-04
RfCi (mg/m3):	1.50E-05
SFO (mg/kg-day)-1:	1.50E+00
IUR (µg/m3)-1:	4.30E-03
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	1.18E-02	Ingestion:	1.25E-01	Ingestion:	6.35E-06
Dermal:	2.48E-03	Dermal:	1.49E-02	Dermal:	8.93E-07
Inhalation:	1.92E-05	Inhalation:	1.92E-05	Inhalation:	4.60E-10
Total:	**1.43E-02**	**Total:**	**1.40E-01**	**Total:**	**7.24E-06**

% Contribution to Media Risk   10.75%   10.26%   66.06%

Exceeds Risk!

Analyte: **Barium**

CAS: **7440-39-3**

Concentration mg/kg :	7.27E+01
RfDo (mg/kg-day):	2.00E-01
RfCi (mg/m3):	5.00E-04
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	2.43E-04	Ingestion:	2.59E-03	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	4.76E-06	Inhalation:	4.76E-06	Inhalation:	
Total:	**2.48E-04**	**Total:**	**2.59E-03**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.19%   0.19%   0.00%

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Benz[a]anthracene**
CAS: **56-55-3**

Concentration mg/kg :	4.82E-01
RfDo (mg/kg-day):	
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	1.00E-01
IUR (µg/m3)-1:	6.00E-05
Mutagen:	Y
VOC:	Y

Calculated Hazard/Risk

	Non-Cancer Adult		Non-Cancer Child		Cancer
Ingestion:		Ingestion:		Ingestion:	1.75E-07
Dermal:		Dermal:		Dermal:	5.85E-08
Inhalation:		Inhalation:		Inhalation:	3.01E-10
Total:	**0.00E+00**	**Total:**	**0.00E+00**	**Total:**	**2.34E-07**

% Contribution to Media Risk 0.00%   0.00%   2.14%

Analyte: **Benzene**
CAS: **71-43-2**

Concentration mg/kg :	5.00E-01
RfDo (mg/kg-day):	4.00E-03
RfCi (mg/m3):	3.00E-02
SFO (mg/kg-day)-1:	5.50E-02
IUR (µg/m3)-1:	7.80E-06
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

	Non-Cancer Adult		Non-Cancer Child		Cancer
Ingestion:	8.35E-05	Ingestion:	8.90E-04	Ingestion:	2.20E-08
Dermal:		Dermal:		Dermal:	
Inhalation:	2.10E-04	Inhalation:	2.10E-04	Inhalation:	1.82E-08
Total:	**2.93E-04**	**Total:**	**1.10E-03**	**Total:**	**4.03E-08**

% Contribution to Media Risk 0.22%   0.08%   0.37%

Analyte: **Benzo(g,h,i)perylene**
CAS: **191-24-2**

Concentration mg/kg :	2.47E-01
RfDo (mg/kg-day):	3.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

	Non-Cancer Adult		Non-Cancer Child		Cancer
Ingestion:	5.50E-06	Ingestion:	5.86E-05	Ingestion:	
Dermal:	3.02E-06	Dermal:	1.81E-05	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**8.52E-06**	**Total:**	**7.67E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk 0.01%   0.01%   0.00%

Site Name:	**Alexandria**
Program:	**Voluntary Remediation Program (VRP)**

<div align="right">**Recreator**</div>

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Benzo[a]pyrene**
CAS: **50-32-8**

Concentration mg/kg :	3.36E-01
RfDo (mg/kg-day):	3.00E-04
RfCi (mg/m3):	2.00E-06
SFO (mg/kg-day)-1:	1.00E+00
IUR (µg/m3)-1:	6.00E-04
Mutagen:	Y
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	7.48E-04	Ingestion:	7.98E-03	Ingestion:	1.22E-06
Dermal:	4.11E-04	Dermal:	2.46E-03	Dermal:	4.08E-07
Inhalation:	5.50E-06	Inhalation:	5.50E-06	Inhalation:	6.79E-12
Total:	**1.16E-03**	**Total:**	**1.04E-02**	**Total:**	**1.63E-06**

% Contribution to Media Risk	0.88%	0.76%	14.88%

Exceeds Risk!

Analyte: **Benzo[b]fluoranthene**
CAS: **205-99-2**

Concentration mg/kg :	6.65E-01
RfDo (mg/kg-day):	
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	1.00E-01
IUR (µg/m3)-1:	6.00E-05
Mutagen:	Y
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:		Ingestion:		Ingestion:	2.42E-07
Dermal:		Dermal:		Dermal:	8.07E-08
Inhalation:		Inhalation:		Inhalation:	1.34E-12
Total:	**0.00E+00**	**Total:**	**0.00E+00**	**Total:**	**3.23E-07**

% Contribution to Media Risk	0.00%	0.00%	2.94%

Analyte: **Benzo[k]fluoranthene**
CAS: **207-08-9**

Concentration mg/kg :	3.61E-01
RfDo (mg/kg-day):	
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	1.00E-02
IUR (µg/m3)-1:	6.00E-06
Mutagen:	Y
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:		Ingestion:		Ingestion:	1.31E-08
Dermal:		Dermal:		Dermal:	4.38E-09
Inhalation:		Inhalation:		Inhalation:	7.29E-14
Total:	**0.00E+00**	**Total:**	**0.00E+00**	**Total:**	**1.75E-08**

% Contribution to Media Risk	0.00%	0.00%	0.16%

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Benzoic Acid**

CAS: **65-85-0**

Concentration mg/kg :	1.20E+00
RfDo (mg/kg-day):	4.00E+00
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	2.00E-07	Ingestion:	2.14E-06	Ingestion:	
Dermal:	8.46E-08	Dermal:	5.07E-07	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**2.85E-07**	**Total:**	**2.64E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%   0.00%

Analyte: **Beryllium and compounds**

CAS: **7440-41-7**

Concentration mg/kg :	9.00E-01
RfDo (mg/kg-day):	2.00E-03
RfCi (mg/m3):	2.00E-05
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	2.40E-03
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	3.01E-04	Ingestion:	3.21E-03	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	1.47E-06	Inhalation:	1.47E-06	Inhalation:	2.63E-11
Total:	**3.02E-04**	**Total:**	**3.21E-03**	**Total:**	**2.63E-11**

% Contribution to Media Risk   0.23%   0.23%   0.00%

Analyte: **Bis(2-ethylhexyl)phthalate**

CAS: **117-81-7**

Concentration mg/kg :	2.31E-01
RfDo (mg/kg-day):	2.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	1.40E-02
IUR (µg/m3)-1:	2.40E-06
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	7.71E-06	Ingestion:	8.23E-05	Ingestion:	2.59E-09
Dermal:	3.26E-06	Dermal:	1.95E-05	Dermal:	7.29E-10
Inhalation:		Inhalation:		Inhalation:	6.74E-15
Total:	**1.10E-05**	**Total:**	**1.02E-04**	**Total:**	**3.32E-09**

% Contribution to Media Risk   0.01%   0.01%   0.03%

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Butylbenzene, n-**

CAS: **104-51-8**

Concentration mg/kg :	1.40E-01
RfDo (mg/kg-day):	5.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	1.87E-06	Ingestion:	1.99E-05	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**1.87E-06**	**Total:**	**1.99E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%   0.00%

Analyte: **Cadmium (Diet)**

CAS: **7440-43-9-Diet**

Concentration mg/kg :	3.33E-01
RfDo (mg/kg-day):	1.00E-04
RfCi (mg/m3):	1.00E-05
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	1.80E-03
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	2.22E-03	Ingestion:	2.37E-02	Ingestion:	
Dermal:	3.76E-04	Dermal:	2.25E-03	Dermal:	
Inhalation:	1.09E-06	Inhalation:	1.09E-06	Inhalation:	7.29E-12
Total:	**2.60E-03**	**Total:**	**2.60E-02**	**Total:**	**7.29E-12**

% Contribution to Media Risk   1.96%   1.90%   0.00%

Analyte: **Carbazole**

CAS: **86-74-8**

Concentration mg/kg :	2.42E-01
RfDo (mg/kg-day):	
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:		Ingestion:		Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**0.00E+00**	**Total:**	**0.00E+00**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%   0.00%

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Chromium(III), Insoluble Salts**
CAS: **16065-83-1**

Concentration mg/kg :	2.06E+02
RfDo (mg/kg-day):	1.50E+00
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	9.17E-05	Ingestion:	9.78E-04	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**9.17E-05**	**Total:**	**9.78E-04**	**Total:**	**0.00E+00**

% Contribution to Media Risk	0.07%	0.07%	0.00%

Analyte: **Chrysene**
CAS: **218-01-9**

Concentration mg/kg :	6.91E-01
RfDo (mg/kg-day):	
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	1.00E-03
IUR (µg/m3)-1:	6.00E-07
Mutagen:	Y
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:		Ingestion:		Ingestion:	2.51E-09
Dermal:		Dermal:		Dermal:	8.39E-10
Inhalation:		Inhalation:		Inhalation:	1.40E-14
Total:	**0.00E+00**	**Total:**	**0.00E+00**	**Total:**	**3.35E-09**

% Contribution to Media Risk	0.00%	0.00%	0.03%

Analyte: **Cobalt**
CAS: **7440-48-4**

Concentration mg/kg :	1.04E+01
RfDo (mg/kg-day):	3.00E-04
RfCi (mg/m3):	6.00E-06
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	9.00E-03
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	2.31E-02	Ingestion:	2.46E-01	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	5.66E-05	Inhalation:	5.66E-05	Inhalation:	1.13E-09
Total:	**2.31E-02**	**Total:**	**2.46E-01**	**Total:**	**1.13E-09**

% Contribution to Media Risk	17.45%	18.02%	0.01%

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Copper**

CAS: **7440-50-8**

Concentration mg/kg :	1.55E+02
RfDo (mg/kg-day):	4.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	2.59E-03	Ingestion:	2.76E-02	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**2.59E-03**	**Total:**	**2.76E-02**	**Total:**	**0.00E+00**

% Contribution to Media Risk 1.95%   2.02%   0.00%

Analyte: **Cresol, o-**

CAS: **95-48-7**

Concentration mg/kg :	1.30E-01
RfDo (mg/kg-day):	5.00E-02
RfCi (mg/m3):	6.00E-01
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	1.74E-06	Ingestion:	1.85E-05	Ingestion:	
Dermal:	7.33E-07	Dermal:	4.39E-06	Dermal:	
Inhalation:	7.09E-12	Inhalation:	7.09E-12	Inhalation:	
Total:	**2.47E-06**	**Total:**	**2.29E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk 0.00%   0.00%   0.00%

Analyte: **Cresol, p-chloro-m-**

CAS: **59-50-7**

Concentration mg/kg :	1.19E-01
RfDo (mg/kg-day):	1.00E-01
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	7.95E-07	Ingestion:	8.48E-06	Ingestion:	
Dermal:	3.36E-07	Dermal:	2.01E-06	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**1.13E-06**	**Total:**	**1.05E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk 0.00%   0.00%   0.00%

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Cumene**

CAS: **98-82-8**

Concentration mg/kg :	1.68E-01
RfDo (mg/kg-day):	1.00E-01
RfCi (mg/m3):	4.00E-01
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	1.12E-06	Ingestion:	1.20E-05	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	3.01E-06	Inhalation:	3.01E-06	Inhalation:	
Total:	**4.13E-06**	**Total:**	**1.50E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%   0.00%

Analyte: **Cyanide (CN-)**

CAS: **57-12-5**

Concentration mg/kg :	8.26E-01
RfDo (mg/kg-day):	6.00E-04
RfCi (mg/m3):	8.00E-04
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	9.19E-04	Ingestion:	9.81E-03	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	8.62E-04	Inhalation:	8.62E-04	Inhalation:	
Total:	**1.78E-03**	**Total:**	**1.07E-02**	**Total:**	**0.00E+00**

% Contribution to Media Risk   1.34%   0.78%   0.00%

Analyte: **Dibenz[a,h]anthracene**

CAS: **53-70-3**

Concentration mg/kg :	1.98E-01
RfDo (mg/kg-day):	
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	1.00E+00
IUR (µg/m3)-1:	6.00E-04
Mutagen:	Y
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:		Ingestion:		Ingestion:	7.20E-07
Dermal:		Dermal:		Dermal:	2.40E-07
Inhalation:		Inhalation:		Inhalation:	4.00E-12
Total:	**0.00E+00**	**Total:**	**0.00E+00**	**Total:**	**9.61E-07**

% Contribution to Media Risk   0.00%   0.00%   8.77%

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Dimethylphenol, 2,4-**

CAS: **105-67-9**

Concentration mg/kg :	2.00E-01
RfDo (mg/kg-day):	2.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	6.68E-06	Ingestion:	7.12E-05	Ingestion:	
Dermal:	2.82E-06	Dermal:	1.69E-05	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**9.50E-06**	**Total:**	**8.81E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.01%   0.01%   0.00%

Analyte: **Ethylbenzene**

CAS: **100-41-4**

Concentration mg/kg :	3.42E-01
RfDo (mg/kg-day):	5.00E-02
RfCi (mg/m3):	1.00E+00
SFO (mg/kg-day)-1:	1.10E-02
IUR (µg/m3)-1:	2.50E-06
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	4.57E-06	Ingestion:	4.87E-05	Ingestion:	3.01E-09
Dermal:		Dermal:		Dermal:	
Inhalation:	2.69E-06	Inhalation:	2.69E-06	Inhalation:	2.49E-09
Total:	**7.25E-06**	**Total:**	**5.14E-05**	**Total:**	**5.51E-09**

% Contribution to Media Risk   0.01%   0.00%   0.05%

Analyte: **Fluoranthene**

CAS: **206-44-0**

Concentration mg/kg :	8.95E-01
RfDo (mg/kg-day):	4.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	1.49E-05	Ingestion:	1.59E-04	Ingestion:	
Dermal:	8.20E-06	Dermal:	4.92E-05	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**2.31E-05**	**Total:**	**2.09E-04**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.02%   0.02%   0.00%

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Fluorene**

CAS: **86-73-7**

Concentration mg/kg :	2.30E-01
RfDo (mg/kg-day):	4.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	3.84E-06	Ingestion:	4.10E-05	Ingestion:	
Dermal:	2.11E-06	Dermal:	1.26E-05	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**5.95E-06**	**Total:**	**5.36E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%   0.00%

Analyte: **Indeno[1,2,3-cd]pyrene**

CAS: **193-39-5**

Concentration mg/kg :	2.82E-01
RfDo (mg/kg-day):	
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	1.00E-01
IUR (µg/m3)-1:	6.00E-05
Mutagen:	Y
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:		Ingestion:		Ingestion:	1.03E-07
Dermal:		Dermal:		Dermal:	3.42E-08
Inhalation:		Inhalation:		Inhalation:	5.70E-13
Total:	**0.00E+00**	**Total:**	**0.00E+00**	**Total:**	**1.37E-07**

% Contribution to Media Risk   0.00%   0.00%   1.25%

Analyte: **Iron**

CAS: **7439-89-6**

Concentration mg/kg :	6.57E+04
RfDo (mg/kg-day):	7.00E-01
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	6.27E-02	Ingestion:	6.69E-01	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**6.27E-02**	**Total:**	**6.69E-01**	**Total:**	**0.00E+00**

% Contribution to Media Risk   47.26%   48.92%   0.00%

Site Name: **Alexandria** **Recreator**

Program: **Voluntary Remediation Program (VRP)**

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **isopropyltoluene**

CAS: **99-87-6**

Concentration mg/kg :	9.93E-02
RfDo (mg/kg-day):	1.00E-01
RfCi (mg/m3):	4.00E-01
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	6.63E-07	Ingestion:	7.07E-06	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	1.15E-06	Inhalation:	1.15E-06	Inhalation:	
Total:	**1.81E-06**	**Total:**	**8.23E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%   0.00%

Analyte: **Lead and Compounds**

CAS: **7439-92-1**

Concentration mg/kg :	2.05E+01
RfDo (mg/kg-day):	
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:		Ingestion:		Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**0.00E+00**	**Total:**	**0.00E+00**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%   0.00%

Analyte: **Manganese (Diet)**

CAS: **7439-96-5-Diet**

Concentration mg/kg :	5.16E+02
RfDo (mg/kg-day):	1.40E-01
RfCi (mg/m3):	5.00E-05
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	2.46E-03	Ingestion:	2.63E-02	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	3.38E-04	Inhalation:	3.38E-04	Inhalation:	
Total:	**2.80E-03**	**Total:**	**2.66E-02**	**Total:**	**0.00E+00**

% Contribution to Media Risk   2.11%   1.95%   0.00%

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Mercury (elemental)**
CAS: **7439-97-6**

Concentration mg/kg :	5.07E-02
RfDo (mg/kg-day):	
RfCi (mg/m3):	3.00E-04
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:		Ingestion:		Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	2.17E-04	Inhalation:	2.17E-04	Inhalation:	
Total:	**2.17E-04**	**Total:**	**2.17E-04**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.16%   0.02%   0.00%

Analyte: **Methyl Ethyl Ketone (2-Butanone)**
CAS: **78-93-3**

Concentration mg/kg :	5.73E-01
RfDo (mg/kg-day):	6.00E-01
RfCi (mg/m3):	5.00E+00
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	6.38E-07	Ingestion:	6.80E-06	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	4.18E-07	Inhalation:	4.18E-07	Inhalation:	
Total:	**1.06E-06**	**Total:**	**7.22E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%   0.00%

Analyte: **Methylcyclohexane**
CAS: **108-87-2**

Concentration mg/kg :	7.39E+00
RfDo (mg/kg-day):	
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:		Ingestion:		Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**0.00E+00**	**Total:**	**0.00E+00**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%   0.00%

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: Methylene Chloride
CAS: 75-09-2

Concentration mg/kg :	6.90E-04
RfDo (mg/kg-day):	6.00E-03
RfCi (mg/m3):	6.00E-01
SFO (mg/kg-day)-1:	2.00E-03
IUR (µg/m3)-1:	1.00E-08
Mutagen:	Y
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	7.68E-08	Ingestion:	8.19E-07	Ingestion:	5.02E-12
Dermal:		Dermal:		Dermal:	
Inhalation:	2.34E-08	Inhalation:	2.34E-08	Inhalation:	1.44E-13
Total:	**1.00E-07**	**Total:**	**8.43E-07**	**Total:**	**5.16E-12**

% Contribution to Media Risk   0.00%   0.00%   0.00%

Analyte: Methylnaphthalene, 1-
CAS: 90-12-0

Concentration mg/kg :	2.18E+00
RfDo (mg/kg-day):	7.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	2.90E-02
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	2.08E-05	Ingestion:	2.22E-04	Ingestion:	5.06E-08
Dermal:	1.14E-05	Dermal:	6.84E-05	Dermal:	1.85E-08
Inhalation:		Inhalation:		Inhalation:	
Total:	**3.22E-05**	**Total:**	**2.90E-04**	**Total:**	**6.92E-08**

% Contribution to Media Risk   0.02%   0.02%   0.63%

Analyte: Methylnaphthalene, 2-
CAS: 91-57-6

Concentration mg/kg :	3.51E+00
RfDo (mg/kg-day):	4.00E-03
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	5.86E-04	Ingestion:	6.25E-03	Ingestion:	
Dermal:	3.22E-04	Dermal:	1.93E-03	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**9.08E-04**	**Total:**	**8.18E-03**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.68%   0.60%   0.00%

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: Naphthalene

CAS: 91-20-3

Concentration mg/kg :	2.05E+00
RfDo (mg/kg-day):	2.00E-02
RfCi (mg/m3):	3.00E-03
SFO (mg/kg-day)-1:	1.20E-01
IUR (µg/m3)-1:	3.40E-05
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	6.83E-05	Ingestion:	7.29E-04	Ingestion:	1.97E-07
Dermal:	3.75E-05	Dermal:	2.25E-04	Dermal:	7.20E-08
Inhalation:	6.56E-04	Inhalation:	6.56E-04	Inhalation:	2.48E-08
Total:	**7.62E-04**	**Total:**	**1.61E-03**	**Total:**	**2.94E-07**

% Contribution to Media Risk 0.57%   0.12%   2.68%

Analyte: Nickel Soluble Salts

CAS: 7440-02-0

Concentration mg/kg :	1.11E+02
RfDo (mg/kg-day):	2.00E-02
RfCi (mg/m3):	9.00E-05
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	2.60E-04
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	3.70E-03	Ingestion:	3.95E-02	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	4.03E-05	Inhalation:	4.03E-05	Inhalation:	3.51E-10
Total:	**3.74E-03**	**Total:**	**3.95E-02**	**Total:**	**3.51E-10**

% Contribution to Media Risk 2.82%   2.89%   0.00%

Analyte: Phenanthrene

CAS: 85-01-8

Concentration mg/kg :	1.70E+00
RfDo (mg/kg-day):	3.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	3.78E-05	Ingestion:	4.03E-04	Ingestion:	
Dermal:	2.07E-05	Dermal:	1.24E-04	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**5.85E-05**	**Total:**	**5.27E-04**	**Total:**	**0.00E+00**

% Contribution to Media Risk 0.04%   0.04%   0.00%

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Pyrene**

CAS: **129-00-0**

Concentration mg/kg :	8.78E-01
RfDo (mg/kg-day):	3.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	1.95E-05	Ingestion:	2.08E-04	Ingestion:	
Dermal:	1.07E-05	Dermal:	6.43E-05	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**3.03E-05**	**Total:**	**2.73E-04**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.02%   0.02%   0.00%

Analyte: **Toluene**

CAS: **108-88-3**

Concentration mg/kg :	2.07E+00
RfDo (mg/kg-day):	8.00E-02
RfCi (mg/m3):	5.00E+00
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	1.73E-05	Ingestion:	1.84E-04	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	4.30E-06	Inhalation:	4.30E-06	Inhalation:	
Total:	**2.16E-05**	**Total:**	**1.89E-04**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.02%   0.01%   0.00%

Analyte: **Trimethylbenzene, 1,2,4-**

CAS: **95-63-6**

Concentration mg/kg :	1.47E+00
RfDo (mg/kg-day):	1.00E-02
RfCi (mg/m3):	6.00E-02
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	9.80E-05	Ingestion:	1.04E-03	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	1.38E-04	Inhalation:	1.38E-04	Inhalation:	
Total:	**2.36E-04**	**Total:**	**1.18E-03**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.18%   0.09%   0.00%

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Trimethylbenzene, 1,3,5-**

CAS: **108-67-8**

Concentration mg/kg :	4.37E-01
RfDo (mg/kg-day):	1.00E-02
RfCi (mg/m3):	6.00E-02
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	2.92E-05	Ingestion:	3.11E-04	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	4.91E-05	Inhalation:	4.91E-05	Inhalation:	
Total:	**7.82E-05**	**Total:**	**3.60E-04**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.06%   0.03%   0.00%

Analyte: **Vanadium and Compounds**

CAS: **7440-62-2**

Concentration mg/kg :	4.04E+01
RfDo (mg/kg-day):	5.00E-03
RfCi (mg/m3):	1.00E-04
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	5.39E-03	Ingestion:	5.75E-02	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	1.32E-05	Inhalation:	1.32E-05	Inhalation:	
Total:	**5.40E-03**	**Total:**	**5.75E-02**	**Total:**	**0.00E+00**

% Contribution to Media Risk   4.07%   4.21%   0.00%

Analyte: **Xylenes**

CAS: **1330-20-7**

Concentration mg/kg :	6.50E+00
RfDo (mg/kg-day):	2.00E-01
RfCi (mg/m3):	1.00E-01
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	
VOC:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	2.17E-05	Ingestion:	2.31E-04	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	5.04E-04	Inhalation:	5.04E-04	Inhalation:	
Total:	**5.26E-04**	**Total:**	**7.35E-04**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.40%   0.05%   0.00%

Program: **Voluntary Remediation Program (VRP)**

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Zinc and Compounds**

CAS: **7440-66-6**

		Calculated Hazard/Risk		
Concentration mg/kg :	4.97E+01			
RfDo (mg/kg-day):	3.00E-01	**Non-Cancer Adult**	**Non-Cancer Child**	**Cancer**
RfCi (mg/m3):		Ingestion: 1.11E-04	Ingestion: 1.18E-03	Ingestion:
SFO (mg/kg-day)-1:		Dermal:	Dermal:	Dermal:
IUR (µg/m3)-1:		Inhalation:	Inhalation:	Inhalation:
Mutagen:		**Total:** **1.11E-04**	**Total:** **1.18E-03**	**Total:** **0.00E+00**
VOC:				

% Contribution to Media Risk   0.08%   0.09%   0.00%

Total Calculated Hazard Index/Risk for   Soil

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	1.26E-01	Ingestion:	1.34E+00	Ingestion:	9.10E-06
Dermal:	3.69E-03	Dermal:	2.21E-02	Dermal:	1.81E-06
Inhalation:	3.19E-03	Inhalation:	3.19E-03	Inhalation:	4.79E-08
Total:	**1.33E-01**	**Total:**	**1.37E+00**	**Total:**	**1.10E-05**

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Report Summary

Hazard/risk values of zero (0.00+00) are reflective of non-calculated values. Hazard/risk for zero value analytes must be evaluated outside of quantitative risk assessment.

Hazard/Risk Summary for Soil

Analyte	CAS	Hazard Adult	Hazard Child	Risk
Acenaphthene	83-32-9	3.55E-06	3.20E-05	0.00E+00
Acenaphthylene	208-96-8	4.83E-06	4.35E-05	0.00E+00
Acetone	67-64-1	1.28E-06	1.36E-05	0.00E+00
Acetophenone	98-86-2	1.01E-06	1.08E-05	0.00E+00
Aluminum	7429-90-5	6.22E-03	6.58E-02	0.00E+00
Anthracene	120-12-7	8.72E-07	7.86E-06	0.00E+00
Antimony (metallic)	7440-36-0	2.24E-03	2.39E-02	0.00E+00
Arsenic, Inorganic	7440-38-2	1.43E-02	1.40E-01	7.24E-06
Barium	7440-39-3	2.48E-04	2.59E-03	0.00E+00
Benz[a]anthracene	56-55-3	0.00E+00	0.00E+00	2.34E-07
Benzene	71-43-2	2.93E-04	1.10E-03	4.03E-08
Benzo(g,h,i)perylene	191-24-2	8.52E-06	7.67E-05	0.00E+00
Benzo[a]pyrene	50-32-8	1.16E-03	1.04E-02	1.63E-06
Benzo[b]fluoranthene	205-99-2	0.00E+00	0.00E+00	3.23E-07
Benzo[k]fluoranthene	207-08-9	0.00E+00	0.00E+00	1.75E-08
Benzoic Acid	65-85-0	2.85E-07	2.64E-06	0.00E+00
Beryllium and compounds	7440-41-7	3.02E-04	3.21E-03	2.63E-11
Bis(2-ethylhexyl)phthalate	117-81-7	1.10E-05	1.02E-04	3.32E-09
Butylbenzene, n-	104-51-8	1.87E-06	1.99E-05	0.00E+00
Cadmium (Diet)	7440-43-9-Diet	2.60E-03	2.60E-02	7.29E-12
Carbazole	86-74-8	0.00E+00	0.00E+00	0.00E+00
Chromium(III), Insoluble Salts	16065-83-1	9.17E-05	9.78E-04	0.00E+00
Chrysene	218-01-9	0.00E+00	0.00E+00	3.35E-09
Cobalt	7440-48-4	2.31E-02	2.46E-01	1.13E-09
Copper	7440-50-8	2.59E-03	2.76E-02	0.00E+00
Cresol, o-	95-48-7	2.47E-06	2.29E-05	0.00E+00
Cresol, p-chloro-m-	59-50-7	1.13E-06	1.05E-05	0.00E+00
Cumene	98-82-8	4.13E-06	1.50E-05	0.00E+00
Cyanide (CN-)	57-12-5	1.78E-03	1.07E-02	0.00E+00
Dibenz[a,h]anthracene	53-70-3	0.00E+00	0.00E+00	9.61E-07
Dimethylphenol, 2,4-	105-67-9	9.50E-06	8.81E-05	0.00E+00
Ethylbenzene	100-41-4	7.25E-06	5.14E-05	5.51E-09

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Hazard/Risk Summary for Soil

Analyte	CAS	Hazard Adult	Hazard Child	Risk
Fluoranthene	206-44-0	2.31E-05	2.09E-04	0.00E+00
Fluorene	86-73-7	5.95E-06	5.36E-05	0.00E+00
Indeno[1,2,3-cd]pyrene	193-39-5	0.00E+00	0.00E+00	1.37E-07
Iron	7439-89-6	6.27E-02	6.69E-01	0.00E+00
isopropyltoluene	99-87-6	1.81E-06	8.23E-06	0.00E+00
Lead and Compounds	7439-92-1	0.00E+00	0.00E+00	0.00E+00
Manganese (Diet)	7439-96-5-Diet	2.80E-03	2.66E-02	0.00E+00
Mercury (elemental)	7439-97-6	2.17E-04	2.17E-04	0.00E+00
Methyl Ethyl Ketone (2-Butanone)	78-93-3	1.06E-06	7.22E-06	0.00E+00
Methylcyclohexane	108-87-2	0.00E+00	0.00E+00	0.00E+00
Methylene Chloride	75-09-2	1.00E-07	8.43E-07	5.16E-12
Methylnaphthalene, 1-	90-12-0	3.22E-05	2.90E-04	6.92E-08
Methylnaphthalene, 2-	91-57-6	9.08E-04	8.18E-03	0.00E+00
Naphthalene	91-20-3	7.62E-04	1.61E-03	2.94E-07
Nickel Soluble Salts	7440-02-0	3.74E-03	3.95E-02	3.51E-10
Phenanthrene	85-01-8	5.85E-05	5.27E-04	0.00E+00
Pyrene	129-00-0	3.03E-05	2.73E-04	0.00E+00
Toluene	108-88-3	2.16E-05	1.89E-04	0.00E+00
Trimethylbenzene, 1,2,4-	95-63-6	2.36E-04	1.18E-03	0.00E+00
Trimethylbenzene, 1,3,5-	108-67-8	7.82E-05	3.60E-04	0.00E+00
Vanadium and Compounds	7440-62-2	5.40E-03	5.75E-02	0.00E+00
Xylenes	1330-20-7	5.26E-04	7.35E-04	0.00E+00
Zinc and Compounds	7440-66-6	1.11E-04	1.18E-03	0.00E+00

Total Hazard Index/Risk for All Media

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	1.26E-01	Ingestion:	1.34E+00	Ingestion:	9.10E-06
Dermal:	3.69E-03	Dermal:	2.21E-02	Dermal:	1.81E-06
Inhalation:	3.19E-03	Inhalation:	3.19E-03	Inhalation:	4.79E-08
Total:	**1.33E-01**	**Total:**	**1.37E+00**	**Total:**	**1.10E-05**
does not exceed hazard index		*Exceeds Hazard Index!*		*does not exceed cumulative risk*	

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Recreator Exposure Default Values

Symbol	Description	Value	Units
AF0-02	Soil Adherence Factor - age segment 0-2	0.2	(mg/cm2)
AF02-06	Soil Adherence Factor - age segment 2-6	0.2	(mg/cm2)
AF06-16	Soil Adherence Factor - age segment 6-16	0.07	(mg/cm2)
AF16-26	Soil Adherence Factor - age segment 16-26	0.07	(mg/cm2)
AFrec-a	Recreator Soil Adherence Factor - adult	0.07	(mg/cm2)
AFrec-c	Recreator Soil Adherence Factor - child	0.2	(mg/cm2)
AFrec-sed-a	Recreator Sediment Adherence Factor - adult - Exposure Factors Handboon	0.2	(mg/cm2)
AFrec-sed-c	Recreator Sediment Adherence Factor - child - Exposure Factors Handbook	0.3	(mg/cm2)
AFsed0-02	Recreator/Trepasser Sediment Adherence Factor - age segment 0-2 - Exposure Factors Handbook	0.3	(mg/cm2)
AFsed02-06	Recreator/Trepasser Sediment Adherence Factor - age segment 2-6 - Exposure Factors Handbook	0.3	(mg/cm2)
AFsed06-16	Recreator/Trepasser Sediment Adherence Factor - age segment 6-16 - Exposure Factors Handbook	0.2	(mg/cm2)
AFsed16-26	Recreator/Trepasser Sediment Adherence Factor - age segment 16-26 - Exposure Factors Handbook	0.2	(mg/cm2)
ATrec	Recreator Averaging Time: 365 x LT	25550	(days)
ATrec	Recreator Averaging Time	365	(days/yr)
ATrec-a	Recreator Averaging Time - adult: 365 x EDrec-a	7300	(days)
ATrec-c	Recreator Averaging Time - child: 365 x EDrec-c	2190	(days)
BW0-02	Body Weight - age segment 0-2	15	(kg)
BW02-06	Body Weight - age segment 2-6	15	(kg)
BW06-16	Body Weight - age segment 6-16	80	(kg)
BW16-26	Body Weight - age segment 16-26	80	(kg)
BWrec-a	Recreator Body Weight - adult	80	(kg)
BWrec-c	Recreator Body Weight - child	15	(kg)
DFSMrec-adj	Recreator Soil Mutagenic Dermal Contact Factor - age adjusted - Virginia DEQ calculated using age-segment values	238602	(mg/kg)
DFSMrec-sed-adj	Recreator Sediment Mutagenic Dermal Contact Factor - age adjusted - Virginia DEQ calculated using age-segment values	413774.4	(mg/kg)

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

DFSrec-adj	Recreator Soil Dermal Contact Factor - age adjusted - Virginia DEQ calculated using age-segment values	57603	(mg/kg)
DFSrec-sed-adj	Recreator Sediment Dermal Contact Factor - age adjusted - Virginia DEQ calculated using age-segment values	114340.2	(mg/kg)
DFWMrec-adj	Recreator Surface Water Mutagenic Dermal Contact Factor - age adjusted - Virginia DEQ calculated using age-segment values	4563910	(cm2-event/kg)
DFWrec-adj	Recreator Surface Water Dermal Contact Factor - age adjusted - Virginia DEQ calculated using age-segment values	1454505	(cm2-event/kg)
ED0-02	Exposure Duration - age segment 0-2	2	(yrs)
ED02-06	Exposure Duration - age segment 2-6	4	(yrs)
ED06-16	Exposure Duration -age segment 6-16	10	(yrs)
ED16-26	Exposure Duration -age segment 16-26	10	(yrs)
EDrec	Recreator Exposure Duration	26	(yrs)
EDrec-a	Recreator Exposure Duration - adult	20	(yrs)
EDrec-c	Recreator Exposure Duration - child	6	(yrs)
EFrec	Recreator Exposure Frequency - Virginia DEQ	195	(days/yr)
EFrec0-02	Recreator/Trepasser Exposure Frequency - age segment 0-2 - Virginia DEQ	195	(days/yr)
EFrec02-06	Recreator/Trepasser Exposure Frequency - age segment 2-6 - Virginia DEQ	195	(days/yr)
EFrec06-16	Recreator/Trepasser Exposure Frequency - age segment 6-16 - Virginia DEQ	195	(days/yr)
EFrec16-26	Recreator/Trepasser Exposure Frequency - age segment 16-26 - Virginia DEQ	195	(days/yr)
EFrec-a	Recreator Exposure Frequency - adult - Virginia DEQ	195	(days/yr)
EFrec-c	Recreator Exposure Frequency - child - Virginia DEQ	195	(days/yr)
ETevent-rec/trs(0-02)	Recreator/Trespasser Exposure Time - age segment 0-2 - Virginia DEQ	2	(hrs/event)
ETevent-rec/trs(02-06)	Recreator/Trespasser Exposure Time - age segment 2-6 - Virginia DEQ	2	(hrs/event)
ETevent-rec/trs(06-16)	Recreator/Trespasser Exposure Time - age segment 6-16 - Virginia DEQ	2	(hrs/event)
ETevent-rec/trs(16-26)	Recreator/Trespasser Exposure Time - age segment 16-26 - Virginia DEQ	2	(hrs/event)
ETevent-rec-a	Recreator Surface Water Exposure Time - adult - Virginia DEQ	2	(hrs/event)
ETevent-rec-adj	Recreator Exposure Time - age adjusted - Virginia DEQ calculated using age-segment values	2	(hrs/event)
ETevent-rec-c	Recreator Surface Water Exposure Time - child - Virginia DEQ	2	(hrs/event)
ETevent-rec-madj	Recreator Exposure Time - mutagen age adjusted - Virginia DEQ calculated using age-segment values	2	(hrs/event)

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

ETrec	Recreator Soil Exposure Time - Virginia DEQ	2	(hrs/day)
ETrec/trs0-02	Recreator/Trespasser Exposure Time - age segment 0-2 - Virginia DEQ	2	(hrs/day)
ETrec/trs02-06	Recreator/Trespasser Exposure Time - age segment 2-6 - Virginia DEQ	2	(hrs/day)
ETrec/trs06-16	Recreator/Trespasser Exposure Time - age segment 6-16 - Virginia DEQ	2	(hrs/day)
ETrec/trs16-26	Recreator/Trespasser Exposure Time - age segment 16-26 - Virginia DEQ	2	(hrs/day)
ETrec-a	Recreator Exposure Time - adult - Virginia DEQ	2	(hrs/day)
ETrec-c	Recreator Exposure Time - child - Virginia DEQ	2	(hrs/day)
ETrec-sed	Recreator Sediment Exposure Time - Virginia DEQ	2	(hrs/day)
EV0-02	Events - age segment 0-2	1	(events/day)
EV02-06	Events - age segment 2-6	1	(events/day)
EV06-16	Events - age segment 6-16	1	(events/day)
EV16-26	Events - age segment 16-26	1	(events/day)
EVrec-a	Recreator Events - adult - Virginia DEQ	1	(events/day)
EVrec-c	Recreator Events - child - Virginia DEQ	1	(events/day)
IFMrec-sed-adj	Recreator Mutagenic Sediment Ingestion Rate - age adjusted - Virginia DEQ calculated using age-segment values	92950	(mg/kg)
IFrec-sed-adj	Recreator Sediment Ingestion Rate - age adjusted - Virginia DEQ calculated using age-segment values	20475	(mg/kg)
IFSMrec-adj	Recreator Mutagenic Soil Ingestion Rate - age adjusted - Virginia DEQ calculated using age-segment values	92950	(mg/kg)
IFSrec-adj	Recreator Soil Ingestion Rate - age adjusted - Virginia DEQ calculated using age-segment values	20475	(mg/kg)
IFWMrec-adj	Recreator Mutagenic Surface Water Ingestion Rate - age adjusted - Virginia DEQ calculated using age-segment values	122.776875	(L/kg)
IFWrec-adj	Recreator Surface Water Ingestion Rate - age adjusted - Virginia DEQ calculated using age-segment values	29.445	(L/kg)
INHMrec-s-adj	Recreator Soil Inhalation Exposure Duration Mutagen - age adjusted - Virginia DEQ calculated using age-segment values	1170	(days)
INHMrec-sed-adj	Recreator Sediment Inhalation Exposure Duration Mutagen - age adjusted - Virginia DEQ calculated using age-segment values	1170	(days)
IRS0-02	Soil/Sediment Ingestion Rate - age segment 0-2	200	(mg/day)
IRS02-06	Soil/Sediment Ingestion Rate - age segment 2-6	200	(mg/day)
IRS06-16	Soil/Sediment Ingestion Rate - age segment 6-16	100	(mg/day)
IRS16-26	Soil/Sediment Ingestion Rate - age segment 16-26	100	(mg/day)

Risk Based Performance Criteria

Default Hazard Index	Default Risk for Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

IRSrec-a	Recreator Soil Ingestion Rate - adult	100	(mg/day)
IRSrec-c	Recreator Soil Ingestion Rate - child	200	(mg/day)
IRSrec-sed-a	Recreator Sediment Ingestion Rate - adult	100	(mg/day)
IRSrec-sed-c	Recreator Sediment Ingestion Rate - child	200	(mg/day)
IRW0-02	Surface Water Ingestion Rate - age segment 0-2	0.12	(L/hr)
IRW02-06	Surface Water Ingestion Rate - age segment 2-6	0.12	(L/hr)
IRW06-16	Surface Water Ingestion Rate - age segment 6-16	0.124	(L/hr)
IRW16-26	Surface Water Ingestion Rate - age segment 16-26	0.0985	(L/hr)
IRWrec-a	Recreator Surface Water Ingestion Rate - adult	0.11	(L/hr)
IRWrec-c	Recreator Surface Water Ingestion Rate - child	0.12	(L/hr)
SArec-a	Recreator Surface Water Surface Area - adult	19652	(cm2)
SArec-a	Recreator Soil Surface Area - adult	6032	(cm2/day)
SArec-c	Recreator Surface Water Surface Area - child	6365	(cm2)
SArec-c	Recreator Soil Surface Area - child	2373	(cm2/day)
SArec-sed-a	Recreator Sediment Surface Area - adult	6032	(cm2/day)
SArec-sed-c	Recreator Sediment Surface Area - child	2373	(cm2/day)
SAs0-02	Surface Area Soil/Sediment - age segment 0-2	2373	(cm2/day)
SAs02-06	Surface Area Soil/Sediment - age segment 2-6	2373	(cm2/day)
SAs06-16	Surface Area Soil/Sediment - age segment 6-16	6032	(cm2/day)
SAs16-26	Surface Area Soil/Sediment - age segment 16-26	6032	(cm2/day)
SAw0-02	Surface Area Water - age segment 0-2	6365	(cm2)
SAw02-06	Surface Area Water - age segment 2-6	6365	(cm2)
SAw06-16	Surface Area Water - age segment 6- 16	19652	(cm2)
SAw16-26	Surface Area Water - age segment 16- 26	19652	(cm2)

END OF REPORT

**ATTACHMENT 3-5
TRESPASSER**

Virginia Department of Environmental Quality

VURAM

Virginia Unified Risk Assessment Model

VERSION: 3.2.1

Trespasser Quantitative Risk Assessment Report

Program: Voluntary Remediation Program (VRP)

Site Name: Alexandria

By submitting this report to the Virginia DEQ, the user confirms that VURAM's default exposure parameters have not been altered, unless a complete unaltered VURAM analysis is provided and all modifications are detailed explicitly in an accompanying narrative or documentation that shows DEQ's prior concurrence with specific changes.

Chemical Specific Notes Displayed as Applicable

Lead

VURAM does not perform an evaluation for lead exposure. Use other approved models for lead modeling.

All Report Pages are Required for Risk Assessment Submission

Site Name: **Alexandria**

Program: **Voluntary Remediation Program (VRP)**

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Acenaphthene**

CAS: **83-32-9**

Concentration mg/kg:	2.06E-01
RfDo (mg/kg-day):	6.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	2.82E-07	Ingestion:	3.01E-06	Ingestion:	
Dermal:	1.55E-07	Dermal:	9.29E-07	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**4.37E-07**	**Total:**	**3.94E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%   0.00%

Analyte: **Acenaphthylene**

CAS: **208-96-8**

Concentration mg/kg:	1.40E-01
RfDo (mg/kg-day):	3.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	3.84E-07	Ingestion:	4.09E-06	Ingestion:	
Dermal:	2.11E-07	Dermal:	1.26E-06	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**5.94E-07**	**Total:**	**5.35E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%   0.00%

Analyte: **Acetone**

CAS: **67-64-1**

Concentration mg/kg:	1.72E+00
RfDo (mg/kg-day):	9.00E-01
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	1.57E-07	Ingestion:	1.68E-06	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**1.57E-07**	**Total:**	**1.68E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%   0.00%

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Acetophenone**

CAS: **98-86-2**

Concentration mg/kg:	1.51E-01
RfDo (mg/kg-day):	1.00E-01
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	1.24E-07	Ingestion:	1.32E-06	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**1.24E-07**	**Total:**	**1.32E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%   0.00%

Analyte: **Aluminum**

CAS: **7429-90-5**

Concentration mg/kg:	9.23E+03
RfDo (mg/kg-day):	1.00E+00
RfCi (mg/m3):	5.00E-03
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	7.58E-04	Ingestion:	8.09E-03	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	7.43E-06	Inhalation:	7.43E-06	Inhalation:	
Total:	**7.66E-04**	**Total:**	**8.10E-03**	**Total:**	**0.00E+00**

% Contribution to Media Risk   4.69%   4.81%   0.00%

Analyte: **Anthracene**

CAS: **120-12-7**

Concentration mg/kg:	2.53E-01
RfDo (mg/kg-day):	3.00E-01
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	6.93E-08	Ingestion:	7.39E-07	Ingestion:	
Dermal:	3.80E-08	Dermal:	2.28E-07	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**1.07E-07**	**Total:**	**9.67E-07**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%   0.00%

Site Name: **Alexandria**

Program: **Voluntary Remediation Program (VRP)**

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Antimony (metallic)**

CAS: **7440-36-0**

Concentration mg/kg:	1.34E+00
RfDo (mg/kg-day):	4.00E-04
RfCi (mg/m3):	3.00E-04
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	

Calculated Hazard/Risk

	Non-Cancer Adult		Non-Cancer Child		Cancer
Ingestion:	2.76E-04	Ingestion:	2.94E-03	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	1.80E-08	Inhalation:	1.80E-08	Inhalation:	
Total:	**2.76E-04**	**Total:**	**2.94E-03**	**Total:**	**0.00E+00**

% Contribution to Media Risk   1.69%   1.75%   0.00%

Analyte: **Arsenic, Inorganic**

CAS: **7440-38-2**

Concentration mg/kg:	8.80E+00
RfDo (mg/kg-day):	3.00E-04
RfCi (mg/m3):	1.50E-05
SFO (mg/kg-day)-1:	1.50E+00
IUR (µg/m3)-1:	4.30E-03
Mutagen:	

Calculated Hazard/Risk

	Non-Cancer Adult		Non-Cancer Child		Cancer
Ingestion:	1.45E-03	Ingestion:	1.54E-02	Ingestion:	7.81E-07
Dermal:	3.05E-04	Dermal:	1.83E-03	Dermal:	1.10E-07
Inhalation:	2.36E-06	Inhalation:	2.36E-06	Inhalation:	5.66E-11
Total:	**1.75E-03**	**Total:**	**1.73E-02**	**Total:**	**8.91E-07**

% Contribution to Media Risk   10.75%   10.26%   66.06%

Analyte: **Barium**

CAS: **7440-39-3**

Concentration mg/kg:	7.27E+01
RfDo (mg/kg-day):	2.00E-01
RfCi (mg/m3):	5.00E-04
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	

Calculated Hazard/Risk

	Non-Cancer Adult		Non-Cancer Child		Cancer
Ingestion:	2.99E-05	Ingestion:	3.19E-04	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	5.86E-07	Inhalation:	5.86E-07	Inhalation:	
Total:	**3.05E-05**	**Total:**	**3.19E-04**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.19%   0.19%   0.00%

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Benz[a]anthracene**

CAS: **56-55-3**

			Calculated Hazard/Risk		
Concentration mg/kg:	4.82E-01	**Non-Cancer Adult**	**Non-Cancer Child**	**Cancer**	
RfDo (mg/kg-day):		Ingestion:	Ingestion:	Ingestion:	2.16E-08
RfCi (mg/m3):		Dermal:	Dermal:	Dermal:	7.20E-09
SFO (mg/kg-day)-1:	1.00E-01	Inhalation:	Inhalation:	Inhalation:	3.71E-11
IUR (µg/m3)-1:	6.00E-05	**Total:** 0.00E+00	**Total:** 0.00E+00	**Total:**	2.88E-08
Mutagen:	Y				

% Contribution to Media Risk   0.00%   0.00%   2.14%

Analyte: **Benzene**

CAS: **71-43-2**

			Calculated Hazard/Risk		
Concentration mg/kg:	5.00E-01	**Non-Cancer Adult**	**Non-Cancer Child**	**Cancer**	
RfDo (mg/kg-day):	4.00E-03	Ingestion: 1.03E-05	Ingestion: 1.10E-04	Ingestion:	2.71E-09
RfCi (mg/m3):	3.00E-02	Dermal:	Dermal:	Dermal:	
SFO (mg/kg-day)-1:	5.50E-02	Inhalation: 2.58E-05	Inhalation: 2.58E-05	Inhalation:	2.24E-09
IUR (µg/m3)-1:	7.80E-06	**Total:** 3.61E-05	**Total:** 1.35E-04	**Total:**	4.95E-09
Mutagen:					

% Contribution to Media Risk   0.22%   0.08%   0.37%

Analyte: **Benzo(g,h,i)perylene**

CAS: **191-24-2**

			Calculated Hazard/Risk		
Concentration mg/kg:	2.47E-01	**Non-Cancer Adult**	**Non-Cancer Child**	**Cancer**	
RfDo (mg/kg-day):	3.00E-02	Ingestion: 6.77E-07	Ingestion: 7.22E-06	Ingestion:	
RfCi (mg/m3):		Dermal: 3.71E-07	Dermal: 2.23E-06	Dermal:	
SFO (mg/kg-day)-1:		Inhalation:	Inhalation:	Inhalation:	
IUR (µg/m3)-1:		**Total:** 1.05E-06	**Total:** 9.45E-06	**Total:**	0.00E+00
Mutagen:					

% Contribution to Media Risk   0.01%   0.01%   0.00%

Program: **Voluntary Remediation Program (VRP)**

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Benzo[a]pyrene**

CAS: **50-32-8**

Concentration mg/kg:	3.36E-01
RfDo (mg/kg-day):	3.00E-04
RfCi (mg/m3):	2.00E-06
SFO (mg/kg-day)-1:	1.00E+00
IUR (μg/m3)-1:	6.00E-04
Mutagen:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	9.21E-05	Ingestion:	9.82E-04	Ingestion:	1.50E-07
Dermal:	5.05E-05	Dermal:	3.03E-04	Dermal:	5.02E-08
Inhalation:	6.77E-07	Inhalation:	6.77E-07	Inhalation:	8.35E-13
Total:	**1.43E-04**	**Total:**	**1.29E-03**	**Total:**	**2.01E-07**

% Contribution to Media Risk   0.88%   0.76%   14.88%

Analyte: **Benzo[b]fluoranthene**

CAS: **205-99-2**

Concentration mg/kg:	6.65E-01
RfDo (mg/kg-day):	
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	1.00E-01
IUR (μg/m3)-1:	6.00E-05
Mutagen:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:		Ingestion:		Ingestion:	2.98E-08
Dermal:		Dermal:		Dermal:	9.94E-09
Inhalation:		Inhalation:		Inhalation:	1.65E-13
Total:	**0.00E+00**	**Total:**	**0.00E+00**	**Total:**	**3.97E-08**

% Contribution to Media Risk   0.00%   0.00%   2.94%

Analyte: **Benzo[k]fluoranthene**

CAS: **207-08-9**

Concentration mg/kg:	3.61E-01
RfDo (mg/kg-day):	
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	1.00E-02
IUR (μg/m3)-1:	6.00E-06
Mutagen:	Y

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:		Ingestion:		Ingestion:	1.62E-09
Dermal:		Dermal:		Dermal:	5.39E-10
Inhalation:		Inhalation:		Inhalation:	8.98E-15
Total:	**0.00E+00**	**Total:**	**0.00E+00**	**Total:**	**2.16E-09**

% Contribution to Media Risk   0.00%   0.00%   0.16%

Risk Based Performance Criteria

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Benzoic Acid**

CAS: **65-85-0**

Concentration mg/kg:	1.20E+00
RfDo (mg/kg-day):	4.00E+00
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	2.47E-08	Ingestion:	2.63E-07	Ingestion:	
Dermal:	1.04E-08	Dermal:	6.24E-08	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**3.51E-08**	**Total:**	**3.25E-07**	**Total:**	**0.00E+00**

	% Contribution to Media Risk	0.00%	0.00%	0.00%

Analyte: **Beryllium and compounds**

CAS: **7440-41-7**

Concentration mg/kg:	9.00E-01
RfDo (mg/kg-day):	2.00E-03
RfCi (mg/m3):	2.00E-05
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	2.40E-03
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	3.70E-05	Ingestion:	3.95E-04	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	1.81E-07	Inhalation:	1.81E-07	Inhalation:	3.23E-12
Total:	**3.72E-05**	**Total:**	**3.95E-04**	**Total:**	**3.23E-12**

	% Contribution to Media Risk	0.23%	0.23%	0.00%

Analyte: **Bis(2-ethylhexyl)phthalate**

CAS: **117-81-7**

Concentration mg/kg:	2.31E-01
RfDo (mg/kg-day):	2.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	1.40E-02
IUR (µg/m3)-1:	2.40E-06
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	9.49E-07	Ingestion:	1.01E-05	Ingestion:	3.19E-10
Dermal:	4.01E-07	Dermal:	2.40E-06	Dermal:	8.97E-11
Inhalation:		Inhalation:		Inhalation:	8.30E-16
Total:	**1.35E-06**	**Total:**	**1.25E-05**	**Total:**	**4.09E-10**

	% Contribution to Media Risk	0.01%	0.01%	0.03%

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Butylbenzene, n-**

CAS: **104-51-8**

Concentration mg/kg:	1.40E-01
RfDo (mg/kg-day):	5.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	2.30E-07	Ingestion:	2.45E-06	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**2.30E-07**	**Total:**	**2.45E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%   0.00%

Analyte: **Cadmium (Diet)**

CAS: **7440-43-9-Diet**

Concentration mg/kg:	3.33E-01
RfDo (mg/kg-day):	1.00E-04
RfCi (mg/m3):	1.00E-05
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	1.80E-03
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	2.74E-04	Ingestion:	2.92E-03	Ingestion:	
Dermal:	4.62E-05	Dermal:	2.77E-04	Dermal:	
Inhalation:	1.34E-07	Inhalation:	1.34E-07	Inhalation:	8.97E-13
Total:	**3.20E-04**	**Total:**	**3.20E-03**	**Total:**	**8.97E-13**

% Contribution to Media Risk   1.96%   1.90%   0.00%

Analyte: **Carbazole**

CAS: **86-74-8**

Concentration mg/kg:	2.42E-01
RfDo (mg/kg-day):	
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:		Ingestion:		Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**0.00E+00**	**Total:**	**0.00E+00**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%   0.00%

Site Name: **Alexandria**

Program: **Voluntary Remediation Program (VRP)**

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Chromium(III), Insoluble Salts**

CAS: **16065-83-1**

Concentration mg/kg:	2.06E+02	colspan	**Calculated Hazard/Risk**		
RfDo (mg/kg-day):	1.50E+00	**Non-Cancer Adult**		**Non-Cancer Child**	**Cancer**
RfCi (mg/m3):		Ingestion: 1.13E-05		Ingestion: 1.20E-04	Ingestion:
SFO (mg/kg-day)-1:		Dermal:		Dermal:	Dermal:
IUR (µg/m3)-1:		Inhalation:		Inhalation:	Inhalation:
Mutagen:		**Total: 1.13E-05**		**Total: 1.20E-04**	**Total: 0.00E+00**

% Contribution to Media Risk   0.07%   0.07%   0.00%

Analyte: **Chrysene**

CAS: **218-01-9**

Concentration mg/kg:	6.91E-01		**Calculated Hazard/Risk**		
RfDo (mg/kg-day):		**Non-Cancer Adult**		**Non-Cancer Child**	**Cancer**
RfCi (mg/m3):		Ingestion:		Ingestion:	Ingestion: 3.09E-10
SFO (mg/kg-day)-1:	1.00E-03	Dermal:		Dermal:	Dermal: 1.03E-10
IUR (µg/m3)-1:	6.00E-07	Inhalation:		Inhalation:	Inhalation: 1.72E-15
Mutagen:	Y	**Total: 0.00E+00**		**Total: 0.00E+00**	**Total: 4.13E-10**

% Contribution to Media Risk   0.00%   0.00%   0.03%

Analyte: **Cobalt**

CAS: **7440-48-4**

Concentration mg/kg:	1.04E+01		**Calculated Hazard/Risk**		
RfDo (mg/kg-day):	3.00E-04	**Non-Cancer Adult**		**Non-Cancer Child**	**Cancer**
RfCi (mg/m3):	6.00E-06	Ingestion: 2.84E-03		Ingestion: 3.03E-02	Ingestion:
SFO (mg/kg-day)-1:		Dermal:		Dermal:	Dermal:
IUR (µg/m3)-1:	9.00E-03	Inhalation: 6.96E-06		Inhalation: 6.96E-06	Inhalation: 1.40E-10
Mutagen:		**Total: 2.85E-03**		**Total: 3.03E-02**	**Total: 1.40E-10**

% Contribution to Media Risk   17.45%   18.02%   0.01%

Program: **Voluntary Remediation Program (VRP)**

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Copper**

CAS: **7440-50-8**

Concentration mg/kg:	1.55E+02
RfDo (mg/kg-day):	4.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	3.18E-04	Ingestion:	3.40E-03	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**3.18E-04**	**Total:**	**3.40E-03**	**Total:**	**0.00E+00**

% Contribution to Media Risk   1.95%   2.02%   0.00%

Analyte: **Cresol, o-**

CAS: **95-48-7**

Concentration mg/kg:	1.30E-01
RfDo (mg/kg-day):	5.00E-02
RfCi (mg/m3):	6.00E-01
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	2.14E-07	Ingestion:	2.28E-06	Ingestion:	
Dermal:	9.02E-08	Dermal:	5.41E-07	Dermal:	
Inhalation:	8.73E-13	Inhalation:	8.73E-13	Inhalation:	
Total:	**3.04E-07**	**Total:**	**2.82E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%   0.00%

Analyte: **Cresol, p-chloro-m-**

CAS: **59-50-7**

Concentration mg/kg:	1.19E-01
RfDo (mg/kg-day):	1.00E-01
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	9.78E-08	Ingestion:	1.04E-06	Ingestion:	
Dermal:	4.13E-08	Dermal:	2.48E-07	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**1.39E-07**	**Total:**	**1.29E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%   0.00%

Program: **Voluntary Remediation Program (VRP)**

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Cumene**

CAS: **98-82-8**

Concentration mg/kg:	1.68E-01			**Calculated Hazard/Risk**			
RfDo (mg/kg-day):	1.00E-01	**Non-Cancer Adult**		**Non-Cancer Child**		**Cancer**	
RfCi (mg/m3):	4.00E-01	Ingestion:	1.38E-07	Ingestion:	1.47E-06	Ingestion:	
SFO (mg/kg-day)-1:		Dermal:		Dermal:		Dermal:	
IUR (µg/m3)-1:		Inhalation:	3.71E-07	Inhalation:	3.71E-07	Inhalation:	
Mutagen:		**Total:**	**5.09E-07**	**Total:**	**1.84E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%   0.00%

Analyte: **Cyanide (CN-)**

CAS: **57-12-5**

Concentration mg/kg:	8.26E-01			**Calculated Hazard/Risk**			
RfDo (mg/kg-day):	6.00E-04	**Non-Cancer Adult**		**Non-Cancer Child**		**Cancer**	
RfCi (mg/m3):	8.00E-04	Ingestion:	1.13E-04	Ingestion:	1.21E-03	Ingestion:	
SFO (mg/kg-day)-1:		Dermal:		Dermal:		Dermal:	
IUR (µg/m3)-1:		Inhalation:	1.06E-04	Inhalation:	1.06E-04	Inhalation:	
Mutagen:		**Total:**	**2.19E-04**	**Total:**	**1.31E-03**	**Total:**	**0.00E+00**

% Contribution to Media Risk   1.34%   0.78%   0.00%

Analyte: **Dibenz[a,h]anthracene**

CAS: **53-70-3**

Concentration mg/kg:	1.98E-01			**Calculated Hazard/Risk**			
RfDo (mg/kg-day):		**Non-Cancer Adult**		**Non-Cancer Child**		**Cancer**	
RfCi (mg/m3):		Ingestion:		Ingestion:		Ingestion:	8.87E-08
SFO (mg/kg-day)-1:	1.00E+00	Dermal:		Dermal:		Dermal:	2.96E-08
IUR (µg/m3)-1:	6.00E-04	Inhalation:		Inhalation:		Inhalation:	4.92E-13
Mutagen:	Y	**Total:**	**0.00E+00**	**Total:**	**0.00E+00**	**Total:**	**1.18E-07**

% Contribution to Media Risk   0.00%   0.00%   8.77%

Risk Based Performance Criteria

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Dimethylphenol, 2,4-**

CAS: **105-67-9**

Concentration mg/kg:	2.00E-01
RfDo (mg/kg-day):	2.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	8.22E-07	Ingestion:	8.77E-06	Ingestion:	
Dermal:	3.47E-07	Dermal:	2.08E-06	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**1.17E-06**	**Total:**	**1.08E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk	0.01%	0.01%	0.00%

Analyte: **Ethylbenzene**

CAS: **100-41-4**

Concentration mg/kg:	3.42E-01
RfDo (mg/kg-day):	5.00E-02
RfCi (mg/m3):	1.00E+00
SFO (mg/kg-day)-1:	1.10E-02
IUR (µg/m3)-1:	2.50E-06
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	5.62E-07	Ingestion:	6.00E-06	Ingestion:	3.71E-10
Dermal:		Dermal:		Dermal:	
Inhalation:	3.31E-07	Inhalation:	3.31E-07	Inhalation:	3.07E-10
Total:	**8.93E-07**	**Total:**	**6.33E-06**	**Total:**	**6.78E-10**

% Contribution to Media Risk	0.01%	0.00%	0.05%

Analyte: **Fluoranthene**

CAS: **206-44-0**

Concentration mg/kg:	8.95E-01
RfDo (mg/kg-day):	4.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	1.84E-06	Ingestion:	1.96E-05	Ingestion:	
Dermal:	1.01E-06	Dermal:	6.05E-06	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**2.85E-06**	**Total:**	**2.57E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk	0.02%	0.02%	0.00%

Site Name: **Alexandria**

Program: **Voluntary Remediation Program (VRP)**

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Fluorene**

CAS: **86-73-7**

Concentration mg/kg:	2.30E-01
RfDo (mg/kg-day):	4.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	4.73E-07	Ingestion:	5.04E-06	Ingestion:	
Dermal:	2.59E-07	Dermal:	1.56E-06	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**7.32E-07**	**Total:**	**6.60E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk	0.00%	0.00%	0.00%

Analyte: **Indeno[1,2,3-cd]pyrene**

CAS: **193-39-5**

Concentration mg/kg:	2.82E-01
RfDo (mg/kg-day):	
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	1.00E-01
IUR (µg/m3)-1:	6.00E-05
Mutagen:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:		Ingestion:		Ingestion:	1.26E-08
Dermal:		Dermal:		Dermal:	4.21E-09
Inhalation:		Inhalation:		Inhalation:	7.01E-14
Total:	**0.00E+00**	**Total:**	**0.00E+00**	**Total:**	**1.68E-08**

% Contribution to Media Risk	0.00%	0.00%	1.25%

Analyte: **Iron**

CAS: **7439-89-6**

Concentration mg/kg:	6.57E+04
RfDo (mg/kg-day):	7.00E-01
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	7.71E-03	Ingestion:	8.23E-02	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**7.71E-03**	**Total:**	**8.23E-02**	**Total:**	**0.00E+00**

% Contribution to Media Risk	47.26%	48.92%	0.00%

Site Name: **Alexandria**

Program: **Voluntary Remediation Program (VRP)**

Risk Based Performance Criteria

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **isopropyltoluene**

CAS: **99-87-6**

Concentration mg/kg:	9.93E-02
RfDo (mg/kg-day):	1.00E-01
RfCi (mg/m3):	4.00E-01
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	8.16E-08	Ingestion:	8.71E-07	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	1.42E-07	Inhalation:	1.42E-07	Inhalation:	
Total:	**2.23E-07**	**Total:**	**1.01E-06**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%   0.00%

Analyte: **Lead and Compounds**

CAS: **7439-92-1**

Concentration mg/kg:	2.05E+01
RfDo (mg/kg-day):	
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:		Ingestion:		Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**0.00E+00**	**Total:**	**0.00E+00**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%   0.00%

Analyte: **Manganese (Diet)**

CAS: **7439-96-5-Diet**

Concentration mg/kg:	5.16E+02
RfDo (mg/kg-day):	1.40E-01
RfCi (mg/m3):	5.00E-05
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	3.03E-04	Ingestion:	3.23E-03	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	4.16E-05	Inhalation:	4.16E-05	Inhalation:	
Total:	**3.45E-04**	**Total:**	**3.27E-03**	**Total:**	**0.00E+00**

% Contribution to Media Risk   2.11%   1.95%   0.00%

Program: **Voluntary Remediation Program (VRP)**

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Mercury (elemental)**

CAS: **7439-97-6**

Concentration mg/kg:	5.07E-02		**Calculated Hazard/Risk**				
RfDo (mg/kg-day):			**Non-Cancer Adult**		**Non-Cancer Child**		**Cancer**
RfCi (mg/m3):	3.00E-04	Ingestion:		Ingestion:		Ingestion:	
SFO (mg/kg-day)-1:		Dermal:		Dermal:		Dermal:	
IUR (µg/m3)-1:		Inhalation:	2.67E-05	Inhalation:	2.67E-05	Inhalation:	
Mutagen:		**Total:**	**2.67E-05**	**Total:**	**2.67E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.16%   0.02%   0.00%

Analyte: **Methyl Ethyl Ketone (2-Butanone)**

CAS: **78-93-3**

Concentration mg/kg:	5.73E-01		**Calculated Hazard/Risk**				
RfDo (mg/kg-day):	6.00E-01		**Non-Cancer Adult**		**Non-Cancer Child**		**Cancer**
RfCi (mg/m3):	5.00E+00	Ingestion:	7.85E-08	Ingestion:	8.37E-07	Ingestion:	
SFO (mg/kg-day)-1:		Dermal:		Dermal:		Dermal:	
IUR (µg/m3)-1:		Inhalation:	5.15E-08	Inhalation:	5.15E-08	Inhalation:	
Mutagen:		**Total:**	**1.30E-07**	**Total:**	**8.89E-07**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%   0.00%

Analyte: **Methylcyclohexane**

CAS: **108-87-2**

Concentration mg/kg:	7.39E+00		**Calculated Hazard/Risk**				
RfDo (mg/kg-day):			**Non-Cancer Adult**		**Non-Cancer Child**		**Cancer**
RfCi (mg/m3):		Ingestion:		Ingestion:		Ingestion:	
SFO (mg/kg-day)-1:		Dermal:		Dermal:		Dermal:	
IUR (µg/m3)-1:		Inhalation:		Inhalation:		Inhalation:	
Mutagen:		**Total:**	**0.00E+00**	**Total:**	**0.00E+00**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.00%   0.00%   0.00%

Site Name: **Alexandria**

Program: **Voluntary Remediation Program (VRP)**

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Methylene Chloride**

CAS: **75-09-2**

Concentration mg/kg:	6.90E-04
RfDo (mg/kg-day):	6.00E-03
RfCi (mg/m3):	6.00E-01
SFO (mg/kg-day)-1:	2.00E-03
IUR (µg/m3)-1:	1.00E-08
Mutagen:	Y

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	9.45E-09	Ingestion:	1.01E-07	Ingestion:	6.18E-13
Dermal:		Dermal:		Dermal:	
Inhalation:	2.88E-09	Inhalation:	2.88E-09	Inhalation:	1.78E-14
Total:	**1.23E-08**	**Total:**	**1.04E-07**	**Total:**	**6.36E-13**

% Contribution to Media Risk 0.00% 0.00% 0.00%

Analyte: **Methylnaphthalene, 1-**

CAS: **90-12-0**

Concentration mg/kg:	2.18E+00
RfDo (mg/kg-day):	7.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	2.90E-02
IUR (µg/m3)-1:	
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	2.56E-06	Ingestion:	2.73E-05	Ingestion:	6.23E-09
Dermal:	1.40E-06	Dermal:	8.42E-06	Dermal:	2.28E-09
Inhalation:		Inhalation:		Inhalation:	
Total:	**3.96E-06**	**Total:**	**3.57E-05**	**Total:**	**8.51E-09**

% Contribution to Media Risk 0.02% 0.02% 0.63%

Analyte: **Methylnaphthalene, 2-**

CAS: **91-57-6**

Concentration mg/kg:	3.51E+00
RfDo (mg/kg-day):	4.00E-03
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	7.21E-05	Ingestion:	7.70E-04	Ingestion:	
Dermal:	3.96E-05	Dermal:	2.37E-04	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**1.12E-04**	**Total:**	**1.01E-03**	**Total:**	**0.00E+00**

% Contribution to Media Risk 0.68% 0.60% 0.00%

Program: **Voluntary Remediation Program (VRP)**

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Naphthalene**

CAS: **91-20-3**

Concentration mg/kg:	2.05E+00
RfDo (mg/kg-day):	2.00E-02
RfCi (mg/m3):	3.00E-03
SFO (mg/kg-day)-1:	1.20E-01
IUR (µg/m3)-1:	3.40E-05
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	8.41E-06	Ingestion:	8.97E-05	Ingestion:	2.42E-08
Dermal:	4.62E-06	Dermal:	2.77E-05	Dermal:	8.86E-09
Inhalation:	8.07E-05	Inhalation:	8.07E-05	Inhalation:	3.06E-09
Total:	**9.37E-05**	**Total:**	**1.98E-04**	**Total:**	**3.61E-08**

% Contribution to Media Risk	0.57%	0.12%	2.68%

Analyte: **Nickel Soluble Salts**

CAS: **7440-02-0**

Concentration mg/kg:	1.11E+02
RfDo (mg/kg-day):	2.00E-02
RfCi (mg/m3):	9.00E-05
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	2.60E-04
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	4.56E-04	Ingestion:	4.86E-03	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	4.96E-06	Inhalation:	4.96E-06	Inhalation:	4.31E-11
Total:	**4.61E-04**	**Total:**	**4.87E-03**	**Total:**	**4.31E-11**

% Contribution to Media Risk	2.82%	2.89%	0.00%

Analyte: **Phenanthrene**

CAS: **85-01-8**

Concentration mg/kg:	1.70E+00
RfDo (mg/kg-day):	3.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	4.65E-06	Ingestion:	4.96E-05	Ingestion:	
Dermal:	2.55E-06	Dermal:	1.53E-05	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**7.20E-06**	**Total:**	**6.49E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk	0.04%	0.04%	0.00%

Program: **Voluntary Remediation Program (VRP)**

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Pyrene**

CAS: **129-00-0**

Concentration mg/kg:	8.78E-01
RfDo (mg/kg-day):	3.00E-02
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	2.41E-06	Ingestion:	2.57E-05	Ingestion:	
Dermal:	1.32E-06	Dermal:	7.92E-06	Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**3.73E-06**	**Total:**	**3.36E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk	0.02%	0.02%	0.00%

Analyte: **Toluene**

CAS: **108-88-3**

Concentration mg/kg:	2.07E+00
RfDo (mg/kg-day):	8.00E-02
RfCi (mg/m3):	5.00E+00
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	2.13E-06	Ingestion:	2.27E-05	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	5.29E-07	Inhalation:	5.29E-07	Inhalation:	
Total:	**2.66E-06**	**Total:**	**2.32E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk	0.02%	0.01%	0.00%

Analyte: **Trimethylbenzene, 1,2,4-**

CAS: **95-63-6**

Concentration mg/kg:	1.47E+00
RfDo (mg/kg-day):	1.00E-02
RfCi (mg/m3):	6.00E-02
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		**Non-Cancer Child**		**Cancer**	
Ingestion:	1.21E-05	Ingestion:	1.29E-04	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:	1.69E-05	Inhalation:	1.69E-05	Inhalation:	
Total:	**2.90E-05**	**Total:**	**1.46E-04**	**Total:**	**0.00E+00**

% Contribution to Media Risk	0.18%	0.09%	0.00%

Program: **Voluntary Remediation Program (VRP)**

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Trimethylbenzene, 1,3,5-**
CAS: **108-67-8**

Concentration mg/kg:	4.37E-01			**Calculated Hazard/Risk**			
RfDo (mg/kg-day):	1.00E-02		**Non-Cancer Adult**		**Non-Cancer Child**		**Cancer**
RfCi (mg/m3):	6.00E-02	Ingestion:	3.59E-06	Ingestion:	3.83E-05	Ingestion:	
SFO (mg/kg-day)-1:		Dermal:		Dermal:		Dermal:	
IUR (µg/m3)-1:		Inhalation:	6.04E-06	Inhalation:	6.04E-06	Inhalation:	
Mutagen:		**Total:**	**9.63E-06**	**Total:**	**4.43E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.06%   0.03%   0.00%

Analyte: **Vanadium and Compounds**
CAS: **7440-62-2**

Concentration mg/kg:	4.04E+01			**Calculated Hazard/Risk**			
RfDo (mg/kg-day):	5.00E-03		**Non-Cancer Adult**		**Non-Cancer Child**		**Cancer**
RfCi (mg/m3):	1.00E-04	Ingestion:	6.63E-04	Ingestion:	7.08E-03	Ingestion:	
SFO (mg/kg-day)-1:		Dermal:		Dermal:		Dermal:	
IUR (µg/m3)-1:		Inhalation:	1.63E-06	Inhalation:	1.63E-06	Inhalation:	
Mutagen:		**Total:**	**6.65E-04**	**Total:**	**7.08E-03**	**Total:**	**0.00E+00**

% Contribution to Media Risk   4.07%   4.21%   0.00%

Analyte: **Xylenes**
CAS: **1330-20-7**

Concentration mg/kg:	6.50E+00			**Calculated Hazard/Risk**			
RfDo (mg/kg-day):	2.00E-01		**Non-Cancer Adult**		**Non-Cancer Child**		**Cancer**
RfCi (mg/m3):	1.00E-01	Ingestion:	2.67E-06	Ingestion:	2.85E-05	Ingestion:	
SFO (mg/kg-day)-1:		Dermal:		Dermal:		Dermal:	
IUR (µg/m3)-1:		Inhalation:	6.20E-05	Inhalation:	6.20E-05	Inhalation:	
Mutagen:		**Total:**	**6.47E-05**	**Total:**	**9.05E-05**	**Total:**	**0.00E+00**

% Contribution to Media Risk   0.40%   0.05%   0.00%

Site Name: **Alexandria**

Program: **Voluntary Remediation Program (VRP)**

Risk Based Performance Criteria

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Soil

Analyte: **Zinc and Compounds**

CAS: **7440-66-6**

Concentration mg/kg:	4.97E+01
RfDo (mg/kg-day):	3.00E-01
RfCi (mg/m3):	
SFO (mg/kg-day)-1:	
IUR (µg/m3)-1:	
Mutagen:	

Calculated Hazard/Risk

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	1.36E-05	Ingestion:	1.45E-04	Ingestion:	
Dermal:		Dermal:		Dermal:	
Inhalation:		Inhalation:		Inhalation:	
Total:	**1.36E-05**	**Total:**	**1.45E-04**	**Total:**	**0.00E+00**

% Contribution to Media Risk	0.08%	0.09%	0.00%

Total Calculated Hazard/Risk for   Soil

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	1.55E-02	Ingestion:	1.65E-01	Ingestion:	1.12E-06
Dermal:	4.55E-04	Dermal:	2.72E-03	Dermal:	2.23E-07
Inhalation:	3.92E-04	Inhalation:	3.92E-04	Inhalation:	5.89E-09
Total:	**1.63E-02**	**Total:**	**1.68E-01**	**Total:**	**1.35E-06**

Site Name: **Alexandria**

Program: **Voluntary Remediation Program (VRP)**

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Report Summary

Hazard/risk values of zero (0.00+00) are reflective of non-calculated values. Hazard/risk for zero value analytes must be evaluated outside of quantitative risk assessment.

Hazard/Risk Summary for Soil

Analyte	CAS	Hazard Adult	Hazard Child	Risk
Acenaphthene	83-32-9	4.37E-07	3.94E-06	0.00E+00
Acenaphthylene	208-96-8	5.94E-07	5.35E-06	0.00E+00
Acetone	67-64-1	1.57E-07	1.68E-06	0.00E+00
Acetophenone	98-86-2	1.24E-07	1.32E-06	0.00E+00
Aluminum	7429-90-5	7.66E-04	8.10E-03	0.00E+00
Anthracene	120-12-7	1.07E-07	9.67E-07	0.00E+00
Antimony (metallic)	7440-36-0	2.76E-04	2.94E-03	0.00E+00
Arsenic, Inorganic	7440-38-2	1.75E-03	1.73E-02	8.91E-07
Barium	7440-39-3	3.05E-05	3.19E-04	0.00E+00
Benz[a]anthracene	56-55-3	0.00E+00	0.00E+00	2.88E-08
Benzene	71-43-2	3.61E-05	1.35E-04	4.95E-09
Benzo(g,h,i)perylene	191-24-2	1.05E-06	9.45E-06	0.00E+00
Benzo[a]pyrene	50-32-8	1.43E-04	1.29E-03	2.01E-07
Benzo[b]fluoranthene	205-99-2	0.00E+00	0.00E+00	3.97E-08
Benzo[k]fluoranthene	207-08-9	0.00E+00	0.00E+00	2.16E-09
Benzoic Acid	65-85-0	3.51E-08	3.25E-07	0.00E+00
Beryllium and compounds	7440-41-7	3.72E-05	3.95E-04	3.23E-12
Bis(2-ethylhexyl)phthalate	117-81-7	1.35E-06	1.25E-05	4.09E-10
Butylbenzene, n-	104-51-8	2.30E-07	2.45E-06	0.00E+00
Cadmium (Diet)	7440-43-9-Diet	3.20E-04	3.20E-03	8.97E-13
Carbazole	86-74-8	0.00E+00	0.00E+00	0.00E+00
Chromium(III), Insoluble Salts	16065-83-1	1.13E-05	1.20E-04	0.00E+00
Chrysene	218-01-9	0.00E+00	0.00E+00	4.13E-10
Cobalt	7440-48-4	2.85E-03	3.03E-02	1.40E-10
Copper	7440-50-8	3.18E-04	3.40E-03	0.00E+00
Cresol, o-	95-48-7	3.04E-07	2.82E-06	0.00E+00
Cresol, p-chloro-m-	59-50-7	1.39E-07	1.29E-06	0.00E+00
Cumene	98-82-8	5.09E-07	1.84E-06	0.00E+00
Cyanide (CN-)	57-12-5	2.19E-04	1.31E-03	0.00E+00
Dibenz[a,h]anthracene	53-70-3	0.00E+00	0.00E+00	1.18E-07
Dimethylphenol, 2,4-	105-67-9	1.17E-06	1.08E-05	0.00E+00
Ethylbenzene	100-41-4	8.93E-07	6.33E-06	6.78E-10

Site Name: Alexandria

Program: Voluntary Remediation Program (VRP)

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Hazard/Risk Summary for Soil

Analyte	CAS	Hazard Adult	Hazard Child	Risk
Fluoranthene	206-44-0	2.85E-06	2.57E-05	0.00E+00
Fluorene	86-73-7	7.32E-07	6.60E-06	0.00E+00
Indeno[1,2,3-cd]pyrene	193-39-5	0.00E+00	0.00E+00	1.68E-08
Iron	7439-89-6	7.71E-03	8.23E-02	0.00E+00
isopropyltoluene	99-87-6	2.23E-07	1.01E-06	0.00E+00
Lead and Compounds	7439-92-1	0.00E+00	0.00E+00	0.00E+00
Manganese (Diet)	7439-96-5-Diet	3.45E-04	3.27E-03	0.00E+00
Mercury (elemental)	7439-97-6	2.67E-05	2.67E-05	0.00E+00
Methyl Ethyl Ketone (2-Butanone)	78-93-3	1.30E-07	8.89E-07	0.00E+00
Methylcyclohexane	108-87-2	0.00E+00	0.00E+00	0.00E+00
Methylene Chloride	75-09-2	1.23E-08	1.04E-07	6.36E-13
Methylnaphthalene, 1-	90-12-0	3.96E-06	3.57E-05	8.51E-09
Methylnaphthalene, 2-	91-57-6	1.12E-04	1.01E-03	0.00E+00
Naphthalene	91-20-3	9.37E-05	1.98E-04	3.61E-08
Nickel Soluble Salts	7440-02-0	4.61E-04	4.87E-03	4.31E-11
Phenanthrene	85-01-8	7.20E-06	6.49E-05	0.00E+00
Pyrene	129-00-0	3.73E-06	3.36E-05	0.00E+00
Toluene	108-88-3	2.66E-06	2.32E-05	0.00E+00
Trimethylbenzene, 1,2,4-	95-63-6	2.90E-05	1.46E-04	0.00E+00
Trimethylbenzene, 1,3,5-	108-67-8	9.63E-06	4.43E-05	0.00E+00
Vanadium and Compounds	7440-62-2	6.65E-04	7.08E-03	0.00E+00
Xylenes	1330-20-7	6.47E-05	9.05E-05	0.00E+00
Zinc and Compounds	7440-66-6	1.36E-05	1.45E-04	0.00E+00

Total Hazard/Risk for All Media

Non-Cancer Adult		Non-Cancer Child		Cancer	
Ingestion:	1.55E-02	Ingestion:	1.65E-01	Ingestion:	1.12E-06
Dermal:	4.55E-04	Dermal:	2.72E-03	Dermal:	2.23E-07
Inhalation:	3.92E-04	Inhalation:	3.92E-04	Inhalation:	5.89E-09
Total:	**1.63E-02**	**Total:**	**1.68E-01**	**Total:**	**1.35E-06**
does not exceed hazard index		*does not exceed hazard index*		*does not exceed cumulative risk*	

Site Name: Alexandria

Program: Voluntary Remediation Program (VRP)

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

Trespasser Exposure Default Values

Symbol	Description	Value	Units
AF0-02	Soil Adherence Factor - age segment 0-2	0.2	(mg/cm2)
AF02-06	Soil Adherence Factor - age segment 2-6	0.2	(mg/cm2)
AF06-16	Soil Adherence Factor - age segment 6-16	0.07	(mg/cm2)
AF16-26	Soil Adherence Factor - age segment 16-26	0.07	(mg/cm2)
AFsed0-02	Recreator/Trespasser Sediment Adherence Factor - age segment 0-2 - Exposure Factors Handbook	0.3	(mg/cm2)
AFsed02-06	Recreator/Trespasser Sediment Adherence Factor - age segment 2-6 - Exposure Factors Handbook	0.3	(mg/cm2)
AFsed06-16	Recreator/Trespasser Sediment Adherence Factor - age segment 6-16 - Exposure Factors Handbook	0.2	(mg/cm2)
AFsed16-26	Recreator/Trespasser Sediment Adherence Factor - age segment 16-26 - Exposure Factors Handbook	0.2	(mg/cm2)
AFtrs-a	Trespasser Soil Adherence Factor- adult	0.07	(mg/cm2)
AFtrs-c	Trespasser Soil Adherence Factor - child	0.2	(mg/cm2)
AFtrs-sed-a	Trespasser Sediment Adherence Factor - adult - Exposure Factors Handbook	0.2	(mg/cm2)
AFtrs-sed-c	Trespasser Sediment Adherence Factor - child - Exposure Factors Handbook	0.3	(mg/cm2)
ATtrs	Trespasser Averaging Time	365	(days/yr)
ATtrs	Trespasser Averaging Time: 365 x LT	25550	(days)
ATtrs-a	Trespasser Averaging Time - adult: 365 x EDtrs-a	7300	(days)
ATtrs-c	Trespasser Averaging Time - child: 365 x EDtrs-c	2190	(days)
BW0-02	Body Weight - age segment 0-2	15	(kg)
BW02-06	Body Weight - age segment 2-6	15	(kg)
BW06-16	Body Weight - age segment 6-16	80	(kg)
BW16-26	Body Weight - age segment 16-26	80	(kg)
BWtrs-a	Trespasser Body Weight - adult	80	(kg)
BWtrs-c	Trespasser Body Weight - child	15	(kg)
DFSMtrs-adj	Trespasser Soil Mutagenic Dermal Contact Factor - age adjusted - Virginia DEQ calculated using age-segment values	29366.4	(mg/kg)
DFSMtrs-sed-adj	Trespasser Sediment Mutagenic Dermal Contact Factor - age adjusted - Virginia DEQ calculated using age-segment values	50926.08	(mg/kg)
DFStrs-adj	Trespasser Soil Dermal Contact Factor - age adjusted - Virginia DEQ calculated using age-segment values	7089.6	(mg/kg)

Risk Based Performance Criteria

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

DFStrs-sed-adj	Trespasser Sediment Dermal Contact Factor - age adjusted - Virginia DEQ calculated using age-segment values	14072.64	(mg/kg)
DFWMtrs-adj	Trespasser Surface Water Mutagenic Dermal Contact Factor - age adjusted - Virginia DEQ calculated using age-segment values	561712	(cm2-event/kg)
DFWtrs-adj	Trespasser Surface Water Dermal Contact Factor - age adjusted - Virginia DEQ calculated using age-segment values	179016	(cm2-event/kg)
ED0-02	Exposure Duration - age segment 0-2	2	(yrs)
ED02-06	Exposure Duration - age segment 2-6	4	(yrs)
ED06-16	Exposure Duration -age segment 6-16	10	(yrs)
ED16-26	Exposure Duration -age segment 16-26	10	(yrs)
EDtrs	Trespasser Soil/Sediment Exposure Duration	26	(yrs)
EDtrs-a	Trespasser Soil/Sediment Exposure Duration - adult	20	(yrs)
EDtrs-c	Trespasser Soil/Sediment Exposure Duration - child	6	(yrs)
EFtrs	Trespasser Exposure Frequency - Virginia DEQ	24	(days/yr)
EFtrs0-02	Trespasser Exposure Frequency - age segment 0-2 - Virginia DEQ	24	(days/yr)
EFtrs02-06	Trespasser Exposure Frequency - age segment 2-6 - Virginia DEQ	24	(days/yr)
EFtrs06-16	Trespasser Exposure Frequency - age segment 6-16 - Virginia DEQ	24	(days/yr)
EFtrs16-26	Trespasser Exposure Frequency - age segment 16-26 - Virginia DEQ	24	(days/yr)
EFtrs-a	Trespasser Exposure Frequency - adult - Virginia DEQ	24	(days/yr)
EFtrs-c	Trespasser Exposure Frequency - child - Virginia DEQ	24	(days/yr)
ETevent-rec/trs(0-02)	Recreator/Trespasser Exposure Time - age segment 0-2 - Virginia DEQ	2	(hrs/event)
ETevent-rec/trs(02-06)	Recreator/Trespasser Exposure Time - age segment 2-6 - Virginia DEQ	2	(hrs/event)
ETevent-rec/trs(06-16)	Recreator/Trespasser Exposure Time - age segment 6-16 - Virginia DEQ	2	(hrs/event)
ETevent-rec/trs(16-26)	Recreator/Trespasser Exposure Time - age segment 16-26 - Virginia DEQ	2	(hrs/event)
ETevent-trs-a	Trespasser Surface Water Exposure Time - adult - Virginia DEQ	2	(hrs/event)
ETevent-trs-adj	Trespasser Exposure Time - age adjusted - Virginia DEQ calculated using age-segment values	2	(hrs/event)
ETevent-trs-c	Trespasser Surface Water Exposure Time - child - Virginia DEQ	2	(hrs/event)
ETevent-trs-madj	Trespasser Exposure Time - mutagen age adjusted - Virginia DEQ calculated using age-segment values	2	(hrs/event)
ETrec/trs0-02	Recreator/Trespasser Exposure Time - age segment 0-2 - Virginia DEQ	2	(hrs/day)

<u>Risk Based Performance Criteria</u>

Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
1	1.00E-06	1.00E-04

ETrec/trs02-06	Recreator/Trespasser Exposure Time - age segment 2-6 - Virginia DEQ	2	(hrs/day)
ETrec/trs06-16	Recreator/Trespasser Exposure Time - age segment 6-16 - Virginia DEQ	2	(hrs/day)
ETrec/trs16-26	Recreator/Trespasser Exposure Time - age segment 16-26 - Virginia DEQ	2	(hrs/day)
ETtrs	Trespasser Soil Exposure Time - Virginia DEQ	2	(hrs/day)
ETtrs-a	Trespasser Exposure Time - adult - Virginia DEQ	2	(hrs/day)
ETtrs-c	Trespasser Exposure Time - child - Virginia DEQ	2	(hrs/day)
ETtrs-sed	Trespasser Sediment Exposure Time - Virginia DEQ	2	(hrs)
EV0-02	Events - age segment 0-2	1	(events/day)
EV02-06	Events - age segment 2-6	1	(events/day)
EV06-16	Events - age segment 6-16	1	(events/day)
EV16-26	Events - age segment 16-26	1	(events/day)
EVtrs-a	Trespasser Events - adult - Virginia DEQ	1	(events/day)
EVtrs-c	Trespasser Surface Water Events - child - Virginia DEQ	1	(events/day)
IFMtrs-sed-adj	Trespasser Mutagenic Sediment Ingestion Rate - age adjusted - Virginia DEQ calculated using age-segment values	11440	(mg/kg)
IFSMtrs-adj	Trespasser Mutagenic Soil Ingestion Rate - age adjusted - Virginia DEQ calculated using age-segment values	11440	(mg/kg)
IFStrs-adj	Trespasser Soil Ingestion Rate - age adjusted - Virginia DEQ calculated using age-segment values	2520	(mg/kg)
IFStrs-sed-adj	Trespasser Sediment Ingestion Rate - age adjusted - Virginia DEQ calculated using age-segment values	2520	(mg/kg)
IFWMtrs-adj	Trespasser Mutagenic Surface Water Ingestion Rate - age adjusted - Virginia DEQ calculated using age-segment values	15.111	(L/kg)
IFWtrs-adj	Trespasser Surface Water Ingestion Rate - age adjusted - Virginia DEQ calculated using age-segment values	3.624	(L/kg)
INHMtrs-sed-adj	Trespasser Sediment Inhalation Exposure Duration Mutagen - age adjusted - Virginia DEQ calculated using age-segment values	144	(days)
INHMtrs-soil-adj	Trespasser Soil Inhalation Exposure Duration Mutagen - age adjusted - Virginia DEQ calculated using age-segment values	144	(days)
IRS0-02	Soil/Sediment Ingestion Rate - age segment 0-2	200	(mg/day)
IRS02-06	Soil/Sediment Ingestion Rate - age segment 2-6	200	(mg/day)
IRS06-16	Soil/Sediment Ingestion Rate - age segment 6-16	100	(mg/day)
IRS16-26	Soil/Sediment Ingestion Rate - age segment 16-26	100	(mg/day)
IRStrs-a	Trespasser Soil Ingestion Rate - adult	100	(mg/day)

Program: Voluntary Remediation Program (VRP)

<u>Risk Based Performance Criteria</u>

		Default Hazard Index	Default Risk Individual Chemical	Default Cumulative Risk-All Chemicals
		1	1.00E-06	1.00E-04

IRStrs-c	Trespasser Soil Ingestion Rate - child	200	(mg/day)
IRtrs-sed-a	Trespasser Sediment Ingestion Rate - adult	100	(mg/day)
IRtrs-sed-c	Trespasser Sediment Ingestion Rate - child	200	(mg/day)
IRW0-02	Surface Water Ingestion Rate - age segment 0-2	0.12	(L/hr)
IRW02-06	Surface Water Ingestion Rate - age segment 2-6	0.12	(L/hr)
IRW06-16	Surface Water Ingestion Rate - age segment 6-16	0.124	(L/hr)
IRW16-26	Surface Water Ingestion Rate - age segment 16-26	0.0985	(L/hr)
IRWtrs-a	Trespasser Surface Water Ingestion Rate - adult	0.11	(L/hr)
IRWtrs-c	Trespasser Surface Water Ingestion Rate - child	0.12	(L/hr)
SAs0-02	Surface Area Soil/Sediment - age segment 0-2	2373	(cm2/day)
SAs02-06	Surface Area Soil/Sediment - age segment 2-6	2373	(cm2/day)
SAs06-16	Surface Area Soil/Sediment - age segment 6-16	6032	(cm2/day)
SAs16-26	Surface Area Soil/Sediment - age segment 16-26	6032	(cm2/day)
SAtrs-a	Trespasser Soil Surface Area - adult	6032	(cm2/day)
SAtrs-a	Trespasser Surface Water Surface Area Surface - adult	19652	(cm2)
SAtrs-c	Trespasser Surface Water Surface Area - child	6365	(cm2)
SAtrs-c	Trespasser Soil Surface Area - child	2373	(cm2/day)
SAtrs-sed-a	Trespasser Sediment Surface Area - adult	6032	(cm2/day)
SAtrs-sed-c	Trespasser Sediment Surface Area - child	2373	(cm2/day)
SAw0-02	Surface Area Water - age segment 0-2	6365	(cm2)
SAw02-06	Surface Area Water - age segment 2-6	6365	(cm2)
SAw06-16	Surface Area Water - age segment 6- 16	19652	(cm2)
SAw16-26	Surface Area Water - age segment 16- 26	19652	(cm2)

END OF REPORT