PNNL-14450

Pacific Northwest
National Laboratory
Operated by Battelle for the
U.S. Department of Energy

Statistical Analysis of F001 – F005 Spent Solvent Concentrations in Tank Wastes

R.F. O'Brien

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Prepared for the U.S. Department of Energy
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Summary

A large quantity of mixed waste is generated at the Hanford Site from maintenance, sampling, analysis and research performed on tank waste. The majority of this waste contains only trace residues of actual tank waste and would be expected to contain a low concentration of spent solvent constituents. This paper gives a statistical methodology to find estimates of the mean concentration, as well as the 90th and 95th percentile of the concentration distribution, along with their respective upper 95th percent confidence limits, for each of the seven constituents of concern. This method is suitable when a large percentage of concentrations are reported as non-detects.

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Tables

1.0 Introduction

The Hanford Site manages approximately 53 million gallons of high-level waste in 177 waste tanks. This waste is regulated as mixed radioactive and hazardous waste (mixed waste) under the *Resource Conservation and Recovery Act (RCRA) Regulations* (40 CFR 261ff) and the *Washington State Dangerous Waste Regulations* (WAC 173-303). Among other hazardous constituents and properties, this waste is regulated as a listed waste with waste numbers F001, F002, F003, F004 and F005 due to past discharges of certain spent solvents (specifically 1,1,1-trichloroethane, methylene chloride, cresols, acetone, methyl ethyl ketone, and methyl isobutyl ketone) to the waste tanks. Under the RCRA regulations, when a listed hazardous waste is mixed with a solid waste, the resulting mixture also must be managed as a listed hazardous waste (40 CFR 261.3(a)(2)(iv)). As a result, a large quantity of mixed waste is generated at the Hanford Site from maintenance, sampling, analysis and research performed on tank waste. The majority of this waste contains only trace residues of actual tank waste and would be expected to contain a low concentration of spent solvent constituents.

The Pacific Northwest National Laboratory (PNNL) supports the Hanford Site by performing research on samples of tank waste. This research produces secondary wastes, including hood waste, solutions from analysis of tank waste samples and product from vitrification studies, all of which must be managed as F001-F005 mixed waste regardless of the concentrations of the spent solvent constituents. In order to dispose of F001-F005 waste, the land disposal restrictions (LDR) treatment standards of 40 CFR 268 must be met.

These treatment standards can be met by performing treatment on a waste stream or demonstrating that a waste stream meets the hazardous constituent concentration limits in the treatment standards (see Table 1) when the waste stream is generated. In the case of secondary waste streams from research of tank samples, if the concentrations of the F001-F005 spent solvents are below the treatment standard concentrations listed in 40 CFR 268.40 and the waste is not otherwise regulated (e.g., for toxicity characteristic constituents), the waste can be disposed in a RCRA-permitted disposal unit without further treatment.

Table 1.1. Land Disposal Restrictions Treatment Standards for F001-F005 Constituents in Tank Waste

Constituent/CAS#	Wastewater (mg/L)	Nonwastewater (mg/kg)
1,1,1-Trichloroethane (71-55-6)	0.054	6
Methylene chloride (75-09-2)	0.089	30
Acetone (67-64-1)	0.28	160
o-Cresol (95-48-7)	0.11	5.6
m- and p-Cresol (108-39-4, 106-44-5)	0.77	5.6
Methyl ethyl ketone (78-93-3)	0.28	36
Methyl isobutyl ketone (108-10-1)	0.14	33

PNNL developed and maintains the Tank Waste Information Network System (TWINS) database, a current, complete set of analysis results for all tank waste samples. Tank waste analysis results can be queried by a variety of criteria, including constituent name, waste tank, and analysis method. The sample analysis results have been reviewed and data qualifiers assigned as appropriate. Data flagged “TPA” are post-1989 results that are recognized by the Washington State Department of Ecology for use in regulatory documents. The quality and ease of assembling tank data make TWINS an ideal tool for evaluating hazardous constituent concentration data for tank-derived waste streams.

In this paper, TWINS data for the F001-F005 spent solvent constituents are evaluated to estimate the mean and the 90^{th} and 95^{th} percentiles for each of the concentration distributions in the tank waste. Upper bounds for these means and percentiles of the measured constituents are then computed and compared with the LDR treatment standard concentration limits. Additionally, comparisons of upper-bound estimates are made to the LDR treatment standards when expected concentrations in the secondary waste streams contain small amounts of tank waste (e.g., less than 1 weight percent).

Section 2 of this report discusses the TWINS data used in the statistical analyses. Section 3 discusses the statistical methodology used in analyzing the data. Section 4 gives the results and conclusion of the analysis. Appendix A gives the data used in the analyses and Appendix B gives the Mathematica® codes in the statistical analysis.

2.0 Processing TWINS Data F001-F005 Constituents for Statistical Analysis

The TWINS database was queried for all analysis records for the seven F001-F005 constituents 1,1,1-trichloroethane, methylene chloride, acetone, o-cresol, p-cresol[1], methyl ethyl ketone or methyl isobutyl ketone. Records that were flagged as rejected (i.e, an "R" data qualifier in TWINS) were excluded from further evaluation. The remaining records produced from this query are summarized in Table 2.1.

Duplicate concentration measurements were dropped from the statistical analysis, as their inclusion would bias the results to give more weight to observations that had multiple measurements. Analysis results for liquids (expressed as mg/L) were normalized to mg/kg to allow direct comparison with solid sample results. The average density of tank waste liquid samples from TWINS of 1.27 g/ml was used to convert liquid analytical results to mg/kg (i.e., liquid analysis results were divided by 1.27). The statistical analysis used only the data records that were non-duplicate as given in row 2 of Table 2.1.

A great many of the concentration measurements used in the statistical analysis were flagged in TWINS with data qualifier "U", meaning the constituent was not detected and the analysis result was recorded at the detection limit. As can be seen in Table 2.1 a great percentage of the detection limits exceeded the non-wastewater and wastewater standards. To avoid biases in overestimating the mean concentration and the upper percentiles of the concentration distributions, concentration values were imputed for the statistical analysis. This is discussed more fully in Section 3.

[1] Analysis results reported as p-cresol actually represents the combined m-cresol and p-cresol concentration, as it is difficult to distinguish between m-cresol and p-cresol by semivolatile organic analysis.

Table 2.1. Records for F001-F005 Constituents used in the Statistical Analysis

	1,1,1-Trichlorothane	methylene chloride	acetone	o-cresol	p-cresol	methyl ethyl ketone	methyl isobutyl ketone
Total Analyses (excluding rejected data)	143	159	219	155	154	201	107
Non-duplicate Analyses	110	115	165	103	104	152	79
Analyses at Detection Limit (% of Non-Duplicates)	104 (95%)	82 (71%)	68 (41%)	103 (100%)	104 (100%)	97 (64%)	79 (100%)
Detection Limits Above:							
Non-wastewater Standard (% of Non-Duplicates)	3 (3%)	1 (1%)	0 (0%)	53 (51%)	55 (53%)	2 (1%)	2 (3%)
Wastewater Standard (% of Non-Duplicates)	62 (56%)	70 (61%)	65 (39%)	103 (100%)	92 (88%)	83 (55%)	74 (94%)

3.0 Statistical Methodology

The statistical problem associated with this study was to find estimates of the mean concentration, as well as the 90th and 95th percentile of the concentration distribution, along with their respective upper 90th percent confidence limits, for each of the seven constituents 1,1,1-trichloroethane, methylene chloride, acetone, o-cresol, p-cresol, methyl ethyl ketone and methyl isobutyl ketone.

When estimating means and percentiles, if a large percentage of the data are non-detects statistical analysis can be problematic. The standard statistical methods, advocated in Environmental Protection Agency guidance (EPA, 2002), such as maximum likelihood and non-parametric methods tend to be biased when a high percentage of the data are multiple non-detects and these non-detect values are also above the standard used for making comparisons. Further, if the concentration data for the constituents of concern do not conform to a known standard statistical distribution (e.g., the distribution is normal, lognormal or gamma) this further makes the maximum likelihood approach undesirable. Therefore a bootstrap technique (Efron and Tibshirani, 1993) was used to estimate the means, percentiles and upper bounds of the estimates. The bootstrap technique is an alternative method that is advocated in Environmental Protection Agency guidance (EPA, 2002) when data does not conform to a standard distribution. The bootstrap technique is essentially a Monte Carlo method carried out on the empirical distribution of the data. As applied in this situation the bootstrap technique implemented is a fairly conservative approach.

The bootstrap technique used in this report substitutes values for measurements recorded at the detection limit during simulation using a conservative approach that follows closely to the model used in standard laboratory techniques used to establish detection limits. In the laboratory a detection limit is formed by taking repeated measurements of a standard low level concentration and then forming the detection limit as the mean of the measurements of the standard concentration plus three to ten times the standard deviation of the measurements of the standard, (Currie, 1968). For this study, when a measurement was recorded at the detection limit, a value was randomly selected during the bootstrap simulation from a folded or half normal distribution with parameter σ = (detection limit)/3 where the density function, f(x), of the half normal is given by:

$$\text{half normal distribution: } f(x) = \frac{1}{\sigma}\sqrt{\frac{2}{\pi}}\, e^{-\frac{x^2}{2\sigma^2}}, \quad x > 0 \tag{1}$$

This technique essentially randomly substitutes a value of between 0 and the detection limit 99% of the time and greater than the detection limit 1% of the time on average if the detection limit is equal to 3σ (where σ is the standard deviation of the low level laboratory standard used to form the detection limit). If we assumed that the detection limit where actually computed as 5σ or 10σ, as is often the case, then this would tend to lower means and percentiles as the estimate of σ would be smaller.

To estimate the mean, 90th and 95th percentiles 10,000 bootstrap simulations were run where samples of size n were drawn with replacement from the n data points for each of the seven F00's. For example 1,1,1-trichloroethane had n = 110 records. Let $x_1, x_2, \ldots, x_n$ represent the n original observations where x_i is either a recorded measurement or a detection limit. The bootstrap simulation is carried according to the following steps to obtain the estimates and upper confidence bounds.

1) In simulation 1 a new sample of size n is selected with replacement from the original sample (i.e., an original observation can be selected more than once in the new sample). Let $x^*_1, x^*_2,\ldots,x^*_n$ be the new sample.

2) For each i, i=1,n , if x^*_i is a measured value do nothing, and if x^*_i is a detection limit randomly replace it with a value from the half normal distribution with parameter σ = (detection limit)/3.

3) Calculate the mean, 90^{th} and 95^{th} percentiles from the new sample $x^*_1, x^*_2,\ldots,x^*_n$ and save these values.

4) Repeat Steps 1 to 3 above 10,000 times so that there should be 10,000 estimates of the mean, 90^{th} and 95^{th} percentiles.

5) Estimates of the mean, 90^{th} and 95^{th} percentiles are then obtained by taking the average of the 10,000 saved mean, 90^{th} and 95^{th} percentile estimates respectively.

6) The upper 90% confidence limits are obtained by taking the 90^{th} percentile of the 10,000 mean, 90^{th} and 95^{th} percentile estimates respectively.

4.0 Results and Conclusions

Results of the statistical analysis are given in Table 4.1. The results show that all the upper 90% confidence limits for mean, 90th and 95th percentiles as being below the nonwastewater standard for each constituent except for o-cresol and p-cresol, where only the upper bound of the means are below the nonwastewater standards. The major reason that the o-cresol and p-cresol values exceed the nonwastewater standard is that over 50% of the data are at a detection limit greater than the standard. None of the estimates or upper bounds are below the respective wastewater treatment standards.

Table 4.1. Estimates and 95% Upper Confidence Bounds in the Non-Liquid State (mg/kg)

	Mean		***90th Percentile***		***95th Percentile***	
	Est	***90% UB***	***Est***	***90% UB***	***Est***	***90% UB***
1,1,1-trichlorothane	0.62	0.82	1.36	1.65	2.18	3.03
Methylene chloride	0.55	0.74	1.27	1.53	1.89	2.34
Acetone	2.00	2.42	4.91	5.80	7.82	9.80
o-cresol	3.42	4.54	8.17	10.36	12.85	17.54
p-cresol	3.72	4,87	8.83	11.31	14.46	21.78
Methyl ethyl ketone	1.07	1.36	2.54	3.04	4.21	5.98
Methyl isobutyl ketone	1.47	1.96	3.21	3.82	4.81	6.30

Table 4.1 describes essentially pure tank waste. To evaluate secondary waste streams generated at PNNL, a hypothetical secondary waste stream containing less than one percent tank waste by weight was evaluated. One percent was chosen because the vast majority of F001-F005 waste streams generated at PNNL contain less than one percent tank waste. Table 4.2 shows that this secondary waste stream would easily have all the upper bounds for each constituent below the nonwastewater standards, but the upper bound of the 90th and 95th percentile exceeds the wastewater treatment for o-cresol. Results in Table 4.2 are directly calculated from Table 4.1 by multiplying each estimate by 0.01.

Table 4.2. Estimates as a 1% component of a secondary waste stream (mg/kg)

	Mean		***90th Percentile***		***95th Percentile***	
	Est	***90% UB***	***Est***	***90% UB***	***Est***	***90% UB***
1,1,1-Trichlorethane	0.006	0.008	0.014	0.017	0.022	0.030
Methylene chloride	0.006	0.008	0.013	0.015	0.019	0.023
Acetone	0.020	0.024	0.049	0.058	0.078	0.098
o-cresol	0.034	0.045	0.082	0.104	0.129	0.175
p-cresol	0.037	0.049	0.088	0.113	0.145	0.218
Methyl ethyl ketone	0.011	0.014	0.025	0.030	0.042	0.060
Methyl isobutyl ketone	0.015	0.020	0.032	0.038	0.048	0.063

Table 4.2 shows that secondary waste streams would easily meet the LDR treatment standards for wastewater and nonwastewater of Table 1.1 for each F001-F005 constituent with the exception of the 95th percentile upper-bound concentration of o-cresol which only slightly exceeds the nonwastewater treatment standard. However, this exceedence for o-cresol is entirely due to the fact that all the data for o-cresol are recorded at the detection limit and that all of these detection limits exceed the wastewater standard for o-cresol.

5.0 References

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Currie, L.A. (1968). "Limits for qualitative detection and quantitative determination." *Anal. Chem.* 40(3):586-593; 1968.

Efron, B. and R. J. Tibshirani. (1993). *An Introduction to the Bootstrap*. Chapman & Hall, New York.

EPA. (2002). *RCRA Waste Sampling Draft Technical Guidance: Planning, Implementation and Assessment*. U. S. Environmental Protection Agency, Washington, D.C.

Appendix A

F001 – F005 Data

Lab Sample ID	Standard Value	Non-Detect=1	Dup=1	Detection Limit	Analysis Date	Tank	Solid=0 Liquid=1	Liquid to Solid Correction
,1-Trichloroethane								
R-936	0.0004	.	1	.	1/8/96	241-AP-103	1	0.787
Vial #563-2	0.017	.	0	.	7/3/95	241-SY-101	0	1
92-05848-M1	0.39	.	0	.	8/11/96	241-T-111	0	1
92-05842-M1	0.57	.	0	.	8/6/96	241-T-111	0	1
J742	0.8	.	0	.	10/22/96	241-C-110	0	1
92-6750-A1	4.5	.	0	.	6/24/96	241-C-112	0	1
R9591	0.01	1	0	0.01	11/24/95	241-AW-106	1	0.787
R9593	0.01	1	0	0.01	11/24/95	241-AW-106	1	0.787
R9595	0.01	1	0	0.01	11/24/95	241-AW-106	1	0.787
R9597	0.01	1	0	0.01	11/26/95	241-AW-106	1	0.787
R9763	0.01	1	0	0.01	11/26/95	241-AW-106	1	0.787
R9765	0.01	1	0	0.01	11/26/95	241-AW-106	1	0.787
R9769	0.01	1	0	0.01	11/28/95	241-AW-106	1	0.787
R9771	0.01	1	0	0.01	11/28/95	241-AW-106	1	0.787
S03T000858	0.014	1	0	0.014	4/3/07	241-TX-116	1	0.787
S03T000889	0.014	1	0	0.014	4/22/07	241-TX-116	1	0.787
R9767	0.017	1	0	0.017	11/28/95	241-AW-106	1	0.787
R9589DL	0.02	1	0	0.02	11/24/95	241-AW-106	1	0.787
Vial #420-2	0.02	1	0	0.02	7/3/95	241-SY-101	0	1
Vial #421-2	0.023	1	0	0.023	7/3/95	241-SY-101	0	1
Vial #424-2	0.023	1	0	0.023	7/3/95	241-SY-101	0	1
Vial #533-2	0.024	1	0	0.024	7/31/95	241-SY-101	0	1
94-04448	0.025	1	0	0.025	4/2/98	241-AP-108	1	0.787
94-04449	0.025	1	0	0.025	4/2/98	241-AP-108	1	0.787
94-04450	0.025	1	0	0.025	4/2/98	241-AP-108	1	0.787
Vial #529-2	0.025	1	0	0.025	7/31/95	241-SY-101	0	1
Vial #531-2	0.026	1	0	0.026	7/31/95	241-SY-101	0	1
R9765DL	0.05	1	0	0.05	11/26/95	241-AW-106	1	0.787
R9769DL	0.05	1	0	0.05	11/28/95	241-AW-106	1	0.787
V133	0.05	1	0	0.05	7/1/98	241-AP-108	1	0.787
V134	0.05	1	0	0.05	7/1/98	241-AP-108	1	0.787
91-0859	0.1	1	0	0.1	6/21/95	241-AW-101	1	0.787
R9771DL	0.2	1	0	0.2	11/28/95	241-AW-106	1	0.787
93-06634	0.25	1	0	0.25	5/12/97	241-AP-102	1	0.787
93-06635	0.25	1	0	0.25	5/12/97	241-AP-102	1	0.787
93-06636	0.25	1	0	0.25	5/12/97	241-AP-102	1	0.787
93-06637MS	0.25	1	0	0.25	5/12/97	241-AP-102	1	0.787
93-06638	0.25	1	0	0.25	5/12/97	241-AP-102	1	0.787
93-06639	0.25	1	0	0.25	5/12/97	241-AP-102	1	0.787
93-06640	0.25	1	0	0.25	5/12/97	241-AP-102	1	0.787
93-06641	0.25	1	0	0.25	5/12/97	241-AP-102	1	0.787
93-08652	0.25	1	1	0.25	10/14/96	241-AP-107	1	0.787
93-08653	0.25	1	1	0.25	10/14/97	241-AP-107	1	0.787
93-08654	0.25	1	1	0.25	10/14/97	241-AP-107	1	0.787
93-08655	0.25	1	1	0.25	10/14/97	241-AP-107	1	0.787
96-3095	0.5	1	0	0.5	1/1/04	241-AP-104	1	0.787
96-3096	0.5	1	0	0.5	1/1/04	241-AP-104	1	0.787

Lab Sample ID	Standard Value	Non-Detect=1	Dup=1	Detection Limit	Analysis Date	Tank	Solid=0 Liquid=1	Liquid to Solid Correction
96-3097	0.5	1	0	0.5	1/1/04	241-AP-104	1	0.787
97-03065	1	1	0	1	1/1/04	241-AY-101	1	0.787
97-03066	1	1	0	1	1/1/04	241-AY-101	1	0.787
97-03067	1	1	0	1	1/1/04	241-AY-101	1	0.787
R9597DL	1	1	0	1	11/26/95	241-AW-106	1	0.787
R9763DL	1	1	0	1	11/26/95	241-AW-106	1	0.787
92-05845-M1	1.3	1	0	1.3	8/11/96	241-T-111	0	1
92-05852-M1	1.3	1	0	1.3	8/11/96	241-T-111	0	1
92-05844-M1	1.6	1	0	1.6	8/11/96	241-T-111	0	1
92-5846-M1	1.6	1	0	1.6	8/8/96	241-T-111	0	1
92-5850-M1	1.6	1	0	1.6	8/6/96	241-T-111	0	1
R9591DL	2	1	0	2	11/24/95	241-AW-106	1	0.787
R9593DL	2	1	0	2	11/24/95	241-AW-106	1	0.787
R9595DL	2	1	0	2	11/24/95	241-AW-106	1	0.787
92-5843-M1	2.2	1	0	2.2	8/8/96	241-T-111	0	1
92-5849-M1	2.2	1	0	2.2	8/6/96	241-T-111	0	1
COR45K108	2.2	1	0	2.2	2/17/97	241-T-104	0	1
COR45K116	2.3	1	0	2.3	2/17/97	241-T-104	0	1
COR46K123	2.3	1	0	2.3	2/23/97	241-T-104	0	1
92-04772	2.4	1	0	2.4	3/17/96	241-B-202	0	1
92-04771-A	2.5	1	0	2.5	3/17/96	241-B-202	0	1
COR46S8	2.5	1	0	2.5	2/18/97	241-T-104	0	1
COR46K121	2.6	1	0	2.6	2/23/97	241-T-104	0	1
93-01070-M1	2.7	1	0	2.7	2/11/97	241-S-104	0	1
COR45K110	2.7	1	0	2.7	2/17/97	241-T-104	0	1
92-04768-A	2.8	1	0	2.8	3/14/96	241-B-202	0	1
93-01069-M1	2.8	1	0	2.8	2/11/97	241-S-104	0	1
92-04769	2.9	1	0	2.9	3/14/96	241-B-202	0	1
92-09438-M1	2.9	1	0	2.9	10/30/96	241-BX-107	0	1
93-01066-M1	2.9	1	0	2.9	2/20/97	241-S-104	0	1
COR45K112	2.9	1	0	2.9	2/17/97	241-T-104	0	1
J748	2.9	1	0	2.9	10/27/96	241-C-110	0	1
93-01071-M1	3	1	0	3	1/22/97	241-S-104	0	1
93-01815-M1	3	1	0	3	2/20/97	241-S-104	0	1
COR45K114	3	1	0	3	2/17/97	241-T-104	0	1
COR46K120	3	1	0	3	2/23/97	241-T-104	0	1
COR46S4	3	1	0	3	2/18/97	241-T-104	0	1
92-04770-A	3.1	1	0	3.1	3/17/96	241-B-202	0	1
92-09441-M1	3.1	1	0	3.1	11/3/96	241-BX-107	0	1
92-09443-M1	3.1	1	0	3.1	11/4/96	241-BX-107	0	1
93-01064-M1	3.1	1	0	3.1	2/20/97	241-S-104	0	1
93-01065-M1	3.1	1	0	3.1	2/20/97	241-S-104	0	1
93-01067-M1	3.1	1	0	3.1	2/20/97	241-S-104	0	1
93-01073-M1	3.1	1	0	3.1	1/22/97	241-S-104	0	1
COR46K122	3.1	1	0	3.1	2/23/97	241-T-104	0	1
J747	3.1	1	0	3.1	10/27/96	241-C-110	0	1
91-07374	3.1	1	1	3.1	2/29/96	241-B-201	0	1
92-09442-M1	3.2	1	0	3.2	11/3/96	241-BX-107	0	1
92-09444-M1	3.2	1	0	3.2	11/4/96	241-BX-107	0	1

Lab Sample ID	Standard Value	Non-Detect=1	Dup=1	Detection Limit	Analysis Date	Tank	Solid=0 Liquid=1	Liquid to Solid Correction
93-01750-M1	3.2	1	0	3.2	2/5/97	241-S-104	0	1
93-01752-M1	3.2	1	0	3.2	2/11/97	241-S-104	0	1
J745	3.2	1	0	3.2	10/22/96	241-C-110	0	1
92-09439-M1	3.3	1	0	3.3	10/30/96	241-BX-107	0	1
92-09440-M1	3.3	1	0	3.3	11/3/96	241-BX-107	0	1
93-01074-M1	3.3	1	0	3.3	1/22/97	241-S-104	0	1
COR46S2	3.3	1	0	3.3	2/18/97	241-T-104	0	1
J749	3.3	1	0	3.3	10/27/96	241-C-110	0	1
COR46S9	3.4	1	0	3.4	2/18/97	241-T-104	0	1
91-07358	3.5	1	1	3.5	2/28/96	241-B-201	0	1
91-07350	3.8	1	1	3.8	2/27/96	241-B-201	0	1
92-05851-M1	14	1	0	14	8/11/96	241-T-111	0	1
93-01068-M1	30	1	0	30	2/5/97	241-S-104	0	1
93-01751-M1	32	1	0	32	2/5/97	241-S-104	0	1
Acetone								
S01T000089	0.0237	.	0	.	1/24/05	241-AP-107	1	0.787
S03T000099	0.025	.	0	.	1/29/07	241-AP-108	1	0.787
S01T000090	0.026	.	0	.	1/24/05	241-AP-107	1	0.787
S02T002507	0.04	.	0	.	12/5/06	241-SY-101	1	0.787
Vial #533-2	0.046	.	0	.	7/31/95	241-SY-101	0	1
Vial #529-2	0.05	.	0	.	7/31/95	241-SY-101	0	1
Vial #531-2	0.051	.	0	.	7/31/95	241-SY-101	0	1
S00T002255	0.052	.	0	.	1/24/05	241-AP-107	1	0.787
Vial #424-2	0.056	.	0	.	7/3/95	241-SY-101	0	1
Vial #563-2	0.06	.	0	.	7/3/95	241-SY-101	0	1
94-04448	0.065	.	0	.	4/2/98	241-AP-108	1	0.787
S02T002476	0.078	.	0	.	12/5/06	241-SY-101	1	0.787
S02T002473	0.089	.	0	.	12/5/06	241-SY-101	1	0.787
S95T002193	0.09	.	0	.	9/22/99	241-AW-105	1	0.787
94-04449	0.1	.	0	.	4/2/98	241-AP-108	1	0.787
94-04450	0.11	.	0	.	4/2/98	241-AP-108	1	0.787
Vial #421-2	0.11	.	0	.	7/3/95	241-SY-101	0	1
S00T001011	0.128	.	0	.	6/9/04	241-AZ-101	1	0.787
S95T002194	0.16	.	0	.	9/22/99	241-AW-105	1	0.787
S96T004518	0.16	.	0	.	10/1/00	241-AY-101	1	0.787
S02T001307	0.17	.	0	.	7/25/06	241-AP-107	1	0.787
S03T000858	0.18	.	0	.	4/3/07	241-TX-116	1	0.787
R9769DL	0.2	.	0	.	11/28/95	241-AW-106	1	0.787
S96T004519	0.22	.	0	.	10/1/00	241-AY-101	1	0.787
93-06637MS	0.23	.	0	.	5/12/97	241-AP-102	1	0.787
R9765DL	0.23	.	0	.	11/26/95	241-AW-106	1	0.787
R9769	0.3	.	0	.	11/28/95	241-AW-106	1	0.787
S03T000889	0.3	.	0	.	4/22/07	241-TX-116	1	0.787
S02T001300	0.31	.	0	.	7/25/06	241-AP-107	1	0.787
S02T001296	0.32	.	0	.	9/5/06	241-AP-107	1	0.787
S00T001213	0.324	.	0	.	7/19/04	241-AZ-101	1	0.787
V133	0.34	.	0	.	7/1/98	241-AP-108	1	0.787
S00T001214	0.345	.	0	.	7/19/04	241-AZ-101	1	0.787

Lab Sample ID	Standard Value	Non-Detect=1	Dup=1	Detection Limit	Analysis Date	Tank	Solid=0 Liquid=1	Liquid to Solid Correction
S00T001012	0.362	.	0	.	6/9/04	241-AZ-101	1	0.787
S00T001215	0.385	.	0	.	7/19/04	241-AZ-101	1	0.787
S00T001216	0.404	.	0	.	7/20/04	241-AZ-101	1	0.787
S03T000100	0.41	.	0	.	1/29/07	241-AP-108	1	0.787
V150	0.41	.	0	.	11/23/98	241-AP-106	1	0.787
R9767	0.43	.	0	.	11/28/95	241-AW-106	1	0.787
S96V000041	0.44	.	0	.	9/26/00	241-AP-105	1	0.787
S02T000584	0.45	.	0	.	4/6/06	241-AP-108	1	0.787
S96V000040	0.49	.	0	.	9/26/00	241-AP-105	1	0.787
V134	0.53	.	0	.	7/1/98	241-AP-108	1	0.787
S96V000039	0.55	.	0	.	9/25/00	241-AP-105	1	0.787
S02T000600	0.74	.	0	.	4/6/06	241-AP-108	1	0.787
S00T000739	0.798	.	0	.	3/17/04	241-AP-108	1	0.787
COR45K114	0.81	.	0	.	2/17/97	241-T-104	0	1
93-01071-M1	0.83	.	0	.	1/22/97	241-S-104	0	1
92-04771-A	0.89	.	0	.	3/17/96	241-B-202	0	1
S02T000582	0.95	.	0	.	4/6/06	241-AP-108	1	0.787
S95T002195	0.97	.	0	.	9/22/99	241-AW-105	1	0.787
R9591DL	1	.	0	.	11/24/95	241-AW-106	1	0.787
S99T000184	1	.	0	.	4/1/03	241-AW-102	1	0.787
S99T000196	1	.	0	.	4/1/03	241-AW-102	1	0.787
S99T000197	1.1	.	0	.	4/1/03	241-AW-102	1	0.787
S00T001014	1.19	.	0	.	6/16/04	241-AZ-101	1	0.787
S95T002459	1.2	.	0	.	9/29/99	241-AY-102	1	0.787
S95T002473	1.2	.	0	.	9/29/99	241-AY-102	1	0.787
R9771	1.3	.	0	.	11/28/95	241-AW-106	1	0.787
S00T000740	1.34	.	0	.	3/17/04	241-AP-108	1	0.787
96-3096	1.4	.	0	.	1/1/04	241-AP-104	1	0.787
96-3097	1.5	.	0	.	1/1/04	241-AP-104	1	0.787
93-01752-M1	1.6	.	0	.	2/11/97	241-S-104	0	1
S95T002460	1.6	.	0	.	9/29/99	241-AY-102	1	0.787
S95T002474	1.7	.	0	.	9/29/99	241-AY-102	1	0.787
S00T001951	2.0262	.	0	.	1/3/05	241-AW-104	1	0.787
COR46K120	2.1	.	0	.	2/23/97	241-T-104	0	1
S00T000741	2.16	.	0	.	3/17/04	241-AP-108	1	0.787
R9765	2.4	.	0	.	11/26/95	241-AW-106	1	0.787
S00T001956	2.452	.	0	.	1/3/05	241-AW-104	1	0.787
92-04769	3.1	.	0	.	3/14/96	241-B-202	0	1
COR46K122	3.7	.	0	.	2/23/97	241-T-104	0	1
R9771DL	3.9	.	0	.	11/28/95	241-AW-106	1	0.787
S95V000002	3.9	.	0	.	2/11/99	241-AP-107	1	0.787
S95V000003	4	.	0	.	2/11/99	241-AP-107	1	0.787
S95V000005	4	.	0	.	2/11/99	241-AP-107	1	0.787
S95V000001	4.1	.	0	.	2/11/99	241-AP-107	1	0.787
92-04768-A	4.2	.	0	.	3/14/96	241-B-202	0	1
S95V000004	4.2	.	0	.	2/11/99	241-AP-107	1	0.787
R9597DL	4.4	.	0	.	11/26/95	241-AW-106	1	0.787
S00T001953	4.6098	.	0	.	1/3/05	241-AW-104	1	0.787
R9763DL	4.9	.	0	.	11/26/95	241-AW-106	1	0.787

Lab Sample ID	Standard Value	Non-Detect=1	Dup=1	Detection Limit	Analysis Date	Tank	Solid=0 Liquid=1	Liquid to Solid Correction
92-04770-A	5.8	.	0	.	3/17/96	241-B-202	0	1
J742	6	.	0	.	10/22/96	241-C-110	0	1
R9597	6.2	.	0	.	11/26/95	241-AW-106	1	0.787
R9593DL	7.1	.	0	.	11/24/95	241-AW-106	1	0.787
V163	7.3	.	0	.	11/23/98	241-AP-106	1	0.787
R9763	9.3	.	0	.	11/26/95	241-AW-106	1	0.787
93-01074-M1	9.8	.	0	.	1/22/97	241-S-104	0	1
R9591	11	.	0	.	11/24/95	241-AW-106	1	0.787
R9593	11	.	0	.	11/24/95	241-AW-106	1	0.787
R9595DL	11	.	0	.	11/24/95	241-AW-106	1	0.787
R9595	16	.	0	.	11/24/95	241-AW-106	1	0.787
S00T001013	18.8	.	0	.	6/16/04	241-AZ-101	1	0.787
R9589DL	45	.	0	.	11/24/95	241-AW-106	1	0.787
R-936	0.69	.	1	.	1/8/96	241-AP-103	1	0.787
91-07350	5.7	.	1	.	2/27/96	241-B-201	0	1
S03T000098	0.018	1	0	0.018	1/29/07	241-AP-108	1	0.787
Vial #420-2	0.041	1	0	0.041	7/3/95	241-SY-101	0	1
91-0859	0.2	1	0	0.2	6/21/95	241-AW-101	1	0.787
93-06634	0.5	1	0	0.5	5/12/97	241-AP-102	1	0.787
93-06635	0.5	1	0	0.5	5/12/97	241-AP-102	1	0.787
93-06636	0.5	1	0	0.5	5/12/97	241-AP-102	1	0.787
93-06638	0.5	1	0	0.5	5/12/97	241-AP-102	1	0.787
93-06639	0.5	1	0	0.5	5/12/97	241-AP-102	1	0.787
93-06640	0.5	1	0	0.5	5/12/97	241-AP-102	1	0.787
93-06641	0.5	1	0	0.5	5/12/97	241-AP-102	1	0.787
96-3095	0.5	1	0	0.5	1/1/04	241-AP-104	1	0.787
V162	0.5	1	0	0.5	11/23/98	241-AP-106	1	0.787
93-08652	0.5	1	1	0.5	10/14/96	241-AP-107	1	0.787
93-08653	0.5	1	1	0.5	10/14/97	241-AP-107	1	0.787
93-08654	0.5	1	1	0.5	10/14/97	241-AP-107	1	0.787
93-08655	0.5	1	1	0.5	10/14/97	241-AP-107	1	0.787
97-03065	1	1	0	1	1/1/04	241-AY-101	1	0.787
97-03066	1	1	0	1	1/1/04	241-AY-101	1	0.787
97-03067	1	1	0	1	1/1/04	241-AY-101	1	0.787
2A	2	1	0	2	1/12/04	241-AP-107	1	0.787
3A	2	1	0	2	1/12/04	241-AP-107	1	0.787
4A	2	1	0	2	1/12/04	241-AP-107	1	0.787
92-05852-M1	2.7	1	0	3	8/11/96	241-T-111	0	1
J748	2.7	1	0	3	10/27/96	241-C-110	0	1
92-5846-M1	3.3	1	0	3	8/8/96	241-T-111	0	1
92-5849-M1	4.4	1	0	4	8/6/96	241-T-111	0	1
COR45K108	4.4	1	0	4	2/17/97	241-T-104	0	1
92-05845-M1	4.6	1	0	5	8/11/96	241-T-111	0	1
COR45K116	4.6	1	0	5	2/17/97	241-T-104	0	1
COR46K123	4.6	1	0	5	2/23/97	241-T-104	0	1
92-04772	4.8	1	0	5	3/17/96	241-B-202	0	1
92-05844-M1	4.9	1	0	5	8/11/96	241-T-111	0	1
COR46S8	4.9	1	0	5	2/18/97	241-T-104	0	1
COR46K121	5.2	1	0	5	2/23/97	241-T-104	0	1

Lab Sample ID	Standard Value	Non-Detect=1	Dup=1	Detection Limit	Analysis Date	Tank	Solid=0 Liquid=1	Liquid to Solid Correction
COR45K110	5.4	1	0	5	2/17/97	241-T-104	0	1
93-01070-M1	5.5	1	0	6	2/11/97	241-S-104	0	1
93-01069-M1	5.6	1	0	6	2/11/97	241-S-104	0	1
93-01066-M1	5.7	1	0	6	2/20/97	241-S-104	0	1
92-5843-M1	5.8	1	0	6	8/8/96	241-T-111	0	1
COR45K112	5.8	1	0	6	2/17/97	241-T-104	0	1
92-09438-M1	5.9	1	0	6	10/30/96	241-BX-107	0	1
93-01815-M1	6	1	0	6	2/20/97	241-S-104	0	1
COR46S4	6	1	0	6	2/18/97	241-T-104	0	1
92-09441-M1	6.2	1	0	6	11/3/96	241-BX-107	0	1
92-09443-M1	6.2	1	0	6	11/4/96	241-BX-107	0	1
93-01064-M1	6.2	1	0	6	2/20/97	241-S-104	0	1
93-01065-M1	6.2	1	0	6	2/20/97	241-S-104	0	1
93-01073-M1	6.2	1	0	6	1/22/97	241-S-104	0	1
J747	6.2	1	0	6	10/27/96	241-C-110	0	1
91-07374	6.2	1	1	6	2/29/96	241-B-201	0	1
93-01067-M1	6.3	1	0	6	2/20/97	241-S-104	0	1
93-01750-M1	6.3	1	0	6	2/5/97	241-S-104	0	1
92-09444-M1	6.4	1	0	6	11/4/96	241-BX-107	0	1
J745	6.4	1	0	6	10/22/96	241-C-110	0	1
92-5850-M1	6.5	1	0	6	8/6/96	241-T-111	0	1
COR46S2	6.5	1	0	6	2/18/97	241-T-104	0	1
92-09440-M1	6.6	1	0	7	11/3/96	241-BX-107	0	1
92-09439-M1	6.7	1	0	7	10/30/96	241-BX-107	0	1
J749	6.7	1	0	7	10/27/96	241-C-110	0	1
92-6750-A1	6.8	1	0	7	6/24/96	241-C-112	0	1
COR46S9	6.8	1	0	7	2/18/97	241-T-104	0	1
92-05842-M1	6.9	1	0	7	8/6/96	241-T-111	0	1
91-07358	7	1	1	7	2/28/96	241-B-201	0	1
92-05848-M1	9.5	1	0	10	8/11/96	241-T-111	0	1
92-05851-M1	14	1	0	14	8/11/96	241-T-111	0	1
92-09442-M1	26	1	0	26	11/3/96	241-BX-107	0	1
93-01068-M1	61	1	0	61	2/5/97	241-S-104	0	1
93-01751-M1	63	1	0	63	2/5/97	241-S-104	0	1
Methylene Chloride								
R9765	0.0005	.	0	0	11/26/95	241-AW-106	1	0.787
R9771	0.0005	.	0	0	11/28/95	241-AW-106	1	0.787
R9591	0.0006	.	0	0	11/24/95	241-AW-106	1	0.787
R9593	0.0006	.	0	0	11/24/95	241-AW-106	1	0.787
R9595	0.0006	.	0	0	11/24/95	241-AW-106	1	0.787
R9597	0.0006	.	0	0	11/26/95	241-AW-106	1	0.787
R9763	0.0006	.	0	0	11/26/95	241-AW-106	1	0.787
R9769	0.0006	.	0	0	11/28/95	241-AW-106	1	0.787
R9589DL	0.001	.	0	0	11/24/95	241-AW-106	1	0.787
R9767	0.002	.	0	0	11/28/95	241-AW-106	1	0.787
R9765DL	0.003	.	0	0	11/26/95	241-AW-106	1	0.787
Vial #529-2	0.008	.	0	0	7/31/95	241-SY-101	0	1
Vial #533-2	0.01	.	0	0	7/31/95	241-SY-101	0	1

Lab Sample ID	Standard Value	Non-Detect=1	Dup=1	Detection Limit	Analysis Date	Tank	Solid=0 Liquid=1	Liquid to Solid Correction
Vial #424-2	0.014	.	0	0	7/3/95	241-SY-101	0	1
R9597DL	0.044	.	0	0	11/26/95	241-AW-106	1	0.787
R9763DL	0.061	.	0	0	11/26/95	241-AW-106	1	0.787
R9591DL	0.085	.	0	0	11/24/95	241-AW-106	1	0.787
R9595DL	0.092	.	0	0	11/24/95	241-AW-106	1	0.787
R9593DL	0.11	.	0	0	11/24/95	241-AW-106	1	0.787
S00T001013	0.139	.	0	0	6/16/04	241-AZ-101	1	0.787
S00T001216	0.197	.	0	0	7/20/04	241-AZ-101	1	0.787
S00T001014	0.199	.	0	0	6/16/04	241-AZ-101	1	0.787
S00T001214	0.23	.	0	0	7/19/04	241-AZ-101	1	0.787
S00T001215	0.232	.	0	0	7/19/04	241-AZ-101	1	0.787
S00T001012	0.233	.	0	0	6/9/04	241-AZ-101	1	0.787
S00T001213	0.24	.	0	0	7/19/04	241-AZ-101	1	0.787
COR46K122	0.32	.	0	0	2/23/97	241-T-104	0	1
S00T001011	0.383	.	0	0	6/9/04	241-AZ-101	1	0.787
COR46K121	0.39	.	0	0	2/23/97	241-T-104	0	1
COR46K123	0.4	.	0	0	2/23/97	241-T-104	0	1
COR46K120	0.61	.	0	0	2/23/97	241-T-104	0	1
R-936	0.0004	.	1	1	1/8/96	241-AP-103	1	0.787
R9771DL	0.01	1	0	0.01	11/28/95	241-AW-106	1	0.787
Vial #420-2	0.02	1	0	0.02	7/3/95	241-SY-101	0	1
Vial #563-2	0.022	1	0	0.022	7/3/95	241-SY-101	0	1
Vial #421-2	0.023	1	0	0.023	7/3/95	241-SY-101	0	1
94-04448	0.025	1	0	0.025	4/2/98	241-AP-108	1	0.787
94-04449	0.025	1	0	0.025	4/2/98	241-AP-108	1	0.787
94-04450	0.025	1	0	0.025	4/2/98	241-AP-108	1	0.787
S03T000858	0.025	1	0	0.025	4/3/07	241-TX-116	1	0.787
S03T000889	0.025	1	0	0.025	4/22/07	241-TX-116	1	0.787
Vial #531-2	0.026	1	0	0.026	7/31/95	241-SY-101	0	1
R9769DL	0.05	1	0	0.05	11/28/95	241-AW-106	1	0.787
V133	0.05	1	0	0.05	7/1/98	241-AP-108	1	0.787
V134	0.05	1	0	0.05	7/1/98	241-AP-108	1	0.787
91-0859	0.1	1	0	0.1	6/21/95	241-AW-101	1	0.787
93-06634	0.25	1	0	0.25	5/12/97	241-AP-102	1	0.787
93-06635	0.25	1	0	0.25	5/12/97	241-AP-102	1	0.787
93-06636	0.25	1	0	0.25	5/12/97	241-AP-102	1	0.787
93-06637MS	0.25	1	0	0.25	5/12/97	241-AP-102	1	0.787
93-06638	0.25	1	0	0.25	5/12/97	241-AP-102	1	0.787
93-06639	0.25	1	0	0.25	5/12/97	241-AP-102	1	0.787
93-06640	0.25	1	0	0.25	5/12/97	241-AP-102	1	0.787
93-06641	0.25	1	0	0.25	5/12/97	241-AP-102	1	0.787
VBLK	0.25	1	1	0.25	10/14/97	241-AP-107	1	0.787
96-3095	0.5	1	0	0.5	1/1/04	241-AP-104	1	0.787
96-3096	0.5	1	0	0.5	1/1/04	241-AP-104	1	0.787
96-3097	0.5	1	0	0.5	1/1/04	241-AP-104	1	0.787
97-03065	1	1	0	1	1/1/04	241-AY-101	1	0.787
97-03066	1	1	0	1	1/1/04	241-AY-101	1	0.787
97-03067	1	1	0	1	1/1/04	241-AY-101	1	0.787
92-05845-M1	1.3	1	0	1.3	8/11/96	241-T-111	0	1

Lab Sample ID	Standard Value	Non-Detect=1	Dup=1	Detection Limit	Analysis Date	Tank	Solid=0 Liquid=1	Liquid to Solid Correction
92-05852-M1	1.3	1	0	1.3	8/11/96	241-T-111	0	1
92-05844-M1	1.6	1	0	1.6	8/11/96	241-T-111	0	1
92-5846-M1	1.6	1	0	1.6	8/8/96	241-T-111	0	1
92-5850-M1	1.6	1	0	1.6	8/6/96	241-T-111	0	1
92-05842-M1	2	1	0	2	8/6/96	241-T-111	0	1
91-07350	2	1	1	2	2/27/96	241-B-201	0	1
92-5843-M1	2.2	1	0	2.2	8/8/96	241-T-111	0	1
92-5849-M1	2.2	1	0	2.2	8/6/96	241-T-111	0	1
COR45K108	2.2	1	0	2.2	2/17/97	241-T-104	0	1
92-05848-M1	2.3	1	0	2.3	8/11/96	241-T-111	0	1
COR45K116	2.3	1	0	2.3	2/17/97	241-T-104	0	1
92-04772	2.4	1	0	2.4	3/17/96	241-B-202	0	1
92-04771-A	2.5	1	0	2.5	3/17/96	241-B-202	0	1
COR46S8	2.5	1	0	2.5	2/18/97	241-T-104	0	1
93-01070-M1	2.7	1	0	2.7	2/11/97	241-S-104	0	1
COR45K110	2.7	1	0	2.7	2/17/97	241-T-104	0	1
92-04768-A	2.8	1	0	2.8	3/14/96	241-B-202	0	1
93-01069-M1	2.8	1	0	2.8	2/11/97	241-S-104	0	1
92-04769	2.9	1	0	2.9	3/14/96	241-B-202	0	1
92-09438-M1	2.9	1	0	2.9	10/30/96	241-BX-107	0	1
93-01066-M1	2.9	1	0	2.9	2/20/97	241-S-104	0	1
COR45K112	2.9	1	0	2.9	2/17/97	241-T-104	0	1
J748	2.9	1	0	2.9	10/27/96	241-C-110	0	1
93-01071-M1	3	1	0	3	1/22/97	241-S-104	0	1
93-01815-M1	3	1	0	3	2/20/97	241-S-104	0	1
COR45K114	3	1	0	3	2/17/97	241-T-104	0	1
COR46S4	3	1	0	3	2/18/97	241-T-104	0	1
92-04770-A	3.1	1	0	3.1	3/17/96	241-B-202	0	1
92-09441-M1	3.1	1	0	3.1	11/3/96	241-BX-107	0	1
92-09443-M1	3.1	1	0	3.1	11/4/96	241-BX-107	0	1
93-01064-M1	3.1	1	0	3.1	2/20/97	241-S-104	0	1
93-01065-M1	3.1	1	0	3.1	2/20/97	241-S-104	0	1
93-01067-M1	3.1	1	0	3.1	2/20/97	241-S-104	0	1
93-01073-M1	3.1	1	0	3.1	1/22/97	241-S-104	0	1
J747	3.1	1	0	3.1	10/27/96	241-C-110	0	1
91-07374	3.1	1	1	3.1	2/29/96	241-B-201	0	1
92-09442-M1	3.2	1	0	3.2	11/3/96	241-BX-107	0	1
92-09444-M1	3.2	1	0	3.2	11/4/96	241-BX-107	0	1
93-01750-M1	3.2	1	0	3.2	2/5/97	241-S-104	0	1
93-01752-M1	3.2	1	0	3.2	2/11/97	241-S-104	0	1
J745	3.2	1	0	3.2	10/22/96	241-C-110	0	1
92-09439-M1	3.3	1	0	3.3	10/30/96	241-BX-107	0	1
92-09440-M1	3.3	1	0	3.3	11/3/96	241-BX-107	0	1
93-01074-M1	3.3	1	0	3.3	1/22/97	241-S-104	0	1
COR46S2	3.3	1	0	3.3	2/18/97	241-T-104	0	1
J749	3.3	1	0	3.3	10/27/96	241-C-110	0	1
92-6750-A1	3.4	1	0	3.4	6/24/96	241-C-112	0	1
COR46S9	3.4	1	0	3.4	2/18/97	241-T-104	0	1
J742	3.4	1	0	3.4	10/22/96	241-C-110	0	1

Lab Sample ID	Standard Value	Non-Detect=1	Dup=1	Detection Limit	Analysis Date	Tank	Solid=0 Liquid=1	Liquid to Solid Correction
91-07358	3.5	1	1	3.5	2/28/96	241-B-201	0	1
92-05851-M1	14	1	0	14	8/11/96	241-T-111	0	1
93-01068-M1	30	1	0	30	2/5/97	241-S-104	0	1
93-01751-M1	32	1	0	32	2/5/97	241-S-104	0	1
O-Cresol								
S03T000854	0.2	1	0	0.2	4/10/07	241-TX-116	1	0.787
S03T000891	0.2	1	0	0.2	5/17/07	241-TX-116	1	0.787
R318	0.5	1	0	0.5	3/20/96	241-AW-106	1	0.787
R318RR	0.5	1	0	0.5	5/29/96	241-AW-106	1	0.787
R319	0.5	1	0	0.5	5/22/96	241-AW-106	1	0.787
R321	0.5	1	0	0.5	3/28/96	241-AW-106	1	0.787
R321RR	0.5	1	0	0.5	5/28/96	241-AW-106	1	0.787
R322	0.5	1	0	0.5	3/21/96	241-AW-106	1	0.787
R326	0.5	1	0	0.5	3/5/96	241-AW-106	1	0.787
R327	0.5	1	0	0.5	3/5/96	241-AW-106	1	0.787
R328	0.5	1	0	0.5	5/22/96	241-AW-106	1	0.787
R329	0.5	1	0	0.5	3/6/96	241-AW-106	1	0.787
R330	0.5	1	0	0.5	3/28/96	241-AW-106	1	0.787
R320	0.67	1	0	0.67	3/28/96	241-AW-106	1	0.787
93-06634	1	1	0	1	5/27/97	241-AP-102	1	0.787
93-06635	1	1	0	1	5/27/97	241-AP-102	1	0.787
93-06636	1	1	0	1	5/28/97	241-AP-102	1	0.787
93-06637	1	1	0	1	5/27/97	241-AP-102	1	0.787
93-06638	1	1	0	1	5/26/97	241-AP-102	1	0.787
93-06639	1	1	0	1	5/27/97	241-AP-102	1	0.787
93-06640	1	1	0	1	5/27/97	241-AP-102	1	0.787
93-06641	1	1	0	1	5/28/97	241-AP-102	1	0.787
94-04446	1	1	0	1	4/7/98	241-AP-108	1	0.787
94-04448	1	1	0	1	4/8/98	241-AP-108	1	0.787
94-04449	1	1	0	1	4/7/98	241-AP-108	1	0.787
94-04450	1	1	0	1	4/7/98	241-AP-108	1	0.787
97-03065	1	1	0	1	1/1/04	241-AY-101	1	0.787
97-03066	1	1	0	1	1/1/04	241-AY-101	1	0.787
97-03067	1	1	0	1	1/1/04	241-AY-101	1	0.787
V133	1	1	0	1	7/27/98	241-AP-108	1	0.787
V134	1	1	0	1	7/27/98	241-AP-108	1	0.787
93-06635PPT	2	1	0	2	5/25/97	241-AP-102	1	0.787
93-06636PPT	2	1	0	2	5/25/97	241-AP-102	1	0.787
93-06637PPT	2	1	0	2	5/25/97	241-AP-102	1	0.787
93-06638PPT	2	1	0	2	5/25/97	241-AP-102	1	0.787
93-06639PPT	2	1	0	2	5/26/97	241-AP-102	1	0.787
93-08644-E1	2	1	0	2	9/2/97	241-AP-101	1	0.787
93-08645-E1	2	1	0	2	9/2/97	241-AP-101	1	0.787
93-08646-E1	2	1	0	2	9/2/97	241-AP-101	1	0.787
93-08647	2	1	0	2	9/3/97	241-AP-101	1	0.787
93-08648	2	1	0	2	9/3/97	241-AP-101	1	0.787
93-08652	2	1	0	2	9/9/97	241-AP-107	1	0.787

Lab Sample ID	Standard Value	Non-Detect=1	Dup=1	Detection Limit	Analysis Date	Tank	Solid=0 Liquid=1	Liquid to Solid Correction
93-08653	2	1	0	2	9/9/97	241-AP-107	1	0.787
93-08654	2	1	0	2	9/10/97	241-AP-107	1	0.787
93-08655	2	1	0	2	9/10/97	241-AP-107	1	0.787
SBLK	2	1	0	2	9/9/97	241-AP-107	1	0.787
93-06634PPT	2.2	1	0	2.2	5/25/97	241-AP-102	1	0.787
93-06640PPT	2.3	1	0	2.3	5/26/97	241-AP-102	1	0.787
Vial #1061	2.5	1	0	2.5	10/23/95	241-SY-101	1	0.787
Vial #1063	4	1	0	4	10/23/95	241-SY-101	1	0.787
93-01810-E1	8.8	1	0	8.8	3/9/97	241-T-104	0	1
93-01809-E1	9.1	1	0	9.1	3/9/97	241-T-104	0	1
92-09437-E1	9.2	1	0	9.2	12/16/96	241-C-110	0	1
93-01811-E1	9.2	1	0	9.2	3/10/97	241-T-104	0	1
93-01756-E1	9.3	1	0	9.3	1/9/97	241-S-104	0	1
93-04312-E1	9.3	1	0	9.3	4/30/97	241-B-111	0	1
92-11297-E1	9.7	1	0	9.7	12/23/96	241-BX-107	0	1
93-04313-E1	9.7	1	0	9.7	4/30/97	241-B-111	0	1
92-08307-E1	9.8	1	0	9.8	12/15/96	241-C-110	0	1
93-04316-E1	9.8	1	0	9.8	5/5/97	241-B-111	0	1
93-04317-E1	9.9	1	0	9.9	5/5/97	241-B-111	0	1
92-08305-E1	10	1	0	10	12/9/96	241-C-110	0	1
92-08311-E1	10	1	0	10	12/12/96	241-C-110	0	1
92-08303-E1	11	1	0	11	12/9/96	241-C-110	0	1
92-08309-E1	11	1	0	11	12/12/96	241-C-110	0	1
92-11296-E1	11	1	0	11	12/23/96	241-BX-107	0	1
92-11299-E1	11	1	0	11	12/23/96	241-BX-107	0	1
93-01076-E1	11	1	0	11	1/9/97	241-S-104	0	1
93-01812-E1	11	1	0	11	3/10/97	241-T-104	0	1
92-11298-E1	12	1	0	12	12/23/96	241-BX-107	0	1
92-08277-E1	13	1	0	13	9/4/96	241-T-111	0	1
93-01758-E1	14	1	0	14	12/30/96	241-S-104	0	1
92-08279-E1	16	1	0	16	9/4/96	241-T-111	0	1
93-01757-E1	16	1	0	16	1/12/97	241-S-104	0	1
92-06747-E1	17	1	0	17	6/16/96	241-C-112	0	1
92-06767-E1	18	1	0	18	10/4/96	241-C-112	0	1
92-10669-D4	18	1	0	18	1/19/97	241-B-201	0	1
93-07230-E1	18	1	0	18	8/14/97	241-T-107	0	1
0	19	1	0	19	1/19/97	241-B-201	0	1
92-05078-B2	19	1	0	19	4/25/96	241-SY-101	0	1
92-05085-2	19	1	0	19	4/26/96	241-SY-101	0	1
93-01354-E1	19	1	0	19	2/6/97	241-C-109	1	0.787
92-05072-A1	20	1	0	20	4/25/96	241-SY-101	0	1
92-05072-A4	20	1	0	20	4/25/96	241-SY-101	0	1
92-05072-B	20	1	0	20	4/25/96	241-SY-101	0	1
92-05078-A2	20	1	0	20	4/25/96	241-SY-101	0	1
92-05091-2	20	1	0	20	4/26/96	241-SY-101	0	1
92-08283-E1	20	1	0	20	9/4/96	241-T-111	0	1
92-08293-E1	21	1	0	21	9/5/96	241-B-202	0	1
93-01371-E1	21	1	0	21	1/22/97	241-C-109	0	1
93-01759-E1	21	1	0	21	12/30/96	241-S-104	0	1

Lab Sample ID	Standard Value	Non-Detect=1	Dup=1	Detection Limit	Analysis Date	Tank	Solid=0 Liquid=1	Liquid to Solid Correction
92-06774-E1	22	1	0	22	9/26/96	241-C-112	0	1
92-08291-E1	23	1	0	23	9/5/96	241-B-202	0	1
93-01358-E1	24	1	0	24	1/22/97	241-C-109	0	1
92-08281-E1	25	1	0	25	9/4/96	241-T-111	0	1
92-08289-E1	27	1	0	27	9/5/96	241-B-202	0	1
93-01760-E1	27	1	0	27	12/30/96	241-S-104	0	1
92-08295-E1	29	1	0	29	9/5/96	241-B-202	0	1
91-0859	50	1	0	50	3/27/95	241-AW-101	1	0.787
Vial #1061	97	1	0	97	10/24/95	241-SY-101	0	1
Vial #1060	110	1	0	110	10/24/95	241-SY-101	0	1
Vial #1063	110	1	0	110	10/24/95	241-SY-101	0	1
Vial #1062	160	1	0	160	10/24/95	241-SY-101	0	1
P-Cresol								
R318	0.5	1	0	0.5	3/20/96	241-AW-106	1	0.787
R318RR	0.5	1	0	0.5	5/29/96	241-AW-106	1	0.787
R319	0.5	1	0	0.5	5/22/96	241-AW-106	1	0.787
R321	0.5	1	0	0.5	3/28/96	241-AW-106	1	0.787
R321RR	0.5	1	0	0.5	5/28/96	241-AW-106	1	0.787
R322	0.5	1	0	0.5	3/21/96	241-AW-106	1	0.787
R326	0.5	1	0	0.5	3/5/96	241-AW-106	1	0.787
R327	0.5	1	0	0.5	3/5/96	241-AW-106	1	0.787
R328	0.5	1	0	0.5	5/22/96	241-AW-106	1	0.787
R329	0.5	1	0	0.5	3/6/96	241-AW-106	1	0.787
R330	0.5	1	0	0.5	3/28/96	241-AW-106	1	0.787
R320	0.67	1	0	0.67	3/28/96	241-AW-106	1	0.787
93-06634	1	1	0	1	5/27/97	241-AP-102	1	0.787
93-06635	1	1	0	1	5/27/97	241-AP-102	1	0.787
93-06636	1	1	0	1	5/28/97	241-AP-102	1	0.787
93-06637	1	1	0	1	5/27/97	241-AP-102	1	0.787
93-06638	1	1	0	1	5/26/97	241-AP-102	1	0.787
93-06639	1	1	0	1	5/27/97	241-AP-102	1	0.787
93-06640	1	1	0	1	5/27/97	241-AP-102	1	0.787
93-06641	1	1	0	1	5/28/97	241-AP-102	1	0.787
94-04446	1	1	0	1	4/7/98	241-AP-108	1	0.787
94-04448	1	1	0	1	4/8/98	241-AP-108	1	0.787
94-04449	1	1	0	1	4/7/98	241-AP-108	1	0.787
94-04450	1	1	0	1	4/7/98	241-AP-108	1	0.787
97-03065	1	1	0	1	1/1/04	241-AY-101	1	0.787
97-03066	1	1	0	1	1/1/04	241-AY-101	1	0.787
97-03067	1	1	0	1	1/1/04	241-AY-101	1	0.787
V133	1	1	0	1	7/27/98	241-AP-108	1	0.787
V134	1	1	0	1	7/27/98	241-AP-108	1	0.787
93-06635PPT	2	1	0	2	5/25/97	241-AP-102	1	0.787
93-06636PPT	2	1	0	2	5/25/97	241-AP-102	1	0.787
93-06637PPT	2	1	0	2	5/25/97	241-AP-102	1	0.787
93-06638PPT	2	1	0	2	5/25/97	241-AP-102	1	0.787
93-06639PPT	2	1	0	2	5/26/97	241-AP-102	1	0.787

Lab Sample ID	Standard Value	Non-Detect=1	Dup=1	Detection Limit	Analysis Date	Tank	Solid=0 Liquid=1	Liquid to Solid Correction
93-08644-E1	2	1	0	2	9/2/97	241-AP-101	1	0.787
93-08645-E1	2	1	0	2	9/2/97	241-AP-101	1	0.787
93-08646-E1	2	1	0	2	9/2/97	241-AP-101	1	0.787
93-08647	2	1	0	2	9/3/97	241-AP-101	1	0.787
93-08648	2	1	0	2	9/3/97	241-AP-101	1	0.787
93-08652	2	1	0	2	9/9/97	241-AP-107	1	0.787
93-08653	2	1	0	2	9/9/97	241-AP-107	1	0.787
93-08654	2	1	0	2	9/10/97	241-AP-107	1	0.787
93-08655	2	1	0	2	9/10/97	241-AP-107	1	0.787
SBLK	2	1	0	2	9/9/97	241-AP-107	1	0.787
93-06634PPT	2.2	1	0	2.2	5/25/97	241-AP-102	1	0.787
93-06640PPT	2.3	1	0	2.3	5/26/97	241-AP-102	1	0.787
Vial #1061	2.5	1	0	2.5	10/23/95	241-SY-101	1	0.787
Vial #1063	4	1	0	4	10/23/95	241-SY-101	1	0.787
93-07218-E1	5	1	0	5	8/14/97	241-T-107	1	0.787
93-01810-E1	8.8	1	0	8.8	3/9/97	241-T-104	0	1
93-01809-E1	9.1	1	0	9.1	3/9/97	241-T-104	0	1
92-09437-E1	9.2	1	0	9.2	12/16/96	241-C-110	0	1
93-01811-E1	9.2	1	0	9.2	3/10/97	241-T-104	0	1
93-01756-E1	9.3	1	0	9.3	1/9/97	241-S-104	0	1
93-04312-E1	9.3	1	0	9.3	4/30/97	241-B-111	0	1
92-11297-E1	9.7	1	0	9.7	12/23/96	241-BX-107	0	1
93-04313-E1	9.7	1	0	9.7	4/30/97	241-B-111	0	1
92-08307-E1	9.8	1	0	9.8	12/15/96	241-C-110	0	1
93-04316-E1	9.8	1	0	9.8	5/5/97	241-B-111	0	1
93-04317-E1	9.9	1	0	9.9	5/5/97	241-B-111	0	1
92-08305-E1	10	1	0	10	12/9/96	241-C-110	0	1
92-08311-E1	10	1	0	10	12/12/96	241-C-110	0	1
92-08303-E1	11	1	0	11	12/9/96	241-C-110	0	1
92-08309-E1	11	1	0	11	12/12/96	241-C-110	0	1
92-11296-E1	11	1	0	11	12/23/96	241-BX-107	0	1
92-11299-E1	11	1	0	11	12/23/96	241-BX-107	0	1
93-01076-E1	11	1	0	11	1/9/97	241-S-104	0	1
93-01812-E1	11	1	0	11	3/10/97	241-T-104	0	1
92-11298-E1	12	1	0	12	12/23/96	241-BX-107	0	1
92-08277-E1	13	1	0	13	9/4/96	241-T-111	0	1
93-01758-E1	14	1	0	14	12/30/96	241-S-104	0	1
92-08279-E1	16	1	0	16	9/4/96	241-T-111	0	1
93-01757-E1	16	1	0	16	1/12/97	241-S-104	0	1
92-06747-E1	17	1	0	17	6/16/96	241-C-112	0	1
92-06767-E1	18	1	0	18	10/4/96	241-C-112	0	1
92-10669-D4	18	1	0	18	1/19/97	241-B-201	0	1
93-07230-E1	18	1	0	18	8/14/97	241-T-107	0	1
0	19	1	0	19	1/19/97	241-B-201	0	1
92-05078-B2	19	1	0	19	4/25/96	241-SY-101	0	1
92-05085-2	19	1	0	19	4/26/96	241-SY-101	0	1
93-01354-E1	19	1	0	19	2/6/97	241-C-109	1	0.787
92-05072-A1	20	1	0	20	4/25/96	241-SY-101	0	1
92-05072-A4	20	1	0	20	4/25/96	241-SY-101	0	1

Lab Sample ID	Standard Value	Non-Detect=1	Dup=1	Detection Limit	Analysis Date	Tank	Solid=0 Liquid=1	Liquid to Solid Correction
92-05072-B	20	1	0	20	4/25/96	241-SY-101	0	1
92-05078-A2	20	1	0	20	4/25/96	241-SY-101	0	1
92-05091-2	20	1	0	20	4/26/96	241-SY-101	0	1
92-08283-E1	20	1	0	20	9/4/96	241-T-111	0	1
92-08293-E1	21	1	0	21	9/5/96	241-B-202	0	1
93-01371-E1	21	1	0	21	1/22/97	241-C-109	0	1
93-01759-E1	21	1	0	21	12/30/96	241-S-104	0	1
92-06774-E1	22	1	0	22	9/26/96	241-C-112	0	1
92-08291-E1	23	1	0	23	9/5/96	241-B-202	0	1
93-01358-E1	24	1	0	24	1/22/97	241-C-109	0	1
92-08281-E1	25	1	0	25	9/4/96	241-T-111	0	1
92-08289-E1	27	1	0	27	9/5/96	241-B-202	0	1
93-01760-E1	27	1	0	27	12/30/96	241-S-104	0	1
92-08295-E1	29	1	0	29	9/5/96	241-B-202	0	1
91-0859	50	1	0	50	3/27/95	241-AW-101	1	0.787
92-03254-E1	70	1	1	70	6/18/96	241-B-201	0	1
92-03255-E1	89	1	1	89	6/18/96	241-B-201	0	1
Vial #1061	97	1	0	97	10/24/95	241-SY-101	0	1
Vial #1060	110	1	0	110	10/24/95	241-SY-101	0	1
Vial #1063	110	1	0	110	10/24/95	241-SY-101	0	1
Vial #1062	160	1	0	160	10/24/95	241-SY-101	0	1
Methyl Ethyl Ketone								
V133	0.036	0	0	0	6/30/94	241-AP-108	1	0.787
V150	0.049	0	0	0	11/22/94	241-AP-106	1	0.787
R9769	0.057	0	0	0	11/27/91	241-AW-106	1	0.787
V134	0.062	0	0	0	6/30/94	241-AP-108	1	0.787
S00T000739	0.0655	0	0	0	3/16/00	241-AP-108	1	0.787
R9771	0.067	0	0	0	11/27/91	241-AW-106	1	0.787
Vial #533-2	0.068	0	0	0	7/30/91	241-SY-101	0	1
S00T000740	0.075	0	0	0	3/16/00	241-AP-108	1	0.787
Vial #420-2	0.076	0	0	0	7/2/91	241-SY-101	0	1
Vial #529-2	0.086	0	0	0	7/30/91	241-SY-101	0	1
Vial #424-2	0.092	0	0	0	7/2/91	241-SY-101	0	1
R9597	0.097	0	0	0	11/25/91	241-AW-106	1	0.787
S00T000741	0.103	0	0	0	3/16/00	241-AP-108	1	0.787
S02T001300	0.11	0	0	0	7/24/02	241-AP-107	1	0.787
S02T001307	0.11	0	0	0	7/24/02	241-AP-107	1	0.787
Vial #563-2	0.11	0	0	0	7/2/91	241-SY-101	0	1
R9763	0.12	0	0	0	11/25/91	241-AW-106	1	0.787
S02T001296	0.12	0	0	0	9/4/02	241-AP-107	1	0.787
R9767	0.13	0	0	0	11/27/91	241-AW-106	1	0.787
R9591	0.15	0	0	0	11/23/91	241-AW-106	1	0.787
R9593	0.15	0	0	0	11/23/91	241-AW-106	1	0.787
R9769DL	0.16	0	0	0	11/27/91	241-AW-106	1	0.787
R9595	0.2	0	0	0	11/23/91	241-AW-106	1	0.787
R9765DL	0.2	0	0	0	11/25/91	241-AW-106	1	0.787
S02T002473	0.2	0	0	0	12/4/02	241-SY-101	1	0.787

Lab Sample ID	Standard Value	Non-Detect=1	Dup=1	Detection Limit	Analysis Date	Tank	Solid=0 Liquid=1	Liquid to Solid Correction
S02T002507	0.21	0	0	0	12/4/02	241-SY-101	1	0.787
R9765	0.24	0	0	0	11/25/91	241-AW-106	1	0.787
S02T002476	0.24	0	0	0	12/4/02	241-SY-101	1	0.787
S00T001011	0.357	0	0	0	6/8/00	241-AZ-101	1	0.787
S00T001012	0.378	0	0	0	6/8/00	241-AZ-101	1	0.787
S00T001216	0.412	0	0	0	7/19/00	241-AZ-101	1	0.787
S99T000196	0.5	0	0	0	3/31/99	241-AW-102	1	0.787
S99T000197	0.5	0	0	0	3/31/99	241-AW-102	1	0.787
S00T001215	0.517	0	0	0	7/18/00	241-AZ-101	1	0.787
S00T001214	0.545	0	0	0	7/18/00	241-AZ-101	1	0.787
R9771DL	0.56	0	0	0	11/27/91	241-AW-106	1	0.787
93-06637MS	0.59	0	0	0	5/11/93	241-AP-102	1	0.787
S00T001213	0.616	0	0	0	7/18/00	241-AZ-101	1	0.787
R9589DL	0.62	0	0	0	11/23/91	241-AW-106	1	0.787
S01T000090	0.733	0	0	0	1/23/01	241-AP-107	1	0.787
S00T001014	0.847	0	0	0	6/15/00	241-AZ-101	1	0.787
S00T001013	0.862	0	0	0	6/15/00	241-AZ-101	1	0.787
S00T002255	0.926	0	0	0	1/23/01	241-AP-107	1	0.787
S01T000089	0.964	0	0	0	1/23/01	241-AP-107	1	0.787
S00T001951	1.2876	0	0	0	1/2/01	241-AW-104	1	0.787
J747	1.3	0	0	0	10/26/92	241-C-110	0	1
92-05848-M1	1.6	0	0	0	8/10/92	241-T-111	0	1
J749	1.6	0	0	0	10/26/92	241-C-110	0	1
92-04768-A	2.3	0	0	0	3/13/92	241-B-202	0	1
R9597DL	3	0	0	0	11/25/91	241-AW-106	1	0.787
R9763DL	3.1	0	0	0	11/25/91	241-AW-106	1	0.787
R9591DL	7.6	0	0	0	11/23/91	241-AW-106	1	0.787
R9593DL	8.1	0	0	0	11/23/91	241-AW-106	1	0.787
R9595DL	8.1	0	0	0	11/23/91	241-AW-106	1	0.787
R-936	0.058	0	1	1	1/7/92	241-AP-103	1	0.787
S03T000098	0.016	1	0	0.016	1/28/03	241-AP-108	1	0.787
S03T000099	0.016	1	0	0.016	1/28/03	241-AP-108	1	0.787
S03T000100	0.016	1	0	0.016	1/28/03	241-AP-108	1	0.787
S03T000858	0.016	1	0	0.016	4/2/03	241-TX-116	1	0.787
S03T000889	0.016	1	0	0.016	4/21/03	241-TX-116	1	0.787
Vial #421-2	0.046	1	0	0.046	7/2/91	241-SY-101	0	1
94-04448	0.05	1	0	0.05	4/1/94	241-AP-108	1	0.787
94-04449	0.05	1	0	0.05	4/1/94	241-AP-108	1	0.787
94-04450	0.05	1	0	0.05	4/1/94	241-AP-108	1	0.787
S02T000582	0.05	1	0	0.05	4/5/02	241-AP-108	1	0.787
S02T000584	0.05	1	0	0.05	4/5/02	241-AP-108	1	0.787
S02T000600	0.05	1	0	0.05	4/5/02	241-AP-108	1	0.787
Vial #531-2	0.051	1	0	0.051	7/30/91	241-SY-101	0	1
91-0859	0.2	1	0	0.2	6/20/91	241-AW-101	1	0.787
93-06634	0.5	1	0	0.5	5/11/93	241-AP-102	1	0.787
93-06635	0.5	1	0	0.5	5/11/93	241-AP-102	1	0.787
93-06636	0.5	1	0	0.5	5/11/93	241-AP-102	1	0.787
93-06638	0.5	1	0	0.5	5/11/93	241-AP-102	1	0.787
93-06639	0.5	1	0	0.5	5/11/93	241-AP-102	1	0.787

Lab Sample ID	Standard Value	Non-Detect=1	Dup=1	Detection Limit	Analysis Date	Tank	Solid=0 Liquid=1	Liquid to Solid Correction
93-06640	0.5	1	0	0.5	5/11/93	241-AP-102	1	0.787
93-06641	0.5	1	0	0.5	5/11/93	241-AP-102	1	0.787
96-3095	0.5	1	0	0.5	1/1/04	241-AP-104	1	0.787
96-3096	0.5	1	0	0.5	1/1/04	241-AP-104	1	0.787
96-3097	0.5	1	0	0.5	1/1/04	241-AP-104	1	0.787
S95V000001	0.5	1	0	0.5	2/10/95	241-AP-107	1	0.787
S95V000002	0.5	1	0	0.5	2/10/95	241-AP-107	1	0.787
S95V000003	0.5	1	0	0.5	2/10/95	241-AP-107	1	0.787
S99T000184	0.5	1	0	0.5	3/31/99	241-AW-102	1	0.787
V162	0.5	1	0	0.5	11/22/94	241-AP-106	1	0.787
V163	0.5	1	0	0.5	11/22/94	241-AP-106	1	0.787
93-08652	0.5	1	1	0.5	10/13/92	241-AP-107	1	0.787
93-08653	0.5	1	1	0.5	10/13/93	241-AP-107	1	0.787
93-08654	0.5	1	1	0.5	10/13/93	241-AP-107	1	0.787
93-08655	0.5	1	1	0.5	10/13/93	241-AP-107	1	0.787
VBLK	0.5	1	1	0.5	10/13/93	241-AP-107	1	0.787
97-03065	1	1	0	1	1/1/04	241-AY-101	1	0.787
97-03066	1	1	0	1	1/1/04	241-AY-101	1	0.787
97-03067	1	1	0	1	1/1/04	241-AY-101	1	0.787
S00T001953	1.25	1	0	1.25	1/2/01	241-AW-104	1	0.787
S00T001956	1.25	1	0	1.25	1/2/01	241-AW-104	1	0.787
2A	2	1	0	2	1/11/00	241-AP-107	1	0.787
3A	2	1	0	2	1/11/00	241-AP-107	1	0.787
4A	2	1	0	2	1/11/00	241-AP-107	1	0.787
92-05845-M1	2.7	1	0	2.7	8/10/92	241-T-111	0	1
92-05852-M1	2.7	1	0	2.7	8/10/92	241-T-111	0	1
92-05842-M1	2.8	1	0	2.8	8/5/92	241-T-111	0	1
92-5850-M1	3.2	1	0	3.2	8/5/92	241-T-111	0	1
92-05844-M1	3.3	1	0	3.3	8/10/92	241-T-111	0	1
92-5846-M1	3.3	1	0	3.3	8/7/92	241-T-111	0	1
92-5843-M1	4.4	1	0	4.4	8/7/92	241-T-111	0	1
92-5849-M1	4.4	1	0	4.4	8/5/92	241-T-111	0	1
COR45K108	4.4	1	0	4.4	2/16/93	241-T-104	0	1
COR45K116	4.6	1	0	4.6	2/16/93	241-T-104	0	1
COR46K123	4.6	1	0	4.6	2/22/93	241-T-104	0	1
92-04772	4.8	1	0	4.8	3/16/92	241-B-202	0	1
COR46S8	4.9	1	0	4.9	2/17/93	241-T-104	0	1
92-04771-A	5	1	0	5	3/16/92	241-B-202	0	1
COR46K121	5.2	1	0	5.2	2/22/93	241-T-104	0	1
COR45K110	5.4	1	0	5.4	2/16/93	241-T-104	0	1
93-01070-M1	5.5	1	0	5.5	2/10/93	241-S-104	0	1
93-01069-M1	5.6	1	0	5.6	2/10/93	241-S-104	0	1
92-04769	5.7	1	0	5.7	3/13/92	241-B-202	0	1
93-01066-M1	5.7	1	0	5.7	2/19/93	241-S-104	0	1
COR45K112	5.8	1	0	5.8	2/16/93	241-T-104	0	1
J748	5.8	1	0	5.8	10/26/92	241-C-110	0	1
92-09438-M1	5.9	1	0	5.9	10/29/92	241-BX-107	0	1
93-01071-M1	5.9	1	0	5.9	1/21/93	241-S-104	0	1
93-01815-M1	6	1	0	6	2/19/93	241-S-104	0	1

Lab Sample ID	Standard Value	Non-Detect=1	Dup=1	Detection Limit	Analysis Date	Tank	Solid=0 Liquid=1	Liquid to Solid Correction
COR45K114	6	1	0	6	2/16/93	241-T-104	0	1
COR46S4	6	1	0	6	2/17/93	241-T-104	0	1
92-04770-A	6.1	1	0	6.1	3/16/92	241-B-202	0	1
COR46K120	6.1	1	0	6.1	2/22/93	241-T-104	0	1
92-09441-M1	6.2	1	0	6.2	11/2/92	241-BX-107	0	1
92-09443-M1	6.2	1	0	6.2	11/3/92	241-BX-107	0	1
93-01064-M1	6.2	1	0	6.2	2/19/93	241-S-104	0	1
93-01065-M1	6.2	1	0	6.2	2/19/93	241-S-104	0	1
93-01073-M1	6.2	1	0	6.2	1/21/93	241-S-104	0	1
91-07374	6.2	1	1	6.2	2/28/92	241-B-201	0	1
92-09442-M1	6.3	1	0	6.3	11/2/92	241-BX-107	0	1
93-01067-M1	6.3	1	0	6.3	2/19/93	241-S-104	0	1
93-01750-M1	6.3	1	0	6.3	2/4/93	241-S-104	0	1
COR46K122	6.3	1	0	6.3	2/22/93	241-T-104	0	1
92-09444-M1	6.4	1	0	6.4	11/3/92	241-BX-107	0	1
93-01752-M1	6.4	1	0	6.4	2/10/93	241-S-104	0	1
J745	6.4	1	0	6.4	10/21/92	241-C-110	0	1
COR46S2	6.5	1	0	6.5	2/17/93	241-T-104	0	1
92-09440-M1	6.6	1	0	6.6	11/2/92	241-BX-107	0	1
93-01074-M1	6.6	1	0	6.6	1/21/93	241-S-104	0	1
92-09439-M1	6.7	1	0	6.7	10/29/92	241-BX-107	0	1
92-6750-A1	6.8	1	0	6.8	6/23/92	241-C-112	0	1
COR46S9	6.8	1	0	6.8	2/17/93	241-T-104	0	1
J742	6.8	1	0	6.8	10/21/92	241-C-110	0	1
91-07358	7	1	1	7	2/27/92	241-B-201	0	1
91-07350	7.6	1	1	7.6	2/26/92	241-B-201	0	1
92-05851-M1	28	1	0	28	8/10/92	241-T-111	0	1
93-01068-M1	61	1	0	61	2/4/93	241-S-104	0	1
93-01751-M1	63	1	0	63	2/4/93	241-S-104	0	1
Methyl Isobutyl Ketone								
S03T000098	0.015	1	0	0.015	1/29/07	241-AP-108	1	0.787
S03T000099	0.015	1	0	0.015	1/29/07	241-AP-108	1	0.787
S03T000100	0.015	1	0	0.015	1/29/07	241-AP-108	1	0.787
S03T000858	0.015	1	0	0.015	4/3/07	241-TX-116	1	0.787
S03T000889	0.015	1	0	0.015	4/22/07	241-TX-116	1	0.787
93-06634	0.5	1	0	0.5	5/12/97	241-AP-102	1	0.787
93-06635	0.5	1	0	0.5	5/12/97	241-AP-102	1	0.787
93-06636	0.5	1	0	0.5	5/12/97	241-AP-102	1	0.787
93-06637MS	0.5	1	0	0.5	5/12/97	241-AP-102	1	0.787
93-06638	0.5	1	0	0.5	5/12/97	241-AP-102	1	0.787
93-06639	0.5	1	0	0.5	5/12/97	241-AP-102	1	0.787
93-06640	0.5	1	0	0.5	5/12/97	241-AP-102	1	0.787
93-06641	0.5	1	0	0.5	5/12/97	241-AP-102	1	0.787
S99T000184	0.5	1	0	0.5	4/1/03	241-AW-102	1	0.787
S99T000196	0.5	1	0	0.5	4/1/03	241-AW-102	1	0.787
S99T000197	0.5	1	0	0.5	4/1/03	241-AW-102	1	0.787
93-08652	0.5	1	1	0.5	10/14/96	241-AP-107	1	0.787
93-08653	0.5	1	1	0.5	10/14/97	241-AP-107	1	0.787

Lab Sample ID	Standard Value	Non-Detect=1	Dup=1	Detection Limit	Analysis Date	Tank	Solid=0 Liquid=1	Liquid to Solid Correction
93-08654	0.5	1	1	0.5	10/14/97	241-AP-107	1	0.787
93-08655	0.5	1	1	0.5	10/14/97	241-AP-107	1	0.787
VBLK	0.5	1	1	0.5	10/14/97	241-AP-107	1	0.787
92-05845-M1	2.7	1	0	2.7	8/11/96	241-T-111	0	1
92-05852-M1	2.7	1	0	2.7	8/11/96	241-T-111	0	1
92-5850-M1	3.2	1	0	3.2	8/6/96	241-T-111	0	1
92-05844-M1	3.3	1	0	3.3	8/11/96	241-T-111	0	1
92-5846-M1	3.3	1	0	3.3	8/8/96	241-T-111	0	1
92-05842-M1	4	1	0	4	8/6/96	241-T-111	0	1
92-5843-M1	4.4	1	0	4.4	8/8/96	241-T-111	0	1
92-5849-M1	4.4	1	0	4.4	8/6/96	241-T-111	0	1
COR45K108	4.4	1	0	4.4	2/17/97	241-T-104	0	1
92-05848-M1	4.6	1	0	4.6	8/11/96	241-T-111	0	1
COR45K116	4.6	1	0	4.6	2/17/97	241-T-104	0	1
COR46K123	4.6	1	0	4.6	2/23/97	241-T-104	0	1
92-04772	4.8	1	0	4.8	3/17/96	241-B-202	0	1
COR46S8	4.9	1	0	4.9	2/18/97	241-T-104	0	1
92-04771-A	5	1	0	5	3/17/96	241-B-202	0	1
COR46K121	5.2	1	0	5.2	2/23/97	241-T-104	0	1
COR45K110	5.4	1	0	5.4	2/17/97	241-T-104	0	1
93-01070-M1	5.5	1	0	5.5	2/11/97	241-S-104	0	1
92-04768-A	5.6	1	0	5.6	3/14/96	241-B-202	0	1
93-01069-M1	5.6	1	0	5.6	2/11/97	241-S-104	0	1
92-04769	5.7	1	0	5.7	3/14/96	241-B-202	0	1
93-01066-M1	5.7	1	0	5.7	2/20/97	241-S-104	0	1
COR45K112	5.8	1	0	5.8	2/17/97	241-T-104	0	1
J748	5.8	1	0	5.8	10/27/96	241-C-110	0	1
92-09438-M1	5.9	1	0	5.9	10/30/96	241-BX-107	0	1
93-01071-M1	5.9	1	0	5.9	1/22/97	241-S-104	0	1
93-01815-M1	6	1	0	6	2/20/97	241-S-104	0	1
COR45K114	6	1	0	6	2/17/97	241-T-104	0	1
COR46S4	6	1	0	6	2/18/97	241-T-104	0	1
92-04770-A	6.1	1	0	6.1	3/17/96	241-B-202	0	1
COR46K120	6.1	1	0	6.1	2/23/97	241-T-104	0	1
92-09441-M1	6.2	1	0	6.2	11/3/96	241-BX-107	0	1
92-09443-M1	6.2	1	0	6.2	11/4/96	241-BX-107	0	1
93-01064-M1	6.2	1	0	6.2	2/20/97	241-S-104	0	1
93-01065-M1	6.2	1	0	6.2	2/20/97	241-S-104	0	1
93-01073-M1	6.2	1	0	6.2	1/22/97	241-S-104	0	1
J747	6.2	1	0	6.2	10/27/96	241-C-110	0	1
91-07374	6.2	1	1	6.2	2/29/96	241-B-201	0	1
92-09442-M1	6.3	1	0	6.3	11/3/96	241-BX-107	0	1
93-01067-M1	6.3	1	0	6.3	2/20/97	241-S-104	0	1
93-01750-M1	6.3	1	0	6.3	2/5/97	241-S-104	0	1
COR46K122	6.3	1	0	6.3	2/23/97	241-T-104	0	1
92-09444-M1	6.4	1	0	6.4	11/4/96	241-BX-107	0	1
93-01752-M1	6.4	1	0	6.4	2/11/97	241-S-104	0	1
J745	6.4	1	0	6.4	10/22/96	241-C-110	0	1
COR46S2	6.5	1	0	6.5	2/18/97	241-T-104	0	1

Lab Sample ID	Standard Value	Non-Detect=1	Dup=1	Detection Limit	Analysis Date	Tank	Solid=0 Liquid=1	Liquid to Solid Correction
92-09440-M1	6.6	1	0	6.6	11/3/96	241-BX-107	0	1
93-01074-M1	6.6	1	0	6.6	1/22/97	241-S-104	0	1
92-09439-M1	6.7	1	0	6.7	10/30/96	241-BX-107	0	1
J749	6.7	1	0	6.7	10/27/96	241-C-110	0	1
92-6750-A1	6.8	1	0	6.8	6/24/96	241-C-112	0	1
COR46S9	6.8	1	0	6.8	2/18/97	241-T-104	0	1
J742	6.8	1	0	6.8	10/22/96	241-C-110	0	1
91-07358	7	1	1	7	2/28/96	241-B-201	0	1
91-07350	7.6	1	1	7.6	2/27/96	241-B-201	0	1
92-05851-M1	28	1	0	28	8/11/96	241-T-111	0	1
93-01068-M1	61	1	0	61	2/5/97	241-S-104	0	1
93-01751-M1	63	1	0	63	2/5/97	241-S-104	0	1

Appendix B

Statistical Analysis of F00's Mathematica® Code

Statistical Analysis of F00's
Mathematica® Code

■ Libraries Needed

```
<< Statistics`
<< Statistics`DataManipulation`
<< Graphics`Graphics`
Needs["EDA`"]
```

■ 1,1,1-Trichloroethane

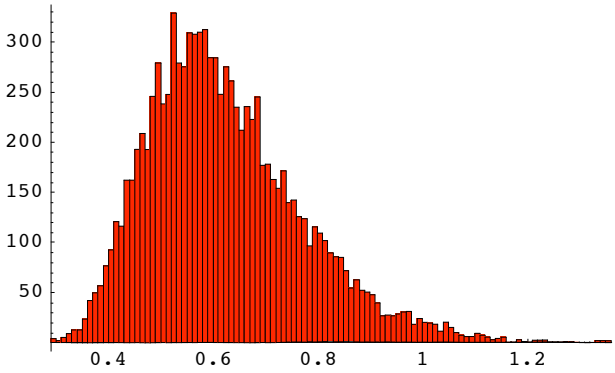
```
dat = Import["/Documents/Current Projects/Ellefson/trichlor.csv"];
Dimensions[dat]
adjv = Column[dat, 10];
```

```
{110, 10}
```

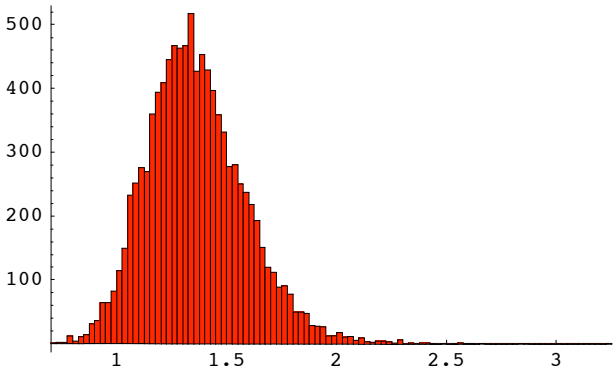
```
temp = Table[0, {i, 1, Length[dat]}];
bootavg = Table[0, {i, 1, 10000}];
boot90 = Table[0, {i, 1, 10000}];
boot95 = Table[0, {i, 1, 10000}];

For[j = 1, j ≤ 10000, j++,
  For[i = 1, i ≤ Length[dat], i++,
   k = Round[1 + (Length[dat] - 1) * Random[]];
   If[dat[[k, 3]] == 1,
    temp[[i]] = Random[HalfNormalDistribution[√π / (√2 dat[[k, 10]] / 3)]],
    temp[[i]] = dat[[k, 10]]];
  ];
  bootavg[[j]] = Mean[temp];
  boot90[[j]] = Quantile[temp, 0.90];
  boot95[[j]] = Quantile[temp, 0.95];
 ];
```

```
Mean[bootavg]
StandardDeviation[bootavg]
Quantile[bootavg, 0.95]
Quantile[bootavg, 0.90]
Histogram[bootavg]

Mean[boot90]
StandardDeviation[boot90]
Quantile[boot90, 0.95]
Quantile[boot90, 0.90]
Histogram[boot90]

Mean[boot95]
StandardDeviation[boot95]
Quantile[boot95, 0.95]
Quantile[boot95, 0.90]
Histogram[boot90]
```

```
0.623192

0.147412

0.895863

0.82319
```




```
- Graphics -

1.3636

0.226176

1.75754

1.65054
```



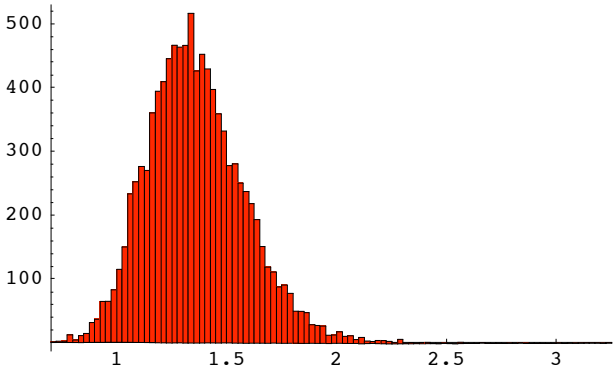
- Graphics -

2.18198

0.791415

4.5

3.03117



- Graphics -

■ Methylene Chloride

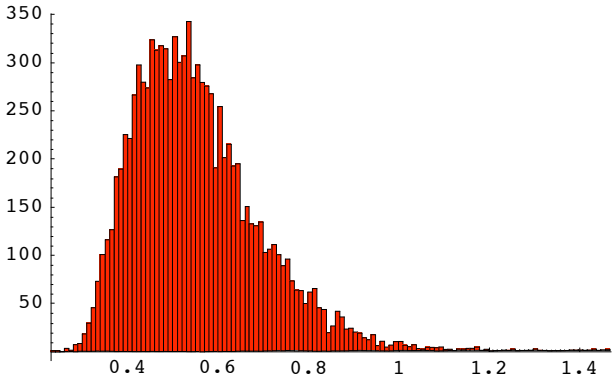
```
dat = Import["/Documents/Current Projects/Ellefson/methylene.csv"];
Dimensions[dat]
adjv = Column[dat, 10];
```

{115, 10}

```
temp = Table[0, {i, 1, Length[dat]}];
bootavg = Table[0, {i, 1, 10000}];
boot90 = Table[0, {i, 1, 10000}];
boot95 = Table[0, {i, 1, 10000}];
```

```
For[j = 1, j ≤ 10000, j++,
  For[i = 1, i ≤ Length[dat], i++,
   k = Round[1 + (Length[dat] - 1) * Random[]];
   If[dat[[k, 3]] == 1,
    temp[[i]] = Random[HalfNormalDistribution[√π / (√2 dat[[k, 10]] / 3)]],
    temp[[i]] = dat[[k, 10]]];
  ];
  bootavg[[j]] = Mean[temp];
  boot90[[j]] = Quantile[temp, 0.90];
  boot95[[j]] = Quantile[temp, 0.95];
 ];

Mean[bootavg]
StandardDeviation[bootavg]
Quantile[bootavg, 0.95]
Quantile[bootavg, 0.90]
Histogram[bootavg]

Mean[boot90]
StandardDeviation[boot90]
Quantile[boot90, 0.95]
Quantile[boot90, 0.90]
Histogram[boot90]

Mean[boot95]
StandardDeviation[boot95]
Quantile[boot95, 0.95]
Quantile[boot95, 0.90]
Histogram[boot90]
```

```
0.551252

0.136475

0.807471

0.738048
```

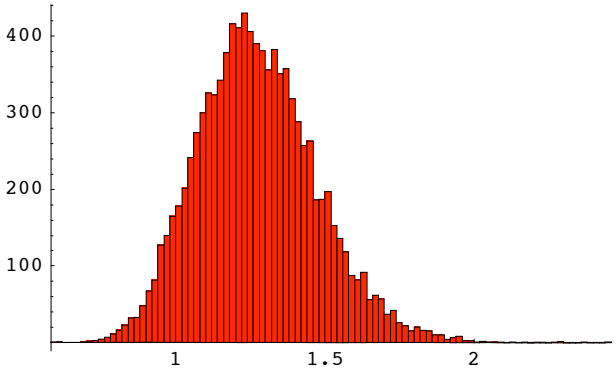



```
- Graphics -

1.2739
```

0.20119

1.62443

1.53237



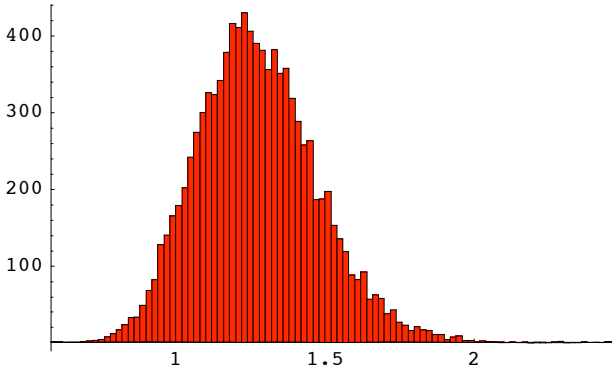
- Graphics -

1.88692

0.557198

2.63599

2.34295



- Graphics -

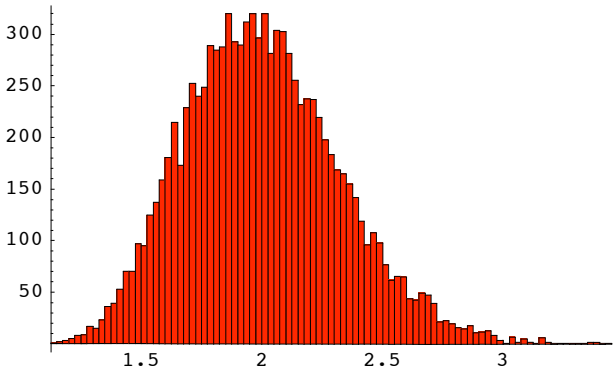
■ Acetone

```
dat = Import["/Documents/Current Projects/Ellefson/acetone.csv"];
Dimensions[dat]
adjv = Column[dat, 10];
```

{165, 10}

```
temp = Table[0, {i, 1, Length[dat]}];
bootavg = Table[0, {i, 1, 10000}];
boot90 = Table[0, {i, 1, 10000}];
boot95 = Table[0, {i, 1, 10000}];

For[j = 1, j ≤ 10000, j++,
  For[i = 1, i ≤ Length[dat], i++,
   k = Round[1 + (Length[dat] - 1) * Random[]];
   If[dat[[k, 3]] == 1,
    temp[[i]] = Random[HalfNormalDistribution[√π / (√2 dat[[k, 10]] / 3)]],
    temp[[i]] = dat[[k, 10]]];
  ];
  bootavg[[j]] = Mean[temp];
  boot90[[j]] = Quantile[temp, 0.90];
  boot95[[j]] = Quantile[temp, 0.95];
 ];


Mean[bootavg]
StandardDeviation[bootavg]
Quantile[bootavg, 0.95]
Quantile[bootavg, 0.90]
Histogram[bootavg]

Mean[boot90]
StandardDeviation[boot90]
Quantile[boot90, 0.95]
Quantile[boot90, 0.90]
Histogram[boot90]

Mean[boot95]
StandardDeviation[boot95]
Quantile[boot95, 0.95]
Quantile[boot95, 0.90]
Histogram[boot90]
```

```
2.00353

0.322199

2.56984

2.42406
```



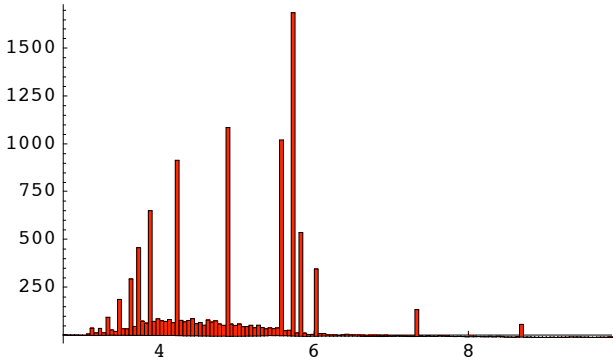
- Graphics -

4.91177

0.941664

6

5.8



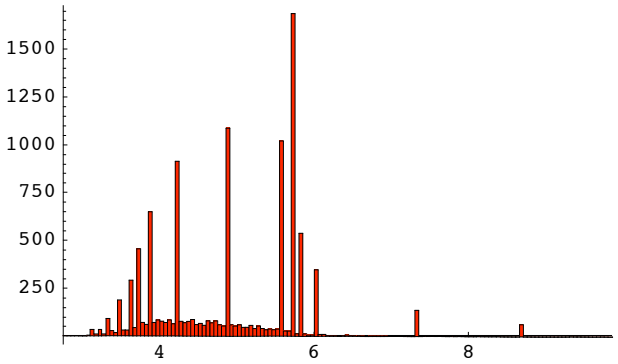
- Graphics -

7.81577

1.68665

9.8

9.8



■ O_Cresol

```
dat = Import["/Documents/Current Projects/Ellefson/O_Cresol.csv"];
Dimensions[dat]
adjv = Column[dat, 10];
```

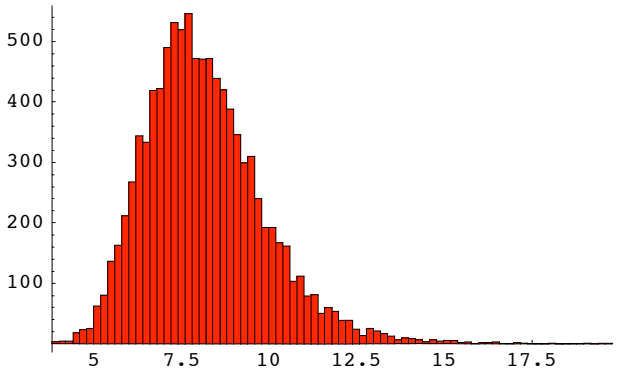
```
{103, 10}
```

```
temp = Table[0, {i, 1, Length[dat]}];
bootavg = Table[0, {i, 1, 10000}];
boot90 = Table[0, {i, 1, 10000}];
boot95 = Table[0, {i, 1, 10000}];

For[j = 1, j ≤ 10000, j++,
  For[i = 1, i ≤ Length[dat], i++,
   k = Round[1 + (Length[dat] - 1) * Random[]];
   If[dat[[k, 3]] == 1,
    temp[[i]] = Random[HalfNormalDistribution[√π / (√2 dat[[k, 10]] / 3)]],
    temp[[i]] = dat[[k, 10]]];
  ];
  bootavg[[j]] = Mean[temp];
  boot90[[j]] = Quantile[temp, 0.90];
  boot95[[j]] = Quantile[temp, 0.95];
 ];
```

```
Mean[bootavg]
StandardDeviation[bootavg]
Quantile[bootavg, 0.95]
Quantile[bootavg, 0.90]
Histogram[bootavg]

Mean[boot90]
StandardDeviation[boot90]
Quantile[boot90, 0.95]
Quantile[boot90, 0.90]
Histogram[boot90]

Mean[boot95]
StandardDeviation[boot95]
Quantile[boot95, 0.95]
Quantile[boot95, 0.90]
Histogram[boot90]
```

```
3.42942

0.8317

4.94305

4.53732
```


```
- Graphics -

8.16929

1.7078

11.2352

10.3636
```



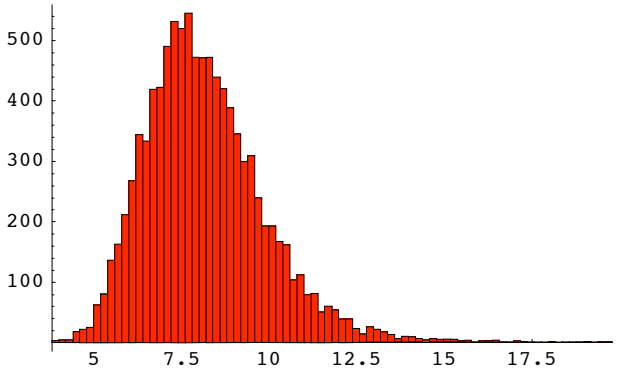
- Graphics -

12.8505

4.3762

20.4703

17.5453



- Graphics -

■ P_Cresol

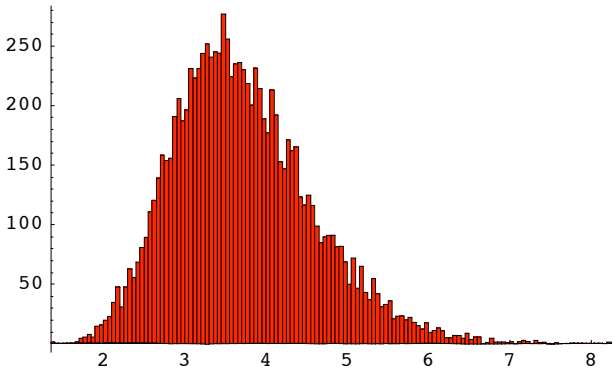
```
dat = Import["/Documents/Current Projects/Ellefson/P_Cresol.csv"];
Dimensions[dat]
adjv = Column[dat, 10];
```

{104, 10}

```
temp = Table[0, {i, 1, Length[dat]}];
bootavg = Table[0, {i, 1, 10000}];
boot90 = Table[0, {i, 1, 10000}];
boot95 = Table[0, {i, 1, 10000}];
```

```
For[j = 1, j ≤ 10000, j++,
  For[i = 1, i ≤ Length[dat], i++,
   k = Round[1 + (Length[dat] - 1) * Random[]];
   If[dat[[k, 3]] == 1,
    temp[[i]] = Random[HalfNormalDistribution[√π / (√2 dat[[k, 10]] / 3)]],
    temp[[i]] = dat[[k, 10]]];
  ];
  bootavg[[j]] = Mean[temp];
  boot90[[j]] = Quantile[temp, 0.90];
  boot95[[j]] = Quantile[temp, 0.95];
 ];


Mean[bootavg]
StandardDeviation[bootavg]
Quantile[bootavg, 0.95]
Quantile[bootavg, 0.90]
Histogram[bootavg]

Mean[boot90]
StandardDeviation[boot90]
Quantile[boot90, 0.95]
Quantile[boot90, 0.90]
Histogram[boot90]

Mean[boot95]
StandardDeviation[boot95]
Quantile[boot95, 0.95]
Quantile[boot95, 0.90]
Histogram[boot90]
```

```
3.72222

0.858815

5.28905

4.87519
```

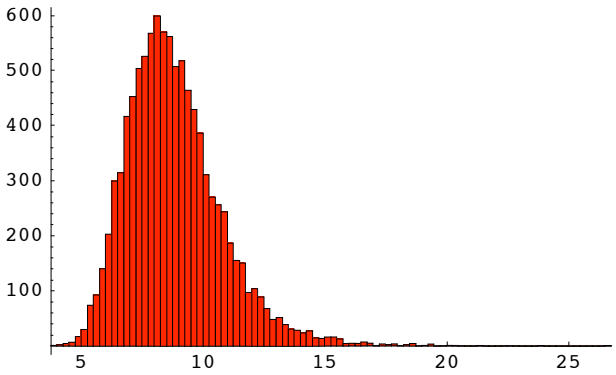



```
- Graphics -

8.83146
```

1.95722

12.3406

11.3079



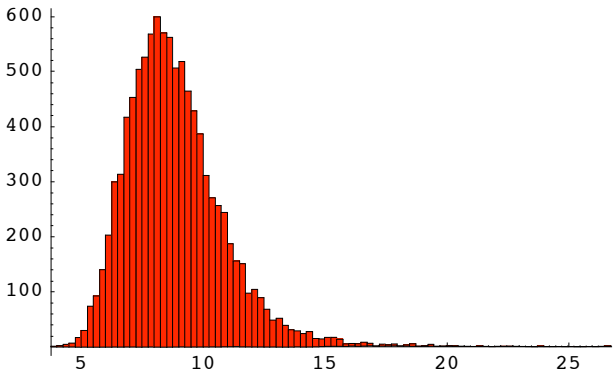
- Graphics -

14.666

5.41556

25.9069

21.78



- Graphics -

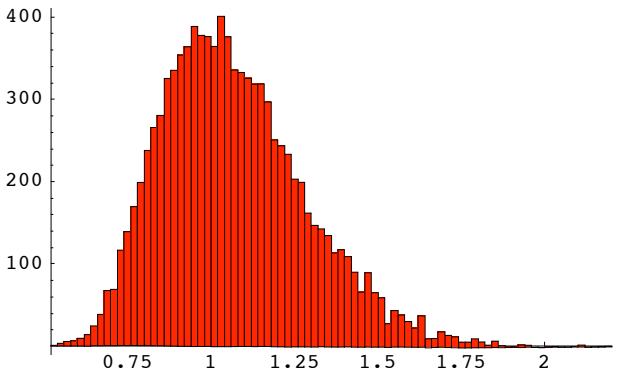
■ Methyl Ethyl Ketone

```
dat = Import["/Documents/Current Projects/Ellefson/Methyl Ethyl Ketone.csv"];
Dimensions[dat]
adjv = Column[dat, 10];
```

{152, 10}

```
temp = Table[0, {i, 1, Length[dat]}];
bootavg = Table[0, {i, 1, 10000}];
boot90 = Table[0, {i, 1, 10000}];
boot95 = Table[0, {i, 1, 10000}];

For[j = 1, j ≤ 10000, j++,
  For[i = 1, i ≤ Length[dat], i++,
   k = Round[1 + (Length[dat] - 1) * Random[]];
   If[dat[[k, 3]] == 1,
    temp[[i]] = Random[HalfNormalDistribution[√π / (√2 dat[[k, 10]] / 3)]],
    temp[[i]] = dat[[k, 10]]];
  ];
  bootavg[[j]] = Mean[temp];
  boot90[[j]] = Quantile[temp, 0.90];
  boot95[[j]] = Quantile[temp, 0.95];
 ];

Mean[bootavg]
StandardDeviation[bootavg]
Quantile[bootavg, 0.95]
Quantile[bootavg, 0.90]
Histogram[bootavg]

Mean[boot90]
StandardDeviation[boot90]
Quantile[boot90, 0.95]
Quantile[boot90, 0.90]
Histogram[boot90]

Mean[boot95]
StandardDeviation[boot95]
Quantile[boot95, 0.95]
Quantile[boot95, 0.90]
Histogram[boot90]
```

```
1.07052

0.218214

1.4695

1.36768
```



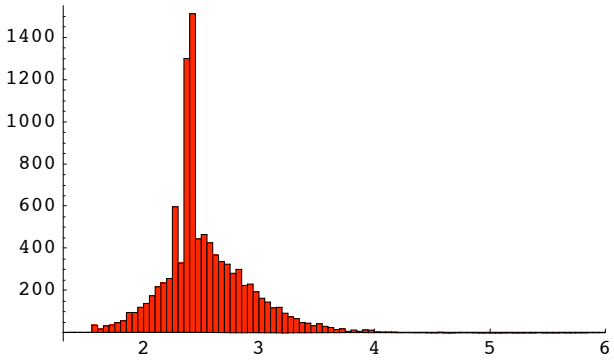
- Graphics -

2.53894

0.380616

3.23815

3.03932



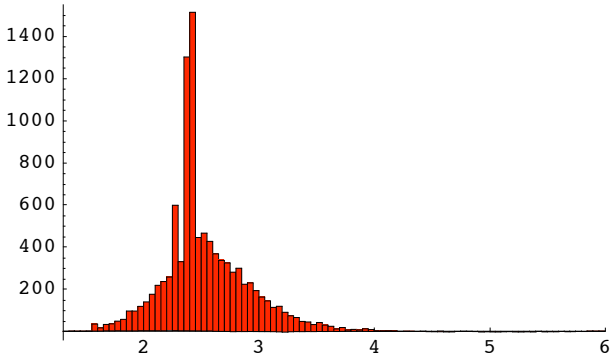
- Graphics -

4.21074

1.10642

6.3747

5.9812



- Graphics -

■ Methyl Isobutyl Ketone

```
dat = Import["/Documents/Current Projects/Ellefson/Methyl Isobutyl Ketone.csv"];
Dimensions[dat]
adjv = Column[dat, 10];
```

```
{79, 10}
```

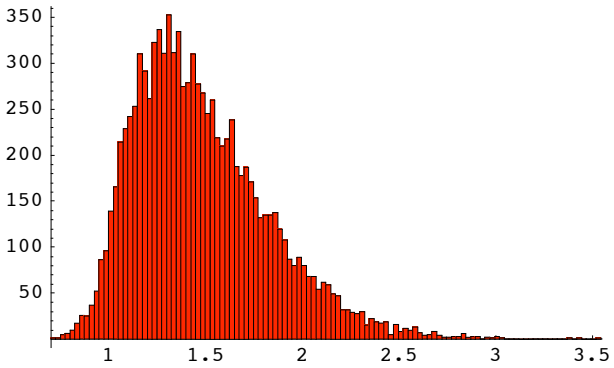
```
temp = Table[0, {i, 1, Length[dat]}];
bootavg = Table[0, {i, 1, 10000}];
boot90 = Table[0, {i, 1, 10000}];
boot95 = Table[0, {i, 1, 10000}];

For[j = 1, j ≤ 10000, j++,
  For[i = 1, i ≤ Length[dat], i++,
   k = Round[1 + (Length[dat] - 1) * Random[]];
   If[dat[[k, 3]] == 1,
    temp[[i]] = Random[HalfNormalDistribution[√π / (√2 dat[[k, 10]] / 3)]],
    temp[[i]] = dat[[k, 10]]];
  ];
  bootavg[[j]] = Mean[temp];
  boot90[[j]] = Quantile[temp, 0.90];
  boot95[[j]] = Quantile[temp, 0.95];
 ];

Mean[bootavg]
StandardDeviation[bootavg]
Quantile[bootavg, 0.95]
Quantile[bootavg, 0.90]
Histogram[bootavg]

Mean[boot90]
StandardDeviation[boot90]
Quantile[boot90, 0.95]
Quantile[boot90, 0.90]
Histogram[boot90]

Mean[boot95]
StandardDeviation[boot95]
Quantile[boot95, 0.95]
Quantile[boot95, 0.90]
Histogram[boot90]
```

```
1.48271
```

```
0.348595
```

```
2.13371
```

```
1.95671
```



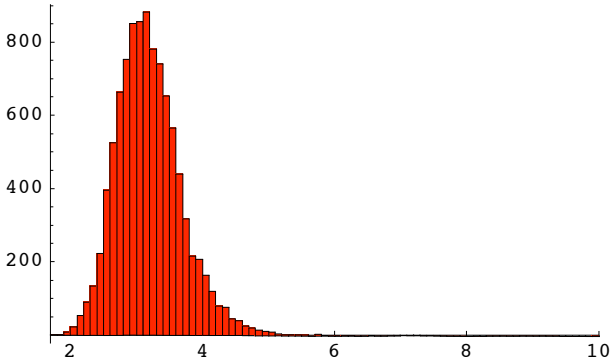
- Graphics -

3.19566

0.499584

4.07999

3.82162



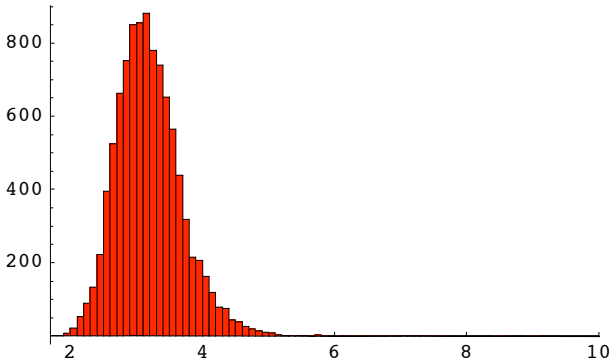
- Graphics -

4.77573

2.13522

8.73715

6.29769



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