**TABLE E1**
**Summary Statistics and MTCA Statistical Comparisons for Chemicals of Concern**
Unocal Edmonds Bulk Fuel Terminal Lower Yard
Phase I Remedial Implementation
11720 Unoco Road
Edmonds, Washington

| Summary statistics | | | | |
|---|---|---|---|---|
| | **Chemical Group** | **N of Cases** | **Maximum** | **Average** |
| | cPAH[a] | 166 | 0.33 | 0.04 |
| | TPH[b] | 470 | 16,360 | 293 |

| 95% UCL Mean < Cleanup Criteria? | | | | |
|---|---|---|---|---|
| | | | **95% UCL** | **Result** |
| Chebyshev (Mean, Sd) UCL | cPAH | | 0.05 | **0.14** PASS |
| Chebyshev (Mean, Sd) UCL | TPH | | 591 | **2,975** PASS |
| (95% UCL calculations from EPA's ProUCL) | | | | |

| More than 10% of samples greater than cleanup criteria? | | | |
|---|---|---|---|
| | | **90%** | **Soil Cleanup Result** |
| | cPAH | 0.09 | **0.14** PASS |
| | TPH | 678 | **2,975** PASS |

| Any sample values greater than 2x cleanup criteria? | | | |
|---|---|---|---|
| **Sample** | **cPAH** | **2 x Criterion Result** | |
| EX-B20-M-17-SSW-6 | 0.33 | **0.28** FAIL | |
| | | | |
| **Sample** | **TPH** | **2 x Criterion** | |
| EX-A2-O-15-SSW-6 | 7,829 | **5,950** FAIL | |
| EX-A2-N-16-SSW-6 | 7,836 | | |
| EX-B20-M-17-SSW-6 | 16,360 | | |

Notes:

[a]: Carcinogenic PAHs, summed by toxicity equivalence to benzo-a-pyrene.

[b]: Total petroleum hydrocarbons, summed from gasoline, diesel, and heavy oil analyses.

**TABLE E2**
**Summary Statistics and MTCA Statistical Comparisons for Chemicals of Concern**
Unocal Edmonds Bulk Fuel Terminal Lower Yard
Phase I Remedial Implementation
11720 Unoco Road
Edmonds, Washington

ProUCL output
USEPA ProUCL Version 4.0 (Version 4.00.02)
 28-Oct-08

**Goodness-of-Fit Test Statistics for Data Sets with Non-Detects**

User Selected Options
From File                   C:\Project\Chevron\Edmonds\phaseI in 22Oct08.wst
Full Precision              OFF
Confidence Coefficient        0.95

CPAH

| | Num Obs | Num Miss | Num Valid | Detects | NDs | % NDs |
|---|---|---|---|---|---|---|
| Raw Statistics | 470 | 304 | 166 | 99 | 67 | 40.36% |

| | Number | Minimum | Maximum | Mean | Median | SD |
|---|---|---|---|---|---|---|
| Statistics (Non-Detects Only) | 67 | 0.0201 | 0.332 | 0.0622 | 0.0366 | 0.052 |
| Statistics (Detects Only) | 99 | 0.0159 | 0.0199 | 0.0178 | 0.0177 | 9.18E-04 |
| Statistics (All: NDs treated as DL value) | 166 | 0.0159 | 0.332 | 0.0357 | 0.0188 | 0.0395 |
| Statistics (All: NDs treated as DL/2 value) | 166 | 0.0101 | 0.166 | 0.0231 | 0.0178 | 0.0177 |
| Statistics (Normal ROS Estimated Data) | 166 | 0.0159 | 0.0199 | 0.0178 | 0.0178 | 7.12E-04 |
| Statistics (Gamma ROS Estimated Data) | 166 | 0.0159 | 0.0199 | 0.0179 | 0.018 | 7.20E-04 |
| Statistics (Lognormal ROS Estimated Data) | 166 | 0.0159 | 0.0199 | 0.0178 | 0.0177 | 7.12E-04 |

| | K Hat | K Star | Theta Hat | Log Mean | Log Stdv | Log CV |
|---|---|---|---|---|---|---|
| Statistics (Detects Only) | 379.6 | 372.8 | 4.68E-05 | -4.032 | 0.0516 | -0.0128 |
| Statistics (NDs = DL) | 1.839 | 1.81 | 0.0194 | -3.628 | 0.66 | -0.182 |
| Statistics (NDs = DL/2) | 3.671 | 3.609 | 0.00631 | -3.908 | 0.464 | -0.119 |
| Statistics (Gamma ROS Estimates) | 615.3 | 604.1 | 2.90E-05 | -- | -- | -- |
| Statistics (Lognormal ROS Estimates) | -- | -- | -- | -4.032 | 0.04 | -0.00991 |

**TABLE E2**
**Summary Statistics and MTCA Statistical Comparisons for Chemicals of Concern**
Unocal Edmonds Bulk Fuel Terminal Lower Yard
Phase I Remedial Implementation
11720 Unoco Road
Edmonds, Washington

Normal Distribution Test Results

| | No NDs | NDs = DL | NDs = DL/ | Normal ROS |
|---|---|---|---|---|
| Correlation Coefficient R | 0.994 | 0.721 | 0.715 | 0.963 |

| | Test value | Crit. (0.05) | Conclusion with Alpha(0.05) |
|---|---|---|---|
| Lilliefors (Detects Only) | 0.0894 | 0.089 | Data Not Normal |
| Lilliefors (NDs = DL) | 0.308 | 0.0688 | Data Not Normal |
| Lilliefors (NDs = DL/2) | 0.38 | 0.0688 | Data Not Normal |
| Lilliefors (Normal ROS Estimates) | 0.225 | 0.0688 | Data Not Normal |

Gamma Distribution Test Results

| | No NDs | NDs = DL | NDs = DL/ | Gamma ROS |
|---|---|---|---|---|
| Correlation Coefficient R | 0.994 | 0.889 | 0.833 | 0.969 |

| | Test value | Crit. (0.05) | Conclusion with Alpha(0.05) |
|---|---|---|---|
| Anderson-Darling (Detects Only) | 0.401 | 0.75 | |
| Kolmogorov-Smirnov (Detects Only) | 0.0825 | 0.0897 | Data Appear Gamma Distributed |
| Anderson-Darling (NDs = DL) | 22.99 | 0.768 | |
| Kolmogorov-Smirnov (NDs = DL) | 0.29 | 0.0735 | Data Not Gamma Distributed |
| Anderson-Darling (NDs = DL/2) | 20.12 | 0.757 | |
| Kolmogorov-Smirnov (NDs = DL/2) | 0.352 | 0.0728 | Data Not Gamma Distributed |
| Anderson-Darling (Gamma ROS Estimates) | 5.473 | 0.75 | |
| Kolmogorov-Smirnov (Gamma ROS Est.) | 0.198 | 0.0722 | Data Not Gamma Distributed |

Lognormal Distribution Test Results

| | No NDs | NDs = DL | NDs = DL/ | Log ROS |
|---|---|---|---|---|
| Correlation Coefficient R | 0.995 | 0.847 | 0.877 | 0.964 |

| | Test value | Crit. (0.05) | Conclusion with Alpha(0.05) |
|---|---|---|---|
| Lilliefors (Detects Only) | 0.0792 | 0.089 | Data Appear Lognormal |
| Lilliefors (NDs = DL) | 0.272 | 0.0688 | Data Not Lognormal |
| Lilliefors (NDs = DL/2) | 0.32 | 0.0688 | Data Not Lognormal |
| Lilliefors (Lognormal ROS Estimates) | 0.212 | 0.0688 | Data Not Lognormal |

Note: Substitution methods such as DL or DL/2 are not recommended.

**TABLE E2**
**Summary Statistics and MTCA Statistical Comparisons for Chemicals of Concern**
Unocal Edmonds Bulk Fuel Terminal Lower Yard
Phase I Remedial Implementation
11720 Unoco Road
Edmonds, Washington

TPH

| | Num Obs | Num Miss | Num Valid | Detects | NDs | % NDs |
|---|---|---|---|---|---|---|
| Raw Statistics | 470 | 0 | 470 | 258 | 212 | 45.11% |

| | Number | Minimum | Maximum | Mean | Median | SD |
|---|---|---|---|---|---|---|
| Statistics (Non-Detects Only) | 212 | 45.41 | 16360 | 589.3 | 126.3 | 1490 |
| Statistics (Detects Only) | 258 | 38.2 | 98.3 | 49.22 | 48.02 | 6.932 |
| Statistics (All: NDs treated as DL value) | 470 | 38.2 | 16360 | 292.8 | 50.84 | 1035 |
| Statistics (All: NDs treated as DL/2 value) | 470 | 22.71 | 8180 | 159.9 | 48.4 | 514.5 |
| Statistics (Normal ROS Estimated Data) | 470 | 38.2 | 98.3 | 48.87 | 48.77 | 5.192 |
| Statistics (Gamma ROS Estimated Data) | 470 | 38.2 | 98.3 | 49.73 | 50.27 | 5.196 |
| Statistics (Lognormal ROS Estimated Data) | 470 | 38.2 | 98.3 | 48.74 | 48.47 | 5.192 |

| | K Hat | K Star | Theta Hat | Log Mean | Log Stdv | Log CV |
|---|---|---|---|---|---|---|
| Statistics (Detects Only) | 64.82 | 64.41 | 0.759 | 3.889 | 0.118 | 0.0303 |
| Statistics (NDs = DL) | 0.539 | 0.537 | 542.8 | 4.516 | 1.13 | 0.25 |
| Statistics (NDs = DL/2) | 0.694 | 0.691 | 230.4 | 4.203 | 0.958 | 0.228 |
| Statistics (Gamma ROS Estimates) | 114.3 | 113.6 | 0.435 | -- | -- | -- |
| Statistics (Lognormal ROS Estimates) | -- | -- | -- | 3.882 | 0.0884 | 0.0228 |

Normal Distribution Test Results

| | No NDs | NDs = DL | NDs = DL/ | Normal ROS |
|---|---|---|---|---|
| Correlation Coefficient R | 0.795 | 0.475 | 0.472 | 0.726 |

| | Test value | Crit. (0.05) | Conclusion with Alpha(0.05) |
|---|---|---|---|
| Lilliefors (Detects Only) | 0.242 | 0.0552 | Data Not Normal |
| Lilliefors (NDs = DL) | 0.403 | 0.0409 | Data Not Normal |
| Lilliefors (NDs = DL/2) | 0.395 | 0.0409 | Data Not Normal |
| Lilliefors (Normal ROS Estimates) | 0.297 | 0.0409 | Data Not Normal |

Gamma Distribution Test Results

| | No NDs | NDs = DL | NDs = DL/ | Gamma ROS |
|---|---|---|---|---|
| Correlation Coefficient R | 0.821 | 0.779 | 0.747 | 0.777 |

| | Test value | Crit. (0.05) | Conclusion with Alpha(0.05) |
|---|---|---|---|
| Anderson-Darling (Detects Only) | 19.8 | 0.751 | |

**TABLE E2**
**Summary Statistics and MTCA Statistical Comparisons for Chemicals of Concern**
Unocal Edmonds Bulk Fuel Terminal Lower Yard
Phase I Remedial Implementation
11720 Unoco Road
Edmonds, Washington

| | | | |
|---|---|---|---|
| Kolmogorov-Smirnov (Detects Only) | 0.217 | 0.0568 | Data Not Gamma Distributed |
| Anderson-Darling (NDs = DL) | 86.02 | 0.819 | |
| Kolmogorov-Smirnov (NDs = DL) | 0.332 | 0.0442 | Data Not Gamma Distributed |
| Anderson-Darling (NDs = DL/2) | 82.33 | 0.803 | |
| Kolmogorov-Smirnov (NDs = DL/2) | 0.356 | 0.0437 | Data Not Gamma Distributed |
| Anderson-Darling (Gamma ROS Estimates) | 40.47 | 0.752 | |
| Kolmogorov-Smirnov (Gamma ROS Est.) | 0.311 | 0.0418 | Data Not Gamma Distributed |

Lognormal Distribution Test Results

| | No NDs | NDs = DL | NDs = DL/. | Log ROS |
|---|---|---|---|---|
| Correlation Coefficient R | 0.862 | 0.821 | 0.847 | 0.79 |

| | Test value | Crit. (0.05) | Conclusion with Alpha(0.05) |
|---|---|---|---|
| Lilliefors (Detects Only) | 0.203 | 0.0552 | Data Not Lognormal |
| Lilliefors (NDs = DL) | 0.271 | 0.0409 | Data Not Lognormal |
| Lilliefors (NDs = DL/2) | 0.309 | 0.0409 | Data Not Lognormal |
| Lilliefors (Lognormal ROS Estimates) | 0.269 | 0.0409 | Data Not Lognormal |

Note: Substitution methods such as DL or DL/2 are not recommended.

**Nonparametric UCL Statistics for Full Data Sets**

User Selected Options
| | |
|---|---|
| From File | C:\Project\Chevron\Edmonds\phaseI in 22Oct08.wst |
| Full Precision | OFF |
| Confidence Coefficient | 95% |
| Number of Bootstrap Operations | 2000 |

CPAH

| | |
|---|---|
| Number of Valid Observations | 166 |
| Number of Distinct Observations | 98 |
| Minimum | 0.0159 |
| Maximum | 0.332 |
| Mean | 0.0357 |
| Median | 0.0188 |
| SD | 0.0395 |
| Variance | 0.00156 |
| Coefficient of Variation | 1.107 |
| Skewness | 3.795 |
| Mean of log data | -3.628 |
| SD of log data | 0.66 |

Data do not follow a Discernable Distribution

**TABLE E2**
**Summary Statistics and MTCA Statistical Comparisons for Chemicals of Concern**
Unocal Edmonds Bulk Fuel Terminal Lower Yard
Phase I Remedial Implementation
11720 Unoco Road
Edmonds, Washington

95% Useful UCLs
Student's-t UCL                                                    0.0408

95% UCLs (Adjusted for Skewness)
  95% Adjusted-CLT UCL                                   0.0417
  95% Modified-t UCL                                     0.0409

Non-Parametric UCLs
  95% CLT UCL                                            0.0408
  95% Jackknife UCL                                      0.0408
  95% Standard Bootstrap UCL                             0.0407
  95% Bootstrap-t UCL                                    0.0421
  95% Hall's Bootstrap UCL                               0.0428
  95% Percentile Bootstrap UCL                           0.0409
  95% BCA Bootstrap UCL                                  0.0424
95% Chebyshev(Mean, Sd) UCL                                        0.0491
97.5% Chebyshev(Mean, Sd) UCL                                      0.0549
99% Chebyshev(Mean, Sd) UCL                                        0.0662

Potential UCL to Use
Use 95% Chebyshev (Mean, Sd) UCL                                   0.0491

TPH

Number of Valid Observations                                      470
Number of Distinct Observations                                   439
Minimum                                                           38.2
Maximum                                                          16360
Mean                                                             292.8
Median                                                           50.84
SD                                                               1035
Variance                                                       1071415
Coefficient of Variation                                         3.535
Skewness                                                         10.26
Mean of log data                                                 4.516
SD of log data                                                    1.13

Data do not follow a Discernable Distribution

**TABLE E2**
**Summary Statistics and MTCA Statistical Comparisons for Chemicals of Concern**
Unocal Edmonds Bulk Fuel Terminal Lower Yard
Phase I Remedial Implementation
11720 Unoco Road
Edmonds, Washington

95% Useful UCLs
Student's-t UCL                                          371.5

  95% UCLs (Adjusted for Skewness)
  95% Adjusted-CLT UCL                              395.5
  95% Modified-t UCL                                375.3

Non-Parametric UCLs
  95% CLT UCL                                       371.4
  95% Jackknife UCL                                 371.5
  95% Standard Bootstrap UCL                        371.3
  95% Bootstrap-t UCL                               421.7
  95% Hall's Bootstrap UCL                          487.2
  95% Percentile Bootstrap UCL                      375.3
  95% BCA Bootstrap UCL                             404.8
95% Chebyshev(Mean, Sd) UCL                              500.9
97.5% Chebyshev(Mean, Sd) UCL                            591
99% Chebyshev(Mean, Sd) UCL                              767.9

Potential UCL to Use
Use 97.5% Chebyshev (Mean, Sd) UCL                       591