Appendix C.8

95-Percent UCL Supporting Documentation

Chemical of Potential Concern	Max. Conc.	95% UCL (Distribution) (1)		Value	Statistic (2)	Rationale (3)	Description	Mean
Vinyl chloride	17	8.89420757	(NP)	8.894207567	95% UCL-NP	(d)	Chebyshev (Mean, Std)	3.0125
Trichloroethene	17	8.89420757	(NP)	8.894207567	95% UCL-NP	(d)	Chebyshev (Mean, Std)	3.0125
Phenanthrene	1,277	692	(T)	692.4753515	95% UCL-T	(c)	95% Chebyshev (MVUE) UCL	213.4385
Benzo(a)Anthracene	1,064	709	(T)	708.5160332	95% UCL-T	(c)	95% Chebyshev (MVUE) UCL	214.4615
Benzo(b)Fluoranthene	1,560	738.807091	(NP)	738.8070905	95% UCL-NP	(d)	Chebyshev (Mean, Std)	254.8077
Benzo(k)Fluoranthene	1,064	513.930337	(NP)	513.9303369	95% UCL-NP	(d)	Bootstrap-t	211.0615
Benzo(a)Pyrene	1,064	514.558627	(NP)	514.5586274	95% UCL-NP	(d)	Bootstrap-t	211.1077
Indeno(1,2,3-cd)pyrene	1,064	516.824899	(NP)	516.8248987	95% UCL-NP	(d)	Bootstrap-t	218.6
Dibenz(a,h) anthracene	355	213.165864	(NP)	213.1658642	95% UCL-NP	(d)	Jackknife	161.9538
Benzo(g,h,i)perylene	1,206	594.810058	(NP)	594.8100577	95% UCL-NP	(d)	Bootstrap-t	235.3385
Antimony	4,500	3546.48537	(NP)	3546.485372	95% UCL-NP	(d)	Jackknife	2714.667
Arsenic	10,400	5,672	(N)	5671.704568	95% UCL-N	(b)	Student's-t	4504.667
Cadmium	27,550	9,794	(T)	9793.505039	95% UCL-T	(c)	95% Chebyshev (MVUE) UCL	4411
Copper	160,000	101,183	(T)	101182.9809	95% UCL-T	(c)	95% H-UCL	61510
Lead	1,600,000	1,141,914	(T)	1141914.222	95% UCL-T	(c)	95% Chebyshev (MVUE) UCL	438746.7
Manganese	363,000	273,622	(N)	273622.1203	95% UCL-N	(b)	Student's-t	246533.3
Mercury	180	94.6941686	(NP)	94.694	95% UCL-NP	(d)	Bootstrap-t	59.70667
Nickel	180,000	64,599	(T)	64599.30281	95% UCL-T	(c)	95% H-UCL	33793.33
Thallium	85	66	(N)	66.10834954	95% UCL-N	(b)	Student's-t	56.5
TEQ (no 170/193/180) Humans	0.002	N/A	(<4)	0.00219673	Max	(a)		0.001121
C11-C22 Aromatic	18,000	N/A	(<4)	18000	Max	(a)		14500
Aroclor 1242	228	112	(T)	112.3129594	95% UCL-T	(c)	95% Chebyshev (MVUE) UCL	41.31042
Aroclor 1248	21	33	(NP)	20.5	Max	(d & e)	95% Chebyshev (MVUE) UCL	14.37292
Aroclor 1254	296	154	(NP)	153.7276314	97.5% UCL-NP	(d)	sd=1.222968175; 97.5% Chebyshev (Mean, Std)	53.8
Aroclor 1260	171	79	(N)	78.80184607	95% UCL-N	(b)	Student's-t	54.3875

(1) T - Transformed; N - Normal; NP - Non-parametric; <4 - sample size too small to calculate 95% UCL
(2) Statistics: Maximum Detected Value (Max); 95% UCL of Transformed Data (95% UCL - T); 95% of Normal Data (95% UCL - N); 95% of Non-parametric Data (95% UCL - NP).
(3) Rationale

(a) Due to small sample size (<4), the maximum detected concentration is used.
(b) Shapiro-Wilk W Test indicates data are normally distributed.
(c) Shapiro-Wilk W Test indicates data are log-normally distributed.
(d) Shapiro-Wilk W Test indicates data are neither normally nor log-normally distributed.
(e) Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used for EPC.
(f) Due to high standard deviation, the maximum concentration is used.

From File

Summary Statistics for	Vinyl chlori
Number of Samples	12
Minimum	0.85
Maximum	17
Mean	3.0125
Median	1.325
Standard Deviation	4.674307
Variance	21.84915
Coefficient of Variation	1.551637
Skewness	2.913796

Shapiro-Wilk Test Statisitic	0.488431
Shapiro-Wilk 5% Critical Value	0.859

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	5.435788

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	6.444755
Modified-t	5.624955

95 % Non-parametric UCL

CLT	5.231994
Jackknife	5.435788
Standard Bootstrap	5.163561
Bootstrap-t	43.73547
Chebyshev (Mean, Std)	8.894208

From File

Summary Statistics for	Trichloroetl
Number of Samples	12
Minimum	0.85
Maximum	17
Mean	3.0125
Median	1.325
Standard Deviation	4.674307
Variance	21.84915
Coefficient of Variation	1.551637
Skewness	2.913796

Shapiro-Wilk Test Statisitic	0.488431
Shapiro-Wilk 5% Critical Value	0.859

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	5.435788

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	6.444755
Modified-t	5.624955

95 % Non-parametric UCL

CLT	5.231994
Jackknife	5.435788
Standard Bootstrap	5.079024
Bootstrap-t	45.94787
Chebyshev (Mean, Std)	8.894208

Summary Statistics for	Phenanthre
Number of Samples	13
Minimum	7.4
Maximum	1277
Mean	213.4385
Median	173.5
Standard Deviation	332.0458
Variance	110254.4
Coefficient of Variation	1.555698
Skewness	3.142217

95 % UCL (Assuming Normal Data)

Student's-t	377.5745

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	450.6752
Modified-t	390.9509

95 % Non-parametric UCL

CLT	364.9179
Jackknife	377.5745
Standard Bootstrap	358.6396
Bootstrap-t	646.5722
Chebyshev (Mean, Std)	614.8622

Summary Statistics for	ln(Phenant
Minimum	2.00148
Maximum	7.152269
Mean	4.519441
Standard Deviation	1.466846
Variance	2.151637

Shapiro-Wilk Test Statisitic	0.907243
Shapiro-Wilk 5% Critical Value	0.866

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution

MLE Mean	269.1473
MLE Standard Deviation	741.9351
MLE Coefficient of Variation	2.756614
MLE Skewness	29.21713
MLE Median	91.78423
MLE 80% Quantile	317.0074
MLE 90% Quantile	604.4611
MLE 95% Quantile	1024.953
MLE 99% Quantile	2783.109
MVU Estimate of Median	84.4525
MVU Estimate of Mean	233.1572
MVU Estimate of Std. Dev.	419.8416
MVU Estimate of SE of Mean	105.3748

UCL Assuming Lognormal Distribution

95% H-UCL	1308.633
95% Chebyshev (MVUE) UCL	692.4754
99% Chebyshev (MVUE) UCL	1281.623

Recommended UCL to use:

95 % Chebyshev (MVUE) UCL

Summary Statistics for	Benzo(a)A
Number of Samples	13
Minimum	9
Maximum	1064
Mean	214.4615
Median	173.5
Standard Deviation	278.4156
Variance	77515.23
Coefficient of Variation	1.298207
Skewness	2.670443

95 % UCL (Assuming Normal Data)

Student's-t	352.0873

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	402.585
Modified-t	361.6192

95 % Non-parametric UCL

CLT	341.4748
Jackknife	352.0873
Standard Bootstrap	337.1924
Bootstrap-t	521.4384
Chebyshev (Mean, Std)	551.0495

Summary Statistics for	ln(Benzo(a
Minimum	2.197225
Maximum	6.969791
Mean	4.63538
Standard Deviation	1.410908
Variance	1.990662

Shapiro-Wilk Test Statisitic	0.928906
Shapiro-Wilk 5% Critical Value	0.866

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution

MLE Mean	278.8602
MLE Standard Deviation	701.0646
MLE Coefficient of Variation	2.514036
MLE Skewness	23.43176
MLE Median	103.067
MLE 80% Quantile	339.5418
MLE 90% Quantile	631.6887
MLE 95% Quantile	1049.767
MLE 99% Quantile	2743.945

MVU Estimate of Median	95.42987
MVU Estimate of Mean	245.0817
MVU Estimate of Std. Dev.	418.9567
MVU Estimate of SE of Mean	106.3191

UCL Assuming Lognormal Distribution

95% H-UCL	1220.107
95% Chebyshev (MVUE) UCL	708.516
99% Chebyshev (MVUE) UCL	1302.944

Recommended UCL to use:

95 % Chebyshev (MVUE) UCL

From File

Summary Statistics for	Benzo(b)Fl
Number of Samples	13
Minimum	11
Maximum	1560
Mean	254.8077
Median	179
Standard Deviation	400.3499
Variance	160280
Coefficient of Variation	1.571184
Skewness	3.343794

Shapiro-Wilk Test Statisitic	0.490196
Shapiro-Wilk 5% Critical Value	0.866

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	452.7077

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	547.4787
Modified-t	469.8703

95 % Non-parametric UCL

CLT	437.4474
Jackknife	452.7077
Standard Bootstrap	423.4569
Bootstrap-t	909.4501
Chebyshev (Mean, Std)	738.8071

From File

Summary Statistics for	Benzo(k)Fl
Number of Samples	13
Minimum	9.3
Maximum	1064
Mean	211.0615
Median	179
Standard Deviation	269.5732
Variance	72669.72
Coefficient of Variation	1.277226
Skewness	2.992955

Shapiro-Wilk Test Statisitic	0.591794
Shapiro-Wilk 5% Critical Value	0.866

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	344.3163

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	400.3563
Modified-t	354.6602

95 % Non-parametric UCL

CLT	334.0409
Jackknife	344.3163
Standard Bootstrap	333.8826
Bootstrap-t	513.9303
Chebyshev (Mean, Std)	536.9597

From File

Summary Statistics for	Benzo(a)P
Number of Samples	13
Minimum	9.9
Maximum	1064
Mean	211.1077
Median	179
Standard Deviation	269.5358
Variance	72649.57
Coefficient of Variation	1.276769
Skewness	2.99396

Shapiro-Wilk Test Statisitic	0.591429
Shapiro-Wilk 5% Critical Value	0.866

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	344.344

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	400.3984
Modified-t	354.6899

95 % Non-parametric UCL

CLT	334.07
Jackknife	344.344
Standard Bootstrap	331.3726
Bootstrap-t	514.5586
Chebyshev (Mean, Std)	536.9606

From File

Summary Statistics for	Indeno(1,2
Number of Samples	13
Minimum	6.2
Maximum	1064
Mean	218.6
Median	179
Standard Deviation	267.0094
Variance	71294.03
Coefficient of Variation	1.221452
Skewness	2.989716

Shapiro-Wilk Test Statisitic	0.578631
Shapiro-Wilk 5% Critical Value	0.866

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	350.5875

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	406.0233
Modified-t	360.8218

95 % Non-parametric UCL

CLT	340.4098
Jackknife	350.5875
Standard Bootstrap	333.7646
Bootstrap-t	516.8249
Chebyshev (Mean, Std)	541.3986

From File

Summary Statistics for	Dibenz(a,h
Number of Samples	13
Minimum	2.8
Maximum	354.5
Mean	161.9538
Median	179
Standard Deviation	103.6014
Variance	10733.26
Coefficient of Variation	0.639697
Skewness	-0.268898

Shapiro-Wilk Test Statisitic	0.85235
Shapiro-Wilk 5% Critical Value	0.866

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	213.1659

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	206.9271
Modified-t	212.8087

95 % Non-parametric UCL

CLT	209.2169
Jackknife	213.1659
Standard Bootstrap	205.948
Bootstrap-t	206.4111
Chebyshev (Mean, Std)	287.2019

From File

Summary Statistics for	Benzo(g,h,
Number of Samples	13
Minimum	7.9
Maximum	1206
Mean	235.3385
Median	179
Standard Deviation	304.0095
Variance	92421.81
Coefficient of Variation	1.291797
Skewness	3.089126

Shapiro-Wilk Test Statisitic	0.563804
Shapiro-Wilk 5% Critical Value	0.866

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	385.6157

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	451.2175
Modified-t	397.6558

95 % Non-parametric UCL

CLT	374.0277
Jackknife	385.6157
Standard Bootstrap	363.5065
Bootstrap-t	594.8101
Chebyshev (Mean, Std)	602.8681

From File

Summary Statistics for	Antimony
Number of Samples	15
Minimum	100
Maximum	4500
Mean	2714.667
Median	3950
Standard Deviation	1829.104
Variance	3345623
Coefficient of Variation	0.673786
Skewness	-0.622803

Shapiro-Wilk Test Statisitic	0.753468
Shapiro-Wilk 5% Critical Value	0.881

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)	
Student's-t	3546.485
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	3410.338
Modified-t	3533.828
95 % Non-parametric UCL	
CLT	3491.486
Jackknife	3546.485
Standard Bootstrap	3481.616
Bootstrap-t	3492.108
Chebyshev (Mean, Std)	4773.256

Summary Statistics for	Arsenic
Number of Samples	15
Minimum	850
Maximum	10400
Mean	4504.667
Median	3900
Standard Deviation	2566.225
Variance	6585512
Coefficient of Variation	0.569682
Skewness	0.65945
Shapiro-Wilk Test Statisitic	0.946467
Shapiro-Wilk 5% Critical Value	0.881
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t
95 % UCL (Assuming Normal Data)	
Student's-t	5671.705
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	5715.091
Modified-t	5690.508
95 % Non-parametric UCL	
CLT	5594.541
Jackknife	5671.705
Standard Bootstrap	5548.952
Bootstrap-t	5792.8
Chebyshev (Mean, Std)	7392.858

C.8-1.1 Surface Soil Current/Future Aberjona Runs

From File C:\Southwest UCL\aberjona.xls

Summary Statistics for	Cadmium
Number of Samples	15
Minimum	270
Maximum	27550
Mean	4411
Median	2500
Standard Deviation	6762.267
Variance	45728251
Coefficient of Variation	1.533046
Skewness	3.249075

95 % UCL (Assuming Normal Data)

Student's-t	7486.264

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	8848.027
Modified-t	7730.388

95 % Non-parametric UCL

CLT	7282.93
Jackknife	7486.264
Standard Bootstrap	7280.874
Bootstrap-t	15291.96
Chebyshev (Mean, Std)	12021.68

Summary Statistics for	ln(Cadmiur
Minimum	5.598422
Maximum	10.22376
Mean	7.766471
Standard Deviation	1.109587
Variance	1.231184

Shapiro-Wilk Test Statisitic	0.985368
Shapiro-Wilk 5% Critical Value	0.881

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution

MLE Mean	4368.011
MLE Standard Deviation	6802.443
MLE Coefficient of Variation	1.557332
MLE Skewness	8.448966
MLE Median	2360.128
MLE 80% Quantile	6027.408
MLE 90% Quantile	9821.123
MLE 95% Quantile	14643.36
MLE 99% Quantile	31174.98

MVU Estimate of Median	2264.99
MVU Estimate of Mean	4113.277
MVU Estimate of Std. Dev.	5284.055
MVU Estimate of SE of Mean	1303.134

UCL Assuming Lognormal Distribution

95% H-UCL	10390.21
95% Chebyshev (MVUE) UCL	9793.505
99% Chebyshev (MVUE) UCL	17079.29

Recommended UCL to use:

95 % Chebyshev (MVUE) UCL

C.8-1.1 Surface Soil Current/Future Aberjona Runs

Summary Statistics for	Copper
Number of Samples	15
Minimum	16400
Maximum	160000
Mean	61510
Median	40600
Standard Deviation	42739.18
Variance	1.83E+09
Coefficient of Variation	0.694833
Skewness	0.892488

95 % UCL (Assuming Normal Data)

Student's-t	80946.43

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	82378.48
Modified-t	81370.25

95 % Non-parametric UCL

CLT	79661.31
Jackknife	80946.43
Standard Bootstrap	79138.11
Bootstrap-t	84448.62
Chebyshev (Mean, Std)	109611.4

Summary Statistics for	ln(Copper)
Minimum	9.705037
Maximum	11.98293
Mean	10.78658
Standard Deviation	0.73859
Variance	0.545516

Shapiro-Wilk Test Statisitic	0.925571
Shapiro-Wilk 5% Critical Value	0.881

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution

MLE Mean	63534.22
MLE Standard Deviation	54116.01
MLE Coefficient of Variation	0.851762
MLE Skewness	3.173237
MLE Median	48367.15
MLE 80% Quantile	90281.23
MLE 90% Quantile	124949.5
MLE 95% Quantile	163008.4
MLE 99% Quantile	269557.6

MVU Estimate of Median	47494.61
MVU Estimate of Mean	62146.22
MVU Estimate of Std. Dev.	49147.1
MVU Estimate of SE of Mean	12549.19

UCL Assuming Lognormal Distribution

95% H-UCL	101183
95% Chebyshev (MVUE) UCL	116846.9
99% Chebyshev (MVUE) UCL	187009

Recommended UCL to use:

H-UCL

C.8-1.1 Surface Soil Current/Future Aberjona Runs

Summary Statistics for	Lead
Number of Samples	15
Minimum	49700
Maximum	1600000
Mean	438746.7
Median	195000
Standard Deviation	491630.9
Variance	2.42E+11
Coefficient of Variation	1.120535
Skewness	1.483464

95 % UCL (Assuming Normal Data)

Student's-t	662324.8

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	699494.4
Modified-t	670428.3

95 % Non-parametric UCL

CLT	647542
Jackknife	662324.8
Standard Bootstrap	636677.6
Bootstrap-t	760474.2
Chebyshev (Mean, Std)	992059

Summary Statistics for	ln(Lead)
Minimum	10.81376
Maximum	14.28551
Mean	12.36009
Standard Deviation	1.21425
Variance	1.474403

Shapiro-Wilk Test Statisitic	0.919012
Shapiro-Wilk 5% Critical Value	0.881

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution

MLE Mean	487618.7
MLE Standard Deviation	894940.2
MLE Coefficient of Variation	1.835328
MLE Skewness	11.68815
MLE Median	233301.6
MLE 80% Quantile	650911.3
MLE 90% Quantile	1110586
MLE 95% Quantile	1719474
MLE 99% Quantile	3931113

MVU Estimate of Median	222079
MVU Estimate of Mean	451902.7
MVU Estimate of Std. Dev.	652032.1
MVU Estimate of SE of Mean	158299.5

UCL Assuming Lognormal Distribution

95% H-UCL	1333627
95% Chebyshev (MVUE) UCL	1141914
99% Chebyshev (MVUE) UCL	2026963

Recommended UCL to use:

95 % Chebyshev (MVUE) UCL

Summary Statistics for	Manganese
Number of Samples	15
Minimum	132000
Maximum	363000
Mean	246533.3
Median	237000
Standard Deviation	59566.13
Variance	3.55E+09
Coefficient of Variation	0.241615
Skewness	0.110673
Shapiro-Wilk Test Statisitic	0.986363
Shapiro-Wilk 5% Critical Value	0.881
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t
95 % UCL (Assuming Normal Data)	
Student's-t	273622.1
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	272300.6
Modified-t	273695.4
95 % Non-parametric UCL	
CLT	271831
Jackknife	273622.1
Standard Bootstrap	270872.4
Bootstrap-t	273686.3
Chebyshev (Mean, Std)	313572.8

C.8-1.1 Surface Soil Current/Future Aberjona Runs

Summary Statistics for	Nickel
Number of Samples	15
Minimum	6800
Maximum	180000
Mean	33793.33
Median	17000
Standard Deviation	46731.41
Variance	2.18E+09
Coefficient of Variation	1.382859
Skewness	2.628058

95 % UCL (Assuming Normal Data)	
Student's-t	55045.3

95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	62388.62
Modified-t	56409.89

95 % Non-parametric UCL	
CLT	53640.14
Jackknife	55045.3
Standard Bootstrap	52882.85
Bootstrap-t	102338.3
Chebyshev (Mean, Std)	86387.8

Summary Statistics for	ln(Nickel)
Minimum	8.824678
Maximum	12.10071
Mean	9.877055
Standard Deviation	0.983918
Variance	0.968095

Shapiro-Wilk Test Statisitic	0.89632
Shapiro-Wilk 5% Critical Value	0.881

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution	
MLE Mean	31606.01
MLE Standard Deviation	40388.02
MLE Coefficient of Variation	1.277859
MLE Skewness	5.920224
MLE Median	19478.27
MLE 80% Quantile	44732.96
MLE 90% Quantile	68967.44
MLE 95% Quantile	98282.41
MLE 99% Quantile	192076.4
MVU Estimate of Median	18858.51
MVU Estimate of Mean	30238.23
MVU Estimate of Std. Dev.	33457.88
MVU Estimate of SE of Mean	8378.12

UCL Assuming Lognormal Distribution	
95% H-UCL	64599.3
95% Chebyshev (MVUE) UCL	66757.61
99% Chebyshev (MVUE) UCL	113599.5

Recommended UCL to use:

H-UCL

Summary Statistics for	Thallium
Number of Samples	15
Minimum	18.5
Maximum	85
Mean	56.5
Median	60
Standard Deviation	21.12801
Variance	446.3929
Coefficient of Variation	0.373947
Skewness	-0.60298
Shapiro-Wilk Test Statisitic	0.914712
Shapiro-Wilk 5% Critical Value	0.881
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t
95 % UCL (Assuming Normal Data)	
Student's-t	66.10835
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	64.56555
Modified-t	65.9668
95 % Non-parametric UCL	
CLT	65.47305
Jackknife	66.10835
Standard Bootstrap	65.16884
Bootstrap-t	65.0817
Chebyshev (Mean, Std)	80.27879

C.8-1.1 Surface Soil Current/Future Aberjona Runs

Summary Statistics for	TEQ (no 1
Number of Samples	3
Minimum	0.000478
Maximum	0.002197
Mean	0.001121
Median	0.000689

Too Few Observations To Calcula

Summary Statistics for	C11-C22 Aromatic
Number of Samples	2
Minimum	11000
Maximum	18000
Mean	14500
Median	14500

ıte UCLs Too Few Observations To Calculate UCLs

Chemical of Potential Concern	Max. Conc.	95% UCL (Distribution) (1)		Value	Statistic (2)	Rationale (3)	Descriptic	Mean
Vinyl chloride	2	1	(N)	1	95% UCL-N	(b)	Student's-t	1.4
Trichloroethene	2	1	(N)	1	95% UCL-N	(b)	Student's-t	1.4
Phenanthrene	206	204	(N)	204	95% UCL-N	(b)	Student's-t	190.375
Benzo(a)Anthracene	380	499	(T)	380	Max	(c & e)	95% H-UC	237.5
Benzo(b)Fluoranthene	206	204	(N)	204	95% UCL-N	(b)	Student's-t	190.375
Benzo(k)Fluoranthene	206	204	(N)	204	95% UCL-N	(b)	Student's-t	190.375
Benzo(a)Pyrene	206	204	(N)	204	95% UCL-N	(b)	Student's-t	190.375
Indeno(1,2,3-cd)pyrene	206	204	(N)	204	95% UCL-N	(b)	Student's-t	190.375
Dibenz(a,h) anthracene	206	204	(N)	204	95% UCL-N	(b)	Student's-t	190.375
Benzo(g,h,i)perylene	206	204	(N)	204	95% UCL-N	(b)	Student's-t	190.375
Antimony	4,500	4,479	(N)	4,479	95% UCL-N	(b)	Student's-t	4237.5
Arsenic	6,500	7,016	(N)	6,500	Max	(b & e)	Student's-t	4975
Cadmium	2,100	2,080	(N)	2,080	95% UCL-N	(b)	Student's-t	1505
Copper	92,600	85,148	(N)	85,148	95% UCL-N	(b)	Student's-t	45425
Lead	365,000	342,458	(N)	342,458	95% UCL-N	(b)	Student's-t	184675
Manganese	211,000	224,757	(N)	211,000	Max	(b & e)	Student's-t	182500
Mercury	180	167.6143269	(N)	167.614	95% UCL-N	(b)	Student's-t	92.5
Nickel	16,000	15,074	(N)	15,074	95% UCL-N	(b)	Student's-t	10325
Thallium	85	84	(N)	84	95% UCL-N	(b)	Student's-t	78.75
TEQ (no 170/193/180) Humans	0.001	N/A	(<4)	0.001	Max	(a)	Student's-t	0.000583
C11-C22 Aromatic		N/A	(<4)		Max	(a)		
Aroclor 1016	20.5	20.35761811	(NP)	20.3576	95% UCL-NP	(d)	Jackknife	13.64583
Aroclor 1221	41	41.00459424	(NP)	41.0000	Max	(d & e)	Jackknife	26.85833
Aroclor 1232	20.5	20.35761811	(NP)	20.3576	95% UCL-NP	(d)	Jackknife	13.64583
Aroclor 1242	20.5	20.35761811	(NP)	20.3576	95% UCL-NP	(d)	Jackknife	13.64583
Aroclor 1248	20.5	20.35761811	(NP)	20.3576	95% UCL-NP	(d)	Jackknife	13.64583
Aroclor 1254	296	266.7718492	(NP)	266.7718	95% UCL-NP	(d)	Chebyshev	65.66667
Aroclor 1260	96	69.6858271	(N)	69.6858	95% UCL-N	(b)	Student's-t	39.15

(1) T - Transformed; N - Normal; NP - Non-parametric; <4 - sample size too small to calculate 95% UCL
(2) Statistics: Maximum Detected Value (Max); 95% UCL of Transformed Data (95% UCL - T); 95% of Normal Data (95% UCL - N); 95% of Non-parametric Data (95% UCL - NP).
(3) Rationale

(a) Due to small sample size (<4), the maximum detected concentration is used.
(b) Shapiro-Wilk W Test indicates data are normally distributed.
(c) Shapiro-Wilk W Test indicates data are log-normally distributed.
(d) Shapiro-Wilk W Test indicates data are neither normally nor log-normally distributed.
(e) Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used for EPC.
(f) Due to high standard deviation, the maximum concentration is used.

C.8-1.2 Surface Soil Current/Future Triangle Runs

From File

Summary Statistics for	Vinyl chlori
Number of Samples	4
Minimum	1.35
Maximum	1.5
Mean	1.4
Median	1.375
Standard Deviation	0.070711
Variance	0.005
Coefficient of Variation	0.050508
Skewness	1.414214

Shapiro-Wilk Test Statisitic	0.828296
Shapiro-Wilk 5% Critical Value	0.748
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t

95 % UCL (Assuming Normal Data)

Student's-t	1.483204

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	1.484867
Modified-t	1.487371

95 % Non-parametric UCL

CLT	1.458154
Jackknife	1.483204
Standard Bootstrap	1.45032
Bootstrap-t	1.#INF
Chebyshev (Mean, Std)	1.55411

From File

Summary Statistics for	Trichloroetl
Number of Samples	4
Minimum	1.35
Maximum	1.5
Mean	1.4
Median	1.375
Standard Deviation	0.070711
Variance	0.005
Coefficient of Variation	0.050508
Skewness	1.414214

Shapiro-Wilk Test Statisitic	0.828296
Shapiro-Wilk 5% Critical Value	0.748
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t

95 % UCL (Assuming Normal Data)

Student's-t	1.483204

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	1.484867
Modified-t	1.487371

95 % Non-parametric UCL

CLT	1.458154
Jackknife	1.483204
Standard Bootstrap	1.449486
Bootstrap-t	1.#INF
Chebyshev (Mean, Std)	1.55411

C.8-1.2 Surface Soil Current/Future Triangle Runs

From File

Summary Statistics for	Phenanthre
Number of Samples	4
Minimum	179
Maximum	206
Mean	190.375
Median	188.25
Standard Deviation	11.60011
Variance	134.5625
Coefficient of Variation	0.060933
Skewness	0.934914

Shapiro-Wilk Test Statisitic	0.955948
Shapiro-Wilk 5% Critical Value	0.748
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t

95 % UCL (Assuming Normal Data)

Student's-t	204.0246

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	202.8123
Modified-t	204.4765

95 % Non-parametric UCL

CLT	199.9152
Jackknife	204.0246
Standard Bootstrap	198.9168
Bootstrap-t	216.9586
Chebyshev (Mean, Std)	215.6568

C.8-1.2 Surface Soil Current/Future Triangle Runs

From File

Summary Statistics for	Benzo(a)A
Number of Samples	4
Minimum	179
Maximum	380
Mean	237.5
Median	195.5
Standard Deviation	95.70266
Variance	9159
Coefficient of Variation	0.402959
Skewness	1.914709

95 % UCL (Assuming Normal Data)

Student's-t	350.1116

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	365.1578
Modified-t	357.7467

95 % Non-parametric UCL

CLT	316.2084
Jackknife	350.1116
Standard Bootstrap	305.255
Bootstrap-t	1770.797
Chebyshev (Mean, Std)	446.0791

Summary Statistics for	ln(Benzo(a
Minimum	5.187386
Maximum	5.940171
Mean	5.418947
Standard Deviation	0.352622
Variance	0.124343
Shapiro-Wilk Test Statisitic	0.768293
Shapiro-Wilk 5% Critical Value	0.748

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution

MLE Mean	240.1151
MLE Standard Deviation	87.37147
MLE Coefficient of Variation	0.363873
MLE Skewness	1.139798
MLE Median	225.6415
MLE 80% Quantile	303.9652
MLE 90% Quantile	354.982
MLE 95% Quantile	403.03
MLE 99% Quantile	512.4212
MVU Estimate of Median	222.1507
MVU Estimate of Mean	236.3109
MVU Estimate of Std. Dev.	82.56482
MVU Estimate of SE of Mean	41.27749

UCL Assuming Lognormal Distribution

95% H-UCL	498.8997
95% Chebyshev (MVUE) UCL	416.2353
99% Chebyshev (MVUE) UCL	647.0167

Recommended UCL to use:
Student's-t or H-UCL

From File

Summary Statistics for	Benzo(b)Fl
Number of Samples	4
Minimum	179
Maximum	206
Mean	190.375
Median	188.25
Standard Deviation	11.60011
Variance	134.5625
Coefficient of Variation	0.060933
Skewness	0.934914

Shapiro-Wilk Test Statisitic	0.955948
Shapiro-Wilk 5% Critical Value	0.748
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t

95 % UCL (Assuming Normal Data)

Student's-t	204.0246

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	202.8123
Modified-t	204.4765

95 % Non-parametric UCL

CLT	199.9152
Jackknife	204.0246
Standard Bootstrap	198.544
Bootstrap-t	216.9586
Chebyshev (Mean, Std)	215.6568

From File

Summary Statistics for	Benzo(k)Fl
Number of Samples	4
Minimum	179
Maximum	206
Mean	190.375
Median	188.25
Standard Deviation	11.60011
Variance	134.5625
Coefficient of Variation	0.060933
Skewness	0.934914

Shapiro-Wilk Test Statisitic	0.955948
Shapiro-Wilk 5% Critical Value	0.748
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t

95 % UCL (Assuming Normal Data)

Student's-t	204.0246

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	202.8123
Modified-t	204.4765

95 % Non-parametric UCL

CLT	199.9152
Jackknife	204.0246
Standard Bootstrap	198.5556
Bootstrap-t	216.9586
Chebyshev (Mean, Std)	215.6568

From File

Summary Statistics for	Benzo(a)P
Number of Samples	4
Minimum	179
Maximum	206
Mean	190.375
Median	188.25
Standard Deviation	11.60011
Variance	134.5625
Coefficient of Variation	0.060933
Skewness	0.934914

Shapiro-Wilk Test Statisitic	0.955948
Shapiro-Wilk 5% Critical Value	0.748
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t

95 % UCL (Assuming Normal Data)

Student's-t	204.0246

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	202.8123
Modified-t	204.4765

95 % Non-parametric UCL

CLT	199.9152
Jackknife	204.0246
Standard Bootstrap	198.6029
Bootstrap-t	216.9586
Chebyshev (Mean, Std)	215.6568

From File

Summary Statistics for	Indeno(1,2
Number of Samples	4
Minimum	179
Maximum	206
Mean	190.375
Median	188.25
Standard Deviation	11.60011
Variance	134.5625
Coefficient of Variation	0.060933
Skewness	0.934914

Shapiro-Wilk Test Statisitic	0.955948
Shapiro-Wilk 5% Critical Value	0.748
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t

95 % UCL (Assuming Normal Data)

Student's-t	204.0246

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	202.8123
Modified-t	204.4765

95 % Non-parametric UCL

CLT	199.9152
Jackknife	204.0246
Standard Bootstrap	198.6171
Bootstrap-t	216.9586
Chebyshev (Mean, Std)	215.6568

C.8-1.2 Surface Soil Current/Future Triangle Runs

From File

Summary Statistics for	Dibenz(a,h
Number of Samples	4
Minimum	179
Maximum	206
Mean	190.375
Median	188.25
Standard Deviation	11.60011
Variance	134.5625
Coefficient of Variation	0.060933
Skewness	0.934914

Shapiro-Wilk Test Statisitic	0.955948
Shapiro-Wilk 5% Critical Value	0.748
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t

95 % UCL (Assuming Normal Data)

Student's-t	204.0246

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	202.8123
Modified-t	204.4765

95 % Non-parametric UCL

CLT	199.9152
Jackknife	204.0246
Standard Bootstrap	198.5977
Bootstrap-t	218.42
Chebyshev (Mean, Std)	215.6568

From File

Summary Statistics for	Benzo(g,h,
Number of Samples	4
Minimum	179
Maximum	206
Mean	190.375
Median	188.25
Standard Deviation	11.60011
Variance	134.5625
Coefficient of Variation	0.060933
Skewness	0.934914

Shapiro-Wilk Test Statisitic	0.955948
Shapiro-Wilk 5% Critical Value	0.748
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t

95 % UCL (Assuming Normal Data)

Student's-t	204.0246

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	202.8123
Modified-t	204.4765

95 % Non-parametric UCL

CLT	199.9152
Jackknife	204.0246
Standard Bootstrap	198.5328
Bootstrap-t	216.9586
Chebyshev (Mean, Std)	215.6568

From File

Summary Statistics for	Antimony
Number of Samples	4
Minimum	4050
Maximum	4500
Mean	4237.5
Median	4200
Standard Deviation	205.6494
Variance	42291.67
Coefficient of Variation	0.048531
Skewness	0.700652

Shapiro-Wilk Test Statisitic	0.926094
Shapiro-Wilk 5% Critical Value	0.748
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t

95 % UCL (Assuming Normal Data)

Student's-t	4479.484

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	4445.122
Modified-t	4485.488

95 % Non-parametric UCL

CLT	4406.632
Jackknife	4479.484
Standard Bootstrap	4382.603
Bootstrap-t	5395.134
Chebyshev (Mean, Std)	4685.702

From File

Summary Statistics for	Arsenic
Number of Samples	4
Minimum	3100
Maximum	6500
Mean	4975
Median	5150
Standard Deviation	1734.695
Variance	3009167
Coefficient of Variation	0.348682
Skewness	-0.178018
Shapiro-Wilk Test Statisitic	0.841213
Shapiro-Wilk 5% Critical Value	0.748
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t
95 % UCL (Assuming Normal Data)	
Student's-t	7016.184
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	6319.169
Modified-t	7003.317
95 % Non-parametric UCL	
CLT	6401.66
Jackknife	7016.184
Standard Bootstrap	6185.884
Bootstrap-t	10504.34
Chebyshev (Mean, Std)	8755.68

From File

Summary Statistics for	Cadmium
Number of Samples	4
Minimum	920
Maximum	2100
Mean	1505
Median	1500
Standard Deviation	488.6376
Variance	238766.7
Coefficient of Variation	0.324676
Skewness	0.057958

Shapiro-Wilk Test Statisitic	0.995494
Shapiro-Wilk 5% Critical Value	0.748
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t

95 % UCL (Assuming Normal Data)

Student's-t	2079.971

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	1914.434
Modified-t	2081.151

95 % Non-parametric UCL

CLT	1906.869
Jackknife	2079.971
Standard Bootstrap	1853.38
Bootstrap-t	2101.425
Chebyshev (Mean, Std)	2569.961

From File

Summary Statistics for	Copper
Number of Samples	4
Minimum	16400
Maximum	92600
Mean	45425
Median	36350
Standard Deviation	33758.39
Variance	1.14E+09
Coefficient of Variation	0.743168
Skewness	1.28179

Shapiro-Wilk Test Statisitic	0.904241
Shapiro-Wilk 5% Critical Value	0.748
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t

95 % UCL (Assuming Normal Data)

Student's-t	85147.88

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	84747.78
Modified-t	86950.85

95 % Non-parametric UCL

CLT	73188.81
Jackknife	85147.88
Standard Bootstrap	69862.94
Bootstrap-t	180959.1
Chebyshev (Mean, Std)	118999.7

C.8-1.2 Surface Soil Current/Future Triangle Runs

From File

Summary Statistics for	Lead
Number of Samples	4
Minimum	49700
Maximum	365000
Mean	184675
Median	162000
Standard Deviation	134091.6
Variance	1.80E+10
Coefficient of Variation	0.726095
Skewness	0.893988

Shapiro-Wilk Test Statisitic	0.961531
Shapiro-Wilk 5% Critical Value	0.748
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t

95 % UCL (Assuming Normal Data)

Student's-t	342458.1

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	326977.9
Modified-t	347453

95 % Non-parametric UCL

CLT	294955.5
Jackknife	342458.1
Standard Bootstrap	281007.5
Bootstrap-t	463862.4
Chebyshev (Mean, Std)	476920.9

From File

Summary Statistics for	Manganes
Number of Samples	4
Minimum	132000
Maximum	211000
Mean	182500
Median	193500
Standard Deviation	35911.93
Variance	1.29E+09
Coefficient of Variation	0.196778
Skewness	-1.35664

Shapiro-Wilk Test Statisitic	0.873855
Shapiro-Wilk 5% Critical Value	0.748
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t

95 % UCL (Assuming Normal Data)

Student's-t	224756.9

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	199020.5
Modified-t	222726.9

95 % Non-parametric UCL

CLT	212034.9
Jackknife	224756.9
Standard Bootstrap	208533.6
Bootstrap-t	214222.7
Chebyshev (Mean, Std)	260768.2

C.8-1.2 Surface Soil Current/Future Triangle Runs

From File

Summary Statistics for	Nickel
Number of Samples	4
Minimum	7200
Maximum	16000
Mean	10325
Median	9050
Standard Deviation	4035.984
Variance	16289167
Coefficient of Variation	0.390894
Skewness	1.360472

Shapiro-Wilk Test Statisitic	0.864623
Shapiro-Wilk 5% Critical Value	0.748
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t

95 % UCL (Assuming Normal Data)

Student's-t	15074.07

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	15111.06
Modified-t	15302.85

95 % Non-parametric UCL

CLT	13644.3
Jackknife	15074.07
Standard Bootstrap	13187.92
Bootstrap-t	50520.54
Chebyshev (Mean, Std)	19121.22

From File

Summary Statistics for	Thallium
Number of Samples	4
Minimum	75
Maximum	85
Mean	78.75
Median	77.5
Standard Deviation	4.787136
Variance	22.91667
Coefficient of Variation	0.060789
Skewness	0.854563

Shapiro-Wilk Test Statisitic	0.864754
Shapiro-Wilk 5% Critical Value	0.748
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t

95 % UCL (Assuming Normal Data)	
Student's-t	84.38293

95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	83.77987
Modified-t	84.55339

95 % Non-parametric UCL	
CLT	82.68707
Jackknife	84.38293
Standard Bootstrap	82.17276
Bootstrap-t	1.#INF
Chebyshev (Mean, Std)	89.18332

C.8-1.2 Surface Soil Current/Future Triangle Runs

From File

Summary Statistics for	TEQ (no 1
Number of Samples	2
Minimum	0.000478
Maximum	0.000689
Mean	0.000583
Median	0.000583

Too Few Observations To Calcula

From File

Summary Statistics for	C11-C22 Aromatic
Number of Samples	0

Too Few Observations To Calculate UCLs

ıte UCLs

Chemical of Potential Concern	Max. Conc.	95% UCL (Distribution) (1)		Value	Statistic (2)	Rationale (3)	Description	Mean
Vinyl chloride	280	107.5528116	(NP)	107.55281	95% UCL-NP	(d)	Chebyshev (Mean, Std)	28.16333
Trichloroethene	41	19.03207504	(NP)	19.032075	95% UCL-NP	(d)	Bootstrap-t	11.71667
Phenanthrene	68,000	141,274	(T)	68000	Max	(c & e)	99% Chebyshev (MVUE) L	12910.07
Benzo(a)Anthracene	38,000	66,719	(T)	38000	Max	(c & e)	99% Chebyshev (MVUE) L	7629.133
Benzo(b)Fluoranthene	40,000	79,864	(T)	40000	Max	(c & e)	99% Chebyshev (MVUE) L	7501
Benzo(k)Fluoranthene	18,000	26,738	(T)	18000	Max	(c & e)	99% Chebyshev (MVUE) L	3927
Benzo(a)Pyrene	29,000	51,777	(T)	29000	Max	(c & e)	99% Chebyshev (MVUE) L	6466.933
Indeno(1,2,3-cd)pyrene	18,000	10,996	(T)	10995.668	95% UCL-T	(c)	95% Chebyshev (MVUE) L	3214.2
Dibenz(a,h) anthracene	5,500	2,979	(T)	2979.0669	95% UCL-T	(c)	95% Chebyshev (MVUE) L	1066
Benzo(g,h,i)perylene	14,000	8,196	(T)	8195.9444	95% UCL-T	(c)	95% Chebyshev (MVUE) L	2753.333
Antimony	6,680	2824.812955	(NP)	2824.813	95% UCL-NP	(d)	Bootstrap-t	1667.059
Arsenic	8,740	5,658	(N)	5658.1738	95% UCL-N	(b)	Student's-t	4937.941
Cadmium	5,900	2,849	(T)	2849.4155	95% UCL-T	(c)	95% H-UCL	1827.059
Copper	378,000	125,977	(T)	125977.38	95% UCL-T	(c)	95% H-UCL	71117.65
Lead	1,207,000	727,263	(T)	727263.32	95% UCL-T	(c)	95% Chebyshev (MVUE) L	302335.3
Manganese	370,000	260,611	(N)	260610.53	95% UCL-N	(b)	Student's-t	220776.5
Mercury	1100	549.267789	(N)	549.268	95% UCL-N	(b)	Student's-t	409.7941
Nickel	92000	25953.39984	(T)	25953.4	95% UCL-T	(c)	95% H-UCL	18487.65
Thallium	90	71	(N)	70.909632	95% UCL-N	(b)	Student's-t	63.73529
TEQ (no 170/193/180) Humans	0.196	0.340	(T)	0.195869	Max	(c & e)	99% Chebyshev (MVUE) L	0.047465
C11-C22 Aromatic	579,000	456,169	(N)	456168.64	95% UCL-N	(b)	Student's-t	259655
Aroclor 1242	3250	381.1911731	(NP)	381.19117	95% UCL-NP	(d)	sd=1.814000035; 97.5% C	242.838
Aroclor 1248	324	94.83394572	(T)	94.833946	95% UCL-T	(c)	95% Chebyshev (MVUE) L	40.81133
Aroclor 1254	42500	68983.4814	(T)	42500	Max	(c & e)	99% Chebyshev (MVUE) L	3955.488
Aroclor 1260	11700	44180.27163	(T)	11700	Max	(c & e)	99% Chebyshev (MVUE) L	2011.577

(1) T - Transformed; N - Normal; NP - Non-parametric; <4 - sample size too small to calculate 95% UCL
(2) Statistics: Maximum Detected Value (Max); 95% UCL of Transformed Data (95% UCL - T); 95% of Normal Data (95% UCL - N); 95% of Non-parametric Data (95% UCL - NP).
(3) Rationale

(a) Due to small sample size (<4), the maximum detected concentration is used.
(b) Shapiro-Wilk W Test indicates data are normally distributed.
(c) Shapiro-Wilk W Test indicates data are log-normally distributed.
(d) Shapiro-Wilk W Test indicates data are neither normally nor log-normally distributed.
(e) Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used for EPC.
(f) Due to high standard deviation, the maximum concentration is used.

From File

Summary Statistics for	Vinyl chloride
Number of Samples	15
Minimum	1
Maximum	280
Mean	28.16333333
Median	1.45
Standard Deviation	70.53940253
Variance	4975.80731
Coefficient of Variation	2.504653895
Skewness	3.712022967

Shapiro-Wilk Test Statisitic	0.405201697
Shapiro-Wilk 5% Critical Value	0.881

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	60.24241686

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	76.77363931
Modified-t	63.15179333

95 % Non-parametric UCL

CLT	58.12137389
Jackknife	60.24241686
Standard Bootstrap	56.74599989
Bootstrap-t	175.342378
Chebyshev (Mean, Std)	107.5528116

From File

Summary Statistics for	Trichloroethene
Number of Samples	15
Minimum	1
Maximum	41
Mean	11.71666667
Median	1.4
Standard Deviation	13.88691145
Variance	192.8463095
Coefficient of Variation	1.18522715
Skewness	0.807465227

Shapiro-Wilk Test Statisitic	0.736513595
Shapiro-Wilk 5% Critical Value	0.881

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	18.03199365

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	18.41319366
Modified-t	18.15658474

95 % Non-parametric UCL

CLT	17.61442936
Jackknife	18.03199365
Standard Bootstrap	17.29144557
Bootstrap-t	19.03207504
Chebyshev (Mean, Std)	27.34586985

Summary Statistics for	Phenanthrene
Number of Samples	15
Minimum	194
Maximum	68000
Mean	12910.06667
Median	5700
Standard Deviation	17838.90923
Variance	318226682.6
Coefficient of Variation	1.38178289
Skewness	2.370889533

95 % UCL (Assuming Normal Data)

Student's-t	21022.63693

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	23499.02974
Modified-t	21492.57119

95 % Non-parametric UCL

CLT	20486.24037
Jackknife	21022.63693
Standard Bootstrap	20234.19385
Bootstrap-t	28883.18259
Chebyshev (Mean, Std)	32987.09661

99 % Non-parametric UCL

Chebyshev (Mean, Std)	58739.05428

Summary Statistics for	ln(Phenanthrene)
Minimum	5.267858159
Maximum	11.12726298
Mean	8.271770405
Standard Deviation	1.979736242
Variance	3.919355587

Shapiro-Wilk Test Statisitic	0.897035332
Shapiro-Wilk 5% Critical Value	0.881

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution

MLE Mean	27762.68685
MLE Standard Deviation	195067.1586
MLE Coefficient of Variation	7.026234876
MLE Skewness	367.9497032
MLE Median	3911.868456
MLE 80% Quantile	20840.37582
MLE 90% Quantile	49798.06842
MLE 95% Quantile	101563.1978
MLE 99% Quantile	391068.0651

MVU Estimate of Median	3429.045693
MVU Estimate of Mean	20620.10304
MVU Estimate of Std. Dev.	60807.15606
MVU Estimate of SE of Mean	12126.20575

UCL Assuming Lognormal Distribution

95% H-UCL	304157.6097
95% Chebyshev (MVUE) UCL	73477.00848
99% Chebyshev (MVUE) UCL	141274.3269

Recommended UCL to use:

99 % Chebyshev (MVUE) UCL

Summary Statistics for	Benzo(a)Anthracene
Number of Samples	15
Minimum	181
Maximum	38000
Mean	7629.133333
Median	4300
Standard Deviation	10007.19683
Variance	100143988.4
Coefficient of Variation	1.31170821
Skewness	2.256184867

95 % UCL (Assuming Normal Data)	
Student's-t	12180.08913

95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	13487.51776
Modified-t	12430.95676

95 % Non-parametric UCL	
CLT	11879.18363
Jackknife	12180.08913
Standard Bootstrap	11848.65287
Bootstrap-t	15737.816
Chebyshev (Mean, Std)	18891.86178

99 % Non-parametric UCL	
Chebyshev (Mean, Std)	33338.08748

Summary Statistics for	ln(Benzo(a)Anthracene)
Minimum	5.198497031
Maximum	10.54534144
Mean	7.921523149
Standard Deviation	1.772813462
Variance	3.14286757
Shapiro-Wilk Test Statisitic	0.903338831
Shapiro-Wilk 5% Critical Value	0.881
Data are Lognormal at 5% Significance Level	

Estimates Assuming Lognormal Distribution	
MLE Mean	13265.96397
MLE Standard Deviation	62463.13178
MLE Coefficient of Variation	4.708525661
MLE Skewness	118.514598
MLE Median	2755.965597
MLE 80% Quantile	12327.04027
MLE 90% Quantile	26892.11628
MLE 95% Quantile	50909.3202
MLE 99% Quantile	170260.9027
MVU Estimate of Median	2480.124615
MVU Estimate of Mean	10685.95648
MVU Estimate of Std. Dev.	26419.63671
MVU Estimate of SE of Mean	5631.50537

UCL Assuming Lognormal Distribution	
95% H-UCL	93635.09808
95% Chebyshev (MVUE) UCL	35233.11929
99% Chebyshev (MVUE) UCL	66718.72743

Recommended UCL to use:
99 % Chebyshev (MVUE) UCL

Summary Statistics for	Benzo(b)Fluoranthene
Number of Samples	15
Minimum	39
Maximum	40000
Mean	7501
Median	4400
Standard Deviation	10264.86825
Variance	105367520.1
Coefficient of Variation	1.368466637
Skewness	2.538992936

95 % UCL (Assuming Normal Data)

Student's-t	12169.13659

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	13717.02197
Modified-t	12458.71912

95 % Non-parametric UCL

CLT	11860.48319
Jackknife	12169.13659
Standard Bootstrap	11811.9392
Bootstrap-t	16415.1727
Chebyshev (Mean, Std)	19053.72806

99 % Non-parametric UCL

Chebyshev (Mean, Std)	33871.92401

Summary Statistics for	ln(Benzo(b)Fluoranthene)
Minimum	3.663561646
Maximum	10.59663473
Mean	7.862041601
Standard Deviation	1.89728262
Variance	3.59968134
Shapiro-Wilk Test Statisitic	0.934412646
Shapiro-Wilk 5% Critical Value	0.881

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution

MLE Mean	15707.32229
MLE Standard Deviation	93701.21972
MLE Coefficient of Variation	5.965448341
MLE Skewness	230.1862133
MLE Median	2596.81663
MLE 80% Quantile	12903.39088
MLE 90% Quantile	29734.09861
MLE 95% Quantile	58869.09392
MLE 99% Quantile	214297.5984
MVU Estimate of Median	2301.084949
MVU Estimate of Mean	12075.94132
MVU Estimate of Std. Dev.	33233.49467
MVU Estimate of SE of Mean	6812.995636

UCL Assuming Lognormal Distribution

95% H-UCL	143582.2072
95% Chebyshev (MVUE) UCL	41773.10079
99% Chebyshev (MVUE) UCL	79864.39198

Recommended UCL to use:

99 % Chebyshev (MVUE) UCL

Summary Statistics for	Benzo(k)Fluoranthene
Number of Samples	15
Minimum	109
Maximum	18000
Mean	3927
Median	1800
Standard Deviation	5045.811233
Variance	25460211
Coefficient of Variation	1.284902275
Skewness	1.811691764
95 % UCL (Assuming Normal Data)	
Student's-t	6221.674951
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	6721.13802
Modified-t	6323.246669
95 % Non-parametric UCL	
CLT	6069.952905
Jackknife	6221.674951
Standard Bootstrap	5984.282701
Bootstrap-t	7721.51248
Chebyshev (Mean, Std)	9605.87318
99 % Non-parametric UCL	
Chebyshev (Mean, Std)	16889.92377

Summary Statistics for	ln(Benzo(k)Fluoranthene)
Minimum	4.691347882
Maximum	9.798127037
Mean	7.326771064
Standard Deviation	1.603303143
Variance	2.570580969
Shapiro-Wilk Test Statisitic	0.956156523
Shapiro-Wilk 5% Critical Value	0.881
Data are Lognormal at 5% Significance Level	
Estimates Assuming Lognormal Distribution	
MLE Mean	5497.570513
MLE Standard Deviation	19102.31127
MLE Coefficient of Variation	3.474682357
MLE Skewness	52.3753378
MLE Median	1520.464355
MLE 80% Quantile	5893.245952
MLE 90% Quantile	11932.43502
MLE 95% Quantile	21251.967
MLE 99% Quantile	63326.18421
MVU Estimate of Median	1394.958895
MVU Estimate of Mean	4672.663666
MVU Estimate of Std. Dev.	9921.077972
MVU Estimate of SE of Mean	2217.688704
UCL Assuming Lognormal Distribution	
95% H-UCL	28051.8387
95% Chebyshev (MVUE) UCL	14339.34461
99% Chebyshev (MVUE) UCL	26738.38766
Recommended UCL to use:	
99 % Chebyshev (MVUE) UCL	

Summary Statistics for	Benzo(a)Pyrene
Number of Samples	15
Minimum	181
Maximum	29000
Mean	6466.933333
Median	4450
Standard Deviation	7930.064046
Variance	62885915.78
Coefficient of Variation	1.226247997
Skewness	1.963056493

95 % UCL (Assuming Normal Data)

Student's-t	10073.27501

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	10943.74262
Modified-t	10246.24349

95 % Non-parametric UCL

CLT	9834.826621
Jackknife	10073.27501
Standard Bootstrap	9737.297287
Bootstrap-t	13646.95424
Chebyshev (Mean, Std)	15391.92596

99 % Non-parametric UCL

Chebyshev (Mean, Std)	26839.63674

Summary Statistics for	ln(Benzo(a)Pyrene)
Minimum	5.198497031
Maximum	10.27505111
Mean	7.858352422
Standard Deviation	1.672328171
Variance	2.796681511
Shapiro-Wilk Test Statisitic	0.906683651
Shapiro-Wilk 5% Critical Value	0.881

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution

MLE Mean	10474.4389
MLE Standard Deviation	41091.53997
MLE Coefficient of Variation	3.923030185
MLE Skewness	72.14517567
MLE Median	2587.25416
MLE 80% Quantile	10630.36414
MLE 90% Quantile	22187.71689
MLE 95% Quantile	40511.13944
MLE 99% Quantile	126524.0576
MVU Estimate of Median	2355.666337
MVU Estimate of Mean	8721.583576
MVU Estimate of Std. Dev.	19720.90143
MVU Estimate of SE of Mean	4327.244889

UCL Assuming Lognormal Distribution

95% H-UCL	60755.13691
95% Chebyshev (MVUE) UCL	27583.60675
99% Chebyshev (MVUE) UCL	51777.12659

Recommended UCL to use:

99 % Chebyshev (MVUE) UCL

Summary Statistics for	Indeno(1,2,3-cd)pyrene
Number of Samples	15
Minimum	78
Maximum	18000
Mean	3214.2
Median	1900
Standard Deviation	4483.739323
Variance	20103918.31
Coefficient of Variation	1.394978322
Skewness	2.855067682
95 % UCL (Assuming Normal Data)	
Student's-t	5253.262469
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	6030.33859
Modified-t	5395.500016
95 % Non-parametric UCL	
CLT	5118.441313
Jackknife	5253.262469
Standard Bootstrap	5079.830307
Bootstrap-t	7667.638135
Chebyshev (Mean, Std)	8260.482116

Summary Statistics for	ln(Indeno(1,2,3-cd)pyrene)
Minimum	4.356708827
Maximum	9.798127037
Mean	7.258684189
Standard Deviation	1.489988625
Variance	2.220066102
Shapiro-Wilk Test Statisitic	0.959635834
Shapiro-Wilk 5% Critical Value	0.881
Data are Lognormal at 5% Significance Level	
Estimates Assuming Lognormal Distribution	
MLE Mean	4310.103686
MLE Standard Deviation	12348.23231
MLE Coefficient of Variation	2.864950175
MLE Skewness	32.11018826
MLE Median	1420.386347
MLE 80% Quantile	5002.657633
MLE 90% Quantile	9636.560909
MLE 95% Quantile	16476.91314
MLE 99% Quantile	45451.34673
MVU Estimate of Median	1318.613268
MVU Estimate of Mean	3775.348557
MVU Estimate of Std. Dev.	7205.957592
MVU Estimate of SE of Mean	1656.454916
UCL Assuming Lognormal Distribution	
95% H-UCL	18028.05564
95% Chebyshev (MVUE) UCL	10995.66814
99% Chebyshev (MVUE) UCL	20256.86687
Recommended UCL to use:	
95 % Chebyshev (MVUE) UCL	

Summary Statistics for	Dibenz(a,h) anthracene
Number of Samples	15
Minimum	36
Maximum	5500
Mean	1066
Median	590
Standard Deviation	1384.732414
Variance	1917483.857
Coefficient of Variation	1.298998512
Skewness	2.609494128

95 % UCL (Assuming Normal Data)	
Student's-t	1695.732393

95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	1911.496655
Modified-t	1735.88185

95 % Non-parametric UCL	
CLT	1654.094998
Jackknife	1695.732393
Standard Bootstrap	1640.595259
Bootstrap-t	2342.96675
Chebyshev (Mean, Std)	2624.464913

Summary Statistics for	ln(Dibenz(a,h) anthracene)
Minimum	3.583518938
Maximum	8.612503371
Mean	6.293274569
Standard Deviation	1.287123467
Variance	1.656686819
Shapiro-Wilk Test Statisitic	0.972773836
Shapiro-Wilk 5% Critical Value	0.881
Data are Lognormal at 5% Significance Level	

Estimates Assuming Lognormal Distribution	
MLE Mean	1238.452603
MLE Standard Deviation	2550.705698
MLE Coefficient of Variation	2.059590889
MLE Skewness	14.9153814
MLE Median	540.9217176
MLE 80% Quantile	1605.023855
MLE 90% Quantile	2827.726254
MLE 95% Quantile	4494.423442
MLE 99% Quantile	10798.08144
MVU Estimate of Median	511.7619118
MVU Estimate of Mean	1133.16652
MVU Estimate of Std. Dev.	1766.340504
MVU Estimate of SE of Mean	423.4785818

UCL Assuming Lognormal Distribution	
95% H-UCL	3759.222909
95% Chebyshev (MVUE) UCL	2979.066863
99% Chebyshev (MVUE) UCL	5346.725209

Recommended UCL to use:
95 % Chebyshev (MVUE) UCL

Summary Statistics for	Benzo(g,h,i)perylene
Number of Samples	15
Minimum	157
Maximum	14000
Mean	2753.333333
Median	1700
Standard Deviation	3492.485845
Variance	12197457.38
Coefficient of Variation	1.268457329
Skewness	2.64627968

95 % UCL (Assuming Normal Data)	
Student's-t	4341.605152

95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	4894.944019
Modified-t	4444.295089

95 % Non-parametric UCL	
CLT	4236.589908
Jackknife	4341.605152
Standard Bootstrap	4173.62431
Bootstrap-t	6093.722851
Chebyshev (Mean, Std)	6683.996469

Summary Statistics for	ln(Benzo(g,h,i)perylene)
Minimum	5.056245805
Maximum	9.546812609
Mean	7.235378111
Standard Deviation	1.329647317
Variance	1.767961987
Shapiro-Wilk Test Statisitic	0.94333332
Shapiro-Wilk 5% Critical Value	0.881
Data are Lognormal at 5% Significance Level	

Estimates Assuming Lognormal Distribution	
MLE Mean	3358.86737
MLE Standard Deviation	7403.922527
MLE Coefficient of Variation	2.204291421
MLE Skewness	17.32330732
MLE Median	1387.66549
MLE 80% Quantile	4268.125825
MLE 90% Quantile	7661.590762
MLE 95% Quantile	12365.28151
MLE 99% Quantile	30581.10975
MVU Estimate of Median	1307.964075
MVU Estimate of Mean	3048.431012
MVU Estimate of Std. Dev.	4964.980948
MVU Estimate of SE of Mean	1180.920554

UCL Assuming Lognormal Distribution	
95% H-UCL	10862.25469
95% Chebyshev (MVUE) UCL	8195.944368
99% Chebyshev (MVUE) UCL	14798.44217

Recommended UCL to use:
95 % Chebyshev (MVUE) UCL

From File

Summary Statistics for	Antimony
Number of Samples	17
Minimum	120
Maximum	6680
Mean	1667.058824
Median	530
Standard Deviation	2112.573267
Variance	4462965.809
Coefficient of Variation	1.267245785
Skewness	1.211894058

Shapiro-Wilk Test Statistic	0.738623714
Shapiro-Wilk 5% Critical Value	0.892

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	2561.604636

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	2670.758737
Modified-t	2586.704783

95 % Non-parametric UCL

CLT	2509.839513
Jackknife	2561.604636
Standard Bootstrap	2465.466398
Boolstrap-t	2824.812955
Chebyshev (Mean, Std)	3900.446522

Summary Statistics for	Antimony
Number of Samples	17
Minimum	120
Maximum	6680
Mean	1667.058824
Median	530
Standard Deviation	2112.573267
Variance	4462965.809
Coefficient of Variation	1.267245785
Skewness	1.211894058

Shapiro-Wilk Test Statisitic	0.738623714
Shapiro-Wilk 5% Critical Value	0.892

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

97.5 % UCL (Assuming Normal Data)

Student's-t	2753.243669

97.5 % UCL (Adjusted for Skewness)

Adjusted-CLT	2889.236462
Modified-t	2778.343816

97.5 % Non-parametric UCL

CLT	2671.293953
Jackknife	2753.243669
Standard Bootstrap	2644.652384
Bootstrap-t	3158.854847
Chebyshev (Mean, Std)	4866.835163

Summary Statistics for	Arsenic
Number of Samples	17
Minimum	2270
Maximum	8740
Mean	4937.941176
Median	5120
Standard Deviation	1700.912493
Variance	2893103.309
Coefficient of Variation	0.344457828
Skewness	0.436047021
Shapiro-Wilk Test Statisitic	0.971673518
Shapiro-Wilk 5% Critical Value	0.892
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t
95 % UCL (Assuming Normal Data)	
Student's-t	5658.173782
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	5663.112992
Modified-t	5665.445133
95 % Non-parametric UCL	
CLT	5616.495727
Jackknife	5658.173782
Standard Bootstrap	5606.902177
Bootstrap-t	5744.389116
Chebyshev (Mean, Std)	6736.125929

Summary Statistics for	Cadmium
Number of Samples	17
Minimum	380
Maximum	5900
Mean	1827.058824
Median	1300
Standard Deviation	1599.511702
Variance	2558437.684
Coefficient of Variation	0.875457145
Skewness	1.676080128

95 % UCL (Assuming Normal Data)	
Student's-t	2504.354384

95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	2633.666337
Modified-t	2530.637813

95 % Non-parametric UCL	
CLT	2465.160988
Jackknife	2504.354384
Standard Bootstrap	2439.041339
Bootstrap-t	2824.617002
Chebyshev (Mean, Std)	3518.043848

Summary Statistics for	ln(Cadmium)
Minimum	5.940171253
Maximum	8.68270763
Mean	7.218764543
Standard Deviation	0.761181689
Variance	0.579397563
Shapiro-Wilk Test Statisitic	0.955738924
Shapiro-Wilk 5% Critical Value	0.892

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution	
MLE Mean	1823.409401
MLE Standard Deviation	1615.506545
MLE Coefficient of Variation	0.885981253
MLE Skewness	3.353406065
MLE Median	1364.801865
MLE 80% Quantile	2596.612708
MLE 90% Quantile	3629.619182
MLE 95% Quantile	4773.850167
MLE 99% Quantile	8016.627901
MVU Estimate of Median	1341.719485
MVU Estimate of Mean	1785.467339
MVU Estimate of Std. Dev.	1472.276993
MVU Estimate of SE of Mean	352.3330015

UCL Assuming Lognormal Distribution	
95% H-UCL	2849.415549
95% Chebyshev (MVUE) UCL	3321.251287
99% Chebyshev (MVUE) UCL	5291.136441

Recommended UCL to use:
H-UCL

Summary Statistics for	Copper
Number of Samples	17
Minimum	7200
Maximum	378000
Mean	71117.64706
Median	51000
Standard Deviation	87503.23734
Variance	7656816544
Coefficient of Variation	1.230401187
Skewness	3.038707354

95 % UCL (Assuming Normal Data)	
Student's-t	108169.9263

95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	122738.4219
Modified-t	110776.7569

95 % Non-parametric UCL	
CLT	106025.8038
Jackknife	108169.9263
Standard Bootstrap	105683.853
Bootstrap-t	167420.7077
Chebyshev (Mean, Std)	163625.044

Summary Statistics for	ln(Copper)
Minimum	8.881836305
Maximum	12.84264947
Mean	10.73930338
Standard Deviation	0.915395379
Variance	0.837948701
Shapiro-Wilk Test Statisitic	0.965632778
Shapiro-Wilk 5% Critical Value	0.892

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution	
MLE Mean	70142.04837
MLE Standard Deviation	80330.87672
MLE Coefficient of Variation	1.14525992
MLE Skewness	4.937925904
MLE Median	46133.90278
MLE 80% Quantile	99988.7014
MLE 90% Quantile	149579.9692
MLE 95% Quantile	207965.7696
MLE 99% Quantile	387903.9473
MVU Estimate of Median	45009.28006
MVU Estimate of Mean	67874.70982
MVU Estimate of Std. Dev.	69621.24468
MVU Estimate of SE of Mean	16455.83499

UCL Assuming Lognormal Distribution	
95% H-UCL	125977.3784
95% Chebyshev (MVUE) UCL	139604.0316
99% Chebyshev (MVUE) UCL	231608.2006

Recommended UCL to use:
H-UCL

Summary Statistics for	Lead
Number of Samples	17
Minimum	13200
Maximum	1207000
Mean	302335.2941
Median	238000
Standard Deviation	300306.383
Variance	9.02E+10
Coefficient of Variation	0.993289202
Skewness	2.161072187

95 % UCL (Assuming Normal Data)	
Student's-t	429496.7145

95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	462929.2939
Modified-t	435859.3005

95 % Non-parametric UCL	
CLT	422138.202
Jackknife	429496.7145
Standard Bootstrap	417160.3917
Bootstrap-t	568565.6198
Chebyshev (Mean, Std)	619815.6826

Summary Statistics for	ln(Lead)
Minimum	9.487972109
Maximum	14.0036485
Mean	12.1965192
Standard Deviation	1.044659823
Variance	1.091314146
Shapiro-Wilk Test Statisitic	0.920692432
Shapiro-Wilk 5% Critical Value	0.892

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution	
MLE Mean	341866.7323
MLE Standard Deviation	480828.6343
MLE Coefficient of Variation	1.406479744
MLE Skewness	7.001716748
MLE Median	198098.4079
MLE 80% Quantile	478904.6261
MLE 90% Quantile	758355.1331
MLE 95% Quantile	1104589.802
MLE 99% Quantile	2249903.634
MVU Estimate of Median	191829.8842
MVU Estimate of Mean	326553.1886
MVU Estimate of Std. Dev.	394728.588
MVU Estimate of SE of Mean	91929.20895

UCL Assuming Lognormal Distribution	
95% H-UCL	701459.6754
95% Chebyshev (MVUE) UCL	727263.3204
99% Chebyshev (MVUE) UCL	1241237.269

Recommended UCL to use:

95 % Chebyshev (MVUE) UCL

Summary Statistics for	Manganese
Number of Samples	17
Minimum	46700
Maximum	370000
Mean	220776.4706
Median	235000
Standard Deviation	94072.74133
Variance	8849680662
Coefficient of Variation	0.426099489
Skewness	-0.238766126

Shapiro-Wilk Test Statisitic	0.970196673
Shapiro-Wilk 5% Critical Value	0.892
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t

95 % UCL (Assuming Normal Data)

Student's-t	260610.5337

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	256893.6532
Modified-t	260390.324

95 % Non-parametric UCL

CLT	258305.4364
Jackknife	260610.5337
Standard Bootstrap	257482.3453
Bootstrap-t	260153.2256
Chebyshev (Mean, Std)	320229.0702

From File

Summary Statistics for	Nickel
Number of Samples	17
Minimum	5400
Maximum	92000
Mean	18487.64706
Median	13000
Standard Deviation	20140.85696
Variance	405654119.1
Coefficient of Variation	1.089422407
Skewness	3.384065317

95 % UCL (Assuming Normal Data)	
Student's-t	27016.07044

95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	30806.53927
Modified-t	27684.28589

95 % Non-parametric UCL	
CLT	26522.55197
Jackknife	27016.07044
Standard Bootstrap	26330.52446
Bootstrap-t	41268.05269
Chebyshev (Mean, Std)	39780.32498

Summary Statistics for	ln(Nickel)
Minimum	8.594154233
Maximum	11.42954386
Mean	9.540780738
Standard Deviation	0.687397265
Variance	0.472514999

Shapiro-Wilk Test Statisitic	0.919487133
Shapiro-Wilk 5% Critical Value	0.892

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution	
MLE Mean	17624.37627
MLE Standard Deviation	13697.47704
MLE Coefficient of Variation	0.777189322
MLE Skewness	2.801008379
MLE Median	13915.80799
MLE 80% Quantile	24875.32001
MLE 90% Quantile	33660.69864
MLE 95% Quantile	43111.68006
MLE 99% Quantile	68848.71055
MVU Estimate of Median	13723.60317
MVU Estimate of Mean	17334.81641
MVU Estimate of Std. Dev.	12725.31287
MVU Estimate of SE of Mean	3058.000902

UCL Assuming Lognormal Distribution	
95% H-UCL	25953.39984
95% Chebyshev (MVUE) UCL	30664.33331
99% Chebyshev (MVUE) UCL	47761.54121

Recommended UCL to use:
H-UCL

Summary Statistics for	Thallium
Number of Samples	17
Minimum	32.5
Maximum	90
Mean	63.73529412
Median	70
Standard Deviation	16.94302737
Variance	287.0661765
Coefficient of Variation	0.265834301
Skewness	-0.467845854
Shapiro-Wilk Test Statisitic	0.905162382
Shapiro-Wilk 5% Critical Value	0.892
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t
95 % UCL (Assuming Normal Data)	
Student's-t	70.90963189
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	69.99624621
Modified-t	70.8319189
95 % Non-parametric UCL	
CLT	70.49447095
Jackknife	70.90963189
Standard Bootstrap	70.31729197
Bootstrap-t	70.39952228
Chebyshev (Mean, Std)	81.64726408

Summary Statistics for	TEQ (no 170/193/180) Humans
Number of Samples	9
Minimum	0.0014621
Maximum	0.195869
Mean	0.047464878
Median	0.0180841
Standard Deviation	0.062965962
Variance	0.003964712
Coefficient of Variation	1.326580104
Skewness	1.919856534
95 % UCL (Assuming Normal Data)	
Student's-t	0.086494288
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	0.096340145
Modified-t	0.088732911
95 % Non-parametric UCL	
CLT	0.081988142
Jackknife	0.086494288
Standard Bootstrap	0.080059184
Bootstrap-t	0.127067191
Chebyshev (Mean, Std)	0.1389523
99 % Non-parametric UCL	
Chebyshev (Mean, Std)	0.25629935

Summary Statistics for	ln(TEQ (no 170/193/180) Humans)
Minimum	-6.527881521
Maximum	-1.630309211
Mean	-3.981450065
Standard Deviation	1.601970589
Variance	2.566309769
Shapiro-Wilk Test Statisitic	0.957135856
Shapiro-Wilk 5% Critical Value	0.829
Data are Lognormal at 5% Significance Level	
Estimates Assuming Lognormal Distribution	
MLE Mean	0.067320184
MLE Standard Deviation	0.233375856
MLE Coefficient of Variation	3.466655072
MLE Skewness	52.06117682
MLE Median	0.018658564
MLE 80% Quantile	0.072238299
MLE 90% Quantile	0.146179807
MLE 95% Quantile	0.26022505
MLE 99% Quantile	0.77471003
MVU Estimate of Median	0.01614536
MVU Estimate of Mean	0.052561384
MVU Estimate of Std. Dev.	0.094994817
MVU Estimate of SE of Mean	0.028848684
UCL Assuming Lognormal Distribution	
95% H-UCL	1.018080694
95% Chebyshev (MVUE) UCL	0.178309883
99% Chebyshev (MVUE) UCL	0.339602168
Recommended UCL to use:	
99 % Chebyshev (MVUE) UCL	

Summary Statistics for	C11-C22 Aromatic
Number of Samples	6
Minimum	23930
Maximum	579000
Mean	259655
Median	173500
Standard Deviation	238881.6991
Variance	5.71E+10
Coefficient of Variation	0.91999653
Skewness	0.664298582

Shapiro-Wilk Test Statisitic	0.855417825
Shapiro-Wilk 5% Critical Value	0.788
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t

95 % UCL (Assuming Normal Data)	
Student's-t	456168.64

95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	448326.3438
Modified-t	460576.6615

95 % Non-parametric UCL	
CLT	420066.1348
Jackknife	456168.64
Standard Bootstrap	406132.5756
Bootstrap-t	651651.5769
Chebyshev (Mean, Std)	684748.099

C.8-1.4 Surface Soil Curren a Murphy Summary Table

Chemical of Potential Concern	Max. Conc.	95% UCL (Distribution) (1)		Value	Statistic (2)	Rationale (3)	Descriptic	Mean
Vinyl chloride	225	127	(T)	127.0310016	95% UCL-T	(c)	99% Cheb	30.02777778
Trichloroethene	1,300	378.5714986	(NP)	378.5714986	95% UCL-NP	(d)	Jackknife	142.28
Phenanthrene	5,600	12,041	(T)	5600	Max	(c & e)	99% Cheb	1554.6
Benzo(a)Anthracene	3,000	2,453	(T)	2452.505943	95% UCL-T	(c)	95% Cheb	805.7
Benzo(b)Fluoranthene	2,300	3,095	(T)	2300	Max	(c & e)	95% Cheb	931.4
Benzo(k)Fluoranthene	1,600	928	(N)	927.542066	95% UCL-N	(b)	Student's-t	608.5
Benzo(a)Pyrene	2,800	1,554	(N)	1553.60884	95% UCL-N	(b)	Student's-t	966.9
Indeno(1,2,3-cd)pyrene	6,500	12,088	(T)	6500	Max	(c & e)	99% Cheb	1268.19
Dibenz(a,h) anthracene	1,600	915	(T)	914.6130741	95% UCL-T	(c)	95% Cheb	275.54
Benzo(g,h,i)perylene	2,300	1,355	(N)	1355.263273	95% UCL-N	(b)	Student's-t	890.4
Antimony	5,000	3,598	(N)	3597.905057	95% UCL-N	(b)	Student's-t	2544.111111
Arsenic	10,000	8,117	(T)	8117.386864	95% UCL-T	(c)	95% H-UC	5144.444444
Cadmium	3,500	2,959	(T)	2958.903745	95% UCL-T	(c)	95% Cheb	1072.111111
Copper	48,000	35,501	(N)	35501.38584	95% UCL-N	(b)	Student's-t	29122.22222
Lead	1,900,000	828,181	(T)	828181.2929	95% UCL-T	(c)	95% Cheb	316820
Manganese	420,000	411,280	(N)	411280.4501	95% UCL-N	(b)	Student's-t	288000
Mercury	720	575.7380221	(T)	575.738	95% UCL-T	(c)	95% Cheb	205.97
Nickel	19,000	16,831	(N)	16830.58761	95% UCL-N	(b)	Student's-t	14300
Thallium	10,000	5714.308386	(NP)	5714.308386	95% UCL-NP	(d)	Bootstrap-I	3304.166667
C11-C22 Aromatic	4,700,000	3,720,135	(T)	3720134.935	95% UCL-T	(c)	99% Cheb	565502.3684
TEQ (no 170/193/180) Humans	0.000058381	N/A	(<4)	0.000058381	Max	(a)		0.000058381
Aroclor 1242	50	37	(N)	37.4903309	95% UCL-N	(b)	Student's-t	20.84
Aroclor 1248	50	37	(N)	37.4903309	95% UCL-N	(b)	Student's-t	20.84
Aroclor 1254	2200	4,802	(T)	2200	Max	(d)	sd=2.5085	450.84
Aroclor 1260	53	49	(N)	49.08881346	95% UCL-N	(b)	Student's-t	31.9

(1) T - Transformed; N - Normal; NP - Non-parametric; <4 - sample size too small to calculate 95% UCL
(2) Statistics: Maximum Detected Value (Max); 95% UCL of Transformed Data (95% UCL - T); 95% of Normal Data (95% UCL - N); 95% of Non-parametric Data (95% UCL - NP).
(3) Rationale

(a) Due to small sample size (<4), the maximum detected concentration is used.
(b) Shapiro-Wilk W Test indicates data are normally distributed.
(c) Shapiro-Wilk W Test indicates data are log-normally distributed.
(d) Shapiro-Wilk W Test indicates data are neither normally nor log-normally distributed.
(e) Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used for EPC.
(f) Due to high standard deviation, the maximum concentration is used.

C.8-1.4 Surface Soil Current/Future Murphy Runs

Summary Statistics for	Vinyl chloride
Number of Samples	9
Minimum	1.05
Maximum	225
Mean	30.02777778
Median	5
Standard Deviation	73.32198729
Variance	5376.113819
Coefficient of Variation	2.441805312
Skewness	2.967933032

95 % UCL (Assuming Normal Data)

Student's-t	75.47636342

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	96.06514678
Modified-t	79.50626616

95 % Non-parametric UCL

CLT	70.22909004
Jackknife	75.47636342
Standard Bootstrap	68.26554551
Bootstrap-t	598.4151285
Chebyshev (Mean, Std)	136.5621554

99 % Non-parametric UCL

Chebyshev (Mean, Std)	273.2092985

Summary Statistics for	ln(Vinyl chloride)
Minimum	0.048790164
Maximum	5.416100402
Mean	1.662176353
Standard Deviation	1.769249672
Variance	3.1302444
Shapiro-Wilk Test Statisitic	0.847426444
Shapiro-Wilk 5% Critical Value	0.829

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution

MLE Mean	25.21145747
MLE Standard Deviation	117.9281133
MLE Coefficient of Variation	4.67756033
MLE Skewness	116.3756926
MLE Median	5.270769424
MLE 80% Quantile	23.50451018
MLE 90% Quantile	51.19603976
MLE 95% Quantile	96.79468274
MLE 99% Quantile	322.9350078
MVU Estimate of Median	4.41552538
MVU Estimate of Mean	18.23525528
MVU Estimate of Std. Dev.	37.09119861
MVU Estimate of SE of Mean	10.93438392

UCL Assuming Lognormal Distribution

95% H-UCL	665.9789354
95% Chebyshev (MVUE) UCL	65.89712978
99% Chebyshev (MVUE) UCL	127.0310016

Recommended UCL to use:

99 % Chebyshev (MVUE) UCL

From File

Summary Statistics for	Trichloroethene
Number of Samples	10
Minimum	1.25
Maximum	1300
Mean	142.28
Median	2.5
Standard Deviation	407.6232099
Variance	166156.6812
Coefficient of Variation	2.864936814
Skewness	3.138598024

Shapiro-Wilk Test Statisitic	0.404185448
Shapiro-Wilk 5% Critical Value	0.842

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	378.5714986

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	491.006602
Modified-t	399.8942552

95 % Non-parametric UCL

CLT	354.3045556
Jackknife	378.5714986
Standard Bootstrap	346.8716543
Bootstrap-t	10014.92163
Chebyshev (Mean, Std)	704.1498197

C.8-1.4 Surface Soil Current/Future Murphy Runs

Summary Statistics for	Phenanthrene
Number of Samples	10
Minimum	34
Maximum	5600
Mean	1554.6
Median	330.5
Standard Deviation	2105.69562
Variance	4433954.044
Coefficient of Variation	1.354493516
Skewness	1.365237304

95 % UCL (Assuming Normal Data)

Student's-t	2775.232097

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	2957.047972
Modified-t	2823.145001

95 % Non-parametric UCL

CLT	2649.874183
Jackknife	2775.232097
Standard Bootstrap	2574.084772
Bootstrap-t	3954.186622
Chebyshev (Mean, Std)	4457.101108

99 % Non-parametric UCL

Chebyshev (Mean, Std)	8180.016594

Summary Statistics for	ln(Phenanthrene)
Minimum	3.526360525
Maximum	8.630521877
Mean	6.195990292
Standard Deviation	1.777203433
Variance	3.158452043
Shapiro-Wilk Test Statisitic	0.93730061
Shapiro-Wilk 5% Critical Value	0.842

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution

MLE Mean	2380.858255
MLE Standard Deviation	11301.96645
MLE Coefficient of Variation	4.747013574
MLE Skewness	121.2108991
MLE Median	490.777217
MLE 80% Quantile	2203.334542
MLE 90% Quantile	4815.989001
MLE 95% Quantile	9131.542785
MLE 99% Quantile	30630.9274
MVU Estimate of Median	418.1013486
MVU Estimate of Mean	1760.082255
MVU Estimate of Std. Dev.	3750.757181
MVU Estimate of SE of Mean	1033.223127

UCL Assuming Lognormal Distribution

95% H-UCL	42367.95949
95% Chebyshev (MVUE) UCL	6263.797453
99% Chebyshev (MVUE) UCL	12040.52257

Recommended UCL to use:

99 % Chebyshev (MVUE) UCL

C.8-1.4 Surface Soil Current/Future Murphy Runs

Summary Statistics for	Benzo(a)Anthracene
Number of Samples	10
Minimum	58
Maximum	3000
Mean	805.7
Median	483.5
Standard Deviation	923.9680189
Variance	853716.9
Coefficient of Variation	1.146789151
Skewness	1.697387203

95 % UCL (Assuming Normal Data)	
Student's-t	1341.306861

95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	1453.878967
Modified-t	1367.445719

95 % Non-parametric UCL	
CLT	1286.300476
Jackknife	1341.306861
Standard Bootstrap	1278.441695
Bootstrap-t	1731.046765
Chebyshev (Mean, Std)	2079.302022

Summary Statistics for	ln(Benzo(a)Anthracene)
Minimum	4.060443011
Maximum	8.006367568
Mean	6.027215604
Standard Deviation	1.300031116
Variance	1.690080902
Shapiro-Wilk Test Statisitic	0.954081294
Shapiro-Wilk 5% Critical Value	0.842
Data are Lognormal at 5% Significance Level	

Estimates Assuming Lognormal Distribution	
MLE Mean	965.1234829
MLE Standard Deviation	2029.037372
MLE Coefficient of Variation	2.10236038
MLE Skewness	15.59934408
MLE Median	414.559124
MLE 80% Quantile	1243.570426
MLE 90% Quantile	2203.397106
MLE 95% Quantile	3518.418188
MLE 99% Quantile	8527.810957
MVU Estimate of Median	380.7149291
MVU Estimate of Mean	847.2899608
MVU Estimate of Std. Dev.	1230.875843
MVU Estimate of SE of Mean	368.2618026

UCL Assuming Lognormal Distribution	
95% H-UCL	4901.724694
95% Chebyshev (MVUE) UCL	2452.505943
99% Chebyshev (MVUE) UCL	4511.448633

Recommended UCL to use:
95 % Chebyshev (MVUE) UCL

C.8-1.4 Surface Soil Current/Future Murphy Runs

Summary Statistics for	Benzo(b)Fluoranthene
Number of Samples	10
Minimum	72
Maximum	2300
Mean	931.4
Median	641.5
Standard Deviation	871.8622725
Variance	760143.8222
Coefficient of Variation	0.936077166
Skewness	0.380936984
95 % UCL (Assuming Normal Data)	
Student's-t	1436.802141
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	1420.385749
Modified-t	1442.337551
95 % Non-parametric UCL	
CLT	1384.897756
Jackknife	1436.802141
Standard Bootstrap	1367.723243
Bootstrap-t	1495.004078
Chebyshev (Mean, Std)	2133.179207

Summary Statistics for	ln(Benzo(b)Fluoranthene)
Minimum	4.276666119
Maximum	7.740664402
Mean	6.187421398
Standard Deviation	1.346630819
Variance	1.813414564
Shapiro-Wilk Test Statisitic	0.866041703
Shapiro-Wilk 5% Critical Value	0.842
Data are Lognormal at 5% Significance Level	
Estimates Assuming Lognormal Distribution	
MLE Mean	1204.872076
MLE Standard Deviation	2729.333823
MLE Coefficient of Variation	2.265247802
MLE Skewness	18.41951729
MLE Median	486.5897657
MLE 80% Quantile	1518.266405
MLE 90% Quantile	2745.839128
MLE 95% Quantile	4458.773894
MLE 99% Quantile	11155.4638
MVU Estimate of Median	444.0730401
MVU Estimate of Mean	1044.521652
MVU Estimate of Std. Dev.	1582.187198
MVU Estimate of SE of Mean	470.3684084
UCL Assuming Lognormal Distribution	
95% H-UCL	6798.36639
95% Chebyshev (MVUE) UCL	3094.81001
99% Chebyshev (MVUE) UCL	5724.628223
Recommended UCL to use:	
95 % Chebyshev (MVUE) UCL	

Summary Statistics for	Benzo(k)Fluoranthene
Number of Samples	10
Minimum	36
Maximum	1600
Mean	608.5
Median	430.5
Standard Deviation	550.3750741
Variance	302912.7222
Coefficient of Variation	0.904478347
Skewness	0.71591918
Shapiro-Wilk Test Statisitic	0.894035535
Shapiro-Wilk 5% Critical Value	0.842
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t
95 % UCL (Assuming Normal Data)	
Student's-t	927.542066
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	936.8787505
Modified-t	934.1091339
95 % Non-parametric UCL	
CLT	894.7767077
Jackknife	927.542066
Standard Bootstrap	878.0937083
Bootstrap-t	1014.681217
Chebyshev (Mean, Std)	1367.139685

Summary Statistics for	Benzo(a)Pyrene
Number of Samples	10
Minimum	58
Maximum	2800
Mean	966.9
Median	536
Standard Deviation	1012.12334
Variance	1024393.656
Coefficient of Variation	1.046771476
Skewness	0.744799998

Shapiro-Wilk Test Statisitic	0.845971792
Shapiro-Wilk 5% Critical Value	0.842
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t

95 % UCL (Assuming Normal Data)

Student's-t	1553.60884

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	1573.902094
Modified-t	1566.172665

95 % Non-parametric UCL

CLT	1493.354324
Jackknife	1553.60884
Standard Bootstrap	1482.187484
Bootstrap-t	1757.751964
Chebyshev (Mean, Std)	2362.015746

C.8-1.4 Surface Soil Current/Future Murphy Runs

Summary Statistics for	Indeno(1,2,3-cd)pyrene
Number of Samples	10
Minimum	8.9
Maximum	6500
Mean	1268.19
Median	606
Standard Deviation	1950.812635
Variance	3805669.939
Coefficient of Variation	1.538265272
Skewness	2.56370114
95 % UCL (Assuming Normal Data)	
Student's-t	2399.039348
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	2817.29826
Modified-t	2482.394357
95 % Non-parametric UCL	
CLT	2282.902048
Jackknife	2399.039348
Standard Bootstrap	2244.045695
Bootstrap-t	4480.156476
Chebyshev (Mean, Std)	3957.199647
99 % Non-parametric UCL	
Chebyshev (Mean, Std)	7406.27866

Summary Statistics for	ln(Indeno(1,2,3-cd)pyrene)
Minimum	2.186051277
Maximum	8.779557456
Mean	6.069308492
Standard Deviation	1.852091752
Variance	3.430243859
Shapiro-Wilk Test Statisitic	0.960138039
Shapiro-Wilk 5% Critical Value	0.842
Data are Lognormal at 5% Significance Level	
Estimates Assuming Lognormal Distribution	
MLE Mean	2402.89712
MLE Standard Deviation	13135.77798
MLE Coefficient of Variation	5.46664186
MLE Skewness	179.7659979
MLE Median	432.3815828
MLE 80% Quantile	2067.976812
MLE 90% Quantile	4671.550898
MLE 95% Quantile	9099.724566
MLE 99% Quantile	32121.27647
MVU Estimate of Median	363.2254062
MVU Estimate of Mean	1712.615697
MVU Estimate of Std. Dev.	3847.356234
MVU Estimate of SE of Mean	1042.756106
UCL Assuming Lognormal Distribution	
95% H-UCL	53919.07708
95% Chebyshev (MVUE) UCL	6257.884188
99% Chebyshev (MVUE) UCL	12087.90796
Recommended UCL to use:	
99 % Chebyshev (MVUE) UCL	

C.8-1.4 Surface Soil Current/Future Murphy Runs

Summary Statistics for	Dibenz(a,h) anthracene
Number of Samples	10
Minimum	5.4
Maximum	1600
Mean	275.54
Median	150
Standard Deviation	472.2014923
Variance	222974.2493
Coefficient of Variation	1.713731191
Skewness	2.993447012

95 % UCL (Assuming Normal Data)	
Student's-t	549.2663128

95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	672.1904518
Modified-t	572.8248152

95 % Non-parametric UCL	
CLT	521.1548451
Jackknife	549.2663128
Standard Bootstrap	513.185726
Bootstrap-t	1467.507978
Chebyshev (Mean, Std)	926.4248391

Summary Statistics for	ln(Dibenz(a,h) anthracene)
Minimum	1.686398954
Maximum	7.377758908
Mean	4.73362933
Standard Deviation	1.495131237
Variance	2.235417416
Shapiro-Wilk Test Statisitic	0.930717511
Shapiro-Wilk 5% Critical Value	0.842
Data are Lognormal at 5% Significance Level	

Estimates Assuming Lognormal Distribution	
MLE Mean	347.6993043
MLE Standard Deviation	1004.74776
MLE Coefficient of Variation	2.889703106
MLE Skewness	32.79924001
MLE Median	113.7074964
MLE 80% Quantile	402.2264448
MLE 90% Quantile	776.5592704
MLE 95% Quantile	1330.247395
MLE 99% Quantile	3682.343274
MVU Estimate of Median	101.5646904
MVU Estimate of Mean	287.9271553
MVU Estimate of Std. Dev.	494.7616702
MVU Estimate of SE of Mean	143.77161

UCL Assuming Lognormal Distribution	
95% H-UCL	2813.951992
95% Chebyshev (MVUE) UCL	914.6130741
99% Chebyshev (MVUE) UCL	1718.436613

Recommended UCL to use:
95 % Chebyshev (MVUE) UCL

Summary Statistics for	Benzo(g,h,i)perylene
Number of Samples	10
Minimum	41
Maximum	2300
Mean	890.4
Median	668.5
Standard Deviation	801.9292294
Variance	643090.4889
Coefficient of Variation	0.900639296
Skewness	0.550213505
Shapiro-Wilk Test Statisitic	0.897046266
Shapiro-Wilk 5% Critical Value	0.842
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t
95 % UCL (Assuming Normal Data)	
Student's-t	1355.263273
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	1354.668506
Modified-t	1362.617144
95 % Non-parametric UCL	
CLT	1307.522196
Jackknife	1355.263273
Standard Bootstrap	1291.419575
Bootstrap-t	1436.769588
Chebyshev (Mean, Std)	1995.783159

Summary Statistics for	Antimony
Number of Samples	9
Minimum	47
Maximum	5000
Mean	2544.111111
Median	2000
Standard Deviation	1700.080766
Variance	2890274.611
Coefficient of Variation	0.668241555
Skewness	0.056822587

Shapiro-Wilk Test Statisitic	0.927208138
Shapiro-Wilk 5% Critical Value	0.829
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t

95 % UCL (Assuming Normal Data)

Student's-t	3597.905057

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	3487.708193
Modified-t	3599.694001

95 % Non-parametric UCL

CLT	3476.239116
Jackknife	3597.905057
Standard Bootstrap	3429.291433
Bootstrap-t	3590.02611
Chebyshev (Mean, Std)	5014.271196

Summary Statistics for	Arsenic
Number of Samples	9
Minimum	2500
Maximum	10000
Mean	5144.444444
Median	3600
Standard Deviation	2961.465478
Variance	8770277.778
Coefficient of Variation	0.575662836
Skewness	0.894691803

95 % UCL (Assuming Normal Data)	
Student's-t	6980.106875

95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	7082.740722
Modified-t	7029.173521

95 % Non-parametric UCL	
CLT	6768.17019
Jackknife	6980.106875
Standard Bootstrap	6672.789761
Bootstrap-t	7608.284617
Chebyshev (Mean, Std)	9447.354026

Summary Statistics for	ln(Arsenic)
Minimum	7.824046011
Maximum	9.210340372
Mean	8.410562096
Standard Deviation	0.536204966
Variance	0.287515765
Shapiro-Wilk Test Statisitic	0.840168776
Shapiro-Wilk 5% Critical Value	0.829

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution	
MLE Mean	5189.122977
MLE Standard Deviation	2994.944972
MLE Coefficient of Variation	0.577158218
MLE Skewness	1.923732758
MLE Median	4494.286022
MLE 80% Quantile	7070.279505
MLE 90% Quantile	8951.581298
MLE 95% Quantile	10857.58578
MLE 99% Quantile	15642.93797
MVU Estimate of Median	4422.955395
MVU Estimate of Mean	5098.791174
MVU Estimate of Std. Dev.	2784.190329
MVU Estimate of SE of Mean	925.9686627

UCL Assuming Lognormal Distribution	
95% H-UCL	8117.386864
95% Chebyshev (MVUE) UCL	9134.995
99% Chebyshev (MVUE) UCL	14312.06304

Recommended UCL to use:
H-UCL

C.8-1.4 Surface Soil Current/Future Murphy Runs

Summary Statistics for:	Cadmium
Number of Samples	9
Minimum	79
Maximum	3500
Mean	1072.111111
Median	830
Standard Deviation	1004.448909
Variance	1008917.611
Coefficient of Variation	0.936888816
Skewness	2.038632578

95 % UCL (Assuming Normal Data)	
Student's-t	1694.718108

95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	1865.945982
Modified-t	1732.63852

95 % Non-parametric UCL	
CLT	1622.834922
Jackknife	1694.718108
Standard Bootstrap	1592.784924
Bootstrap-t	2261.48888
Chebyshev (Mean, Std)	2531.541541

Summary Statistics for	ln(Cadmium)
Minimum	4.369447852
Maximum	8.160518247
Mean	6.585820375
Standard Deviation	1.043001299
Variance	1.08785171

Shapiro-Wilk Test Statisitic	0.925736494
Shapiro-Wilk 5% Critical Value	0.829

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution	
MLE Mean	1248.56008
MLE Standard Deviation	1751.499433
MLE Coefficient of Variation	1.4028155
MLE Skewness	6.969034957
MLE Median	724.7453669
MLE 80% Quantile	1749.624501
MLE 90% Quantile	2768.544596
MLE 95% Quantile	4030.144507
MLE 99% Quantile	8199.60611

MVU Estimate of Median	681.9892709
MVU Estimate of Mean	1150.72866
MVU Estimate of Std. Dev.	1275.451362
MVU Estimate of SE of Mean	414.8238141

UCL Assuming Lognormal Distribution	
95% H-UCL	4376.222729
95% Chebyshev (MVUE) UCL	2958.903745
99% Chebyshev (MVUE) UCL	5278.173497

Recommended UCL to use:

95 % Chebyshev (MVUE) UCL

Summary Statistics for	Copper
Number of Samples	9
Minimum	16000
Maximum	48000
Mean	29122.22222
Median	28000
Standard Deviation	10291.47436
Variance	105914444.4
Coefficient of Variation	0.353389047
Skewness	0.584069747

Shapiro-Wilk Test Statisitic	0.956866107
Shapiro-Wilk 5% Critical Value	0.829
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t

95 % UCL (Assuming Normal Data)

Student's-t	35501.38584

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	35478.52022
Modified-t	35612.69952

95 % Non-parametric UCL

CLT	34764.87853
Jackknife	35501.38584
Standard Bootstrap	34520.32681
Bootstrap-t	37054.43242
Chebyshev (Mean, Std)	44075.38779

C.8-1.4 Surface Soil Current/Future Murphy Runs

Summary Statistics for	Lead
Number of Samples	10
Minimum	15000
Maximum	1900000
Mean	316820
Median	115000
Standard Deviation	577368.4858
Variance	3.33E+11
Coefficient of Variation	1.822386484
Skewness	2.79623054

95 % UCL (Assuming Normal Data)

Student's-t	651509.6385

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	789644.1847
Modified-t	678417.2283

95 % Non-parametric UCL

CLT	617137.2873
Jackknife	651509.6385
Standard Bootstrap	604880.9658
Bootstrap-t	3157998.513
Chebyshev (Mean, Std)	1112667.536

Summary Statistics for	ln(Lead)
Minimum	9.61580548
Maximum	14.45736444
Mean	11.68356292
Standard Deviation	1.406136964
Variance	1.97722116
Shapiro-Wilk Test Statisitic	0.931794602
Shapiro-Wilk 5% Critical Value	0.842

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution

MLE Mean	318753.5445
MLE Standard Deviation	795138.0164
MLE Coefficient of Variation	2.494522901
MLE Skewness	23.00609792
MLE Median	118606.0665
MLE 80% Quantile	389161.0897
MLE 90% Quantile	722482.8151
MLE 95% Quantile	1198592.153
MLE 99% Quantile	3122790.317
MVU Estimate of Median	107344.1023
MVU Estimate of Mean	271593.41
MVU Estimate of Std. Dev.	433256.6705
MVU Estimate of SE of Mean	127690.0176

UCL Assuming Lognormal Distribution

95% H-UCL	2068494.518
95% Chebyshev (MVUE) UCL	828181.2929
99% Chebyshev (MVUE) UCL	1542093.044

Recommended UCL to use:

95 % Chebyshev (MVUE) UCL

Summary Statistics for	Manganese
Number of Samples	4
Minimum	197000
Maximum	420000
Mean	288000
Median	267500
Standard Deviation	104769.5885
Variance	1.10E+10
Coefficient of Variation	0.363783293
Skewness	0.658840229

Shapiro-Wilk Test Statisitic	0.900436049
Shapiro-Wilk 5% Critical Value	0.748
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t

95 % UCL (Assuming Normal Data)	
Student's-t	411280.4501

95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	392604.2512
Modified-t	414156.5509

95 % Non-parametric UCL	
CLT	374165.3188
Jackknife	411280.4501
Standard Bootstrap	361802.1094
Bootstrap-t	1376797.502
Chebyshev (Mean, Std)	516340.0242

Summary Statistics for	Nickel
Number of Samples	9
Minimum	7500
Maximum	19000
Mean	14300
Median	14800
Standard Deviation	4082.584965
Variance	16667500
Coefficient of Variation	0.285495452
Skewness	-0.611449659
Shapiro-Wilk Test Statisitic	0.916492167
Shapiro-Wilk 5% Critical Value	0.829
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t
95 % UCL (Assuming Normal Data)	
Student's-t	16830.58761
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	16242.0485
Modified-t	16784.35992
95 % Non-parametric UCL	
CLT	16538.41823
Jackknife	16830.58761
Standard Bootstrap	16443.93865
Bootstrap-t	16500.59375
Chebyshev (Mean, Std)	20231.85843

From File

Summary Statistics for	Thallium
Number of Samples	9
Minimum	37.5
Maximum	10000
Mean	3304.166667
Median	4500
Standard Deviation	3482.254119
Variance	12126093.75
Coefficient of Variation	1.053897842
Skewness	0.684582112

Shapiro-Wilk Test Statisitic	0.819067577
Shapiro-Wilk 5% Critical Value	0.829

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)	
Student's-t	5462.639594
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	5496.457196
Modified-t	5506.785685
95 % Non-parametric UCL	
CLT	5213.432774
Jackknife	5462.639594
Standard Bootstrap	5173.006767
Bootstrap-t	5714.308386
Chebyshev (Mean, Std)	8363.7646

Summary Statistics for	C11-C22 Aromatic
Number of Samples	19
Minimum	4545
Maximum	4700000
Mean	565502.3684
Median	200000
Standard Deviation	1080227.214
Variance	1.17E+12
Coefficient of Variation	1.910208117
Skewness	3.484554403

95 % UCL (Assuming Normal Data)	
Student's-t	995239.9098

95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	1184816.393
Modified-t	1028258.423

95 % Non-parametric UCL	
CLT	973131.8352
Jackknife	995239.9098
Standard Bootstrap	960508.2626
Bootstrap-t	1960958.021
Chebyshev (Mean, Std)	1645729.582

99 % Non-parametric UCL	
Chebyshev (Mean, Std)	3031291.37

Summary Statistics for	ln(C11-C22 Aromatic)
Minimum	8.421783007
Maximum	15.36307307
Mean	12.08665435
Standard Deviation	1.709310453
Variance	2.921742226
Shapiro-Wilk Test Statisitic	0.977744544
Shapiro-Wilk 5% Critical Value	0.901

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution	
MLE Mean	764919.1854
MLE Standard Deviation	3206610.082
MLE Coefficient of Variation	4.192090018
MLE Skewness	86.24646168
MLE Median	177487.3033
MLE 80% Quantile	752398.7292
MLE 90% Quantile	1596171.148
MLE 95% Quantile	2953407.215
MLE 99% Quantile	9459314.437
MVU Estimate of Median	164303.0758
MVU Estimate of Mean	652189.5213
MVU Estimate of Std. Dev.	1645468.898
MVU Estimate of SE of Mean	308340.1156

UCL Assuming Lognormal Distribution	
95% H-UCL	3491514.371
95% Chebyshev (MVUE) UCL	1996212.926
99% Chebyshev (MVUE) UCL	3720134.935

Recommended UCL to use:

99 % Chebyshev (MVUE) UCL

C.8-2.1 Surface Soil Current/Future Aberjona Summary Table

Chemical of Potential Concern	Max. Conc.	95% UCL (Distribution) (1)		Value	Statistic (2)	Rationale (3)	Description	Mean
Naphthalene	26000	11767.61915	(NP)	11767.619	95% UCL-NP	(d)	Chebyshev (Mean, Std)	2415.5833
Vinyl chloride	2.1	1.951983273	(NP)	1.9519833	95% UCL-NP	(d)	Chebyshev (Mean, Std)	1.5833333
Methylene chloride	25	25.27466343	(T)	25	Max	(c & e)	95% H-UCL	13.933333
Trichloroethene	2.1	1.951983273	(NP)	1.9519833	95% UCL-NP	(d)	Chebyshev (Mean, Std)	1.5833333
Xylenes (total)	4800	2574.245448	(NP)	2574.2454	95% UCL-NP	(d)	Chebyshev (Mean, Std)	483.77
2-Methylnaphthalene	32400	14654.02731	(NP)	14654.027	95% UCL-NP	(d)	Chebyshev (Mean, Std)	2997.8333
2,4,6-Trichlorophenol	600	420.0964065	(NP)	420.09641	95% UCL-NP	(d)	Chebyshev (Mean, Std)	245.4
Acenaphthylene	6900	3286.357798	(NP)	3286.3578	95% UCL-NP	(d)	Chebyshev (Mean, Std)	872.83333
Phenanthrene	5000	2412.342422	(NP)	2412.3424	95% UCL-NP	(d)	Chebyshev (Mean, Std)	654.66667
Benzo(a)Anthracene	1120	634.8873812	(NP)	634.88738	95% UCL-NP	(d)	Chebyshev (Mean, Std)	285.75
Bis(2-ethylhexyl) phthalate	734	587.3382555	(NP)	587.33826	95% UCL-NP	(d)	Chebyshev (Mean, Std)	322.15
Benzo(b)Fluoranthene	1120	634.3765218	(NP)	634.37652	95% UCL-NP	(d)	Chebyshev (Mean, Std)	287.91667
Benzo(k)Fluoranthene	7900	3645.880866	(NP)	3645.8809	95% UCL-NP	(d)	Chebyshev (Mean, Std)	849.75
Benzo(a)Pyrene	3700	1773.285207	(NP)	1773.2852	95% UCL-NP	(d)	Chebyshev (Mean, Std)	500.25
Indeno(1,2,3-cd)pyrene	4700	2218.496078	(NP)	2218.4961	95% UCL-NP	(d)	Chebyshev (Mean, Std)	583
Dibenz(a,h) anthracene	2800	1383.9311	(NP)	1383.9311	95% UCL-NP	(d)	Chebyshev (Mean, Std)	434.025
2,4,6-Trichlorophenol	600	420.0964065	(NP)	420.0964	95%UCL-NP	(d)	Chebyshev (Mean, Std)	245.4
Methylene chloride	25	25.27466343	(T)	25.0000	Max	(c & e)	95% H-UCL	13.933333
Antimony	6900	5095.689137	(NP)	5095.6891	95% UCL-NP	(d)	Jackknife	4110.4167
Arsenic	42600	20877.83458	(NP)	20877.835	95% UCL-NP	(d)	Chebyshev (Mean, Std)	6452.5
Barium	203000	155196.0397	(T)	155196.04	95% UCL-T	(c)	95% Chebyshev (MVUE) UC	49200
Cadmium	8200	3297.527278	(T)	3297.5273	95% UCL-T	(c)	95% Chebyshev (MVUE) UC	1537.9167
Lead	637000	184825.4732	(T)	184825.47	95% UCL-T	(c)	95% Chebyshev (MVUE) UC	73250.833
Manganese	320000	259954.5866	(T)	259954.59	95% UCL-T	(c)	95% Chebyshev (MVUE) UC	104658.33
Mercury	1000	486.8556878	(NP)	486.85569	95% UCL-NP	(d)	Chebyshev (Mean, Std)	147.875
Thallium	150	102.3088053	(NP)	102.30881	95% UCL-NP	(d)	Bootstrap-I	88.75
alpha-Chlordane	6.33	3.909937551	(NP)	3.9099376	95% UCL-NP	(d)	Chebyshev (Mean, Std)	1.613
gamma-Chlordane	7.72	4.652237232	(NP)	4.6522372	95% UCL-NP	(d)	Chebyshev (Mean, Std)	1.752
4,4'-DDE	7.4	5.042754541	(NP)	5.0427545	95% UCL-NP	(d)	Chebyshev (Mean, Std)	2.725
4,4'-DDT	22	16.43066214	(NP)	16.430662	95% UCL-NP	(d)	Chebyshev (Mean, Std)	6.32
Aroclor 1242	283	161.1133774	(NP)	161.11338	95% UCL-NP	(d)	Chebyshev (Mean, Std)	45.915
Aroclor 1248	30.5	24.20848218	(NP)	24.208482	95% UCL-NP	(d)	Jackknife	20.165
Aroclor 1254	30.5	24.20848218	(NP)	24.208482	95% UCL-NP	(d)	Jackknife	20.165
Aroclor 1260	232	137.2986038	(NP)	137.2986	95% UCL-NP	(d)	Chebyshev (Mean, Std)	46.625
TEQ (no 170/193/180) Humans	0.00765	N/A	(<4)	0.0076515		(a)		0.0045019
C5-C8 Aliphatic	19,000	N/A	(<4)	19000		(a)		10500
C9-C10 Aromatic	177,000.0	N/A	(<4)	177000		(a)		177000
C9-C18 Aliphatic	2,430,000	N/A	(<4)	2430000	Max	(a)		1218360
C19-C36 Aliphatic	640,000	N/A	(<4)	640000	Max	(a)		343000
C11-C22 Aromatic	1,720,000	N/A	(<4)	1720000		(a)		924000
1,2,4-Trimethylbenzene		N/A	(<4)			(a)		
1,3,5-Trimethylbenzene		N/A	(<4)			(a)		
cis-1,2-Dichloroethene		N/A	(<4)			(a)		

(1) T - Transformed; N - Normal; NP - Non-parametric; <4 - sample size too small to calculate 95% UCL
(2) Statistics: Maximum Detected Value (Max); 95% UCL of Transformed Data (95% UCL - T); 95% of Normal Data (95% UCL - N); 95% of Non-parametric Data (95% UCL - NP).
(3) Rationale

(a) Due to small sample size (<4), the maximum detected concentration is used.
(b) Shapiro-Wilk W Test indicates data are normally distributed.
(c) Shapiro-Wilk W Test indicates data are log-normally distributed.
(d) Shapiro-Wilk W Test indicates data are neither normally nor log-normally distributed.
(e) Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used for EPC.
(f) Due to high standard deviation, the maximum concentration is used.

From File

Summary Statistics for	Naphthalene
Number of Samples	12
Minimum	13
Maximum	26000
Mean	2415.583333
Median	199.75
Standard Deviation	7432.244427
Variance	55238257.22
Coefficient of Variation	3.076790738
Skewness	3.455741956

Shapiro-Wilk Test Statisitic	0.349093659
Shapiro-Wilk 5% Critical Value	0.859

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)	
Student's-t	6268.661342
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	8231.593584
Modified-t	6625.382438
95 % Non-parametric UCL	
CLT	5944.623635
Jackknife	6268.661342
Standard Bootstrap	5733.558392
Bootstrap-t	281814.9332
Chebyshev (Mean, Std)	11767.61915

From File

Summary Statistics for	Vinyl chloride
Number of Samples	9
Minimum	1.4
Maximum	2.1
Mean	1.583333333
Median	1.45
Standard Deviation	0.253722289
Variance	0.064375
Coefficient of Variation	0.160245656
Skewness	1.438225426

Shapiro-Wilk Test Statisitic	0.767001874
Shapiro-Wilk 5% Critical Value	0.829

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	1.740602928

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	1.765768838
Modified-t	1.747360517

95 % Non-parametric UCL

CLT	1.722445343
Jackknife	1.740602928
Standard Bootstrap	1.714219701
Bootstrap-t	1.984598325
Chebyshev (Mean, Std)	1.951983273

From File

Summary Statistics for	Methylene chlorid
Number of Samples	9
Minimum	5.7
Maximum	25
Mean	13.93333333
Median	8.9
Standard Deviation	8.328415215
Variance	69.3625
Coefficient of Variation	0.597733149
Skewness	0.336692449

95 % UCL (Assuming Normal Data)

Student's-t	19.09569603

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	18.83258988
Modified-t	19.14762408

95 % Non-parametric UCL

CLT	18.49967466
Jackknife	19.09569603
Standard Bootstrap	18.17728538
Bootstrap-t	19.18073688
Chebyshev (Mean, Std)	26.03424009

Summary Statistics for
Minimum
Maximum
Mean
Standard Deviation
Variance

Shapiro-Wilk Test Statisitic
Shapiro-Wilk 5% Critical Value
Data are Lognormal at 5% Signific

Estimates Assuming Lognormal D
MLE Mean
MLE Standard Deviation
MLE Coefficient of Variation
MLE Skewness
MLE Median
MLE 80% Quantile
MLE 90% Quantile
MLE 95% Quantile
MLE 99% Quantile

MVU Estimate of Median
MVU Estimate of Mean
MVU Estimate of Std. Dev.
MVU Estimate of SE of Mean

UCL Assuming Lognormal Distr
95% H-UCL
95% Chebyshev (MVUE) UCL
99% Chebyshev (MVUE) UCL
Recommended UCL to use:
H-UCL

From File

ln(Methylene chlo	Summary Statistics for	Trichloroethene
1.740466175	Number of Samples	9
3.218875825	Minimum	1.4
2.460345393	Maximum	2.1
0.634595902	Mean	1.583333333
0.402711959	Median	1.45
	Standard Deviation	0.253722289
0.832887571	Variance	0.064375
0.829	Coefficient of Variation	0.160245656
;ance Level	Skewness	1.438225426
istribution	Shapiro-Wilk Test Statisitic	0.767001874
14.32063311	Shapiro-Wilk 5% Critical Value	0.829
10.08436935	Data not Normal at 5% Significance Level	
0.704184603	Data not Lognormal: Try Non-parametric UCL	
2.461742022		
11.708855	95 % UCL (Assuming Normal Data)	
20.0169403	Student's-t	1.740602928
26.46441835		
33.25668008	95 % UCL (Adjusted for Skewness)	
51.23461925	Adjusted-CLT	1.765768838
	Modified-t	1.747360517
11.44922683		
13.96070203	95 % Non-parametric UCL	
9.083549694	CLT	1.722445343
3.015027856	Jackknife	1.740602928
	Standard Bootstrap	1.712475036
·ibution	Bootstrap-t	1.980021008
25.27466343	Chebyshev (Mean, Std)	1.951983273
27.10290377		
43.95985042		

C.8-2.1 Surface Soil Current/Future Aberjona Runs

From File

Summary Statistics for	Xylenes (total)
Number of Samples	10
Minimum	0.7
Maximum	4800
Mean	483.77
Median	1.425
Standard Deviation	1516.590289
Variance	2300046.104
Coefficient of Variation	3.134940754
Skewness	3.16210881

Shapiro-Wilk Test Statisitic	0.368777727
Shapiro-Wilk 5% Critical Value	0.842

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)	
Student's-t	1362.908831
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	1785.041313
Modified-t	1442.835889
95 % Non-parametric UCL	
CLT	1272.621994
Jackknife	1362.908831
Standard Bootstrap	1221.563594
Bootstrap-t	2625713.05
Chebyshev (Mean, Std)	2574.245448

From File

Summary Statistics for	2-Methylnaphthale
Number of Samples	12
Minimum	173.5
Maximum	32400
Mean	2997.833333
Median	202.25
Standard Deviation	9263.403646
Variance	85810647.11
Coefficient of Variation	3.090032906
Skewness	3.458624008

Shapiro-Wilk Test Statisitic	0.345534426
Shapiro-Wilk 5% Critical Value	0.859

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	7800.234173

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	10249.17164
Modified-t	8245.215149

95 % Non-parametric UCL

CLT	7396.359932
Jackknife	7800.234173
Standard Bootstrap	7077.916198
Bootstrap-t	224786.2004
Chebyshev (Mean, Std)	14654.02731

From File

Summary Statistics for	2,4,6-Trichlorophe
Number of Samples	10
Minimum	173.5
Maximum	600
Mean	245.4
Median	199.75
Standard Deviation	126.7380939
Variance	16062.54444
Coefficient of Variation	0.51645515
Skewness	2.973070369

Shapiro-Wilk Test Statisitic	0.522063569
Shapiro-Wilk 5% Critical Value	0.842

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	318.8676863

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	351.584377
Modified-t	325.1477075

95 % Non-parametric UCL

CLT	311.3226153
Jackknife	318.8676863
Standard Bootstrap	306.7937497
Bootstrap-t	635.4390882
Chebyshev (Mean, Std)	420.0964065

From File

Summary Statistics for	Acenaphthylene
Number of Samples	12
Minimum	173.5
Maximum	6900
Mean	872.8333333
Median	202.25
Standard Deviation	1918.074749
Variance	3679010.742
Coefficient of Variation	2.197526923
Skewness	3.343304112

Shapiro-Wilk Test Statisitic	0.415081812
Shapiro-Wilk 5% Critical Value	0.859

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	1867.215543

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	2354.595465
Modified-t	1956.280921

95 % Non-parametric UCL

CLT	1783.589587
Jackknife	1867.215543
Standard Bootstrap	1750.550143
Bootstrap-t	11406.45317
Chebyshev (Mean, Std)	3286.357798

From File

Summary Statistics for	Phenanthrene
Number of Samples	12
Minimum	37
Maximum	5000
Mean	654.6666667
Median	199.75
Standard Deviation	1396.859047
Variance	1951215.197
Coefficient of Variation	2.133695082
Skewness	3.240359166

Shapiro-Wilk Test Statisitic	0.448639934
Shapiro-Wilk 5% Critical Value	0.859

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)	
Student's-t	1378.836455
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	1720.97192
Modified-t	1441.70208
95 % Non-parametric UCL	
CLT	1317.934933
Jackknife	1378.836455
Standard Bootstrap	1286.217527
Bootstrap-t	10201.40389
Chebyshev (Mean, Std)	2412.342422

From File

Summary Statistics for	Benzo(a)Anthrace
Number of Samples	12
Minimum	25
Maximum	1120
Mean	285.75
Median	199.75
Standard Deviation	277.4662551
Variance	76987.52273
Coefficient of Variation	0.971010517
Skewness	2.861279589

Shapiro-Wilk Test Statisitic	0.589280711
Shapiro-Wilk 5% Critical Value	0.859

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	429.5960665

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	488.1907393
Modified-t	440.6225739

95 % Non-parametric UCL

CLT	417.498842
Jackknife	429.5960665
Standard Bootstrap	413.1630876
Bootstrap-t	789.3651867
Chebyshev (Mean, Std)	634.8873812

From File

Summary Statistics for	Bis(2-ethylhexyl) p
Number of Samples	10
Minimum	194
Maximum	734
Mean	322.15
Median	219
Standard Deviation	192.3877811
Variance	37013.05833
Coefficient of Variation	0.597199383
Skewness	1.582399434

Shapiro-Wilk Test Statisitic	0.725497165
Shapiro-Wilk 5% Critical Value	0.842

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	433.6735738

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	454.7494419
Modified-t	438.747479

95 % Non-parametric UCL

CLT	422.2201943
Jackknife	433.6735738
Standard Bootstrap	415.8404283
Bootstrap-t	633.0418167
Chebyshev (Mean, Std)	587.3382555

From File

Summary Statistics for	Benzo(b)Fluorantl
Number of Samples	12
Minimum	51
Maximum	1120
Mean	287.9166667
Median	199.75
Standard Deviation	275.3383731
Variance	75811.2197
Coefficient of Variation	0.956312729
Skewness	2.924846453

Shapiro-Wilk Test Statisitic	0.574549793
Shapiro-Wilk 5% Critical Value	0.859

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	430.6595811

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	490.3633565
Modified-t	441.8446153

95 % Non-parametric UCL

CLT	418.65513
Jackknife	430.6595811
Standard Bootstrap	413.7650628
Bootstrap-t	829.437305
Chebyshev (Mean, Std)	634.3765218

From File

Summary Statistics for	Benzo(k)Fluorantt
Number of Samples	12
Minimum	13
Maximum	7900
Mean	849.75
Median	199.75
Standard Deviation	2222.139484
Variance	4937903.886
Coefficient of Variation	2.615050878
Skewness	3.453557643

Shapiro-Wilk Test Statisitic	0.360496096
Shapiro-Wilk 5% Critical Value	0.859

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	2001.767653

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	2588.225359
Modified-t	2108.354969

95 % Non-parametric UCL

CLT	1904.884808
Jackknife	2001.767653
Standard Bootstrap	1903.040239
Bootstrap-t	25092.3831
Chebyshev (Mean, Std)	3645.880866

From File

Summary Statistics for	Benzo(a)Pyrene
Number of Samples	12
Minimum	19
Maximum	3700
Mean	500.25
Median	199.75
Standard Deviation	1011.705794
Variance	1023548.614
Coefficient of Variation	2.022400388
Skewness	3.414857546

Shapiro-Wilk Test Statisitic	0.400034144
Shapiro-Wilk 5% Critical Value	0.859

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	1024.745848

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	1288.264681
Modified-t	1072.729615

95 % Non-parametric UCL

CLT	980.6365852
Jackknife	1024.745848
Standard Bootstrap	953.4958391
Bootstrap-t	5948.292807
Chebyshev (Mean, Std)	1773.285207

From File

Summary Statistics for	Indeno(1,2,3-cd)p
Number of Samples	12
Minimum	12
Maximum	4700
Mean	583
Median	199.75
Standard Deviation	1299.760485
Variance	1689377.318
Coefficient of Variation	2.229434794
Skewness	3.43324594

Shapiro-Wilk Test Statisitic	0.38465547
Shapiro-Wilk 5% Critical Value	0.859

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	1256.831249

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	1597.507806
Modified-t	1318.80899

95 % Non-parametric UCL

CLT	1200.163117
Jackknife	1256.831249
Standard Bootstrap	1190.581106
Bootstrap-t	8914.724164
Chebyshev (Mean, Std)	2218.496078

From File

Summary Statistics for	Dibenz(a,h) anthra
Number of Samples	12
Minimum	4.3
Maximum	2800
Mean	434.025
Median	199.75
Standard Deviation	754.9088194
Variance	569887.3257
Coefficient of Variation	1.739321052
Skewness	3.310826578

Shapiro-Wilk Test Statisitic	0.44887258
Shapiro-Wilk 5% Critical Value	0.859

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	825.3903002

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	1015.028385
Modified-t	860.1038027

95 % Non-parametric UCL

CLT	792.4771034
Jackknife	825.3903002
Standard Bootstrap	787.1885725
Bootstrap-t	3467.857518
Chebyshev (Mean, Std)	1383.9311

From File

Summary Statistics for	Antimony
Number of Samples	12
Minimum	335
Maximum	6900
Mean	4110.416667
Median	4425
Standard Deviation	1900.502874
Variance	3611911.174
Coefficient of Variation	0.462362585
Skewness	-1.086227029

Shapiro-Wilk Test Statisitic	0.850980437
Shapiro-Wilk 5% Critical Value	0.859

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)	
Student's-t	5095.689137
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	4829.011183
Modified-t	5067.017226
95 % Non-parametric UCL	
CLT	5012.829296
Jackknife	5095.689137
Standard Bootstrap	4978.380842
Bootstrap-t	4940.317714
Chebyshev (Mean, Std)	6501.83034

From File

Summary Statistics for	Arsenic
Number of Samples	12
Minimum	1400
Maximum	42600
Mean	6452.5
Median	3050
Standard Deviation	11464.09345
Variance	131425438.6
Coefficient of Variation	1.77669019
Skewness	3.378753775

Shapiro-Wilk Test Statisitic	0.432544212
Shapiro-Wilk 5% Critical Value	0.859

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	12395.79839

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	15344.99424
Modified-t	12933.77546

95 % Non-parametric UCL

CLT	11895.97649
Jackknife	12395.79839
Standard Bootstrap	11715.9339
Bootstrap-t	45508.81527
Chebyshev (Mean, Std)	20877.83458

C.8-2.1 Surface Soil Current/Future Aberjona Runs

From File

Summary Statistics for	Barium
Number of Samples	12
Minimum	3300
Maximum	203000
Mean	49200
Median	24150
Standard Deviation	61718.62839
Variance	3809189091
Coefficient of Variation	1.254443667
Skewness	1.738394077

95 % UCL (Assuming Normal Data)	
Student's-t	81196.61854

95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	88059.27953
Modified-t	82686.77546

95 % Non-parametric UCL	
CLT	78505.75402
Jackknife	81196.61854
Standard Bootstrap	77613.65997
Bootstrap-t	106044.3973
Chebyshev (Mean, Std)	126860.9043

Summary Statistics for
Minimum
Maximum
Mean
Standard Deviation
Variance

Shapiro-Wilk Test Statisitic
Shapiro-Wilk 5% Critical Value
Data are Lognormal at 5% Signific

Estimates Assuming Lognormal D
MLE Mean
MLE Standard Deviation
MLE Coefficient of Variation
MLE Skewness
MLE Median
MLE 80% Quantile
MLE 90% Quantile
MLE 95% Quantile
MLE 99% Quantile

MVU Estimate of Median
MVU Estimate of Mean
MVU Estimate of Std. Dev.
MVU Estimate of SE of Mean

UCL Assuming Lognormal Distr
95% H-UCL
95% Chebyshev (MVUE) UCL
99% Chebyshev (MVUE) UCL
Recommended UCL to use:
95 % Chebyshev (MVU

From File

ln(Barium)	Summary Statistics for	Cadmium	Summary Statistics for
8.101677747	Number of Samples	12	Minimum
12.22096126	Minimum	230	Maximum
9.99659315	Maximum	8200	Mean
1.423217854	Mean	1537.916667	Standard Deviation
2.025549059	Median	545	Variance
	Standard Deviation	2247.854996	
0.943259344	Variance	5052852.083	Shapiro-Wilk Test Stat
0.859	Coefficient of Variation	1.461623406	Shapiro-Wilk 5% Critic
:ance Level	Skewness	2.767484585	Data are Lognormal at
›istribution	95 % UCL (Assuming Normal Data)		Estimates Assuming L
60437.65877	Student's-t	2703.265941	MLE Mean
155034.927			MLE Standard Deviatic
2.56520405	95 % UCL (Adjusted for Skewness)		MLE Coefficient of Var
24.57535206	Adjusted-CLT	3159.189103	MLE Skewness
21951.55261	Modified-t	2789.667387	MLE Median
73072.855			MLE 80% Quantile
136684.1532	95 % Non-parametric UCL		MLE 90% Quantile
228156.3729	CLT	2605.261928	MLE 95% Quantile
601389.372	Jackknife	2703.265941	MLE 99% Quantile
	Standard Bootstrap	2563.474243	
20163.69455	Bootstrap-t	5305.635785	MVU Estimate of Medi
52456.50872	Chebyshev (Mean, Std)	4366.405509	MVU Estimate of Mear
88948.92484			MVU Estimate of Std. I
23570.06489			MVU Estimate of SE o
·ibution			UCL Assuming Logr
300402.5463			95% H-UCL
155196.0397			95% Chebyshev (MVU
286975.6933			99% Chebyshev (MVU
			Recommended UCL tc
JE) UCL			95 % Cheb

From File

-	ln(Cadmium)	Summary Statistics for	Lead	Summary S
	5.438079309	Number of Samples	12	Minimum
	9.011889433	Minimum	1100	Maximum
	6.728571692	Maximum	637000	Mean
	1.051391633	Mean	73250.83333	Standard D
	1.105424366	Median	10855	Variance
		Standard Deviation	182132.6038	
:isitic	0.901588139	Variance	3.32E+10	Shapiro-Wi
:al Value	0.859	Coefficient of Variation	2.486423642	Shapiro-Wi
: 5% Significance Level		Skewness	3.193145243	Data are L(
ognormal Distribution		95 % UCL (Assuming Normal Data)		Estimates /
	1452.852109	Student's-t	167673.3375	MLE Mean
ɔn	2065.149421			MLE Stand
'iation	1.421445038	95 % UCL (Adjusted for Skewness)		MLE Coeffi
	7.136373335	Adjusted-CLT	211517.7414	MLE Skewı
	835.9524157	Modified-t	175750.78	MLE Media
	2032.450775			MLE 80% (
	3227.97389	95 % Non-parametric UCL		MLE 90% (
	4713.146112	CLT	159732.5557	MLE 95% (
	9644.167721	Jackknife	167673.3375	MLE 99% (
		Standard Bootstrap	156047.2035	
an	798.1909096	Bootstrap-t	1429501.452	MVU Estim
ı	1362.498542	Chebyshev (Mean, Std)	302429.334	MVU Estim
Dev.	1588.869711			MVU Estim
·f Mean	443.9260376	99 % Non-parametric UCL		MVU Estim
		Chebyshev (Mean, Std)	596386.9096	
ıormal Distribution				UCL Ass
	3770.947827			95% H-UCI
IE) UCL	3297.527278			95% Cheb)
IE) UCL	5779.506846			99% Cheb)
ɔ use:				Recommer
ıyshev (MVUE) UCL				

From File

Statistics for	ln(Lead)	Summary Statistics for	Manganese
	7.003065459	Number of Samples	12
	13.36452493	Minimum	21700
	9.236771902	Maximum	320000
Deviation	1.966833604	Mean	104658.3333
	3.868434425	Median	42700
		Standard Deviation	106223.5932
ilk Test Statisitic	0.904140341	Variance	1.13E+10
ilk 5% Critical Value	0.859	Coefficient of Variation	1.014955902
ognormal at 5% Significance Level		Skewness	1.205693067

Assuming Lognormal Distribution		95 % UCL (Assuming Normal Data)	
	71039.34193	Student's-t	159727.5382
lard Deviation	486333.6301		
icient of Variation	6.845976002	95 % UCL (Adjusted for Skewness)	
ness	341.3909376	Adjusted-CLT	166500.2984
an	10267.8394	Modified-t	161506.3305
Quantile	54108.48528		
Quantile	128560.2677	95 % Non-parametric UCL	
Quantile	260983.6863	CLT	155096.306
Quantile	996123.838	Jackknife	159727.5382
		Standard Bootstrap	150879.5006
ate of Median	8721.348729	Bootstrap-t	183442.9132
ate of Mean	50155.30026	Chebyshev (Mean, Std)	238320.0902
ate of Std. Dev.	132415.0126		
ate of SE of Mean	30895.45655		

suming Lognormal Distribution	
L	1290584.824
yshev (MVUE) UCL	184825.4732
yshev (MVUE) UCL	357561.2116
nded UCL to use:	
99 % Chebyshev (MVUE) UCL	

C.8-2.1 Surface Soil Current/Future Aberjona Runs

From File

Summary Statistics for	ln(Manganese)
Minimum	9.98506754
Maximum	12.67607627
Mean	11.09006456
Standard Deviation	0.99970818
Variance	0.999416445
Shapiro-Wilk Test Statisitic	0.867045087
Shapiro-Wilk 5% Critical Value	0.859
Data are Lognormal at 5% Significance Level	
Estimates Assuming Lognormal Distribution	
MLE Mean	107987.7182
MLE Standard Deviation	141488.4748
MLE Coefficient of Variation	1.31022747
MLE Skewness	6.179944701
MLE Median	65516.97554
MLE 80% Quantile	152484.4601
MLE 90% Quantile	236733.3231
MLE 95% Quantile	339281.1903
MLE 99% Quantile	670236.4122
MVU Estimate of Median	62836.27522
MVU Estimate of Mean	102046.2832
MVU Estimate of Std. Dev.	112140.796
MVU Estimate of SE of Mean	31491.81503
UCL Assuming Lognormal Distribution	
95% H-UCL	259954.5866
95% Chebyshev (MVUE) UCL	239315.9224
99% Chebyshev (MVUE) UCL	415385.8864
Recommended UCL to use:	
H-UCL	

Summary Statistics for	Mercury
Number of Samples	12
Minimum	40
Maximum	1000
Mean	147.875
Median	74.5
Standard Deviation	269.3945337
Variance	72573.41477
Coefficient of Variation	1.821771994
Skewness	3.416158648
Shapiro-Wilk Test Statisitic	0.406697232
Shapiro-Wilk 5% Critical Value	0.859
Data not Normal at 5% Significance Level	
Data not Lognormal: Try Non-parametric UCL	
95 % UCL (Assuming Normal Data)	
Student's-t	287.5364661
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	357.7368239
Modified-t	300.3183337
95 % Non-parametric UCL	
CLT	275.7911599
Jackknife	287.5364661
Standard Bootstrap	270.2805919
Bootstrap-t	1248.92385
Chebyshev (Mean, Std)	486.8556878

From File

Summary Statistics for	Thallium
Number of Samples	12
Minimum	20
Maximum	150
Mean	88.75
Median	85
Standard Deviation	29.00822767
Variance	841.4772727
Coefficient of Variation	0.32685327
Skewness	-0.40955574

Shapiro-Wilk Test Statisitic	0.81910941
Shapiro-Wilk 5% Critical Value	0.859

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	103.7886556

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	101.466056
Modified-t	103.6236488

95 % Non-parametric UCL

CLT	102.5239287
Jackknife	103.7886556
Standard Bootstrap	101.6905042
Bootstrap-t	102.3088053
Chebyshev (Mean, Std)	125.2512194

From File

Summary Statistics for	alpha-Chlordane
Number of Samples	10
Minimum	0.95
Maximum	6.33
Mean	1.613
Median	1
Standard Deviation	1.666373641
Variance	2.776801111
Coefficient of Variation	1.033089672
Skewness	3.10066178

Shapiro-Wilk Test Statisitic	0.446507119
Shapiro-Wilk 5% Critical Value	0.842

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	2.578965419

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	3.031848152
Modified-t	2.66507977

95 % Non-parametric UCL

CLT	2.479761563
Jackknife	2.578965419
Standard Bootstrap	2.430825688
Bootstrap-t	11.85346523
Chebyshev (Mean, Std)	3.909937551

From File

Summary Statistics for	gamma-Chlordan
Number of Samples	10
Minimum	0.95
Maximum	7.72
Mean	1.752
Median	1
Standard Deviation	2.104053231
Variance	4.42704
Coefficient of Variation	1.200943625
Skewness	3.123324217

Shapiro-Wilk Test Statisitic	0.429799126
Shapiro-Wilk 5% Critical Value	0.842

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	2.971680035

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	3.548609194
Modified-t	3.081207376

95 % Non-parametric UCL

CLT	2.846419897
Jackknife	2.971680035
Standard Bootstrap	2.778449266
Bootstrap-t	16.82546072
Chebyshev (Mean, Std)	4.652237232

From File

Summary Statistics for	4,4'-DDE
Number of Samples	10
Minimum	1.9
Maximum	7.4
Mean	2.725
Median	2.025
Standard Deviation	1.681475873
Variance	2.827361111
Coefficient of Variation	0.617055366
Skewness	2.911892192

Shapiro-Wilk Test Statisitic	0.532500038
Shapiro-Wilk 5% Critical Value	0.842

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	3.699719899

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	4.122791198
Modified-t	3.781324506

95 % Non-parametric UCL

CLT	3.599616965
Jackknife	3.699719899
Standard Bootstrap	3.552286726
Bootstrap-t	7.942722869
Chebyshev (Mean, Std)	5.042754541

From File

Summary Statistics for	4,4'-DDT
Number of Samples	10
Minimum	1.95
Maximum	22
Mean	6.32
Median	2.2
Standard Deviation	7.335045255
Variance	53.80288889
Coefficient of Variation	1.160608426
Skewness	1.603359103

Shapiro-Wilk Test Statisitic	0.671197184
Shapiro-Wilk 5% Critical Value	0.842

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	10.5719876

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	11.39196104
Modified-t	10.76799946

95 % Non-parametric UCL

CLT	10.13531197
Jackknife	10.5719876
Standard Bootstrap	10.01837681
Bootstrap-t	17.92396603
Chebyshev (Mean, Std)	16.43066214

From File

Summary Statistics for	Aroclor 1242
Number of Samples	10
Minimum	3.15
Maximum	283
Mean	45.915
Median	20
Standard Deviation	83.57368688
Variance	6984.561139
Coefficient of Variation	1.820182661
Skewness	3.12330207

Shapiro-Wilk Test Statisitic	0.434717354
Shapiro-Wilk 5% Critical Value	0.842

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	94.36109246

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	117.2767108
Modified-t	98.71152361

95 % Non-parametric UCL

CLT	89.38571853
Jackknife	94.36109246
Standard Bootstrap	87.87599248
Bootstrap-t	627.9515352
Chebyshev (Mean, Std)	161.1133774

From File

Summary Statistics for	Aroclor 1248
Number of Samples	10
Minimum	3.15
Maximum	30.5
Mean	20.165
Median	20
Standard Deviation	6.975355427
Variance	48.65558333
Coefficient of Variation	0.345913981
Skewness	-1.48756462

Shapiro-Wilk Test Statisitic	0.803086596
Shapiro-Wilk 5% Critical Value	0.842

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	24.20848218

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	22.68449806
Modified-t	24.03554398

95 % Non-parametric UCL

CLT	23.79321988
Jackknife	24.20848218
Standard Bootstrap	23.63761255
Bootstrap-t	23.38003314
Chebyshev (Mean, Std)	29.77986393

From File

Summary Statistics for	Aroclor 1254
Number of Samples	10
Minimum	3.15
Maximum	30.5
Mean	20.165
Median	20
Standard Deviation	6.975355427
Variance	48.65558333
Coefficient of Variation	0.345913981
Skewness	-1.48756462

Shapiro-Wilk Test Statisitic	0.803086596
Shapiro-Wilk 5% Critical Value	0.842

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	24.20848218

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	22.68449806
Modified-t	24.03554398

95 % Non-parametric UCL

CLT	23.79321988
Jackknife	24.20848218
Standard Bootstrap	23.61936978
Bootstrap-t	23.25435221
Chebyshev (Mean, Std)	29.77986393

From File

Summary Statistics for	Aroclor 1260
Number of Samples	10
Minimum	19
Maximum	232
Mean	46.625
Median	21.75
Standard Deviation	65.78154609
Variance	4327.211806
Coefficient of Variation	1.410864259
Skewness	3.051485788

Shapiro-Wilk Test Statisitic	0.474648168
Shapiro-Wilk 5% Critical Value	0.842

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	84.75732349

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	102.2896117
Modified-t	88.10284771

95 % Non-parametric UCL

CLT	80.84116517
Jackknife	84.75732349
Standard Bootstrap	79.4180223
Bootstrap-t	344.7609263
Chebyshev (Mean, Std)	137.2986038

C.8-2.2 Surface Soil Current/Future Whitney Summary Table

Chemical of Potential Concern	Max. Conc.	95% UCL (Distribution) (1)		Value	Statistic (2)	Rationale (3)	Description	Mean
Naphthalene	12,000	23,192	(T)	12000	Max	(c & e)	99% Chebyshev (MVU	2441.555556
Vinyl chloride	470	338.2086892	(NP)	338.2086892	95% UCL-NP	(d)	Bootstrap-t	113.87
Methylene chloride	2,690	3078.316835	(T)	2690	Max	(c & e)	99% Chebyshev (MVU	378.95
cis-1,2-Dichloroethene	380	1,688	(T)	380	Max	(c & e)	99% Chebyshev (MVU	122.425
Trichloroethene	740	492.2462755	(NP)	492.2462755	95% UCL-NP	(d)	Chebyshev (Mean, Std	138.92
Xylenes (total)	3,330	12,663	(T)	3330	Max	(c & e)	99% Chebyshev (MVU	637.935
2-Methylnaphthalene	20,000	43,837	(T)	20000	Max	(c & e)	99% Chebyshev (MVU	4429.555556
2,4,6-Trichlorophenol	3,250	1,770	(T)	1770.00948	95% UCL-T	(c)	95% Chebyshev (MVU	702.8333333
Acenaphthylene	1,100	2,822	(T)	1100	Max	(c & e)	99% Chebyshev (MVU	225.8277778
Phenanthrene	4,700	2,928	(N)	2927.593731	95% UCL-N	(b)	Student's-t	1824.333333
Benzo(a)Anthracene	1,800	1,217	(N)	1216.643342	95% UCL-N	(b)	Student's-t	850.2222222
Bis(2-ethylhexyl) phthalate	440,000	294127.7394	(NP)	294127.7394	95% UCL-NP	(d & e)	Chebyshev (Mean, Std	72025.94444
Benzo(b)Fluoranthene	1,800	1,493	(N)	1492.594239	95% UCL-N	(b)	Student's-t	1072.666667
Benzo(k)Fluoranthene	1,800	985	(N)	985.0355489	95% UCL-N	(b)	Student's-t	620.5555556
Benzo(a)Pyrene	1,800	1,231	(N)	1230.953744	95% UCL-N	(b)	Student's-t	866.7777778
Indeno(1,2,3-cd)pyrene	1,300	870	(N)	870.2182368	95% UCL-N	(b)	Student's-t	624.2222222
Dibenz(a,h) anthracene	300	232	(N)	232.4816993	95% UCL-N	(b)	Student's-t	184.8888889
Methylene chloride	2690	3078.316835	(T)	2690.0000	Max	(c & e)	99% Chebyshev (MVU	378.95
2,4,6-Trichlorophenol	3250	1770.00948	(T)	1770.0095	95% UCL-T	(c)	95% Chebyshev (MVU	702.8333333
Antimony	10,000	6,499	(N)	6498.591296	95% UCL-N	(b)	Student's-t	4416.428571
Arsenic	32,000	28,045	(T)	28045.02168	95% UCL-T	(c)	95% Chebyshev (MVU	10412.85714
Barium	223,000	165,869	(N)	165869.2819	95% UCL-N	(b)	Student's-t	99957.14286
Cadmium	8,340	6,050	(N)	6049.55843	95% UCL-N	(b)	Student's-t	3609.285714
Lead	1,040,000	576,272	(N)	576271.6673	95% UCL-N	(b)	Student's-t	300652.8571
Manganese	325,000	251,360	(N)	251359.9355	95% UCL-N	(b)	Student's-t	171057.1429
Mercury	12,000	16,676	(T)	12000	Max	(c & e)	99% Chebyshev (MVU	2436.285714
Thallium	80	79	(N)	79.2403655	95% UCL-N	(b)	Student's-t	75
alpha-Chlordane	417,000	537400.7864	(T)	417000	Max	(c & e)	99% Chebyshev (MVU	61991.62857
gamma-Chlordane	299,000	382108.7306	(T)	299000	95% UCL-NP	(c & e)	99% Chebyshev (MVU	6.113124986
4,4'-DDE	118,000	172057.326	(T)	118000	Max	(c & e)	99% Chebyshev (MVU	17857.55
4,4'-DDT	290,000	656925.6109	(T)	290000	Max	(c & e)	99% Chebyshev (MVU	5.293616896
Aroclor 1242	39	30	(N)	29.85211619	95% UCL-N	(b)	Student's-t	24.35714286
Aroclor 1248	977,000	747954.7297	(NP)	747954.7297	95% UCL-NP	(d)	Chebyshev (Mean, Std	139591.7143
Aroclor 1254	535,000	409642.1468	(NP)	409642.1468	95% UCL-NP	(d)	Chebyshev (Mean, Std	76677.57143
Aroclor 1260	295,000	226201.0138	(NP)	226201.0138	95% UCL-NP	(d)	Chebyshev (Mean, Std	43250.78571
TEQ (no 170/193/180) Humans		N/A	(<4)		Max	(a)		1.3965114
C5-C8 Aliphatic		N/A	(<4)		Max	(a)		52000
C9-C10 Aromatic		N/A	(<4)		Max	(a)		498000
C9-C18 Aliphatic		N/A	(<4)		Max	(a)		2725666.667
C19-C36 Aliphatic		N/A	(<4)		Max	(a)		1609666.667
C11-C22 Aromatic		N/A	(<4)		Max	(a)		2244333.333
1,2,4-Trimethylbenzene		N/A	(<4)			(a)		
1,3,5-Trimethylbenzene		N/A	(<4)			(a)		

(1) T - Transformed; N - Normal; NP - Non-parametric; <4 - sample size too small to calculate 95% UCL
(2) Statistics: Maximum Detected Value (Max); 95% UCL of Transformed Data (95% UCL - T); 95% of Normal Data (95% UCL - N); 95% of Non-parametric Data (95% UCL - NP).
(3) Rationale

(a) Due to small sample size (<4), the maximum detected concentration is used.
(b) Shapiro-Wilk W Test indicates data are normally distributed.
(c) Shapiro-Wilk W Test indicates data are log-normally distributed.
(d) Shapiro-Wilk W Test indicates data are neither normally nor log-normally distributed.
(e) Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used for EPC.
(f) Due to high standard deviation, the maximum concentration is used.

From File

Summary Statistics for	Naphthalene
Number of Samples	9
Minimum	29
Maximum	12000
Mean	2441.555556
Median	201
Standard Deviation	4072.045865
Variance	16581557.53
Coefficient of Variation	1.667807991
Skewness	2.006735929

95 % UCL (Assuming Normal Data)

Student's-t	4965.61051

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	5644.349614
Modified-t	5116.934968

95 % Non-parametric UCL

CLT	4674.19536
Jackknife	4965.61051
Standard Bootstrap	4586.800598
Bootstrap-t	11228.45132
Chebyshev (Mean, Std)	8358.101029

99 % Non-parametric UCL

Chebyshev (Mean, Std)	15947.00382

Summary Statistics for	ln(Naphthalene)
Minimum	3.36729583
Maximum	9.392661929
Mean	6.02787853
Standard Deviation	2.258686066
Variance	5.101662743
Shapiro-Wilk Test Statisitic	0.915986483
Shapiro-Wilk 5% Critical Value	0.829

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution

MLE Mean	5317.241336
MLE Standard Deviation	67947.36669
MLE Coefficient of Variation	12.77868774
MLE Skewness	2125.030095
MLE Median	414.8340374
MLE 80% Quantile	2797.463117
MLE 90% Quantile	7557.457663
MLE 95% Quantile	17041.67525
MLE 99% Quantile	79346.71443
MVU Estimate of Median	309.7823881
MVU Estimate of Mean	2815.228501
MVU Estimate of Std. Dev.	7730.189702
MVU Estimate of SE of Mean	2047.920303

UCL Assuming Lognormal Distribution

95% H-UCL	985807.4638
95% Chebyshev (MVUE) UCL	11741.90615
99% Chebyshev (MVUE) UCL	23191.77824

Recommended UCL to use:

99 % Chebyshev (MVUE) UCL

From File

Summary Statistics for	Vinyl chloride
Number of Samples	10
Minimum	0.95
Maximum	470
Mean	113.87
Median	11.475
Standard Deviation	180.4830989
Variance	32574.149
Coefficient of Variation	1.584992526
Skewness	1.391846579

Shapiro-Wilk Test Statisitic	0.685880358
Shapiro-Wilk 5% Critical Value	0.842

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	218.4926537

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	234.589588
Modified-t	222.6794001

95 % Non-parametric UCL

CLT	207.747993
Jackknife	218.4926537
Standard Bootstrap	204.2720316
Bootstrap-t	338.2086892
Chebyshev (Mean, Std)	362.6487835

From File

Summary Statistics for	Methylene chloride
Number of Samples	10
Minimum	2.35
Maximum	2690
Mean	378.95
Median	18.4
Standard Deviation	829.2773725
Variance	687700.9606
Coefficient of Variation	2.188355647
Skewness	2.931823772

95 % UCL (Assuming Normal Data)

Student's-t	859.6664762

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	1070.084694
Modified-t	900.1880614

95 % Non-parametric UCL

CLT	810.2972887
Jackknife	859.6664762
Standard Bootstrap	778.2455409
Bootstrap-t	2404.272486
Chebyshev (Mean, Std)	1522.029973

99 % Non-parametric UCL

Chebyshev (Mean, Std)	2988.210338

Summary Statistics for	ln(Methylene chlorid
Minimum	0.854415328
Maximum	7.897296473
Mean	3.787086172
Standard Deviation	2.363717509
Variance	5.587150461
Shapiro-Wilk Test Statisitic	0.923272985
Shapiro-Wilk 5% Critical Value	0.842

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution

MLE Mean	721.0196583
MLE Standard Deviation	11758.95424
MLE Coefficient of Variation	16.30878452
MLE Skewness	4386.679002
MLE Median	44.12763242
MLE 80% Quantile	325.1958013
MLE 90% Quantile	920.082344
MLE 95% Quantile	2154.688563
MLE 99% Quantile	10776.1765
MVU Estimate of Median	33.12190882
MVU Estimate of Mean	368.5645835
MVU Estimate of Std. Dev.	1144.472396
MVU Estimate of SE of Mean	272.3403483

UCL Assuming Lognormal Distribution

95% H-UCL	101917.8102
95% Chebyshev (MVUE) UCL	1555.66864
99% Chebyshev (MVUE) UCL	3078.316835

Recommended UCL to use:

99 % Chebyshev (MVUE) UCL

From File

Summary Statistics for	cis-1,2-Dichloroethene
Number of Samples	6
Minimum	0.95
Maximum	380
Mean	122.425
Median	26.25
Standard Deviation	170.8204196
Variance	29179.61575
Coefficient of Variation	1.395306674
Skewness	1.042296515
95 % UCL (Assuming Normal Data)	
Student's-t	262.9487094
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	268.8397657
Modified-t	267.8944185
95 % Non-parametric UCL	
CLT	237.1323948
Jackknife	262.9487094
Standard Bootstrap	226.2547046
Bootstrap-t	1519.935024
Chebyshev (Mean, Std)	426.4021645
99 % Non-parametric UCL	
Chebyshev (Mean, Std)	816.3008245

Summary Statistics for	ln(cis-1,2-Dichloroethene)
Minimum	-0.051293294
Maximum	5.940171253
Mean	3.031668459
Standard Deviation	2.603444608
Variance	6.777923827
Shapiro-Wilk Test Statisitic	0.879302699
Shapiro-Wilk 5% Critical Value	0.788
Data are Lognormal at 5% Significance Level	
Estimates Assuming Lognormal Distribution	
MLE Mean	614.3902866
MLE Standard Deviation	18197.19323
MLE Coefficient of Variation	29.61829577
MLE Skewness	26071.31069
MLE Median	20.73179389
MLE 80% Quantile	187.0880109
MLE 90% Quantile	588.216325
MLE 95% Quantile	1501.672609
MLE 99% Quantile	8842.108248
MVU Estimate of Median	11.15219369
MVU Estimate of Mean	181.6665511
MVU Estimate of Std. Dev.	451.0214832
MVU Estimate of SE of Mean	151.379115
UCL Assuming Lognormal Distribution	
95% H-UCL	112423828.8
95% Chebyshev (MVUE) UCL	841.5128155
99% Chebyshev (MVUE) UCL	1687.869728
Recommended UCL to use:	
Greater of	

From File

Summary Statistics for	Trichloroethene
Number of Samples	10
Minimum	0.95
Maximum	740
Mean	138.92
Median	11.55
Standard Deviation	256.3298214
Variance	65704.97733
Coefficient of Variation	1.845161398
Skewness	1.959007839

Shapiro-Wilk Test Statisitic	0.625509723
Shapiro-Wilk 5% Critical Value	0.842

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)	
Student's-t	287.5095704
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	325.9052259
Modified-t	295.8787725
95 % Non-parametric UCL	
CLT	272.2495434
Jackknife	287.5095704
Standard Bootstrap	263.7083674
Bootstrap-t	964.7122058
Chebyshev (Mean, Std)	492.2462755

Summary Statistics for	Xylenes (total)
Number of Samples	10
Minimum	1.35
Maximum	3330
Mean	637.935
Median	75
Standard Deviation	1064.219988
Variance	1132564.182
Coefficient of Variation	1.668226367
Skewness	2.148089987

95 % UCL (Assuming Normal Data)

Student's-t	1254.843286

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	1435.754029
Modified-t	1292.943958

95 % Non-parametric UCL

CLT	1191.487311
Jackknife	1254.843286
Standard Bootstrap	1174.850045
Bootstrap-t	2187.694901
Chebyshev (Mean, Std)	2104.861019

99 % Non-parametric UCL

Chebyshev (Mean, Std)	3986.425019

Summary Statistics for	ln(Xylenes (total))
Minimum	0.300104593
Maximum	8.110727583
Mean	4.248447543
Standard Deviation	2.875826161
Variance	8.270376109
Shapiro-Wilk Test Statisitic	0.921891742
Shapiro-Wilk 5% Critical Value	0.842

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution

MLE Mean	4374.88537
MLE Standard Deviation	273401.2132
MLE Coefficient of Variation	62.49334327
MLE Skewness	244250.1048
MLE Median	69.99666114
MLE 80% Quantile	795.1419475
MLE 90% Quantile	2818.28595
MLE 95% Quantile	7936.134349
MLE 99% Quantile	56253.25548
MVU Estimate of Median	45.50873937
MVU Estimate of Mean	1360.94832
MVU Estimate of Std. Dev.	5571.202491
MVU Estimate of SE of Mean	1135.860566

UCL Assuming Lognormal Distribution

95% H-UCL	6104918.03
95% Chebyshev (MVUE) UCL	6312.04974
99% Chebyshev (MVUE) UCL	12662.61825

Recommended UCL to use:
Greater of
99 % Chebyshev (MVUE) UCL
99 % Chebyshev (Mean, Std)

Summary Statistics for	2-Methylnaphthalene
Number of Samples	9
Minimum	29
Maximum	20000
Mean	4429.555556
Median	201
Standard Deviation	7024.558244
Variance	49344418.53
Coefficient of Variation	1.585838163
Skewness	1.653078992

95 % UCL (Assuming Normal Data)	
Student's-t	8783.723368

95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	9659.651162
Modified-t	8998.763176

95 % Non-parametric UCL	
CLT	8281.01226
Jackknife	8783.723368
Standard Bootstrap	8065.234415
Bootstrap-t	12893.18116
Chebyshev (Mean, Std)	14636.00206

99 % Non-parametric UCL	
Chebyshev (Mean, Std)	27727.37957

Summary Statistics for	ln(2-Methylnaphthalene)
Minimum	3.36729583
Maximum	9.903487553
Mean	6.4538974
Standard Deviation	2.378569868
Variance	5.657594617
Shapiro-Wilk Test Statisitic	0.89834202
Shapiro-Wilk 5% Critical Value	0.829

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution	
MLE Mean	10750.36201
MLE Standard Deviation	181633.0117
MLE Coefficient of Variation	16.89552515
MLE Skewness	4873.662404
MLE Median	635.1729982
MLE 80% Quantile	4739.983522
MLE 90% Quantile	13498.84871
MLE 95% Quantile	31781.66508
MLE 99% Quantile	160564.4844
MVU Estimate of Median	458.9542382
MVU Estimate of Mean	5157.356387
MVU Estimate of Std. Dev.	15118.65514
MVU Estimate of SE of Mean	3887.411476

UCL Assuming Lognormal Distribution	
95% H-UCL	3453328.04
95% Chebyshev (MVUE) UCL	22102.19016
99% Chebyshev (MVUE) UCL	43836.61221

Recommended UCL to use:
99 % Chebyshev (MVUE) UCL

Summary Statistics for	2,4,6-Trichlorophenol
Number of Samples	9
Minimum	70
Maximum	3250
Mean	702.8333333
Median	196
Standard Deviation	1045.107411
Variance	1092249.5
Coefficient of Variation	1.48699181
Skewness	2.238236761

95 % UCL (Assuming Normal Data)	
Student's-t	1350.642475
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	1553.568101
Modified-t	1393.960953
95 % Non-parametric UCL	
CLT	1275.849572
Jackknife	1350.642475
Standard Bootstrap	1251.607516
Bootstrap-t	3407.302526
Chebyshev (Mean, Std)	2221.339196

Summary Statistics for	ln(2,4,6-Trichlorophenol)
Minimum	4.248495242
Maximum	8.086410275
Mean	5.787227799
Standard Deviation	1.236079151
Variance	1.527891668
Shapiro-Wilk Test Statisitic	0.88111642
Shapiro-Wilk 5% Critical Value	0.829
Data are Lognormal at 5% Significance Level	

Estimates Assuming Lognormal Distribution	
MLE Mean	700.0653115
MLE Standard Deviation	1329.838588
MLE Coefficient of Variation	1.899592175
MLE Skewness	12.55336073
MLE Median	326.1077338
MLE 80% Quantile	926.778581
MLE 90% Quantile	1596.532722
MLE 95% Quantile	2491.344996
MLE 99% Quantile	5781.092194
MVU Estimate of Median	299.3491139
MVU Estimate of Mean	617.7265764
MVU Estimate of Std. Dev.	827.6495048
MVU Estimate of SE of Mean	264.351828

UCL Assuming Lognormal Distribution	
95% H-UCL	3793.279544
95% Chebyshev (MVUE) UCL	1770.00948
99% Chebyshev (MVUE) UCL	3247.994055

Recommended UCL to use:
95 % Chebyshev (MVUE) UCL

Summary Statistics for	Acenaphthylene
Number of Samples	9
Minimum	1.45
Maximum	1100
Mean	225.8277778
Median	179
Standard Deviation	338.708934
Variance	114723.7419
Coefficient of Variation	1.499855055
Skewness	2.632539845

95 % UCL (Assuming Normal Data)	
Student's-t	435.776288
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	517.3985082
Modified-t	452.2885984
95 % Non-parametric UCL	
CLT	411.5366507
Jackknife	435.776288
Standard Bootstrap	399.4531784
Bootstrap-t	767.342031
Chebyshev (Mean, Std)	717.9604492
99 % Non-parametric UCL	
Chebyshev (Mean, Std)	1349.198225

Summary Statistics for	ln(Acenaphthylene)
Minimum	0.371563556
Maximum	7.003065459
Mean	4.238411888
Standard Deviation	2.076447883
Variance	4.31163581
Shapiro-Wilk Test Statisitic	0.879416588
Shapiro-Wilk 5% Critical Value	0.829

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution	
MLE Mean	598.3822673
MLE Standard Deviation	5132.235059
MLE Coefficient of Variation	8.576850183
MLE Skewness	656.6638833
MLE Median	69.29771187
MLE 80% Quantile	400.6187988
MLE 90% Quantile	998.8927517
MLE 95% Quantile	2109.420734
MLE 99% Quantile	8675.252084
MVU Estimate of Median	54.20707419
MVU Estimate of Mean	361.7269974
MVU Estimate of Std. Dev.	894.2794704
MVU Estimate of SE of Mean	247.2946027

UCL Assuming Lognormal Distribution	
95% H-UCL	50823.26534
95% Chebyshev (MVUE) UCL	1439.65918
99% Chebyshev (MVUE) UCL	2822.277227

Recommended UCL to use:

99 % Chebyshev (MVUE) UCL

Summary Statistics for	Phenanthrene
Number of Samples	9
Minimum	39
Maximum	4700
Mean	1824.333333
Median	1300
Standard Deviation	1779.884758
Variance	3167989.75
Coefficient of Variation	0.975635716
Skewness	0.690543552

Shapiro-Wilk Test Statisitic	0.874249406
Shapiro-Wilk 5% Critical Value	0.829
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t

95 % UCL (Assuming Normal Data)

Student's-t	2927.593731

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	2946.138664
Modified-t	2950.354619

95 % Non-parametric UCL

CLT	2800.216634
Jackknife	2927.593731
Standard Bootstrap	2750.671597
Bootstrap-t	3236.509929
Chebyshev (Mean, Std)	4410.44593

Summary Statistics for	Benzo(a)Anthracene
Number of Samples	9
Minimum	39
Maximum	1800
Mean	850.2222222
Median	970
Standard Deviation	591.1454512
Variance	349452.9444
Coefficient of Variation	0.695283463
Skewness	0.078614972
Shapiro-Wilk Test Statisitic	0.95297993
Shapiro-Wilk 5% Critical Value	0.829
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t
95 % UCL (Assuming Normal Data)	
Student's-t	1216.643342
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	1179.855574
Modified-t	1217.503951
95 % Non-parametric UCL	
CLT	1174.338136
Jackknife	1216.643342
Standard Bootstrap	1153.196036
Bootstrap-t	1228.415576
Chebyshev (Mean, Std)	1709.13665

From File

Summary Statistics for	Bis(2-ethylhexyl) phthalate
Number of Samples	9
Minimum	201
Maximum	440000
Mean	72025.94444
Median	5.50E+02
Standard Deviation	152860.9388
Variance	2.34E+10
Coefficient of Variation	2.122303845
Skewness	2.224079244
Shapiro-Wilk Test Statisitic	0.563663831
Shapiro-Wilk 5% Critical Value	0.829
Data not Normal at 5% Significance Level	
Data not Lognormal: Try Non-parametric UCL	
95 % UCL (Assuming Normal Data)	
Student's-t	166776.6969
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	196200.3502
Modified-t	173072.5273
95 % Non-parametric UCL	
CLT	155837.2344
Jackknife	166776.6969
Standard Bootstrap	152179.5061
Bootstrap-t	8532505.504
Chebyshev (Mean, Std)	294127.7394

Summary Statistics for	Benzo(b)Fluoranthene
Number of Samples	9
Minimum	78
Maximum	1800
Mean	1072.666667
Median	1300
Standard Deviation	677.4671579
Variance	458961.75
Coefficient of Variation	0.631572863
Skewness	-0.46658225
Shapiro-Wilk Test Statisitic	0.873458238
Shapiro-Wilk 5% Critical Value	0.829
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t
95 % UCL (Assuming Normal Data)	
Student's-t	1492.594239
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	1406.583529
Modified-t	1486.740644
95 % Non-parametric UCL	
CLT	1444.111437
Jackknife	1492.594239
Standard Bootstrap	1421.524259
Bootstrap-t	1467.476749
Chebyshev (Mean, Std)	2057.003626

Summary Statistics for	Benzo(k)Fluoranthene
Number of Samples	9
Minimum	39
Maximum	1800
Mean	620.5555556
Median	290
Standard Deviation	588.0138415
Variance	345760.2778
Coefficient of Variation	0.947560353
Skewness	1.22653964
Shapiro-Wilk Test Statisitic	0.852586302
Shapiro-Wilk 5% Critical Value	0.829
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t
95 % UCL (Assuming Normal Data)	
Student's-t	985.0355489
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	1028.580729
Modified-t	998.3915171
95 % Non-parametric UCL	
CLT	942.9544557
Jackknife	985.0355489
Standard Bootstrap	925.6698191
Bootstrap-t	1299.326572
Chebyshev (Mean, Std)	1474.91986

Summary Statistics for	Benzo(a)Pyrene
Number of Samples	9
Minimum	39
Maximum	1800
Mean	866.7777778
Median	850
Standard Deviation	587.5233565
Variance	345183.6944
Coefficient of Variation	0.677824665
Skewness	-0.001160073

Shapiro-Wilk Test Statisitic	0.951171879
Shapiro-Wilk 5% Critical Value	0.829
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t

95 % UCL (Assuming Normal Data)

Student's-t	1230.953744

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	1188.826834
Modified-t	1230.941123

95 % Non-parametric UCL

CLT	1188.907753
Jackknife	1230.953744
Standard Bootstrap	1174.337625
Bootstrap-t	1236.770333
Chebyshev (Mean, Std)	1720.429424

Summary Statistics for	Indeno(1,2,3-cd)pyrene
Number of Samples	9
Minimum	78
Maximum	1300
Mean	624.2222222
Median	710
Standard Deviation	396.8642015
Variance	157501.1944
Coefficient of Variation	0.635773908
Skewness	0.232362221
Shapiro-Wilk Test Statisitic	0.96360914
Shapiro-Wilk 5% Critical Value	0.829
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t
95 % UCL (Assuming Normal Data)	
Student's-t	870.2182368
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	852.7649956
Modified-t	871.9259451
95 % Non-parametric UCL	
CLT	841.8167294
Jackknife	870.2182368
Standard Bootstrap	830.7499855
Bootstrap-t	878.8139955
Chebyshev (Mean, Std)	1200.852538

Summary Statistics for	Dibenz(a,h) anthracene
Number of Samples	9
Minimum	56
Maximum	300
Mean	184.8888889
Median	190
Standard Deviation	76.78125495
Variance	5895.361111
Coefficient of Variation	0.41528323
Skewness	0.018642219
Shapiro-Wilk Test Statisitic	0.955905492
Shapiro-Wilk 5% Critical Value	0.829
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t
95 % UCL (Assuming Normal Data)	
Student's-t	232.4816993
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	227.1568022
Modified-t	232.5082062
95 % Non-parametric UCL	
CLT	226.9868641
Jackknife	232.4816993
Standard Bootstrap	225.5835068
Bootstrap-t	232.5610166
Chebyshev (Mean, Std)	296.4494659

Summary Statistics for	Antimony
Number of Samples	7
Minimum	425
Maximum	10000
Mean	4416.428571
Median	4200
Standard Deviation	2834.984883
Variance	8037139.286
Coefficient of Variation	0.641917974
Skewness	1.121457936
Shapiro-Wilk Test Statisitic	0.823641654
Shapiro-Wilk 5% Critical Value	0.803
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t
95 % UCL (Assuming Normal Data)	
Student's-t	6498.591296
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	6664.234501
Modified-t	6574.289303
95 % Non-parametric UCL	
CLT	6178.927998
Jackknife	6498.591296
Standard Bootstrap	6057.256587
Bootstrap-t	7403.137329
Chebyshev (Mean, Std)	9087.091517

Summary Statistics for	Arsenic
Number of Samples	7
Minimum	1600
Maximum	32000
Mean	10412.85714
Median	5500
Standard Deviation	11787.76868
Variance	138951490.5
Coefficient of Variation	1.132039796
Skewness	1.409029652

95 % UCL (Assuming Normal Data)	
Student's-t	19070.41743

95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	20276.59631
Modified-t	19465.87733

95 % Non-parametric UCL	
CLT	17741.26855
Jackknife	19070.41743
Standard Bootstrap	17388.96236
Bootstrap-t	59022.349
Chebyshev (Mean, Std)	29833.31145

Summary Statistics for	ln(Arsenic)
Minimum	7.377758908
Maximum	10.37349118
Mean	8.717145188
Standard Deviation	1.100695814
Variance	1.211531275
Shapiro-Wilk Test Statisitic	0.922639727
Shapiro-Wilk 5% Critical Value	0.803

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution	
MLE Mean	11191.51102
MLE Standard Deviation	17187.71149
MLE Coefficient of Variation	1.535781134
MLE Skewness	8.229673173
MLE Median	6106.720639
MLE 80% Quantile	15478.90101
MLE 90% Quantile	25123.00674
MLE 95% Quantile	37338.85684
MLE 99% Quantile	79012.68205
MVU Estimate of Median	5595.113476
MVU Estimate of Mean	9963.34757
MVU Estimate of Std. Dev.	11220.22645
MVU Estimate of SE of Mean	4148.220536

UCL Assuming Lognormal Distribution	
95% H-UCL	67093.94666
95% Chebyshev (MVUE) UCL	28045.02168
99% Chebyshev (MVUE) UCL	51237.62077

Recommended UCL to use:

95 % Chebyshev (MVUE) UCL

Summary Statistics for	Barium
Number of Samples	7
Minimum	4800
Maximum	223000
Mean	99957.14286
Median	67400
Standard Deviation	89743.1865
Variance	8053839524
Coefficient of Variation	0.897816644
Skewness	0.490119297
Shapiro-Wilk Test Statisitic	0.886179496
Shapiro-Wilk 5% Critical Value	0.803
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t
95 % UCL (Assuming Normal Data)	
Student's-t	165869.2819
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	162464.2109
Modified-t	166916.5406
95 % Non-parametric UCL	
CLT	155750.144
Jackknife	165869.2819
Standard Bootstrap	151665.9832
Bootstrap-t	188700.3989
Chebyshev (Mean, Std)	247809.8451

Summary Statistics for	Cadmium
Number of Samples	7
Minimum	400
Maximum	8340
Mean	3609.285714
Median	2900
Standard Deviation	3322.572333
Variance	11039486.9
Coefficient of Variation	0.920562293
Skewness	0.417027298
Shapiro-Wilk Test Statisitic	0.871505985
Shapiro-Wilk 5% Critical Value	0.803
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t
95 % UCL (Assuming Normal Data)	
Student's-t	6049.55843
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	5886.421746
Modified-t	6082.548986
95 % Non-parametric UCL	
CLT	5674.916423
Jackknife	6049.55843
Standard Bootstrap	5509.820452
Bootstrap-t	6545.147612
Chebyshev (Mean, Std)	9083.253343

Summary Statistics for	Lead
Number of Samples	7
Minimum	3170
Maximum	1040000
Mean	300652.8571
Median	179000
Standard Deviation	375270.9389
Variance	1.41E+11
Coefficient of Variation	1.248186837
Skewness	1.478316663

Shapiro-Wilk Test Statisitic	0.825301932
Shapiro-Wilk 5% Critical Value	0.803
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t

95 % UCL (Assuming Normal Data)	
Student's-t	576271.6673

95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	618640.1031
Modified-t	589480.4598

95 % Non-parametric UCL	
CLT	533957.3868
Jackknife	576271.6673
Standard Bootstrap	519437.4196
Bootstrap-t	787474.8588
Chebyshev (Mean, Std)	918915.0846

Summary Statistics for	Manganese
Number of Samples	7
Minimum	32000
Maximum	325000
Mean	171057.1429
Median	158000
Standard Deviation	109336.8931
Variance	1.20E+10
Coefficient of Variation	0.639183441
Skewness	0.217818427

Shapiro-Wilk Test Statisitic	0.926041848
Shapiro-Wilk 5% Critical Value	0.803
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t

95 % UCL (Assuming Normal Data)

Student's-t	251359.9355

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	242666.8066
Modified-t	251926.9733

95 % Non-parametric UCL

CLT	239031.4776
Jackknife	251359.9355
Standard Bootstrap	234209.2849
Bootstrap-t	262368.1339
Chebyshev (Mean, Std)	351190.6519

Summary Statistics for	Mercury
Number of Samples	7
Minimum	40
Maximum	12000
Mean	2436.285714
Median	289
Standard Deviation	4486.755127
Variance	20130971.57
Coefficient of Variation	1.841637498
Skewness	2.121763036

95 % UCL (Assuming Normal Data)

Student's-t	5731.5958

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	6678.838414
Modified-t	5958.258447

95 % Non-parametric UCL

CLT	5225.684483
Jackknife	5731.5958
Standard Bootstrap	4982.461142
Bootstrap-t	91646.18177
Chebyshev (Mean, Std)	9828.254907

99 % Non-parametric UCL

Chebyshev (Mean, Std)	19309.62134

Summary Statistics for	ln(Mercury)
Minimum	3.688879454
Maximum	9.392661929
Mean	5.938528337
Standard Deviation	2.161854646
Variance	4.67361551
Shapiro-Wilk Test Statisitic	0.890524887
Shapiro-Wilk 5% Critical Value	0.803

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution

MLE Mean	3925.841854
MLE Standard Deviation	40435.06715
MLE Coefficient of Variation	10.2997188
MLE Skewness	1123.536662
MLE Median	379.3762047
MLE 80% Quantile	2357.355015
MLE 90% Quantile	6102.85246
MLE 95% Quantile	13290.16052
MLE 99% Quantile	57930.6708
MVU Estimate of Median	267.5680164
MVU Estimate of Mean	2007.094233
MVU Estimate of Std. Dev.	4556.591405
MVU Estimate of SE of Mean	1474.322354

UCL Assuming Lognormal Distribution

95% H-UCL	2379903.904
95% Chebyshev (MVUE) UCL	8433.516385
99% Chebyshev (MVUE) UCL	16676.41644

Recommended UCL to use:

99 % Chebyshev (MVUE) UCL

Summary Statistics for	Thallium
Number of Samples	7
Minimum	65
Maximum	80
Mean	75
Median	75
Standard Deviation	5.773502692
Variance	33.33333333
Coefficient of Variation	0.076980036
Skewness	-0.909326674
Shapiro-Wilk Test Statisitic	0.855562805
Shapiro-Wilk 5% Critical Value	0.803
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t
95 % UCL (Assuming Normal Data)	
Student's-t	79.2403655
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	77.78797902
Modified-t	79.1153655
95 % Non-parametric UCL	
CLT	78.58936488
Jackknife	79.2403655
Standard Bootstrap	78.32091935
Bootstrap-t	78.38061702
Chebyshev (Mean, Std)	84.51189731

From File

Summary Statistics for	alpha-Chlordane
Number of Samples	7
Minimum	9.7
Maximum	417000
Mean	61991.62857
Median	3.68E+01
Standard Deviation	156628.4088
Variance	2.45E+10
Coefficient of Variation	2.526605807
Skewness	2.63984664

95 % UCL (Assuming Normal Data)

Student's-t	177027.8096

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	222481.7783
Modified-t	186872.452

95 % Non-parametric UCL

CLT	159366.9205
Jackknife	177027.8096
Standard Bootstrap	154310.828
Bootstrap-t	9317076.098
Chebyshev (Mean, Std)	320038.3326

Summary Statistics for	ln(alpha-Chlordane)
Minimum	2.272125886
Maximum	12.9408415
Mean	5.906041998
Standard Deviation	4.248225936
Variance	18.0474236
Shapiro-Wilk Test Statisitic	0.840572527
Shapiro-Wilk 5% Critical Value	0.803

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution

MLE Mean	3047261.267
MLE Standard Deviation	2.53E+10
MLE Coefficient of Variation	8297.518682
MLE Skewness	5.71E+11
MLE Median	367.2496998
MLE 80% Quantile	13303.63937
MLE 90% Quantile	86250.60295
MLE 95% Quantile	398066.2241
MLE 99% Quantile	7184349.411
MVU Estimate of Median	72.21858253
MVU Estimate of Mean	50630.01248
MVU Estimate of Std. Dev.	235821.5997
MVU Estimate of SE of Mean	48922.30352

UCL Assuming Lognormal Distribution

95% H-UCL	1.04E+17
95% Chebyshev (MVUE) UCL	263877.3896
99% Chebyshev (MVUE) UCL	537400.7864

Recommended UCL to use:

Needs further investigation.

From File

Summary Statistics for	4,4'-DDE
Number of Samples	7
Minimum	1.9
Maximum	118000
Mean	17857.55
Median	53.5
Standard Deviation	44229.24781
Variance	1956226362
Coefficient of Variation	2.476781407
Skewness	2.628501848

95 % UCL (Assuming Normal Data)

Student's-t	50341.84707

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	63100.69609
Modified-t	53109.86277

95 % Non-parametric UCL

CLT	45354.70683
Jackknife	50341.84707
Standard Bootstrap	43116.88673
Bootstrap-t	10998864.74
Chebyshev (Mean, Std)	90725.63127

Summary Statistics for	ln(4,4'-DDE)
Minimum	0.641853886
Maximum	11.6784399
Mean	4.534789613
Standard Deviation	4.379496162
Variance	19.17998663
Shapiro-Wilk Test Statisitic	0.867183197
Shapiro-Wilk 5% Critical Value	0.803

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution

MLE Mean	1362433.406
MLE Standard Deviation	1.99E+10
MLE Coefficient of Variation	14617.77178
MLE Skewness	3.12E+12
MLE Median	93.20390438
MLE 80% Quantile	3772.389389
MLE 90% Quantile	25911.50042
MLE 95% Quantile	125374.5328
MLE 99% Quantile	2474373.239
MVU Estimate of Median	15.88618016
MVU Estimate of Mean	16140.96737
MVU Estimate of Std. Dev.	77734.5037
MVU Estimate of SE of Mean	15670.18365

UCL Assuming Lognormal Distribution

95% H-UCL	2.10E+17
95% Chebyshev (MVUE) UCL	84445.71431
99% Chebyshev (MVUE) UCL	172057.326

Recommended UCL to use:

Needs further investigation.

Summary Statistics for	Aroclor 1242
Number of Samples	7
Minimum	18
Maximum	38.5
Mean	24.35714286
Median	20
Standard Deviation	7.481723764
Variance	55.97619048
Coefficient of Variation	0.307167545
Skewness	1.287271274

Shapiro-Wilk Test Statisitic	0.831163659
Shapiro-Wilk 5% Critical Value	0.803
Data are Normal at 5% Significance Level	
Recommended UCL to use	Student's-t

95 % UCL (Assuming Normal Data)

Student's-t	29.85211619

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	30.47862687
Modified-t	30.08142591

95 % Non-parametric UCL

CLT	29.00850235
Jackknife	29.85211619
Standard Bootstrap	28.65506239
Bootstrap-t	32.81598445
Chebyshev (Mean, Std)	36.68334966

From File

Summary Statistics for	Aroclor 1248
Number of Samples	7
Minimum	18
Maximum	977000
Mean	139591.7143
Median	2.00E+01
Standard Deviation	369262.345
Variance	1.36E+11
Coefficient of Variation	2.645302745
Skewness	2.645751309

Shapiro-Wilk Test Statisitic	0.453268992
Shapiro-Wilk 5% Critical Value	0.803

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	410797.4956

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	5.18E+05
Modified-t	434058.8369

95 % Non-parametric UCL

CLT	369160.7238
Jackknife	410797.4956
Standard Bootstrap	352919.4011
Bootstrap-t	1.65E+10
Chebyshev (Mean, Std)	747954.7297

From File

Summary Statistics for	Aroclor 1254
Number of Samples	7
Minimum	19.5
Maximum	535000
Mean	76677.57143
Median	3.85E+01
Standard Deviation	202101.8319
Variance	4.08E+10
Coefficient of Variation	2.635735955
Skewness	2.645716294

Shapiro-Wilk Test Statisitic	0.454935791
Shapiro-Wilk 5% Critical Value	0.803

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)	
Student's-t	225111.8377
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	283943.3889
Modified-t	237842.8879
95 % Non-parametric UCL	
CLT	202323.5194
Jackknife	225111.8377
Standard Bootstrap	193787.3031
Bootstrap-t	201792997.2
Chebyshev (Mean, Std)	409642.1468

From File

Summary Statistics for	Aroclor 1260
Number of Samples	7
Minimum	18
Maximum	295000
Mean	43250.78571
Median	2.85E+01
Standard Deviation	111046.5767
Variance	1.23E+10
Coefficient of Variation	2.567504262
Skewness	2.642230097

Shapiro-Wilk Test Statisitic	0.46841306
Shapiro-Wilk 5% Critical Value	0.803

Data not Normal at 5% Significance Level
Data not Lognormal: Try Non-parametric UCL

95 % UCL (Assuming Normal Data)

Student's-t	124809.2603

95 % UCL (Adjusted for Skewness)

Adjusted-CLT	157075.6649
Modified-t	131795.2272

95 % Non-parametric UCL

CLT	112288.0243
Jackknife	124809.2603
Standard Bootstrap	107584.1792
Bootstrap-t	177576767.4
Chebyshev (Mean, Std)	226201.0138

From File

Summary Statistics for	4,4'-DDT
Number of Samples	7
Minimum	1.8
Maximum	290000
Mean	44155.675
Median	6.87E+01
Standard Deviation	108599.9443
Variance	1.18E+10
Coefficient of Variation	2.459478749
Skewness	2.626587

95 % UCL (Assuming Normal Data)	
Student's-t	123917.2135

95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	155213.3896
Modified-t	130708.8136

95 % Non-parametric UCL	
CLT	111671.8515
Jackknife	123917.2135
Standard Bootstrap	106028.8363
Bootstrap-t	9084028.993
Chebyshev (Mean, Std)	223075.0544

Summary Statistics for	ln(4,4'-DDT)
Minimum	0.587786665
Maximum	12.5776362
Mean	5.293616896
Standard Deviation	4.704593297
Variance	22.13319809
Shapiro-Wilk Test Statisitic	0.907618535
Shapiro-Wilk 5% Critical Value	0.803

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution	
MLE Mean	12739474.3
MLE Standard Deviation	8.15E+11
MLE Coefficient of Variation	63997.48389
MLE Skewness	2.62E+14
MLE Median	199.0621119
MLE 80% Quantile	10604.1237
MLE 90% Quantile	84037.57365
MLE 95% Quantile	457107.0421
MLE 99% Quantile	11257002.15
MVU Estimate of Median	22.16130314
MVU Estimate of Mean	61117.15777
MVU Estimate of Std. Dev.	318555.1456
MVU Estimate of SE of Mean	59881.0026

UCL Assuming Lognormal Distribution	
95% H-UCL	1.01E+20
95% Chebyshev (MVUE) UCL	322132.3967
99% Chebyshev (MVUE) UCL	656925.6109

Recommended UCL to use:

Needs further investigation.

From File

Summary Statistics for	gamma-Chlordane
Number of Samples	7
Minimum	8.55
Maximum	299000
Mean	45419.79286
Median	7.85E+01
Standard Deviation	111991.4763
Variance	1.25E+10
Coefficient of Variation	2.465697645
Skewness	2.629024665

95 % UCL (Assuming Normal Data)	
Student's-t	127672.2517

95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	159987.4664
Modified-t	134682.4506

95 % Non-parametric UCL	
CLT	115044.472
Jackknife	127672.2517
Standard Bootstrap	109368.8627
Bootstrap-t	5921733.612
Chebyshev (Mean, Std)	229926.7515

Summary Statistics for	ln(gamma-Chlordane)
Minimum	2.145931283
Maximum	12.60819885
Mean	6.113124986
Standard Deviation	3.935506842
Variance	15.48821411
Shapiro-Wilk Test Statisitic	0.898319685
Shapiro-Wilk 5% Critical Value	0.803

Data are Lognormal at 5% Significance Level

Estimates Assuming Lognormal Distribution	
MLE Mean	1042604.053
MLE Standard Deviation	2.41E+09
MLE Coefficient of Variation	2307.931526
MLE Skewness	1.23E+10
MLE Median	451.7482186
MLE 80% Quantile	12564.46999
MLE 90% Quantile	70986.94589
MLE 95% Quantile	292738.1322
MLE 99% Quantile	4269955.234
MVU Estimate of Median	119.2212489
MVU Estimate of Mean	36466.46567
MVU Estimate of Std. Dev.	156254.7372
MVU Estimate of SE of Mean	34738.35468

UCL Assuming Lognormal Distribution	
95% H-UCL	1.17E+15
95% Chebyshev (MVUE) UCL	187887.4432
99% Chebyshev (MVUE) UCL	382108.7306

Recommended UCL to use:

Needs further investigation.

C.8-2.3 Surface Soil Current/Future Murphy Summary Table

Chemical of Potential Concern	Max. Conc.	95% UCL (Distribution) (1)		Value	Statistic (2)	Rationale (3)	Description	Mean
1,2,4-Trimethylbenzene	45000	10591.83195	(NP)	10591.83195	95% UCL-NP	(d)	Chebyshev (Mean, Std)	2083.7391
1,3,5-Trimethylbenzene	19000	4522.45024	(NP)	4522.45024	95% UCL-NP	(d)	Chebyshev (Mean, Std)	933.73913
Naphthalene	27000	3690.995248	(NP)	3690.995248	95% UCL-NP	(d)	Chebyshev (Mean, Std)	1244.4394
Vinyl chloride	1300	299.7441316	(NP)	299.7441316	95% UCL-NP	(d)	Bootstrap-t	158.20875
Methylene chloride	20761	2724.301938	(NP)	2724.301938	95% UCL-NP	(d)	Chebyshev (Mean, Std)	665.70455
cis-1,2-Dichloroethene	10000	2249.262034	(NP)	2249.262034	95% UCL-NP	(d)	Chebyshev (Mean, Std)	436.09792
Trichloroethene	2076	281.5402178	(NP)	281.5402178	95% UCL-NP	(d)	Chebyshev (Mean, Std)	94.698276
Xylenes (total)	48000	4102.810229	(NP)	4102.810229	95% UCL-NP	(d)	Chebyshev (Mean, Std)	999.12391
2-Methylnaphthalene	2200	1074.794675	(NP)	1074.794675	95% UCL-NP	(d)	Bootstrap-t	605.5
2,4,6-Trichlorophenol	4681.5	5004.727934	(NP)	4681.5	Max	(d & e)	Chebyshev (Mean, Std)	1083.4
Acenaphthylene	8500	1596.17112	(NP)	1596.17112	95% UCL-NP	(d)	Bootstrap-t	804.06731
Phenanthrene	9000	1774.713065	(NP)	1774.713065	95% UCL-NP	(d)	Bootstrap-t	1042.4071
Benzo(a)Anthracene	8500	1477.761045	(NP)	1477.761045	95% UCL-NP	(d)	Bootstrap-t	836.83795
Bis(2-ethylhexyl) phthalate	33000	11686.97791	(NP)	11686.97791	95% UCL-NP	(d)	Chebyshev (Mean, Std)	2824.3125
Benzo(b)Fluoranthene	8500	1486.006713	(NP)	1486.006713	95% UCL-NP	(d)	Bootstrap-t	855.53384
Benzo(k)Fluoranthene	8500	1820.912603	(NP)	1820.912603	95% UCL-NP	(d)	Bootstrap-t	730.62061
Benzo(a)Pyrene	8500	1582.613299	(NP)	1582.613299	95% UCL-NP	(d)	Bootstrap-t	873.12295
Indeno(1,2,3-cd)pyrene	8500	1486.27772	(NP)	1486.27772	95% UCL-NP	(d)	Bootstrap-t	664.03036
Dibenz(a,h) anthracene	8500	1511.875975	(NP)	1511.875975	95% UCL-NP	(d)	Bootstrap-t	598.40192
Methylene chloride	20761	2724.301938	(NP)	2724.3019	95% UCL-NP	(d)	Chebyshev (Mean, Std)	665.70455
2,4,6-Trichlorophenol	4681.5	5004.727934	(NP)	4681.5000	Max	(d & e)	Chebyshev (Mean, Std)	1083.4
Antimony	6000	2845.941451	(NP)	2845.941451	95% UCL-NP	(d)	Bootstrap-t	2498.2292
Arsenic	9300	3976.897179	(NP)	3976.897179	95% UCL-NP	(d)	Bootstrap-t	3530.8333
Barium	980000	336231.5105	(T)	336231.5105	95% UCL-T	(d)	95% Chebyshev (MVUE) UCI	143350
Cadmium	4800	1259.508839	(NP)	1259.508839	95% UCL-NP	(d)	Bootstrap-t	911.14583
Lead	6500000	502952.7576	(T)	502952.7576	95% UCL-T	(d)	95% Chebyshev (MVUE) UCI	255619.61
Manganese	182000	183391.6143	(N)	182000	Max	(b & e)	Student's-t	119940
Mercury	330	75.46675867	(NP)	75.46675867	95% UCL-NP	(d)	Bootstrap-t	52.55
Thallium	30000	8864.447534	(NP)	8864.447534	95% UCL-NP	(d)	Bootstrap-t	6447.1875
alpha-Chlordane	129	121.0789403	(N)	121.0789403	95% UCL-N	(b)	Student's-t	49.1
gamma-Chlordane	128	122.5521153	(N)	122.5521153	95% UCL-N	(b)	Student's-t	50.25
4,4'-DDE	2.05	2.076903618	(N)	2.05	Max	(b & e)	Student's-t	1.975
4,4'-DDT	2.05	2.076903618	(N)	2.05	Max	(b & e)	Student's-t	1.975
Aroclor 1242	500	276.6986601	(NP)	276.6986601	95% UCL-NP	(d)	Bootstrap-t	143.25
Aroclor 1248	800	620.0010961	(NP)	620.0010961	95% UCL-NP	(d)	Chebyshev (Mean, Std)	139.78571
Aroclor 1254	200	195.4768361	(NP)	195.4768361	95% UCL-NP	(d)	Chebyshev (Mean, Std)	72.3125
Aroclor 1260	50	45.06718724	(NP)	45.06718724	95% UCL-NP	(d)	Bootstrap-t	32.642857
C11-C22 Aromatic	72000000	6715507.735	(NP)	6715507.735	95% UCL-NP	(d)	Bootstrap-t	3271893.5
TEQ (no 170/193/180) Humans	45000	3654.556094	(NP)	3654.556094	95% UCL-NP	(d)	Chebyshev (Mean, Std)	869.20704
C5-C8 Aliphatic	1,000	N/A	(<4)	1000	Max	(a)		1,000
C9-C10 Aromatic		N/A	(<4)			(a)		
C9-C18 Aliphatic	1,620	N/A	(<4)	1620	Max	(a)		1,620
C19-C36 Aliphatic	2,160	N/A	(<4)	2160	Max	(a)		2,160

(1) T - Transformed; N - Normal; NP - Non-parametric; <4 - sample size too small to calculate 95% UCL
(2) Statistics: Maximum Detected Value (Max); 95% UCL of Transformed Data (95% UCL - T); 95% of Normal Data (95% UCL - N); 95% of Non-parametric Data (95% UCL - NP).
(3) Rationale

(a) Due to small sample size (<4), the maximum detected concentration is used.
(b) Shapiro-Wilk W Test indicates data are normally distributed.
(c) Shapiro-Wilk W Test indicates data are log-normally distributed.
(d) Shapiro-Wilk W Test indicates data are neither normally nor log-normally distributed.
(e) Recommended UCL exceeds maximum detected concentration. Therefore, maximum concentration is used for EPC.
(f) Due to high standard deviation, the maximum concentration is used.

From File

Summary Statistics for	1,2,4-Trimethylbenzene
Number of Samples	23
Minimum	12.5
Maximum	45000
Mean	2083.73913
Median	12.5
Standard Deviation	9360.937312
Variance	87627147.36
Coefficient of Variation	4.492374873
Skewness	4.7866585
Shapiro-Wilk Test Statisitic	0.232261029
Shapiro-Wilk 5% Critical Value	0.914
Data not Normal at 5% Significance Level	
Data not Lognormal: Try Non-parametric UCL	
95 % UCL (Assuming Normal Data)	
Student's-t	5435.416285
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	7375.947004
Modified-t	5760.109113
95 % Non-parametric UCL	
CLT	5294.313068
Jackknife	5435.416285
Standard Bootstrap	5280.775472
Bootstrap-t	100603.4925
Chebyshev (Mean, Std)	10591.83195

From File

Summary Statistics for	1,3,5-Trimethylbenzene
Number of Samples	23
Minimum	12.5
Maximum	19000
Mean	933.7391304
Median	12.5
Standard Deviation	3948.44067
Variance	15590183.72
Coefficient of Variation	4.22863361
Skewness	4.756754787
Shapiro-Wilk Test Statisitic	0.248758449
Shapiro-Wilk 5% Critical Value	0.914
Data not Normal at 5% Significance Level	
Data not Lognormal: Try Non-parametric UCL	
95 % UCL (Assuming Normal Data)	
Student's-t	2347.475592
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	3160.505555
Modified-t	2483.575331
95 % Non-parametric UCL	
CLT	2287.958295
Jackknife	2347.475592
Standard Bootstrap	2262.180768
Bootstrap-t	26509.87872
Chebyshev (Mean, Std)	4522.45024

From File

Summary Statistics for	Naphthalene	
Number of Samples		52
Minimum		1.35
Maximum		27000
Mean		1244.439423
Median		165
Standard Deviation		4047.436103
Variance		16381739
Coefficient of Variation		3.252417135
Skewness		5.484261888
Lilliefors Test Statisitic		0.379372241
Lilliefors 5% Critical Value		0.122866094
Data not Normal at 5% Significance Level		
Data not Lognormal: Try Non-parametric UCL		
95 % UCL (Assuming Normal Data)		
Student's-t		2184.740484
95 % UCL (Adjusted for Skewness)		
Adjusted-CLT		2623.776183
Modified-t		2255.885354
95 % Non-parametric UCL		
CLT		2167.660236
Jackknife		2184.740484
Standard Bootstrap		2159.159647
Bootstrap-t		3800.226583
Chebyshev (Mean, Std)		3690.995248

From File

Summary Statistics for	Vinyl chloride	
Number of Samples		40
Minimum		1.1
Maximum		1300
Mean		158.20875
Median		9
Standard Deviation		344.0778048
Variance		118389.5358
Coefficient of Variation		2.174834229
Skewness		2.571264973
Shapiro-Wilk Test Statisitic		0.507681145
Shapiro-Wilk 5% Critical Value		0.94
Data not Normal at 5% Significance Level		
Data not Lognormal: Try Non-parametric UCL		
95 % UCL (Assuming Normal Data)		
Student's-t		249.8717979
95 % UCL (Adjusted for Skewness)		
Adjusted-CLT		271.3277832
Modified-t		253.5581112
95 % Non-parametric UCL		
CLT		247.6945078
Jackknife		249.8717979
Standard Bootstrap		247.2000034
Bootstrap-t		299.7441316
Chebyshev (Mean, Std)		395.3480118

From File

Summary Statistics for	Methylene chloride
Number of Samples	44
Minimum	2.5
Maximum	20761
Mean	665.7045455
Median	12.5
Standard Deviation	3132.715501
Variance	9813906.411
Coefficient of Variation	4.70586467
Skewness	6.426497566
Shapiro-Wilk Test Statisitic	0.223217872
Shapiro-Wilk 5% Critical Value	0.944
Data not Normal at 5% Significance Level	
Data not Lognormal: Try Non-parametric UCL	
95 % UCL (Assuming Normal Data)	
Student's-t	1459.631431
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	1931.430568
Modified-t	1535.890478
95 % Non-parametric UCL	
CLT	1442.527186
Jackknife	1459.631431
Standard Bootstrap	1429.236167
Bootstrap-t	5924.577366
Chebyshev (Mean, Std)	2724.301938

From File

Summary Statistics for	cis-1,2-Dichloroethene
Number of Samples	24
Minimum	1.1
Maximum	10000
Mean	436.0979167
Median	2.5
Standard Deviation	2037.820544
Variance	4152712.569
Coefficient of Variation	4.672850904
Skewness	4.893403711
Shapiro-Wilk Test Statisitic	0.222305016
Shapiro-Wilk 5% Critical Value	0.916
Data not Normal at 5% Significance Level	
Data not Lognormal: Try Non-parametric UCL	
95 % UCL (Assuming Normal Data)	
Student's-t	1149.014152
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	1564.267375
Modified-t	1218.263309
95 % Non-parametric UCL	
CLT	1120.30501
Jackknife	1149.014152
Standard Bootstrap	1092.910394
Bootstrap-t	44430.2235
Chebyshev (Mean, Std)	2249.262034

From File

Summary Statistics for	Trichloroethene	
Number of Samples		58
Minimum		1.35
Maximum		2076
Mean		94.69827586
Median		5
Standard Deviation		326.4461633
Variance		106567.0975
Coefficient of Variation		3.447223937
Skewness		4.889139085
Lilliefors Test Statisitic		0.425210364
Lilliefors 5% Critical Value		0.1163375
Data not Normal at 5% Significance Level		
Data not Lognormal: Try Non-parametric UCL		
95 % UCL (Assuming Normal Data)		
Student's-t		166.3689117
95 % UCL (Adjusted for Skewness)		
Adjusted-CLT		194.6073941
Modified-t		170.9552355
95 % Non-parametric UCL		
CLT		165.2040733
Jackknife		166.3689117
Standard Bootstrap		161.5804968
Bootstrap-t		291.289924
Chebyshev (Mean, Std)		281.5402178

From File

Summary Statistics for	Xylenes (total)	
Number of Samples		69
Minimum		0.9
Maximum		48000
Mean		999.123913
Median		5
Standard Deviation		5914.602551
Variance		34982523.34
Coefficient of Variation		5.919788801
Skewness		7.666675194
Lilliefors Test Statisitic		0.456131597
Lilliefors 5% Critical Value		0.106661866
Data not Normal at 5% Significance Level		
Data not Lognormal: Try Non-parametric UCL		
95 % UCL (Assuming Normal Data)		
Student's-t		2186.492667
95 % UCL (Adjusted for Skewness)		
Adjusted-CLT		2872.52146
Modified-t		2296.022466
95 % Non-parametric UCL		
CLT		2170.3164
Jackknife		2186.492667
Standard Bootstrap		2170.300169
Bootstrap-t		9005.874468
Chebyshev (Mean, Std)		4102.810229

From File

Summary Statistics for	2-Methylnaphthalene
Number of Samples	17
Minimum	135
Maximum	2200
Mean	605.5
Median	196
Standard Deviation	730.5795645
Variance	533746.5
Coefficient of Variation	1.206572361
Skewness	1.350185522
Shapiro-Wilk Test Statisitic	0.65424797
Shapiro-Wilk 5% Critical Value	0.892
Data not Normal at 5% Significance Level	
Data not Lognormal: Try Non-parametric UCL	
95 % UCL (Assuming Normal Data)	
Student's-t	914.8558458
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	958.9543089
Modified-t	924.52661
95 % Non-parametric UCL	
CLT	896.9541989
Jackknife	914.8558458
Standard Bootstrap	893.3752469
Bootstrap-t	1074.794675
Chebyshev (Mean, Std)	1377.860153

From File

Summary Statistics for	2,4,6-Trichlorophenol
Number of Samples	5
Minimum	135
Maximum	4681.5
Mean	1083.4
Median	201
Standard Deviation	2011.598786
Variance	4046529.675
Coefficient of Variation	1.856746156
Skewness	2.234952736
Shapiro-Wilk Test Statisitic	0.564745031
Shapiro-Wilk 5% Critical Value	0.762
Data not Normal at 5% Significance Level	
Data not Lognormal: Try Non-parametric UCL	
95 % UCL (Assuming Normal Data)	
Student's-t	3001.239142
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	3523.905401
Modified-t	3151.100082
95 % Non-parametric UCL	
CLT	2563.133887
Jackknife	3001.239142
Standard Bootstrap	2399.157225
Bootstrap-t	531196.135
Chebyshev (Mean, Std)	5004.727934

From File

Summary Statistics for	Acenaphthylene	
Number of Samples		52
Minimum		19
Maximum		8500
Mean		804.0673077
Median		165
Standard Deviation		1789.564678
Variance		3202541.736
Coefficient of Variation		2.225640392
Skewness		3.481601415
Lilliefors Test Statisitic		0.344742072
Lilliefors 5% Critical Value		0.122866094
Data not Normal at 5% Significance Level		
Data not Lognormal: Try Non-parametric UCL		
95 % UCL (Assuming Normal Data)		
Student's-t		1219.819286
95 % UCL (Adjusted for Skewness)		
Adjusted-CLT		1340.294868
Modified-t		1239.789
95 % Non-parametric UCL		
CLT		1212.267293
Jackknife		1219.819286
Standard Bootstrap		1193.321321
Bootstrap-t		1596.17112
Chebyshev (Mean, Std)		1885.806408

From File

Summary Statistics for	Phenanthrene	
Number of Samples		56
Minimum		1.3
Maximum		9000
Mean		1042.407143
Median		167.5
Standard Deviation		2123.928262
Variance		4511071.263
Coefficient of Variation		2.037522744
Skewness		2.895711697
Lilliefors Test Statisitic		0.314316789
Lilliefors 5% Critical Value		0.11839673
Data not Normal at 5% Significance Level		
Data not Lognormal: Try Non-parametric UCL		
95 % UCL (Assuming Normal Data)		
Student's-t		1517.250643
95 % UCL (Adjusted for Skewness)		
Adjusted-CLT		1626.603751
Modified-t		1535.555059
95 % Non-parametric UCL		
CLT		1509.252547
Jackknife		1517.250643
Standard Bootstrap		1519.307105
Bootstrap-t		1774.713065
Chebyshev (Mean, Std)		2279.557916

From File

Summary Statistics for	Benzo(a)Anthracene
Number of Samples	56
Minimum	0.39
Maximum	8500
Mean	836.8379464
Median	167.5
Standard Deviation	1856.059185
Variance	3444955.699
Coefficient of Variation	2.217943382
Skewness	3.175708672
Lilliefors Test Statisitic	0.352508224
Lilliefors 5% Critical Value	0.11839673
Data not Normal at 5% Significance Level	
Data not Lognormal: Try Non-parametric UCL	
95 % UCL (Assuming Normal Data)	
Student's-t	1251.794353
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	1357.27191
Modified-t	1269.336922
95 % Non-parametric UCL	
CLT	1244.804974
Jackknife	1251.794353
Standard Bootstrap	1237.838151
Bootstrap-t	1477.761045
Chebyshev (Mean, Std)	1917.959704

From File

Summary Statistics for	Bis(2-ethylhexyl) phthalate
Number of Samples	16
Minimum	135
Maximum	33000
Mean	2824.3125
Median	198.5
Standard Deviation	8132.939554
Variance	66144705.8
Coefficient of Variation	2.879617448
Skewness	3.864538903
Shapiro-Wilk Test Statisitic	0.365342179
Shapiro-Wilk 5% Critical Value	0.887
Data not Normal at 5% Significance Level	
Data not Lognormal: Try Non-parametric UCL	
95 % UCL (Assuming Normal Data)	
Student's-t	6388.675189
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	8267.65352
Modified-t	6716.071661
95 % Non-parametric UCL	
CLT	6168.686283
Jackknife	6388.675189
Standard Bootstrap	6024.959826
Bootstrap-t	35229.83271
Chebyshev (Mean, Std)	11686.97791

From File

Summary Statistics for	Benzo(b)Fluoranthene
Number of Samples	56
Minimum	0.39
Maximum	8500
Mean	855.5338393
Median	165
Standard Deviation	1853.405276
Variance	3435111.116
Coefficient of Variation	2.166372843
Skewness	3.123978708
Lilliefors Test Statisitic	0.363887685
Lilliefors 5% Critical Value	0.11839673
Data not Normal at 5% Significance Level	
Data not Lognormal: Try Non-parametric UCL	
95 % UCL (Assuming Normal Data)	
Student's-t	1269.896915
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	1373.394269
Modified-t	1287.129054
95 % Non-parametric UCL	
CLT	1262.91753
Jackknife	1269.896915
Standard Bootstrap	1262.319066
Bootstrap-t	1486.006713
Chebyshev (Mean, Std)	1935.109742

From File

Summary Statistics for	Benzo(k)Fluoranthene
Number of Samples	41
Minimum	0.39
Maximum	8500
Mean	730.6206098
Median	165
Standard Deviation	1962.113645
Variance	3849889.955
Coefficient of Variation	2.685543795
Skewness	3.461258301
Shapiro-Wilk Test Statisitic	0.408215888
Shapiro-Wilk 5% Critical Value	0.941
Data not Normal at 5% Significance Level	
Data not Lognormal: Try Non-parametric UCL	
95 % UCL (Assuming Normal Data)	
Student's-t	1246.604124
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	1411.646651
Modified-t	1274.211368
95 % Non-parametric UCL	
CLT	1234.654208
Jackknife	1246.604124
Standard Bootstrap	1230.638448
Bootstrap-t	1820.912603
Chebyshev (Mean, Std)	2066.32093

From File

Summary Statistics for	Benzo(a)Pyrene
Number of Samples	56
Minimum	0.39
Maximum	8500
Mean	873.1229464
Median	165
Standard Deviation	1928.930174
Variance	3720771.616
Coefficient of Variation	2.209230878
Skewness	3.029176575
Lilliefors Test Statisitic	0.364736263
Lilliefors 5% Critical Value	0.11839673
Data not Normal at 5% Significance Level	
Data not Lognormal: Try Non-parametric UCL	
95 % UCL (Assuming Normal Data)	
Student's-t	1304.371012
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	1408.596598
Modified-t	1321.761102
95 % Non-parametric UCL	
CLT	1297.107222
Jackknife	1304.371012
Standard Bootstrap	1307.634552
Bootstrap-t	1582.613299
Chebyshev (Mean, Std)	1996.69077

From File

Summary Statistics for	Indeno(1,2,3-cd)pyrene
Number of Samples	56
Minimum	1
Maximum	8500
Mean	664.0303571
Median	165
Standard Deviation	1701.209946
Variance	2894115.281
Coefficient of Variation	2.561946043
Skewness	3.930535744
Lilliefors Test Statisitic	0.371487713
Lilliefors 5% Critical Value	0.11839673
Data not Normal at 5% Significance Level	
Data not Lognormal: Try Non-parametric UCL	
95 % UCL (Assuming Normal Data)	
Student's-t	1044.367348
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	1165.546801
Modified-t	1064.268141
95 % Non-parametric UCL	
CLT	1037.961087
Jackknife	1044.367348
Standard Bootstrap	1027.817235
Bootstrap-t	1486.27772
Chebyshev (Mean, Std)	1654.955163

From File

Summary Statistics for	Dibenz(a,h) anthracene
Number of Samples	52
Minimum	0.6
Maximum	8500
Mean	598.4019231
Median	165
Standard Deviation	1753.669932
Variance	3075358.231
Coefficient of Variation	2.930588731
Skewness	3.977035553
Lilliefors Test Statisitic	0.439658378
Lilliefors 5% Critical Value	0.122866094
Data not Normal at 5% Significance Level	
Data not Lognormal: Try Non-parametric UCL	
95 % UCL (Assuming Normal Data)	
Student's-t	1005.814827
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	1141.726919
Modified-t	1028.168698
95 % Non-parametric UCL	
CLT	998.4143109
Jackknife	1005.814827
Standard Bootstrap	988.2235518
Bootstrap-t	1511.875975
Chebyshev (Mean, Std)	1658.443707

From File

Summary Statistics for	Antimony	
Number of Samples		48
Minimum		965
Maximum		6000
Mean		2498.229167
Median		2000
Standard Deviation		1263.173768
Variance		1595607.968
Coefficient of Variation		0.50562766
Skewness		1.347534164
Shapiro-Wilk Test Statisitic		0.760761344
Shapiro-Wilk 5% Critical Value		0.947
Data not Normal at 5% Significance Level		
Data not Lognormal: Try Non-parametric UCL		
95 % UCL (Assuming Normal Data)		
Student's-t		2804.154457
95 % UCL (Adjusted for Skewness)		
Adjusted-CLT		2836.016043
Modified-t		2810.064768
95 % Non-parametric UCL		
CLT		2798.12452
Jackknife		2804.154457
Standard Bootstrap		2788.974797
Bootstrap-t		2845.941451
Chebyshev (Mean, Std)		3292.958567

From File

Summary Statistics for	Arsenic	
Number of Samples		48
Minimum		1250
Maximum		9300
Mean		3530.833333
Median		3500
Standard Deviation		1570.236238
Variance		2465641.844
Coefficient of Variation		0.444721144
Skewness		1.535794313
Shapiro-Wilk Test Statisitic		0.852097318
Shapiro-Wilk 5% Critical Value		0.947
Data not Normal at 5% Significance Level		
Data not Lognormal: Try Non-parametric UCL		
95 % UCL (Assuming Normal Data)		
Student's-t		3911.125411
95 % UCL (Adjusted for Skewness)		
Adjusted-CLT		3957.312724
Modified-t		3919.498883
95 % Non-parametric UCL		
CLT		3903.629668
Jackknife		3911.125411
Standard Bootstrap		3892.431416
Bootstrap-t		3976.897179
Chebyshev (Mean, Std)		4518.751969

From File

Summary Statistics for	Barium
Number of Samples	16
Minimum	6100
Maximum	980000
Mean	143350
Median	70000
Standard Deviation	238737.9177
Variance	5.70E+10
Coefficient of Variation	1.665419726
Skewness	3.271193724
95 % UCL (Assuming Normal Data)	
Student's-t	247979.8845
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	293676.2895
Modified-t	256114.8634
95 % Non-parametric UCL	
CLT	241522.2325
Jackknife	247979.8845
Standard Bootstrap	238308.4545
Bootstrap-t	573253.4343
Chebyshev (Mean, Std)	403508.6143

Summary Statistics for	ln(Barium)
Minimum	8.71604405
Maximum	13.79530785
Mean	11.13019394
Standard Deviation	1.225117604
Variance	1.500913143
Shapiro-Wilk Test Statisitic	0.974298724
Shapiro-Wilk 5% Critical Value	0.887
Data are Lognormal at 5% Significance Level	
Estimates Assuming Lognormal Distribution	
MLE Mean	144444.483
MLE Standard Deviation	269681.4999
MLE Coefficient of Variation	1.86702527
MLE Skewness	12.10912143
MLE Median	68199.5974
MLE 80% Quantile	192032.1943
MLE 90% Quantile	329216.2343
MLE 95% Quantile	511709.5195
MLE 99% Quantile	1178575.998
MVU Estimate of Median	65066.17691
MVU Estimate of Mean	134212.8168
MVU Estimate of Std. Dev.	198052.7169
MVU Estimate of SE of Mean	46346.26687
UCL Assuming Lognormal Distribution	
95% H-UCL	382706.689
95% Chebyshev (MVUE) UCL	336231.5105
99% Chebyshev (MVUE) UCL	595352.3497
Recommended UCL to use:	
95 % Chebyshev (MVUE) UCL	

From File

Summary Statistics for	Cadmium	
Number of Samples		48
Minimum		130
Maximum		4800
Mean		911.1458333
Median		200
Standard Deviation		1257.794524
Variance		1582047.063
Coefficient of Variation		1.380453576
Skewness		1.534463832
Shapiro-Wilk Test Statisitic		0.637734798
Shapiro-Wilk 5% Critical Value		0.947
Data not Normal at 5% Significance Level		
Data not Lognormal: Try Non-parametric UCL		
95 % UCL (Assuming Normal Data)		
Student's-t		1215.768336
95 % UCL (Adjusted for Skewness)		
Adjusted-CLT		1252.728159
Modified-t		1222.469864
95 % Non-parametric UCL		
CLT		1209.764078
Jackknife		1215.768336
Standard Bootstrap		1197.848008
Bootstrap-t		1259.508839
Chebyshev (Mean, Std)		1702.490867

From File

Summary Statistics for	Lead	
Number of Samples		51
Minimum		1500
Maximum		6500000
Mean		255619.6078
Median		20000
Standard Deviation		967254.6951
Variance		9.36E+11
Coefficient of Variation		3.783961267
Skewness		5.857648104
95 % UCL (Assuming Normal Data)		
Student's-t		482608.7546
95 % UCL (Adjusted for Skewness)		
Adjusted-CLT		597109.5666
Modified-t		501124.5638
95 % Non-parametric UCL		
CLT		478403.1042
Jackknife		482608.7546
Standard Bootstrap		468483.9902
Bootstrap-t		1447897.708
Chebyshev (Mean, Std)		846000.8615

Summary Statistics for	ln(Lead)	
Minimum		7.313220387
Maximum		15.68731273
Mean		10.13124891
Standard Deviation		2.034717715
Variance		4.140076178
Lilliefors Test Statisitic		0.086345456
Lilliefors 5% Critical Value		0.124064815
Data are Lognormal at 5% Significance Level		
Estimates Assuming Lognormal Distribution		
MLE Mean		199045.1575
MLE Standard Deviation		1564849.505
MLE Coefficient of Variation		7.861781339
MLE Skewness		509.5032261
MLE Median		25115.71215
MLE 80% Quantile		140166.3738
MLE 90% Quantile		343128.803
MLE 95% Quantile		713801.0434
MLE 99% Quantile		2853344.336
MVU Estimate of Median		24115.93691
MVU Estimate of Mean		177813.7396
MVU Estimate of Std. Dev.		898441.7193
MVU Estimate of SE of Mean		74592.00642
UCL Assuming Lognormal Distribution		
95% H-UCL		557625.8578
95% Chebyshev (MVUE) UCL		502952.7576
99% Chebyshev (MVUE) UCL		919994.8327
Recommended UCL to use:		
95 % Chebyshev (MVUE) UCL		

From File

Summary Statistics for	Manganese	
Number of Samples		5
Minimum		35600
Maximum		182000
Mean		119940
Median		160000
Standard Deviation		66553.64753
Variance		4429388000
Coefficient of Variation		0.554891175
Skewness		-0.609342065
Shapiro-Wilk Test Statisitic		0.831873595
Shapiro-Wilk 5% Critical Value		0.762
Data are Normal at 5% Significance Level		
Recommended UCL to use	Student's-t	
95 % UCL (Assuming Normal Data)		
Student's-t		183391.6143
95 % UCL (Adjusted for Skewness)		
Adjusted-CLT		160230.4295
Modified-t		182039.8164
95 % Non-parametric UCL		
CLT		168896.9234
Jackknife		183391.6143
Standard Bootstrap		162997.3893
Bootstrap-t		180716.1866
Chebyshev (Mean, Std)		249676.9431

From File

Summary Statistics for	Mercury	
Number of Samples		49
Minimum		23.15
Maximum		330
Mean		52.55
Median		35
Standard Deviation		51.66662668
Variance		2669.440313
Coefficient of Variation		0.983189851
Skewness		3.882331125
Shapiro-Wilk Test Statisitic		0.495447681
Shapiro-Wilk 5% Critical Value		0.947
Data not Normal at 5% Significance Level		
Data not Lognormal: Try Non-parametric UCL		
95 % UCL (Assuming Normal Data)		
Student's-t		64.92950038
95 % UCL (Adjusted for Skewness)		
Adjusted-CLT		69.06465986
Modified-t		65.61176893
95 % Non-parametric UCL		
CLT		64.69057691
Jackknife		64.92950038
Standard Bootstrap		64.63744547
Bootstrap-t		75.46675867
Chebyshev (Mean, Std)		84.72280064

From File

Summary Statistics for	Thallium	
Number of Samples		48
Minimum		65
Maximum		30000
Mean		6447.1875
Median		5000
Standard Deviation		6233.685678
Variance		38858837.13
Coefficient of Variation		0.966884503
Skewness		2.733687137
Shapiro-Wilk Test Statisitic		0.58783009
Shapiro-Wilk 5% Critical Value		0.947
Data not Normal at 5% Significance Level		
Data not Lognormal: Try Non-parametric UCL		
95 % UCL (Assuming Normal Data)		
Student's-t		7956.91019
95 % UCL (Adjusted for Skewness)		
Adjusted-CLT		8306.496528
Modified-t		8016.080143
95 % Non-parametric UCL		
CLT		7927.152819
Jackknife		7956.91019
Standard Bootstrap		7962.627456
Bootstrap-t		8864.447534
Chebyshev (Mean, Std)		10369.12873

From File

Summary Statistics for	alpha-Chlordane	
Number of Samples		4
Minimum		1
Maximum		129
Mean		49.1
Median		33.2
Standard Deviation		61.17112609
Variance		3741.906667
Coefficient of Variation		1.245847782
Skewness		0.85711495
Shapiro-Wilk Test Statisitic		0.866523328
Shapiro-Wilk 5% Critical Value		0.748
Data are Normal at 5% Significance Level		
Recommended UCL to use	Student's-t	
95 % UCL (Assuming Normal Data)		
Student's-t		121.0789403
95 % UCL (Adjusted for Skewness)		
Adjusted-CLT		113.4145114
Modified-t		123.2635523
95 % Non-parametric UCL		
CLT		99.40877433
Jackknife		121.0789403
Standard Bootstrap		92.39097265
Bootstrap-t		12736.79193
Chebyshev (Mean, Std)		182.4193784

From File

Summary Statistics for	gamma-Chlordane	
Number of Samples		4
Minimum		1
Maximum		128
Mean		50.25
Median		36
Standard Deviation		61.44577555
Variance		3775.583333
Coefficient of Variation		1.222801504
Skewness		0.689731175
Shapiro-Wilk Test Statisitic		0.865531011
Shapiro-Wilk 5% Critical Value		0.748
Data are Normal at 5% Significance Level		
Recommended UCL to use	Student's-t	
95 % UCL (Assuming Normal Data)		
Student's-t		122.5521153
95 % UCL (Adjusted for Skewness)		
Adjusted-CLT		112.1058494
Modified-t		124.3179931
95 % Non-parametric UCL		
CLT		100.7846534
Jackknife		122.5521153
Standard Bootstrap		94.6009178
Bootstrap-t	1.#INF	
Chebyshev (Mean, Std)		184.1679631

From File

Summary Statistics for	4,4'-DDE	
Number of Samples		4
Minimum		1.85
Maximum		2.05
Mean		1.975
Median		2
Standard Deviation		0.08660254
Variance		0.0075
Coefficient of Variation		0.043849388
Skewness		-1.539600718
Shapiro-Wilk Test Statisitic		0.839544604
Shapiro-Wilk 5% Critical Value		0.748
Data are Normal at 5% Significance Level		
Recommended UCL to use	Student's-t	
95 % UCL (Assuming Normal Data)		
Student's-t		2.076903618
95 % UCL (Adjusted for Skewness)		
Adjusted-CLT		2.010607102
Modified-t		2.071348063
95 % Non-parametric UCL		
CLT		2.046224251
Jackknife		2.076903618
Standard Bootstrap		2.035217913
Bootstrap-t		2.025
Chebyshev (Mean, Std)		2.163745861

From File

Summary Statistics for	4,4'-DDT	
Number of Samples		4
Minimum		1.85
Maximum		2.05
Mean		1.975
Median		2
Standard Deviation		0.08660254
Variance		0.0075
Coefficient of Variation		0.043849388
Skewness		-1.539600718
Shapiro-Wilk Test Statisitic		0.839544604
Shapiro-Wilk 5% Critical Value		0.748
Data are Normal at 5% Significance Level		
Recommended UCL to use	Student's-t	
95 % UCL (Assuming Normal Data)		
Student's-t		2.076903618
95 % UCL (Adjusted for Skewness)		
Adjusted-CLT		2.010607102
Modified-t		2.071348063
95 % Non-parametric UCL		
CLT		2.046224251
Jackknife		2.076903618
Standard Bootstrap		2.035938344
Bootstrap-t		2.025
Chebyshev (Mean, Std)		2.163745861

From File

Summary Statistics for	Aroclor 1242	
Number of Samples		18
Minimum		18.5
Maximum		500
Mean		143.25
Median		50
Standard Deviation		196.614377
Variance		38657.21324
Coefficient of Variation		1.372526192
Skewness		1.4448748
Shapiro-Wilk Test Statisitic		0.568640957
Shapiro-Wilk 5% Critical Value		0.897
Data not Normal at 5% Significance Level		
Data not Lognormal: Try Non-parametric UCL		
95 % UCL (Assuming Normal Data)		
Student's-t		223.8676316
95 % UCL (Adjusted for Skewness)		
Adjusted-CLT		236.3402726
Modified-t		226.4980312
95 % Non-parametric UCL		
CLT		219.4765521
Jackknife		223.8676316
Standard Bootstrap		214.4677541
Bootstrap-t		276.6986601
Chebyshev (Mean, Std)		345.2520698

From File

Summary Statistics for	Aroclor 1248	
Number of Samples		7
Minimum		18.5
Maximum		800
Mean		139.7857143
Median		20.5
Standard Deviation		291.4796816
Variance		84960.40476
Coefficient of Variation		2.085189342
Skewness		2.632446398
Shapiro-Wilk Test Statisitic		0.491516824
Shapiro-Wilk 5% Critical Value		0.803
Data not Normal at 5% Significance Level		
Data not Lognormal: Try Non-parametric UCL		
95 % UCL (Assuming Normal Data)		
Student's-t		353.8637968
95 % UCL (Adjusted for Skewness)		
Adjusted-CLT		438.1226948
Modified-t		372.1329549
95 % Non-parametric UCL		
CLT		320.9975348
Jackknife		353.8637968
Standard Bootstrap		306.5276767
Bootstrap-t		3084.372827
Chebyshev (Mean, Std)		620.0010961

From File

Summary Statistics for	Aroclor 1254	
Number of Samples		8
Minimum		18.5
Maximum		200
Mean		72.3125
Median		35.25
Standard Deviation		79.91957453
Variance		6387.138393
Coefficient of Variation		1.105197228
Skewness		1.326936868
Shapiro-Wilk Test Statisitic		0.67590369
Shapiro-Wilk 5% Critical Value		0.818
Data not Normal at 5% Significance Level		
Data not Lognormal: Try Non-parametric UCL		
95 % UCL (Assuming Normal Data)		
Student's-t		125.8454003
95 % UCL (Adjusted for Skewness)		
Adjusted-CLT		132.953474
Modified-t		128.0547384
95 % Non-parametric UCL		
CLT		118.7892153
Jackknife		125.8454003
Standard Bootstrap		117.0713984
Bootstrap-t		326.2576352
Chebyshev (Mean, Std)		195.4768361

From File

Summary Statistics for	Aroclor 1260	
Number of Samples		7
Minimum		18.5
Maximum		50
Mean		32.64285714
Median		20.5
Standard Deviation		16.24734411
Variance		263.9761905
Coefficient of Variation		0.497730454
Skewness		0.368704897
Shapiro-Wilk Test Statisitic		0.690962343
Shapiro-Wilk 5% Critical Value		0.803
Data not Normal at 5% Significance Level		
Data not Lognormal: Try Non-parametric UCL		
95 % UCL (Assuming Normal Data)		
Student's-t		44.57576531
95 % UCL (Adjusted for Skewness)		
Adjusted-CLT		43.65818546
Modified-t		44.71839567
95 % Non-parametric UCL		
CLT		42.7437698
Jackknife		44.57576531
Standard Bootstrap		42.14094531
Bootstrap-t		45.06718724
Chebyshev (Mean, Std)		59.41050184

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Summary Statistics for	C11-C22 Aromatic
Number of Samples	79
Minimum	4590
Maximum	72000000
Mean	3271893.544
Median	130000
Standard Deviation	9198006.905
Variance	8.46E+13
Coefficient of Variation	2.811218269
Skewness	5.779804199
Lilliefors Test Statisitic	0.361212959
Lilliefors 5% Critical Value	0.099682788
Data not Normal at 5% Significance Level	
Data not Lognormal: Try Non-parametric UCL	
95 % UCL (Assuming Normal Data)	
Student's-t	4994541.102
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	5693133.028
Modified-t	5106698.652
95 % Non-parametric UCL	
CLT	4974081.224
Jackknife	4994541.102
Standard Bootstrap	4961219.029
Bootstrap-t	6715507.735
Chebyshev (Mean, Std)	7782729.008

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Summary Statistics for	TEQ (no 170/193/180) Hu
Number of Samples	71
Minimum	0
Maximum	45000
Mean	869.2070423
Median	0
Standard Deviation	5384.334114
Variance	28991053.85
Coefficient of Variation	6.194535769
Skewness	8.104564464
Lilliefors Test Statisitic	0.436522941
Lilliefors 5% Critical Value	0.105148855
Data not Normal at 5% Significance Level	
Data are Lognormal: Try Lognormal UCLs	
95 % UCL (Assuming Normal Data)	
Student's-t	1934.370046
95 % UCL (Adjusted for Skewness)	
Adjusted-CLT	2576.998576
Modified-t	2036.805921
95 % Non-parametric UCL	
CLT	1920.273275
Jackknife	1934.370046
Standard Bootstrap	1920.463699
Bootstrap-t	7611.878357
Chebyshev (Mean, Std)	3654.556094