

Supplement to Report Entitled, “A Laboratory Study of Procedures Evaluated by the Federal Advisory Committee on Detection and Quantitation Approaches and Uses in Clean Water Act Programs”

Comparison of the EPA MDL and ML to the FACDQ DL and QL with Respect to Study Measurement Quality Objectives (MQOs)

Introduction:

This report is a supplement to the report entitled, “A Laboratory Study of Procedures Evaluated by the Federal Advisory Committee on Detection and Quantitation Approaches and Uses in Clean Water Act Programs.” The purpose and objectives of the laboratory study are provided in the laboratory study report and readers are referred to that report for additional information. As a brief summary here, EPA evaluated detection and quantitation limits (DLs and QLs) in the laboratory study based on recommendations from the Federal Advisory Committee on Detection and Quantitation (FACDQ). The study preliminarily assessed the appropriateness of the use of the FACDQ procedures to generate reliable estimates of the lowest concentration at which procedure-specific measurement quality objectives (MQOs) can be achieved. EPA selected two commonly used analytical methods (EPA Methods 200.7 and 625) and tested them in six laboratories (three laboratories per method) for the preliminary assessment of the FACDQ procedures.

The participating laboratories were selected through a competitive solicitation process and were required to submit historical data to demonstrate their ability to perform the analytical methods used in the study. As part of the qualification process, laboratories submitted method detection limit (MDL) data to EPA. The MDL procedure is the detection limit procedure currently specified in 40 CFR Part 136 for use in Clean Water Act programs. The MDL data may be used to calculate the minimum level of quantitation (ML). EPA has used the ML to describe the lowest concentration of a substance in a sample that can be measured with a known level of confidence, and generally represents the lowest calibration point. It is equivalent to the concentration of the lowest calibration standard, assuming that all method-specified sample weights, volumes, and cleanup procedures have been employed. The ML is calculated by multiplying the MDL by 3.18 and rounding the result to the number nearest to $(1, 2, \text{ or } 5) \cdot 10^n$, where n is an integer.

This supplemental report compares the results for the MDL and the calculated ML with respect to the two method laboratory study MQOs using the laboratory-submitted MDL data to the results obtained during the study using the FACDQ procedures. In order to put the results of the laboratory study in proper perspective and to assess the appropriateness of the limits, EPA performed the same statistical analysis with the MDL and ML in this supplemental report as was performed in the laboratory study of the FACDQ procedures. EPA has concluded that this comparison is reasonable because the MDL data is from the same laboratories that participated in the study of the FACDQ procedures and from the same two analytical methods used in the study. Thus, this supplemental report discusses the results obtained in the FACDQ DL/QL

assessment relative to the laboratory study MQOs with those obtained performing the same statistical analyses with the MDL and ML.

EPA set the MQOs during the study design phase to support the study objectives and it identified separate MQOs for each of the two analytical method for four data quality indicators (false positive rate, false negative rate, mean recovery (or mean bias), and relative standard deviation (RSD)). EPA refers readers to section 2.1 of the laboratory study report for more information on how the MQOs were established. The laboratory study MQOs are as follows:

Data Quality Indicator	Measurement Quality Objectives
False Positive Rate	1%
False Negative Rate	5%
Mean Recovery (or Mean Bias)	30% for Method 200.7
	60% for Method 625
Relative Standard Deviation (RSD)	20% for Method 200.7
	30% for Method 625

The goal of specifying these MQOs is also set forth in the pilot study. It states that:

“...the study was designed based on the assumption that the most statistically powerful assessments of whether the limits accurately meet their target MQOs can be made on a method-specific basis, rather than on an analyte or laboratory-specific basis.”

In other words, the laboratory study was testing whether one could get consistent, repeatable error estimates based solely on the method’s DLs and QLs regardless of the laboratory or analyte being tested. In this supplement, EPA is testing whether these results for the two methods differ, and in what way, from running the same statistical tests using the MDL and ML as the detection and quantitation limits, respectively.

Analysis Results for the MDL/ML versus the FACDQ DL/QL MQOs:

(1) Comparison of False Positive Rates Assessment

The FACDQ DL is designed to reflect the minimum measured concentration at which there would be a 1% false positive rate, and requires specific confirmatory analysis if the false positive rate is greater than 3%.

For this comparison, EPA calculated the false positive rates as described in sections 4.2 and 6.2 of the laboratory study report. The false positive rate is defined as concluding that the analyte is present in a sample based on the numeric result when, in fact, it is absent. Table 1 provides the results on false positives (as % false positives) with and without outlier removal for the FACDQ DL and the MDL procedures.

Table 1: MQO on False Positive Rates

Outliers Removed in Full Verification Data	Method	Limit	Number of Total Blank Results	Number of False Positives	% False Positives
No	200.7	DL _t	5032	172	3.42
		DL _k	5032	57	1.13
		MDL	5032	479	9.52
	625	DL	3379	18	0.53
		MDL	3352	305	9.1
Yes	200.7	DL _t	4845	10	2.03
		DL _k	4845	20	0.41
		MDL	4845	388	8.01
	625	DL	3324	2	0.06
		MDL	3035	263	7.97

Observations Regarding False Positive Rates:

- As seen in Table 1, the results for false positive rates when using the DL are much closer to the target 1% rate than using the MDL. The false positive rate is always lower, as would be expected, when using the DL calculated from the larger k-statistic tolerance level as opposed to using the DL calculated from the t-statistic for Method 200.7. Only the DL_t false positive rate before removal of outliers falls slightly above (by 0.42 percent) the boundary for acceptable false positive rate of 3%.
- On the other hand, the false positive rate when using the MDL for both methods before and after outlier removal exceeds the acceptable range. The false positive rates for the MDL vary from 7.97-9.52%; this range is roughly three times the documented maximum acceptable false positive rate of 3% established in the FACDQ report.

(2) Comparison of False Negative Rates Assessment

The FACDQ QL is designed to reflect the minimum measured concentration at which there is a 5% false negative rate and requires specific confirmatory analysis if the false negative rate is greater than the acceptable maximum range of 2-9%.

EPA calculated the false negative rates as described in sections 7.2.1.1 and 7.2.2.1 of the laboratory study report. The study report described two types of statistical comparisons, one with a lab/analyte data set for which the assessment-specific MQO was identified as the limiting MQO (or for which no MQO could be identified as limiting) and one with the full data set. These separate analyses were performed because the FACDQ QL has multiple target MQOs (false negative, RSD, and mean recovery) and any of these MQOs could be limiting. The limiting MQO is the one that achieves the highest concentration for each lab/analyte set. For purposes of this comparison with the ML, EPA used the full data set for the three QL MQOs, regardless of which MQO (if any) was identified as limiting (referred to as the “full group” below). Tables 2, 3,

and 4 provide the results obtained for the FACDQ and the MDL procedures using the same statistical analysis for the full data set.

Table 2: MQO on False Negative Rates

Analyte/Lab Sets Included	Method	Limit	Number of Calculated Limits	Number of Evaluated Replicates	% Replicate Results below Limit	p-Value of Binomial test
Full Group	200.7	QL _{DLt}	71	497	0	<0.0001
		QL _{DLk}	71	497	0	<0.0001
		ML	71	497	0.6	<0.0001
	625	QL	144	1008	2.3	<0.0001
		ML	146	1019	4.5	<0.0001

Observations Regarding False Negative Rates:

- The QL analysis results in no false negatives for Method 200.7 and falls into the acceptable range for Method 625 (2.3%).
- The ML analysis results in slightly higher false negative rates for both methods although the rate for Method 200.7 is still very close to zero (0.6%). The rate for Method 625 is within the acceptable range (4.5%).

(3) Comparison of Observed Relative Standard Deviations

The FACDQ QL is designed to reflect the minimum concentration at which the targeted maximum acceptable RSD would be achieved (Maximum RSD = 20% for Method 200.7 and 30% for Method 625). The RSD is considered to reach the maximum acceptable level if it falls within 15-25% for Method 200.7 or 23-37% for Method 625.

EPA calculated the relative standard deviations (RSD) as described in sections 7.2.1.2 and 7.2.2.2 of the laboratory study report. Table 3 provides the results from this analysis for the full group of lab/analyte sets for the FACDQ and MDL procedures using the same statistical analysis.

Table 3: MQO on Relative Standard Deviations (RSDs)

Analyte/Lab Sets Included	Method	Limit	Number of Calculated Limits	Mean RSD	Median RSD	% RSDs exceeding (20% - 200.7, 30% - 625)
Full Group	200.7	QL _{DLt}	71	15.5	8.2	18.3
		QL _{DLk}	71	10.1	7.6	11.3
		ML	71	20.5	16.2	38
	625	QL	144	16.1	13.4	7.6
		ML	146	25.2	19.5	16.4

Observations Regarding RSDs:

- The QL analyses provide mean RSDs that are below the two methods' target range of 20% maximum RSD for Method 200.7 and 30% maximum RSD for Method 625.
- In comparison, the ML analyses provide higher mean RSDs for both methods than for the QL, although results are still within the acceptable range.

(4) Comparison of Observed Mean Recoveries

The FACDQ QL is designed to reflect the minimum concentration at which the targeted maximum acceptable mean recovery is achieved (Maximum Mean Percent Bias = 30% for Method 200.7 and 60% for Method 625). The mean percent bias is considered to reach the maximum acceptable level if it falls within 21-39% for Method 200.7 or 52-68% for Method 625.

EPA calculated the mean recoveries (bias) as described in sections 7.2.1.3 and 7.2.2.3 of the laboratory study report. Table 4 provides the results from this analysis for the full group of lab/analyte sets for the FACDQ and MDL procedures using the same statistical analysis.

Table 4: MQO on Mean Percent Recoveries (Bias)

Analyte/Lab Sets Included	Method	Limit	Number of Calculated Limits	Mean Percent Bias	Median Percent Bias	% Percent biases exceeding (30% - 200.7, 60% - 625)
Full Group	200.7	QL _{DLt}	71	17.8	7	5.6
		QL _{DLk}	71	10.5	5.8	1.4
		ML	71	40.2	16.9	18.3
	625	QL	144	21.5	19.3	0.7
		ML	146	26.4	21.6	8.2

Observations Regarding Bias:

- In all cases with the QL, the mean percent bias falls significantly below the maximum range.
- Conversely, using the ML for Method 200.7 results in a mean percent bias greater than the maximum acceptable range of biases but by only 1.2%.
- Both the QL and ML analyses result in similar mean percent bias for Method 625, and these both fall far under the maximum range for that method. However, the QL resulted in much smaller percent exceedances than the ML.

Analysis Summary:

Both the FACDQ DL/QL and the EPA MDL/ML generally met the acceptable range for the MQOs described in the FACDQ laboratory study for false negative rate, relative standard deviation, and mean recovery. However, for the false positive rate MQO, the DL consistently fell below the targeted 1% rate, whereas the MDL was significantly above the 1% rate. This difference is not surprising because the FACDQ approach results in DLs that are almost always greater than the detection limit values using the MDL procedure. Therefore, the DL is inherently more stringent against false positives, resulting in a higher detection limit value for an analyte to be considered present in a sample.

See Appendix to Report: DL, MDL, QL, and ML levels for all method/lab/analyte combinations

Appendix
DL, MDL, QL, and ML levels for all method/lab/analyte combinations

Table A1: Method 200.7

200.7	DL_t	DL_k	MDL	QL_{DLt}	QL_{DLk}	ML
Lab 1						
ALUMINUM	24.95	48.42	11.80	50	250	50
ANTIMONY	7.02	13.63	9.44	40	40	20
ARSENIC	15.63	28.41	7.52	50	250	20
BARIUM	0.84	1.19	0.72	4	4	2
BERYLLIUM	0.32	0.62	0.18	1	5	0.5
CADMIUM	0.31	0.61	0.37	2	2	1
CALCIUM	75.91	101.88	33.57	250	250	100
CHROMIUM	0.63	1.22	0.84	4	4	2
COBALT	1.40	2.65	0.82	4	20	2
COPPER	1.82	3.53	0.90	4	20	2
IRON	15.63	30.34	1.92	50	100	5
LEAD	4.63	8.98	5.52	20	20	20
MAGNESIUM	31.95	31.95	11.61	250	250	50
MANGANESE	1.65	1.65	2.00	4	4	5
MOLYBDENUM	1.95	3.79	1.06	4	20	2
NICKEL	4.02	7.58	0.98	20	20	2
POTASSIUM	497.32	867.31	31.61	2000	2000	100
SELENIUM	29.35	53.66	20.61	80	400	50
SILVER	1.48	2.70	1.14	4	20	5
SODIUM	1650.07	1650.07	23.59	4000	4000	100
THALLIUM	10.67	20.71	10.56	50	50	20
TIN	5.46	10.59	3.96	20	100	10
VANADIUM	1.04	1.88	1.99	10	10	5
ZINC	10.48	12.89	3.40	50	50	10
Lab 2						
ALUMINUM	91.97	178.53	30.47	540	360	100
ANTIMONY	25.97	43.86	9.31	52	88	20
ARSENIC	14.62	27.30	4.77	29	55	20
BARIUM	2.24	2.65	1.65	5.5	5.5	5
BERYLLIUM	0.77	1.41	1.00	4.4	4.4	5
CADMIUM	0.68	1.17	0.68	4.2	4.2	2
CALCIUM	75.16	145.90	169.38	150	290	500
CHROMIUM	5.19	5.19	2.57	11	11	10
COBALT	2.00	3.64	1.08	4	7.3	5
COPPER	9.84	19.09	3.67	20	38	10
IRON	51.69	100.42	33.30	140	200	100

200.7	DL_t	DL_k	MDL	QL_{DLt}	QL_{DLk}	ML
LEAD	4.02	7.80	2.33	24	16	10
MAGNESIUM	32.39	62.88	88.65	65	130	200
MANGANESE	0.80	1.35	1.25	1.632	4.8	5
MOLYBDENUM	9.55	17.42	2.10	19	35	5
NICKEL	3.69	5.21	4.01	8.2	10	10
POTASSIUM	531.60	827.53	544.83	1800	1800	2000
SELENIUM	10.72	20.41	7.50	21	41	20
SILVER	2.98	5.52	1.26	6	11	5
SODIUM	885.90	1719.65	454.62	5400	3400	2000
TIN	13.44	26.09	7.16	27	52	20
VANADIUM	4.18	7.41	1.78	8.4	15	5
ZINC	13.22	13.22	14.17	29	29	50
Lab 3						
ALUMINUM	44.95	87.25	21.20	150	150	50
ANTIMONY	36.48	60.05	35.40	150	150	100
ARSENIC	44.00	85.30	28.90	150	300	100
BARIUM	3.41	6.30	1.36	10	10	5
BERYLLIUM	0.32	0.59	0.75	3	3	2
CADMIUM	10.79	18.82	8.55	50	50	20
CALCIUM	66.67	113.64	21.80	300	300	50
CHROMIUM	21.01	40.78	21.40	150	150	50
COBALT	10.23	19.12	8.60	50	50	20
COPPER	2.54	4.93	1.87	6	10	5
IRON	16.70	22.45	9.30	50	50	20
LEAD	87.88	170.59	54.40	250	300	200
MAGNESIUM	81.60	158.40	72.20	300	300	200
MANGANESE	1.71	3.33	1.18	10	10	5
MOLYBDENUM	6.54	12.69	9.71	50	50	20
NICKEL	12.01	23.31	20.40	100	100	50
POTASSIUM	51.78	87.88	40.40	300	300	100
SELENIUM	95.82	167.67	94.10	400	400	200
SILVER	4.03	7.83	3.06	15	20	10
SODIUM	71.05	124.79	16.50	300	300	50
THALLIUM	39.67	60.78	35.10	300	300	100
TIN	52.29	89.63	31.70	225	225	100
VANADIUM	4.20	8.14	4.55	15	25	10
ZINC	11.81	22.62	9.44	50	50	20

Table A2: Method 625

625	DL	MDL	QL	ML
Lab 4				
1,2,4-TRICHLOROBENZENE	0.88	0.35	3	1
2,4,6-TRICHLOROPHENOL	0.62	0.30	3	1
2,4-DICHLOROPHENOL	0.30	0.49	3	2
2,4-DIMETHYLPHENOL	0.74	0.50	3	2
2,4-DINITROPHENOL	1.35	1.12	10	5
2,4-DINITROTOLUENE	0.50	0.58	3	2
2,6-DINITROTOLUENE	0.65	0.57	3	2
2-CHLORONAPHTHALENE	0.42	0.43	3	1
2-CHLOROPHENOL	0.34	0.60	3	2
2-NITROPHENOL	0.37	0.74	3	2
3,3'-DICHLOROBENZIDINE	0.52	0.39	50	1
4-BROMOPHENYLPHENYLETHER	0.50	0.32	3	1
4-CHLORO-3-METHYLPHENOL	0.41	0.68	3	2
4-CHLOROPHENYLPHENYLETHER	0.49	0.37	3	1
4-NITROPHENOL	0.64	0.17	3	0.5
ACENAPHTHENE	0.38	0.28	3	1
ACENAPHTHYLENE	0.38	0.40	3	1
ANTHRACENE	0.59	0.57	3	2
BENZO(A)ANTHRACENE	0.53	0.47	3	1
BENZO(A)PYRENE	0.64	0.33	3	1
BENZO(B)FLUORANTHENE	1.02	0.54	3	2
BENZO(GHI)PERYLENE	0.59	0.53	3	2
BENZO(K)FLUORANTHENE	0.66	0.69	3	2
BIS(2-CHLOROETHOXY)METHANE	0.38	0.68	3	2
BIS(2-CHLOROETHYL)ETHER	0.44	0.84	3	2
BIS(2-CHLOROISOPROPYL)ETHER	0.33	0.63	3	2
BIS(2-ETHYLHEXYL)PHTHALATE	10.69	0.55	11.13	2
BUTYL BENZYL PHTHALATE	7.13	0.41		1
CHRYSENE	0.59	0.30	3	1
DIBENZO(A,H)ANTHRACENE	0.73	0.41	3	1
DIETHYL PHTHALATE	1.27	0.42	3	1
DIMETHYL PHTHALATE	0.55	0.42	3	1
DI-N-BUTYL PHTHALATE	2.85	0.61	10	2
DI-N-OCTYL PHTHALATE	2.97	0.42	4.42	1
FLUORANTHENE	0.57	0.58	3	2
FLUORENE	0.47	0.25	3	1
HEXACHLOROBENZENE	0.42	0.49	3	2
HEXACHLOROBUTADIENE	1.47	0.48	3.50	2

625	DL	MDL	QL	ML
HEXACHLOROETHANE	1.44	0.62	3.49	2
INDENO(1,2,3-CD)PYRENE	1.30	0.60	3	2
ISOPHORONE	0.57	0.54	3	2
NAPHTHALENE	0.34	0.43	3	1
NITROBENZENE	0.39	0.94	3	2
N-NITROSO-DI-N-PROPYLAMINE	2.03	0.73	3	2
PENTACHLOROPHENOL	0.48	0.58	3	2
PHENANTHRENE	0.49	0.49	3	2
PHENOL	0.48	0.56	3	2
PHENOL, 2-METHYL-4,6-DINITRO-	2.32	0.71	10	5
PYRENE	0.65	0.43	3	1
Lab 5				
1,2,4-TRICHLOROBENZENE	2.36	0.28	7.03	1
2,4,6-TRICHLOROPHENOL	2.09	0.24	5.09	1
2,4-DICHLOROPHENOL	1.37	0.19	5	1
2,4-DIMETHYLPHENOL	0.63	0.25	10	1
2,4-DINITROPHENOL	1.49	0.32	20	4
2,4-DINITROTOLUENE	1.80	0.27	5	1
2,6-DINITROTOLUENE	2.01	0.25	5	1
2-CHLORONAPHTHALENE	0.17	0.02	0.5	0.2
2-CHLOROPHENOL	1.08	0.29	5	1
2-NITROPHENOL	1.40	0.28	5	1
3,3'-DICHLOROBENZIDINE	0.89	0.37	5	1
4-BROMOPHENYLPHENYLETHER	2.36	0.22	5.17	1
4-CHLORO-3-METHYLPHENOL	1.20	0.21	5	2
4-CHLOROPHENYLPHENYLETHER	2.24			
4-NITROPHENOL	3.58	0.29	20	4
ACENAPHTHENE	2.09	0.02	5	0.2
ACENAPHTHYLENE	0.13	0.01	0.5	0.2
ANTHRACENE	0.15	0.02	0.5	0.2
BENZO(A)ANTHRACENE	0.06	0.02	0.5	0.2
BENZO(A)PYRENE	0.09	0.01	5	0.2
BENZO(B)FLUORANTHENE	0.07	0.02	0.5	0.2
BENZO(GHI)PERYLENE	0.04	0.02	0.5	0.2
BENZO(K)FLUORANTHENE	0.13	0.03	0.5	0.2
BIS(2-CHLOROETHOXY)METHANE	1.71	0.32	5	1
BIS(2-CHLOROETHYL)ETHER	0.12	0.02	0.5	0.2
BIS(2-CHLOROISOPROPYL)ETHER	0.87	0.40	5	1
BIS(2-ETHYLHEXYL)PHTHALATE	6.06	0.22	10	1
BUTYL BENZYL PHTHALATE	1.03	0.26	5	1
CHRYSENE	0.08	0.02	0.5	0.2

625	DL	MDL	QL	ML
DIBENZO(A,H)ANTHRACENE	0.05	0.02	0.5	0.2
DIETHYL PHTHALATE	1.84	0.60	5.43	2
DIMETHYL PHTHALATE	0.71	0.29		1
DI-N-BUTYL PHTHALATE	1.39	0.67	5	2
DI-N-OCTYL PHTHALATE	1.11	0.23	5	1
FLUORANTHENE	0.13	0.02	0.5	0.2
FLUORENE	0.16	0.02	0.5	0.2
HEXACHLOROBENZENE	2.54	0.03	5.57	1
HEXACHLOROBUTADIENE	2.19	0.27	7.55	1
HEXACHLOROETHANE	1.68	0.19	5.93	1
INDENO(1,2,3-CD)PYRENE	0.04	0.02	0.5	0.2
ISOPHORONE	1.33	0.27	5	1
NAPHTHALENE	0.13	0.03	0.5	0.2
NITROBENZENE	0.11	0.04	0.5	0.2
N-NITROSO-DI-N-PROPYLAMINE	1.00	0.24	5	1
PENTACHLOROPHENOL	3.72	0.27	11.47	2
PHENANTHRENE	0.12	0.02	0.5	0.2
PHENOL	2.59	0.60	5	2
PHENOL, 2-METHYL-4,6-DINITRO-	1.61	0.11	20	4
PYRENE	0.08	0.02	0.5	0.2
Lab 6				
1,2,4-TRICHLOROBENZENE	2.68	0.02	5.24	1
2,4,6-TRICHLOROPHENOL	1.69	0.06	5	1
2,4-DICHLOROPHENOL	2.05	0.06	5	1
2,4-DIMETHYLPHENOL	3.39	0.24	7.10	1
2,4-DINITROPHENOL	14.88	0.94	50	10
2,4-DINITROTOLUENE	2.64	0.03	5	1
2,6-DINITROTOLUENE	2.01	0.13	5	5
2-CHLORONAPHTHALENE	2.01	0.03	5	1
2-CHLOROPHENOL	1.86	0.08	5	1
2-NITROPHENOL	1.95	0.07	5	1
3,3'-DICHLOROBENZIDINE	4.22	0.64		5
4-BROMOPHENYLPHENYLETHER	1.69	0.02	5	1
4-CHLORO-3-METHYLPHENOL	2.68	0.03	5	1
4-CHLOROPHENYLPHENYLETHER	1.52	0.03	5	1
4-NITROPHENOL	25.43	0.06	50	10
ACENAPHTHENE	2.06	0.02	5	1
ACENAPHTHYLENE	1.68	0.02	5	1
ANTHRACENE	2.39	0.04	5	1
BENZO(A)ANTHRACENE	2.58	0.02	5	1
BENZO(A)PYRENE	2.40	0.04	5	1

625	DL	MDL	QL	ML
BENZO(B)FLUORANTHENE	2.26	0.11	5	1
BENZO(GHI)PERYLENE	2.82	0.03	5.16	1
BENZO(K)FLUORANTHENE	2.18	0.02	5	1
BIS(2-CHLOROETHOXY)METHANE	1.94	0.01	5	1
BIS(2-CHLOROETHYL)ETHER	1.44	0.03	5	1
BIS(2-CHLOROISOPROPYL)ETHER	1.45	0.02	5	1
BIS(2-ETHYLHEXYL)PHTHALATE	2.16	0.24	5	1
BUTYL BENZYL PHTHALATE	2.24	0.05	5	1
CHRYSENE	2.06	0.01	5	1
DIBENZO(A,H)ANTHRACENE	2.27	0.03	5	1
DIETHYL PHTHALATE	1.99	0.02	5	1
DIMETHYL PHTHALATE	1.77	0.04	5	1
DI-N-BUTYL PHTHALATE	2.76	0.23	5	1
DI-N-OCTYL PHTHALATE	5.66	0.06	10	1
FLUORANTHENE	2.35	0.01	5	1
FLUORENE	1.76	0.03	5	1
HEXACHLOROBENZENE	2.31	0.04	5	1
HEXACHLOROBUTADIENE	3.73	0.03	6.30	1
HEXACHLOROETHANE	2.99	0.04	5.30	1
INDENO(1,2,3-CD)PYRENE	2.54	0.04	5.21	1
ISOPHORONE	1.97	0.01	5	1
NAPHTHALENE	2.11	0.01	5	1
NITROBENZENE	2.46	0.03	5	1
N-NITROSO-DI-N-PROPYLAMINE	2.09	0.04	5	1
PENTACHLOROPHENOL	2.84	0.11	5	5
PHENANTHRENE	2.31	0.03	5	1
PHENOL	2.07	0.05	5	1
PHENOL, 2-METHYL-4,6-DINITRO-	1.95	0.04	5	5
PYRENE	2.71	0.02	5	1