CHAPTER 8 - QUALITY ASSURANCE

The fundamental objective of a QA program is to ensure high-quality measurements are produced and reported from the analytical laboratory. The defensibility of data generated by laboratories must be based on sound scientific principles, method evaluations, and data verification and validation. WIPP Laboratories, Wastren, in Grand Junction, Colorado; Air Toxics, Ltd., in Folsom, California; and Trace Analysis, in Lubbock, Texas, were the contract laboratories that performed the radiological and nonradiological analyses for WIPP environmental samples.

All laboratories were required to have documented QA programs, standard procedures to perform the work, and to participate in some intercomparison programs with the National Institute of Standards and Technology Radiochemistry Intercomparison Program (NRIP), the Environmental Monitoring Laboratory of the DOE Environmental Measurements Laboratory Quality Assurance Program (QAP), the Environmental Resource Associates® (ERA) interlaboratory assessment, and/or any other reputable intercomparison program.

The contract laboratories used one or more of these accepted protocols in their QA program.

- American Society of Mechanical Engineers NQA-1-1994, *Quality Assurance Program Requirements for Nuclear Facilities*.
- Title 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants."
- EPA/600 14-83-004, QAMS-005/80, *Interim Guidelines and Specification for Preparing Quality Assurance Project Plans.*
- NRC Regulatory Guide 4.15, Rev. 1, Quality Assurance for Radiological Monitoring Program-Effluent Streams and the Environment.
- HPS N13.30 ANSI, *Performance Criteria for Radiobioassay*.
- Proposed ANSI/ASQC-E4, *Quality Assurance Program Requirements for Environmental Programs.*

The WIPP Environmental Monitoring Section performed assessments and audits to ensure the quality of the systems, processes, and deliverables were maintained or improved. Along with these regulatory requirements, the Environmental Monitoring Section also implements DOE Order 414.1A, *Quality Assurance*. The parameters for performance evaluations are completeness, reproducibility, accuracy, comparability, and representativeness.

8.1 Completeness

The completeness parameter was calculated as the ratio of the number of valid results to the total number of samples collected and analyzed. The gross alpha/beta analyses were 96 percent complete for 2001. Samples for air particulates were 95.6 percent complete. Samples and measurements for all other media (groundwater, surface water, soil, sediment, and animal and plant tissues) were 100 percent complete. The data quality objective established for the environmental program is 98 percent complete. The Environmental Monitoring Program exceeded the objective in 2001 for environmental samples.

8.2 Reproducibility

The reproducibility of the measurements was validated through analyses of duplicate samples. A low-volume air sampler was rotated in each quarter from location to location, and sampled along with routine samples. The results of these duplicate comparisons are shown in Tables 8.1, 8.2, 8.3, and 8.4 for the four quarters of 2001. The duplicate samples for other matrices were collected at the same time, same place, and under similar conditions as routine samples. These samples were analyzed in the same analytical batch and/or sample delivery group using similar methods for radiochemical separation and counting as the original samples.

Reproducibility is partially influenced by statistical counting uncertainty, so variances were expected between samples with very low activities (environmental levels). As a part of data validation all radiochemical duplicate samples are evaluated for the RER and on analytical chemistry the relative percent difference (RPD).

Where:

$$RER = \frac{|(Mean\ Activity)_{ori} - (Mean\ Activity)_{dup}|}{\sqrt{(2\times SD)^2_{ori} + (2\times SD)^2_{dup}}}$$

$(\text{Mean Activity})_{ori}$	=	Mean Activity of Original Sample
$(\text{Mean Activity})_{dup}$	=	Mean Activity of Duplicate Sample
SD	=	Standard Deviation of Original and Duplicate Samples

Relative error ratio results equal to or less than one are acceptable and considered to demonstrate reproducibility. A gross alpha result for the week of January 10, 2001, RER is greater than one, 1.03 (Table 8.1).

$$RPD = [\frac{S-D}{\frac{S+D}{2}}] * 100$$

Where:

S = Sample concentration
D = Duplicate sample concentration

An acceptable range for RPD is < 25 percent for the analytical methods. The duplicate results, RER, and RPD for all required analysis passed the required criteria. WIPP's requirement is to reanalyze the batch of samples associated with the duplicate that failed to meet criteria.

8.3 Accuracy and Comparability

The accuracy of the analyses were assured/controlled by using NIST-traceable standards for instrument calibration. Internal QC is performed by using NIST-traceable spiked laboratory control samples. Samples having analysis recoveries outside the range of 50 to 120 percent were reanalyzed. Intercomparisons were performed with the DOE Environmental Measurements Laboratory (EML), NRIP, and ERA to ensure the reliability of radiochemical separation methods and counting instruments. Accuracy, expressed as percent bias, was calculated by:

$$\% \ BIAS = [\frac{A_m - A_k}{A_k}] * 100$$

Where:

% BIAS	=	Percent Bias
A_m	=	Measured Sample Activity
A_k	=	Known Sample Activity

The DOE EML QAP, NRIP, and ERA prepare QC samples containing various alpha-, beta-, and gamma-emitting nuclides in water, soil, air filter, vegetation, synthetic urine, and tissue media and distributes them to numerous laboratories. The programs are an interlaboratory comparison in that results from the participants are compared with the experimentally determined results of QAP, NRIP, and ERA. Also, the administering programs EML, NIST, and ERA assess the results as acceptable or not within a range of bias from the EML, NIST, and ERA known result.

Wastren Laboratory participated in the QAP and ERA programs and WIPP Laboratories participated in the QAP and NRIP programs. The results for Wastren Laboratory are provided in Tables 8.5, 8.6, 8.7, and 8.8 for QAP air, soil, vegetation, and water, respectively. Table 8.9 displays the results for ERA water. Table 8.10 contains the NRIP results for WIPP Laboratories and Tables 8.11, 8.12, 8.13, and 8.14 contain the results for the QAP air, soil, vegetation, and water, respectively. WIPP Laboratories percent bias was acceptable for all radionuclides and all media with two exceptions. Strontium-90 in vegetation during the June intercomparison (QAP 54) and ^{90}Sr in air during the December intercomparison (QAP 55). The percent bias exceeded the acceptable level for the vegetation sample (QAP 54) for ^{90}Sr in June; however,

according to QAP's evaluation, the result is acceptable with a warning. WIPP Laboratories did not analyze the Environmental Monitoring vegetation samples during the June time frame and the laboratory did have acceptable results in the next intercomparison round. The stable carrier addition, as prescribed by the strontium method, was not added correctly during the chemical process for the air filter QAP 55 sample. The weight of the carrier was not recorded properly; therefore, the activity of the sample was calculated with an incorrect weight. In the December intercomparison (QAP 55), the amount of stable strontium carrier added to the air filter sample was recorded incorrectly. This caused an error in the activity calculation that resulted in the reported number being not acceptable.

Wastren Laboratory's percent bias in evaluating soil was acceptable for all radionuclides and all media except for ^{212}Bi in soil during the June intercomparison (QAP 54). The percent bias exceeds the acceptable level of -25 percent; however, the result is acceptable with warning by QAP's evaluation. WIPP does not require the analysis of ^{212}Bi in any media.

DOE EML QAP participant's analytical performance is evaluated based on the historical analytical capabilities for individual analyte/matrix pairs. The criteria for acceptable performance has been chosen to be between the 15th and 85th percentile of the cumulative normalized distribution, which can be viewed as the 70 percent of all historic measurements. The acceptable with warning criteria is between the 5th and 15th percentile and between the 85th and 95th percentile. In other words, the middle 90 percent of all reported values are acceptable, while the outer 5th through 15th (10 percent) and 85th through 95th (10 percent) percentiles are in the warning area. The not acceptable criteria is established at less than the 5th percentile and greater than the 95th percentile, that is, the outer 10 percent of historical data.

The ERA ^{226}Ra also failed to meet the acceptable percent bias due to a calculation problem at the laboratory. Wastren Laboratory assumed equilibrium with ^{224}Ra in the calculation spreadsheet which caused the ^{226}Ra result to be understated. This problem has been corrected by issuing a nonconformance internally, which instructs analysts to not make an assumption of equilibrium on intercomparison samples. The ERA acceptance criteria for ^{226}Ra was 3.44 to 5.86 pCi/l and the reported result was 3.21 pCi/l.

Air Toxics, Ltd., participated in the ERA, for 49 VOCs in non-potable water. Results were 96 percent satisfactory (Table 8.15). Two volatiles results: bromodichloromethane and bromoform have a performance evaluation of "Check for Error" which indicates that the result is above the warning limit, but within the acceptance limit.

Trace Analysis, Inc., participated in several ERA interlaboratory assessments. For the ERA (July 19, 2001) run of WP-76 response performance standards (Table 8.16), 11 of 193 (5.7 percent) parameters were not acceptable. Subsequently, blind samples were analyzed for all analytes missed. When reevaluated, all were acceptable.

The cyanide analysis failed to meet the acceptance criteria due to a problem with the extraction process in the laboratory. The instrument calibration verification passed the QC requirements. The laboratory control sample, however, had low recovery, indicating a loss of cyanide during the extraction process. The corrective action was to retrain the analyst extracting the cyanide samples. The laboratory QA officer also submitted a blind sample to verify the effectiveness of the corrective action. The blind sample had a 99 percent recovery.

The total organic carbon did not meet the acceptance criteria because of deteriorated standards. The standards used had not expired; however, when a new curve was analyzed with new standards, the sample was within acceptable range.

The thallium result in the metals analysis was also not acceptable. The instrument was adjusted to read at a more sensitive range. The blind sample submitted for analysis passed with the adjusted instrument line.

The polychlorinated biphenyl (PCB) Aroclor 1260 in water failed to meet acceptance criteria because of the analyst not following the procedure properly. The analyst has been retrained and blind samples submitted passed acceptance criteria.

Four compounds were out of the acceptable range in the semivolatile analysis. Anthracene and benzo(a)anthracene were misidentified on the instrument raw printout. The laboratory implemented a step in reviewing instrument printouts by a second person to avoid misidentifying peaks. Chrysene and di-n-octylphthalate were missed due to a bad stock standard which has been corrected by replacing the standard and running a new curve. Blind samples for the semi-volatile analysis also passed for the compounds missed.

The ERA UST-34 (Table 8.17) and QuiK™ Response (Table 8.18) both had excellent results; all compounds were within acceptable range.

Wastren Laboratory, participated in several methods within the ERA assessment, WP-74, May 17, 2001. Results were 99 percent satisfactory (Table 8.19). Of the volatile analysis, trichloroethylene was not acceptable due to a reporting problem. The laboratory discovered that the raw data did not match the reported result. To correct the problem internally, the laboratory QA officer now performs a final review prior to reporting results. Bromide and orthophosphate as P also did not pass the acceptable criteria. The laboratory investigated all obvious possibilities such as dilution error, calculation error, calibration problems and was not able to resolve the problem until the ion chromatograph was replaced. The samples were analyzed on the new instrument and the results fell within the acceptable range.

8.4 Representativeness

The primary objective of environmental monitoring has been to protect the health and safety of the population surrounding the WIPP facility. The quality objective of representativeness was based on potential radiation exposure of the population through

inhalation and ingestion. Samples of ambient air, surface water, sediment, groundwater, and biota were collected from areas representative of potential pathways for intake.

The samples were collected using generally accepted methodologies for environmental sampling and approved procedures, ensuring they were representative of the media sampled. These samples were analyzed for natural radioactivity, fallout radioactivity from nuclear weapons tests, and other anthropogenic radionuclides. The reported concentrations at various locations were representative of the baseline information for radionuclides of interest at the WIPP facility.

Table 8.1 - Comparison of Duplicate Air Monitoring Results (First Quarter of 2001) from WIPP Laboratories Data from WIPP East (WEE) Sampling Location

Week Beginning	Gross Alpha (Bq/m^3)					Gross Beta (Bq/m^3)				
	Sample	2 x TPU[a]	Duplicate	2 x TPU	RER[b]	Sample	2 x TPU	Duplicate	2 x TPU	RER
01/03	4.19×10^{-5}	2.29×10^{-5}	4.74×10^{-5}	2.23×10^{-5}	0.17	1.12×10^{-3}	1.49×10^{-4}	1.23×10^{-3}	1.55×10^{-4}	0.51
01/10	2.94×10^{-5}	1.85×10^{-5}	6.17×10^{-5}	2.55×10^{-5}	1.03	7.95×10^{-4}	1.10×10^{-4}	7.78×10^{-4}	1.07×10^{-4}	0.11
01/17	6.18×10^{-5}	2.62×10^{-5}	3.07×10^{-5}	1.86×10^{-5}	0.97	1.21×10^{-3}	1.53×10^{-4}	1.21×10^{-3}	1.52×10^{-4}	0.00
01/24	3.22×10^{-5}	1.93×10^{-5}	5.77×10^{-5}	2.54×10^{-5}	0.80	7.73×10^{-4}	1.08×10^{-4}	8.34×10^{-4}	1.15×10^{-4}	0.39
01/31	9.76×10^{-5}	3.28×10^{-5}	1.07×10^{-5}	3.52×10^{-5}	0.20	1.31×10^{-3}	1.64×10^{-4}	1.32×10^{-3}	1.66×10^{-4}	0.04
02/07	4.93×10^{-5}	2.36×10^{-5}	4.19×10^{-5}	2.13×10^{-5}	0.23	8.69×10^{-4}	1.20×10^{-4}	9.19×10^{-4}	1.24×10^{-4}	0.29
02/14	4.59×10^{-5}	2.28×10^{-5}	4.08×10^{-5}	2.15×10^{-5}	0.16	1.30×10^{-3}	1.64×10^{-4}	1.17×10^{-3}	1.50×10^{-4}	0.58
02/21	4.27×10^{-5}	2.19×10^{-5}	3.75×10^{-5}	2.13×10^{-5}	0.17	7.20×10^{-4}	1.03×10^{-4}	7.49×10^{-4}	1.08×10^{-4}	0.19
02/28	5.57×10^{-5}	2.37×10^{-5}	5.63×10^{-5}	2.39×10^{-5}	0.02	9.12×10^{-4}	1.21×10^{-4}	8.63×10^{-4}	1.16×10^{-4}	0.29
03/07	2.99×10^{-5}	1.81×10^{-5}	1.67×10^{-5}	1.37×10^{-5}	0.58	5.54×10^{-4}	8.61×10^{-5}	5.77×10^{-4}	8.80×10^{-5}	0.19
03/14	4.69×10^{-5}	2.19×10^{-5}	5.14×10^{-5}	2.40×10^{-5}	0.14	6.84×10^{-4}	9.86×10^{-5}	7.17×10^{-4}	1.05×10^{-4}	0.23
03/21	3.56×10^{-5}	2.08×10^{-5}	3.95×10^{-5}	2.13×10^{-5}	0.13	7.69×10^{-4}	1.10×10^{-4}	6.97×10^{-4}	1.02×10^{-4}	0.48
03/28	4.73×10^{-5}	2.27×10^{-5}	6.21×10^{-5}	2.59×10^{-5}	0.43	8.39×10^{-4}	1.15×10^{-4}	8.67×10^{-4}	1.18×10^{-4}	0.17

[a] Total propagated uncertainty
[b] Relative error ratio

Table 8.2 - Comparison of Duplicate Air Monitoring Results (Second Quarter of 2001) from WIPP Laboratories Data from WIPP South (WSS) Sampling Location

Week Beginning	Gross Alpha (Bq/m^3)					Gross Beta (Bq/m^3)				
	Sample	2 x TPU[a]	Duplicate	2 x TPU	RER[b]	Sample	2 x TPU	Duplicate	2 x TPU	RER
04/04	8.69×10^{-5}	3.15×10^{-5}	7.63×10^{-5}	2.94×10^{-5}	0.25	7.40×10^{-4}	1.06×10^{-4}	7.01×10^{-4}	1.02×10^{-4}	0.27
04/11	5.36×10^{-5}	2.38×10^{-5}	5.64×10^{-5}	2.50×10^{-5}	0.08	8.57×10^{-4}	1.16×10^{-4}	9.49×10^{-4}	1.27×10^{-4}	0.53
04/18	7.32×10^{-5}	2.87×10^{-5}	7.40×10^{-5}	2.90×10^{-5}	0.02	7.83×10^{-4}	1.10×10^{-4}	7.68×10^{-4}	1.09×10^{-4}	0.10
04/25	7.80×10^{-5}	2.96×10^{-5}	5.83×10^{-5}	2.57×10^{-5}	0.50	1.06×10^{-3}	1.39×10^{-4}	9.50×10^{-4}	1.27×10^{-4}	0.58
05/02	7.54×10^{-5}	2.92×10^{-5}	6.39×10^{-5}	2.66×10^{-5}	0.29	7.88×10^{-4}	1.12×10^{-4}	7.35×10^{-4}	1.06×10^{-4}	0.34
05/09	6.05×10^{-5}	2.62×10^{-5}	5.82×10^{-5}	2.52×10^{-5}	0.06	7.86×10^{-4}	1.12×10^{-4}	9.11×10^{-4}	1.24×10^{-4}	0.75
05/16	4.32×10^{-5}	2.18×10^{-5}	3.80×10^{-5}	2.04×10^{-5}	0.17	6.44×10^{-4}	9.62×10^{-5}	6.32×10^{-4}	9.51×10^{-5}	0.09
05/23	5.91×10^{-5}	2.75×10^{-5}	6.81×10^{-5}	2.89×10^{-5}	0.23	8.98×10^{-4}	1.23×10^{-4}	8.15×10^{-4}	1.13×10^{-4}	0.50
05/30	8.27×10^{-5}	3.15×10^{-5}	6.98×10^{-5}	2.91×10^{-5}	0.30	8.72×10^{-4}	1.19×10^{-4}	8.65×10^{-4}	1.18×10^{-4}	0.04
06/06	6.82×10^{-5}	2.87×10^{-5}	7.27×10^{-5}	2.94×10^{-5}	0.11	8.90×10^{-4}	1.23×10^{-4}	7.55×10^{-4}	1.09×10^{-4}	0.82
06/13	5.27×10^{-5}	2.43×10^{-5}	5.83×10^{-5}	2.56×10^{-5}	0.16	6.68×10^{-4}	9.81×10^{-5}	6.37×10^{-4}	9.50×10^{-5}	0.23
06/20	9.79×10^{-5}	3.39×10^{-5}	9.08×10^{-5}	3.18×10^{-5}	0.15	8.56×10^{-4}	1.20×10^{-4}	9.21×10^{-4}	1.25×10^{-4}	0.38
06/27	7.38×10^{-5}	3.04×10^{-5}	7.27×10^{-5}	3.06×10^{-5}	0.03	7.49×10^{-4}	1.11×10^{-4}	7.75×10^{-4}	1.15×10^{-4}	0.16

[a] Total propagated uncertainty
[b] Relative error ratio

Table 8.3 - Comparison of Duplicate Air Monitoring Results (Third Quarter of 2001) from WIPP Laboratories Data from Mills Ranch (MLR) Sampling Location

Week Beginning	Gross Alpha (Bq/m^3)					Gross Beta (Bq/m^3)				
	Sample	2 x TPU[a]	Duplicate	2 x TPU	RER[b]	Sample	2 x TPU	Duplicate	2 x TPU	RER
07/04	2.50×10^{-5}	1.63×10^{-5}	4.17×10^{-5}	2.08×10^{-5}	0.63	6.34×10^{-4}	9.07×10^{-5}	6.82×10^{-4}	9.61×10^{-5}	0.36
07/11	6.25×10^{-5}	2.73×10^{-5}	5.70×10^{-5}	2.61×10^{-5}	0.15	8.97×10^{-4}	1.23×10^{-4}	9.08×10^{-4}	1.24×10^{-4}	0.06
07/18	NR[c]	NR	6.90×10^{-5}	2.79×10^{-5}	N/A[d]	NR	NR	7.06×10^{-4}	1.03×10^{-4}	N/A
07/25	5.34×10^{-5}	2.46×10^{-5}	3.39×10^{-5}	1.95×10^{-5}	0.62	6.60×10^{-4}	9.83×10^{-5}	7.24×10^{-4}	1.04×10^{-4}	0.45
08/01	3.96×10^{-5}	2.11×10^{-5}	2.36×10^{-5}	1.65×10^{-5}	0.60	6.86×10^{-4}	1.01×10^{-4}	8.08×10^{-4}	1.13×10^{-4}	0.80
08/08	7.59×10^{-5}	2.96×10^{-5}	9.41×10^{-5}	3.25×10^{-5}	0.41	7.82×10^{-4}	1.10×10^{-4}	7.73×10^{-4}	1.08×10^{-4}	0.06
08/15	8.28×10^{-5}	3.07×10^{-5}	4.44×10^{-5}	2.28×10^{-5}	1.00	8.34×10^{-4}	1.15×10^{-4}	8.22×10^{-4}	1.14×10^{-4}	0.07
08/22	3.28×10^{-5}	2.17×10^{-5}	2.75×10^{-5}	2.04×10^{-5}	0.18	6.88×10^{-4}	1.03×10^{-4}	7.00×10^{-4}	1.04×10^{-4}	0.08
08/29	4.36×10^{-5}	2.27×10^{-5}	5.57×10^{-5}	2.53×10^{-5}	0.36	6.04×10^{-4}	9.04×10^{-5}	6.85×10^{-4}	9.87×10^{-5}	0.61
09/05	4.70×10^{-5}	2.53×10^{-5}	5.23×10^{-5}	2.64×10^{-5}	0.14	7.25×10^{-4}	1.07×10^{-4}	7.80×10^{-4}	1.12×10^{-4}	0.36
09/12	2.50×10^{-5}	1.79×10^{-5}	3.74×10^{-5}	2.11×10^{-5}	0.45	7.50×10^{-4}	1.06×10^{-4}	8.31×10^{-4}	1.14×10^{-4}	0.52
09/19	5.99×10^{-5}	2.59×10^{-5}	3.65×10^{-5}	1.84×10^{-5}	0.74	8.80×10^{-4}	1.22×10^{-4}	7.23×10^{-4}	1.01×10^{-4}	0.99
09/26	5.92×10^{-5}	2.56×10^{-5}	6.35×10^{-5}	2.64×10^{-5}	0.12	1.25×10^{-3}	1.60×10^{-4}	1.42×10^{-3}	1.76×10^{-4}	0.71

[a] Total propagated uncertainty
[b] Relative error ratio
[c] Not Reported
[d] Not Applicable since sample or duplicate value is not reported.

Table 8.4 - Comparison of Duplicate Air Monitoring Results (Fourth Quarter of 2001) from WIPP Laboratories Data from Smith Ranch (SMR) Sampling Location

Week Beginning	Gross Alpha (Bq/m^3)					Gross Beta (Bq/m^3)				
	Sample	2 x TPU[a]	Duplicate	2 x TPU	RER[b]	Sample	2 x TPU	Duplicate	2 x TPU	RER
10/03	4.23×10^{-5}	2.21×10^{-5}	2.52×10^{-5}	1.70×10^{-5}	0.61	1.02×10^{-3}	1.37×10^{-4}	1.17×10^{-3}	1.51×10^{-4}	0.74
10/10	7.41×10^{-5}	3.05×10^{-5}	NR[c]	NR	N/A[d]	8.20×10^{-4}	1.16×10^{-4}	NR	NR	N/A
10/17	3.66×10^{-5}	2.18×10^{-5}	5.75×10^{-5}	2.71×10^{-5}	0.60	1.39×10^{-3}	1.73×10^{-4}	1.19×10^{-3}	1.53×10^{-4}	0.87
10/24	1.08×10^{-4}	3.63×10^{-5}	1.18×10^{-4}	3.87×10^{-5}	0.19	1.19×10^{-3}	1.53×10^{-4}	1.12×10^{-3}	1.47×10^{-4}	0.33
10/31	NR	NR	1.22×10^{-4}	3.86×10^{-5}	N/A	NR	NR	8.51×10^{-4}	1.18×10^{-4}	N/A
11/07	NR	NR	1.63×10^{-4}	4.59×10^{-5}	N/A	NR	NR	1.75×10^{-3}	2.11×10^{-4}	N/A
11/14	NR	NR	4.18×10^{-5}	2.33×10^{-5}	N/A	NR	NR	7.64×10^{-4}	1.12×10^{-4}	N/A
11/21	NR	NR	8.81×10^{-5}	3.01×10^{-5}	N/A	NR	NR	8.12×10^{-4}	1.09×10^{-4}	N/A
11/28	9.20×10^{-5}	3.23×10^{-5}	1.25×10^{-4}	3.89×10^{-5}	0.65	9.38×10^{-4}	1.25×10^{-4}	1.00×10^{-3}	1.33×10^{-4}	0.35
12/05	4.27×10^{-5}	1.98×10^{-5}	6.04×10^{-5}	2.41×10^{-5}	0.57	6.89×10^{-4}	9.55×10^{-5}	7.34×10^{-4}	1.01×10^{-4}	0.32
12/12	7.72×10^{-5}	3.07×10^{-5}	1.19×10^{-4}	4.08×10^{-5}	0.82	1.13×10^{-3}	1.50×10^{-4}	1.08×10^{-3}	1.49×10^{-4}	0.24
12/19	4.28×10^{-5}	2.16×10^{-5}	4.10×10^{-5}	2.13×10^{-5}	0.06	1.09×10^{-3}	1.41×10^{-4}	1.04×10^{-3}	1.36×10^{-4}	0.26
12/26	6.77×10^{-5}	2.68×10^{-5}	9.63×10^{-5}	3.30×10^{-5}	0.67	1.16×10^{-3}	1.49×10^{-4}	1.20×10^{-3}	1.54×10^{-4}	0.19

[a] Total propagated uncertainty
[b] Relative error ratio
[c] Not Reported
[d] Not Applicable since sample or duplicate value is not reported.

Table 8.5 - Environmental Measurements Laboratory Assessments for Wastren, 2001
MATRIX: Air Filter (Bq/Filter)

	QAP[a] 54 June 2001					QAP 55 December 2001				
	Reported		EML[b]		%	Reported		EML		%
RN[c]	Value	Error	Value	Error	Bias	Value	Error	Value	Error	Bias
^{241}Am	0.49	0.02	0.486	0.016	0.82	0.094	0.005	0.088	0.01	6.82
^{60}Co	21	2	19.44	0.5	8.02	19	2	17.5	0.47	8.57
^{137}Cs	9.8	2	8.76	0.34	11.87	18	2	17.1	0.58	5.26
Gross α	3.57	0.34	3.97	0.3	-10.08	5.54	0.67	5.362	0.536	3.32
Gross β	2.51	0.29	2.58	0.15	-2.71	11.98	1.34	12.77	1.277	-6.19
^{54}Mn	7.4	1	6.52	0.28	13.5	88	14	81.15	4.76	8.44
^{238}Pu	0.21	0.008	0.215	0.009	-2.32	0.069	0.004	0.071	0	-2.82
^{239}Pu	0.14	0.006	0.136	0.012	2.94	0.23	0.009	0.2291	0.017	0.39
^{90}Sr	7.34	0.39	7.1	0.22	3.38	3.31	0.19	3.481	0.233	-4.91
^{234}U	0.043	0.004	0.046	0.002	-6.52	0.099	0.005	0.1082	0.01	-8.5
^{238}U	0.046	0.004	0.046	0.002	0	0.104	0.005	0.1093	0.01	-4.85
TOT U(µg)	3.6	N/A[d]	3.7	0.16	-2.7	8.1	N/A	8.844	0.581	-8.41

[a] Quality Assurance Program
[b] Environmental Measurements Laboratory
[c] Radionuclide
[d] Not Applicable

Table 8.6 - Environmental Measurements Laboratory Assessments for Wastren, 2001
MATRIX: Soil (Bq/kg)

	QAP[a] 54 June 2001					QAP 55 December 2001				
	Reported		EML[b]		%	Reported		EML		%
RN[c]	Value	Error	Value	Error	Bias	Value	Error	Value	Error	Bias
^{228}Ac	42.4	10	42.7	1.7	-0.7	56.3	8	59.57	2.09	-5.49
^{241}Am	14.53	0.76	14.8	0.51	-1.82	4.98	0.31	4.432	0.312	12.36
^{212}Bi	25.4	20	42	4.1	-39.52[d]	54.2	18	62.0667	5.152	-12.67
^{137}Cs	1624	162	1740	90	-6.67	542	70	612.33	30.62	-11.48
^{40}K	462	56	468	25	-1.28	617	206	623.33	33.04	-1.02
^{212}Pb	45.8	16	41.5	2.2	10.36	59.7	11	58.33	3.13	2.35
^{214}Pb	29.5	10	34.3	1.6	-13.99	41.9	6	39.67	1.72	5.62
^{239}Pu	24.83	1.11	25.6	0.34	-3.01	9.32	0.49	8.948	0.323	4.16
^{90}Sr	66.6	5.1	69	5.7	-3.48	29.1	2.4	30.596	1.065	-4.89
^{234}Th	59.3	24	46.6	3.5	27.25	N/A[e]	N/A	N/A	N/A	N/A
^{234}U	40.46	2.41	43.6	1.8	-7.2	87	4.81	92.23	1.3	-5.67
^{238}U	42.27	2.46	46.1	1.3	-8.31	92.87	5.08	98.33	3.2	-5.55
TOTU(µg)	3.6	N/A	3.73	0.02	-3.48	8	N/A	7.948	0.125	0.65

[a] Quality Assurance Program
[b] Environmental Measurements Laboratory
[c] Radionuclide
[d] Not Acceptable
[e] Not Applicable

Table 8.7 - Environmental Measurements Laboratory Assessments for Wastren, 2001
MATRIX: Vegetation (Bq/kg)

	QAP[a] 54 June 2001					QAP 55 December 2001				
	Reported		EML[b]		%	Reported		EML		%
RN[c]	Value	Error	Value	Error	Bias	Value	Error	Value	Error	Bias
^{241}Am	6.19	0.34	6.17	0.32	0.32	7.62	0.4	6.915	0.419	10.2
^{244}Cm	3.65	0.24	3.69	0.29	-1.08	4.27	0.26	4.308	1.021	-0.88
^{60}Co	32.4	6	30.4	1.2	6.58	37.4	4	35.3	1.436	5.95
^{137}Cs	835	168	842	42	-0.83	993	130	1030	51.8	-3.59
^{40}K	691	166	603	32	14.59	1200	400	898.67	48.23	33.53
^{239}Pu	9.18	0.48	9.58	1.3	-4.18	11.54	0.48	11.022	0.43	4.7
^{90}Sr	1224	65	1330	70	-7.97	1541	84	1612.8	48.6	-4.45

[a] Quality Assurance Program
[b] Environmental Measurements Laboratory
[c] Radionuclide

Table 8.8 - Environmental Measurements Laboratory Assessments for Wastren, 2001
MATRIX: Water (Bq/l)

	QAP[a] 54 June 2001					QAP 55 December 2001				
	Reported		EML[b]		%	Reported		EML		%
RN[c]	Value	Error	Value	Error	Bias	Value	Error	Value	Error	Bias
^{241}Am	1.62	0.07	1.67	0.08	-2.99	0.77	0.04	0.7597	0.04	1.36
^{60}Co	104	8	98.2	3.6	5.91	218	20	209	7.59	4.31
^{137}Cs	77	14	73	3.7	5.48	44	5	45.133	2.467	-2.51
Gross α	1918	165	1900	190	0.95	1224	118	1150	115	6.43
Gross β	1272	140	1297	100	-1.93	8005	731	7970	800	0.44
^{3}H	86.1	8.4	79.3	2	8.58	214	17	207	2.69	3.38
^{238}Pu	1.58	0.07	1.58	0.09	0	1.13	0.05	1.0882	0.058	3.84
^{239}Pu	1.65	0.07	1.64	0.09	0.61	1.78	0.07	1.628	0.114	9.33
^{90}Sr	4.08	0.26	4.4	0.2	-7.27	3.82	0.25	3.729	0.364	2.44
^{234}U	0.95	0.05	1.04	0.05	-8.65	1.15	0.07	1.166	0.062	-1.37
^{238}U	0.97	0.05	1.04	0.04	-6.73	1.12	0.07	1.169	0.056	4.19
TOTU(µg)	0.078	N/A[d]	0.08	0.003	-2.5	0.091	N/A	0.0944	0	-3.6

[a] Quality Assurance Program
[b] Environmental Measurements Laboratory
[c] Radionuclide
[d] Not Applicable

Table 8.9 - Environmental Resource Associates® for Wastren, 2001
MATRIX: Water (pCi/l)

	37007					37129				
	Reported		ERA[a]		%	Reported		ERA		%
RN[b]	Value	Error	Value	Error	Bias	Value	Error	Value	Error	Bias
U(NAT)	19.8	N/A[c]	20.4	3	-2.94	N/A	N/A	N/A	N/A	N/A
^{226}Ra	3.21	0.122	4.65	0.698	-30.97[d]	N/A	N/A	N/A	N/A	N/A
^{228}Ra	13.4	0.458	14.4	3.6	-6.94	N/A	N/A	N/A	N/A	N/A
Gross α	N/A	N/A	N/A	N/A	N/A	16.3	1.42	17.8	5	-8.42
Gross β	N/A	N/A	N/A	N/A	N/A	45.1	0.833	53	10	-14.9

[a] Environmental Resource Associates®
[b] Radionuclide
[c] Not Applicable
[d] Not Acceptable

Table 8.10 - NRIP for WIPP Laboratories, 2001

	Synthetic Urine (mBq/g)					Soil (Bq/g)				
	Reported		NIST[a]			Reported		NIST		
RN[b]	Value	% 1 σ Error	Value	% 1 σ Error	% Bias	Value	% 1 σ Error	Value	% 1 σ Error	% Bias
^{241}Am	0.0608	19.24	0.061	0.32	-0.3	0.6364	21.4	0.715	0.32	-10.9
^{238}Pu	0.0584	17.59	0.0623	0.55	-6.3	0.7465	14.4	0.73	0.55	2.3
^{239}Pu	0.0582	17.58	0.0609	0.38	-4.4	0.7701	14.7	0.713	0.39	8
^{90}Sr	0.0573	10.81	0.0637	0.37	-10	0.6191	3.5	0.747	0.37	-17.1
^{238}U	0.0597	18.34	0.06	0.03	-0.5	0.7665	30.2	0.703	0.3	9.1

[a] National Institute of Standards and Technology
[b] Radionuclide

Table 8.11 - Environmental Measurements Laboratory Assessments for WIPP Laboratories, 2001
MATRIX: Air Filter (Bq/Filter)

	QAP[a] 54 June 2001					QAP 55 December 2001				
	Reported		EML[b]		%	Reported		EML		%
RN[c]	Value	Error	Value	Error	Bias	Value	Error	Value	Error	Bias
^{241}Am	0.462	0.096	0.486	0.016	-4.94	0.099	0.016	0.088	0.01	12.5
^{60}Co	19.13	2.57	19.44	0.5	-1.59	17.433	2.373	17.5	0.47	-0.38
^{137}Cs	8.377	1.167	8.76	0.34	-4.37	17.4	2.423	17.1	0.58	1.75
Gross α	3.26	0.332	3.97	0.3	-17.88	5.14	0.519	5.362	0.536	-4.14
Gross β	2.523	0.256	2.58	0.15	-2.21	11	1.097	12.77	1.277	-13.86
^{54}Mn	6.593	0.948	6.52	0.28	1.12	84.733	11.5	81.15	4.76	4.42
^{238}Pu	0.2	0.042	0.215	0.009	-6.98	0.065	0.013	0.071	0	-8.45
^{239}Pu	0.129	0.028	0.136	0.012	-5.15	0.232	0.038	0.2291	0.017	1.26
^{90}Sr	5.41	0.298	7.1	0.22	-23.8	1.86	0.141	3.481	0.233	-46.57[d]
Bq U	0.105	0.016	0.093	0	12.9	0.21	0.023	0.2225	0.014	-5.62

[a] Quality Assurance Program
[b] Environmental Measurements Laboratory
[c] Radionuclide
[d] Not Acceptable

Table 8.12 - Environmental Measurements Laboratory Assessments for WIPP Laboratories, 2001
MATRIX: Soil (Bq/Filter)

	QAP[a] 54 June 2001					QAP 55 December 2001				
	Reported		EML[b]		%	Reported		EML		%
RN[c]	Value	Error	Value	Error	Bias	Value	Error	Value	Error	Bias
^{228}Ac	37.667	6.623	42.7	1.7	-11.79	53.033	8.547	59.57	2.09	-10.97
^{241}Am	17.05	2.549	14.8	0.51	15.2	5.523	1.103	4.432	0.312	24.62
^{212}Bi	47.6	11.5	42	4.1	13.33	56.633	12.267	62.0667	5.152	-8.75
^{214}Bi	27	4.713	32.6	1.4	-17.18	32.633	4.967	36.9	1.53	-11.56
Bq U	83.41	8.247	91.8	2.3	-9.14	205.75	21.145	194.23	3.76	5.93
^{137}Cs	1633.3	205.67	1740	90	-6.13	576.667	72.733	612.33	30.62	-5.82
^{40}K	531.67	71.67	468	25	13.6	716.333	94.967	623.33	33.04	14.92
^{212}Pb	51.33	7.607	41.5	2.2	23.69	71.9	10.15	58.33	3.13	23.26
^{214}Pb	34.667	5.837	34.3	1.6	1.07	42.533	6.127	39.67	1.72	7.22
^{239}Pu	30.057	4.631	25.6	0.67	17.41	10.62	2.037	8.948	0.323	18.68
^{90}Sr	61.64	7.363	69	5.7	-10.67	28.733	3.66	30.596	1.065	-6.09

[a] Quality Assurance Program
[b] Environmental Measurements Laboratory
[c] Radionuclide

Table 8.13 - Environmental Measurements Laboratory Assessments for WIPP Laboratories, 2001
MATRIX: Vegetation (Bq/kg)

	QAP[a] 54 June 2001					QAP 55 December 2001				
	Reported		EML[b]		%	Reported		EML		%
RN[c]	Value	Error	Value	Error	Bias	Value	Error	Value	Error	Bias
^{241}Am	6.283	1.14	6.17	0.32	1.83	8.21	1.63	6.915	0.419	18.73
^{244}Cm	3.82	0.769	3.69	0.29	3.52	NR[d]	NR	4.308	1.021	N/A[e]
^{60}Co	29.967	3.97	30.4	1.2	-1.42	33.967	4.48	35.3	1.436	-3.78
^{137}Cs	761	95.8	842	42	-9.62	899	113	1030	51.8	-12.72
^{40}K	661	88.167	603	32	9.62	973.667	128	898.67	48.23	8.34
^{239}Pu	9.27	1.437	9.58	1.3	-3.24	11.27	1.65	11.022	0.43	2.25
^{90}Sr	877.333	70.367	1330	70	-34.04[f]	1601.67	126.667	1612.8	48.6	-0.69

[a] Quality Assurance Program
[b] Environmental Measurements Laboratory
[c] Radionuclide
[d] Not Reported
[e] Not Applicable
[f] Not Acceptable according to the percent bias acceptable limits, but acceptable with warning according to EML

Table 8.14 - Environmental Measurements Laboratory Assessments for WIPP Laboratories, 2001
MATRIX: Water (Bq/l)

	QAP[a] 54 June 2001					QAP 55 December 2001				
	Reported		EML[b]		%	Reported		EML		%
RN[c]	Value	Error	Value	Error	Bias	Value	Error	Value	Error	Bias
^{241}Am	1.66	0.277	1.67	0.08	-0.599	0.742	0.163	0.7597	0.04	-2.33
Bq U	1.947	0.223	2.12	0.09	-8.16	2.227	0.241	2.372	0.118	-6.11
^{60}Co	102.667	13.633	98.2	3.6	4.55	211.333	28.3	209	7.59	1.12
^{137}Cs	75.03	10.167	73	3.7	2.78	45.533	6.343	45.133	2.467	0.89
^{238}Pu	1.507	0.298	1.58	0.09	-4.62	1.031	0.168	1.0882	0.058	-5.26
^{239}Pu	1.597	0.315	1.64	0.09	-2.62	1.653	0.258	1.628	0.114	1.54
^{90}Sr	4.105	0.289	4.4	0.2	-6.7	4.22	0.338	3.729	0.364	13.17

[a] Quality Assurance Program
[b] Environmental Measurements Laboratory
[c] Radionuclide

Table 8.15 - Environmental Resource Associates® Assessment of Air Toxics, Ltd., WP-75, June 14, 2001, for Volatile Organic Compounds

Analyte	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation
Acetone	µg/l	< 10.00	0	NR[a]	Acceptable
Acetonitrile	µg/l	< 10.00	0	NR	Acceptable
Acrylonitrile	µg/l	< 2.00	0	NR	Acceptable
Acrolein	µg/l	< 10.00	0	NR	Acceptable
Benzene	µg/l	59.1	51.7	37.3 - 66.5	Acceptable
Bromodichloromethane	µg/l	43.4	34.6	24.4 - 45.1	Check for Error[b]
Bromoform	µg/l	49.4	37.4	24.0 - 51.3	Check for Error
Bromomethane	µg/l	< 2.00	0	NR	Acceptable
2-Butanone (MEK)	µg/l	< 10.0	0	NR	Acceptable
Carbon disulfide	µg/l	< 2.00	0	NR	Acceptable
Carbon tetrachloride	µg/l	59.3	55.4	34.2 - 78.1	Acceptable
Chlorobenzene	µg/l	36.5	31.7	22.7 - 40.3	Acceptable
Chlorodibromomethane	µg/l	61.6	51.4	34.0 - 68.3	Acceptable
Chloroethane	µg/l	< 2.00	0	NR	Acceptable
2-Chloroethylvinylether	µg/l	< 10.0	0	NR	Acceptable
Chloroform	µg/l	26.9	23.3	16.4 - 30.1	Acceptable
Chloromethane	µg/l	< 2.00	0	NR	Acceptable
DBCP	µg/l	< 10.0	0	NR	Acceptable
1,2-Dibromoethane (EDB)	µg/l	< 2.00	0	NR	Acceptable
Dibromomethane	µg/l	< 2.00	0	NR	Acceptable
1,2-Dichlorobenzene	µg/l	21.3	18.4	12.7 - 23.8	Acceptable
1,3-Dichlorobenzene	µg/l	43.2	38.5	27.1 - 48.1	Acceptable
1,4-Dichlorobenzene	µg/l	14.1	11.6	7.81 - 15.5	Acceptable
Dichlorodifluoromethane	µg/l	< 2.00	0	NR	Acceptable
1,1-Dichloroethane	µg/l	< 2.00	0	NR	Acceptable
1,2-Dichloroethane	µg/l	47.4	39.9	27.6 - 53.3	Acceptable
1,1-Dichloroethylene	µg/l	69.8	64.4	35.2 - 98.5	Acceptable
cis-1,2-Dichloroethylene	µg/l	< 2.00	0	NR	Acceptable

Table 8.15 - Environmental Resource Associates® Assessment of Air Toxics, Ltd., WP-75, June 14, 2001, for Volatile Organic Compounds

Analyte	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation
trans-1,2-Dichloroethylene	µg/l	32.1	28.6	16.5 - 40.6	Acceptable
1,2-Dichloropropane	µg/l	16	14.3	10.8 - 17.7	Acceptable
cis-1,3-Dichloropropylene	µg/l	< 2.00	0	NR	Acceptable
trans-1,3-Dichloropropylene	µg/l	< 2.00	0	NR	Acceptable
Ethylbenzene	µg/l	29.1	24.3	16.4 - 31.6	Acceptable
2-Hexanone	µg/l	< 10.0	0	NR	Acceptable
Methylene chloride	µg/l	12.7	12.2	7.75 - 17.6	Acceptable
4-Methyl-2-pentanone (MIBK)	µg/l	< 10.0	0	NR	Acceptable
Styrene	µg/l	< 2.00	0	NR	Acceptable
1,1,1,2-Tetrachloroethane	µg/l	< 2.00	0	NR	Acceptable
1,1,2,2-Tetrachloroethane	µg/l	109	84.7	49.6 - 118	Acceptable
Tetrachloroethylene	µg/l	44.8	41.7	27.6 - 53.5	Acceptable
Toluene	µg/l	18.5	16.1	11.3 - 20.6	Acceptable
1,1,1-Trichloroethane	µg/l	28.7	26.2	17.1 - 34.5	Acceptable
1,1,2-Trichloroethane	µg/l	47.8	39.3	27.2 - 50.9	Acceptable
Trichloroethylene	µg/l	54.9	50.9	33.0 - 65.8	Acceptable
Trichlorofluoromethane	µg/l	49.8	44	11.6 - 75.5	Acceptable
1,2,3-Trichloropropane	µg/l	< 2.00	0	NR	Acceptable
Vinyl acetate	µg/l	< 10.0	0	NR	Acceptable
Vinyl chloride	µg/l	< 2.00	0	NR	Acceptable
Xylenes, total	µg/l	147	127	72.7 - 171	Acceptable

[a] Not Reported
[b] Check for Error indicates result is above the warning limit, but within the acceptance limit.

Table 8.16 - Environmental Resource Associates® Assessment of Trace Analysis, Inc., WP-76, July 19, 2001

Parameter	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation
pH	S.U.	5.91	5.9	5.77 - 6.04	Acceptable
Cyanide	mg/l	0.333	0.556	0.384 - 0.717	Not Acceptable
Phenolics, total	mg/l	0.182	0.175	0.0886 - 0.261	Acceptable
Grease & Oil (Gravimeteric)	mg/l	20.8	21	12.3 - 25.9	Acceptable
Total Residual Chlorine	mg/l	3.58	3.44	2.83 - 4.05	Acceptable
Mercury	µg/l	3.73	4.27	3.11 - 5.42	Acceptable
Hexavalent Chromium	µg/l	191	187	152 - 215	Acceptable
Minerals					
Total solids at 105°C	mg/l	224	255	217 - 291	Acceptable
Total Dissolved Solids	mg/l	225	240	178 - 302	Acceptable
Conductivity at 25°C	µmhos	336	338	312 - 364	Acceptable
Alkalinity as CaCO3	mg/l	60	56.9	50.7 - 63.4	Acceptable
Chloride	mg/l	51.4	54.7	48.9 - 60.1	Acceptable
Fluoride	mg/l	2.7	2.95	2.57 - 3.29	Acceptable
Potassium	mg/l	15.1	15.1	12.9 - 17.4	Acceptable
Sodium	mg/l	49.4	61.6	55.6 - 67.7	Not Acceptable

Table 8.16 - Environmental Resource Associates® Assessment of Trace Analysis, Inc., WP-76, July 19, 2001

Parameter	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation
Sulfate	mg/l	10.1	11.1	8.03 - 13.9	Acceptable
Hardness					
Total suspended solids	mg/l	41	45	33.7 - 48.2	Acceptable
Calcium	mg/l	27.1	27.2	24.1 - 31.0	Acceptable
Magnesium	mg/l	21.5	20.9	18.3 - 23.4	Acceptable
Calcium hardness as $CaCO_3$	mg/l	NR[a]	67.9	48.8 - 90.5	
Total hardness as $CaCO_3$	mg/l	156	154	140 - 169	Acceptable
Demand					
BOD	mg/l	108	107	54.3 - 161	Acceptable
CBOD	mg/l	67	92.4	41.5 - 143	Acceptable
COD	mg/l	185	174	134 - 198	Acceptable
TOC	mg/l	84.8	68.7	57.4 - 79.0	Not Acceptable
Nutrients					
Ammonia as N	mg/l	3.53	3.78	2.87 - 4.67	Acceptable
Nitrate as N	mg/l	11.8	11.9	9.42 - 14.1	Acceptable
Ortho-phosphate as P	mg/l	1.24	1.27	1.07 - 1.48	Acceptable
Total phosphorus as P	mg/l	1.51	1.43	1.08 - 1.71	Acceptable
Total kjeldahl nitrogen as N	mg/l	17.9	23.7	17.4 - 29.2	Check for Error[b]
Trace Metals					
Aluminum	µg/l	1240	1190	1020 - 1360	Acceptable
Antimony	µg/l	804	733	518 - 880	Acceptable
Arsenic	µg/l	693	621	521 - 727	Acceptable
Barium	µg/l	2080	2070	1760 - 2340	Acceptable
Beryllium	µg/l	46	47	38.6 - 53.3	Acceptable
Boron	µg/l	630	724	517 - 931	Acceptable
Cadmium	µg/l	628	658	562 - 747	Acceptable
Chromium	µg/l	287	286	248 - 325	Acceptable
Cobalt	µg/l	530	519	456 - 582	Acceptable
Copper	µg/l	660	652	592 - 716	Acceptable
Iron	µg/l	2890	2930	2600 - 3300	Acceptable
Lead	µg/l	1450	1450	1270 - 1620	Acceptable
Manganese	µg/l	2740	2690	2420 - 2990	Acceptable
Molybdenum	µg/l	270	279	238 - 320	Acceptable
Nickel	µg/l	1000	988	894 - 1100	Acceptable
Selenium	µg/l	1210	1210	963 - 1400	Acceptable
Silver	µg/l	214	213	182 - 244	Acceptable
Strontium	µg/l	NR	161	137 - 185	NR
Thallium	µg/l	101	191	152 - 224	Not Acceptable
Vanadium	µg/l	1860	1850	1670 - 2030	Acceptable
Zinc	µg/l	624	614	543 - 692	Acceptable
PCBs in H_2O (Standard #1)					
Aroclor 1016/1242	µg/l	2.7	5.79	1.84 - 7.99	Check for Error
Aroclor 1221	µg/l	NR	0	NR	Acceptable
Aroclor 1232	µg/l	NR	0	NR	Acceptable
Aroclor 1248	µg/l	NR	0	NR	Acceptable

Table 8.16 - Environmental Resource Associates® Assessment of Trace Analysis, Inc., WP-76, July 19, 2001

Parameter	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation
Aroclor 1254	µg/l	NR	0	NR	Acceptable
Aroclor 1260	µg/l	NR	0	NR	Acceptable
PCBs in H_2O (Standard #2)					
Aroclor 1016/1242	µg/l	NR	0	NR	Acceptable
Aroclor 1221	µg/l	NR	0	NR	Acceptable
Aroclor 1232	µg/l	NR	0	NR	Acceptable
Aroclor 1248	µg/l	NR	0	NR	Acceptable
Aroclor 1254	µg/l	NR	0	NR	Acceptable
Aroclor 1260	µg/l	0.8	3.52	1.82 - 4.62	Not Acceptable
PCBs in Oil (Standard #1)					
Aroclor 1016/1242	mg/Kg	NR	0	NR	Acceptable
Aroclor 1254	mg/Kg	9.29	29.9	3.67 - 44.9	Check for Error
Aroclor 1260	mg/Kg	NR	0	NR	Acceptable
PCBs in Oil (Standard #2)					
Aroclor 1016/1242	mg/Kg	20.1	41.7	7.72 - 55.8	Acceptable
Aroclor 1254	mg/Kg	NR	0	NR	Acceptable
Aroclor 1260	mg/Kg	NR	0	NR	Acceptable
Volatiles					
Acetone	µg/l	<10.0	0	NR	Acceptable
Acetonitrile	µg/l	NR	0	NR	No Evaluation
Acrylonitrile	µg/l	<1.00	0	NR	Acceptable
Acrolein	µg/l	NR	0	NR	No Evaluation
Benzene	µg/l	35.1	30.8	22.0 - 39.9	Acceptable
Bromodichloromethane	µg/l	17.6	15.7	10.9 - 20.6	Acceptable
Bromoform	µg/l	50.6	44.9	29.1 - 61.5	Acceptable
Bromomethane	µg/l	< 1.00	0	NR	Acceptable
2-Butanone (MEK)	µg/l	< 5.00	0	NR	Acceptable
Carbon disulfide	µg/l	< 1.00	0	NR	Acceptable
Carbon tetrachloride	µg/l	50.9	44.3	27.4 - 62.5	Acceptable
Chlorobenzene	µg/l	17	16.2	12.0 - 20.4	Acceptable
Chlorodibromomethane	µg/l	22.1	21.5	14.2 - 28.5	Acceptable
Chloroethane	µg/l	< 1.00	0	NR	Acceptable
2-Chloroethylvinylether	µg/l	< 5.00	0	NR	Acceptable
Chloroform	µg/l	61.7	53.7	37.3 - 68.8	Acceptable
Chloromethane	µg/l	< 1.00	0	NR	Acceptable
DBCP	µg/l	< 5.00	0	NR	Acceptable
1,2-Dibromoethane (EDB)	µg/l	< 1.00	0	NR	Acceptable
Dibromomethane	µg/l	< 1.00	0	NR	Acceptable
1,2-Dichlorobenzene	µg/l	36.6	33.9	23.8 - 43.1	Acceptable
1,3-Dichlorobenzene	µg/l	16.2	16.3	11.2 - 20.7	Acceptable
1,4-Dichlorobenzene	µg/l	55.9	48.4	33.3 - 62.4	Acceptable
Dichlorodifluoromethane	µg/l	< 1.00	0	NR	Acceptable
1,1-Dichloroethane	µg/l	< 1.00	0	NR	Acceptable
1,2-Dichloroethane	µg/l	49.5	44.7	30.9 - 59.6	Acceptable
1,1-Dichloroethylene	µg/l	100	86.9	48.3 - 132	Acceptable

Table 8.16 - Environmental Resource Associates® Assessment of Trace Analysis, Inc., WP-76, July 19, 2001

Parameter	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation
cis-1,2-Dichloroethylene	µg/l	2.01	0	NR	Not Acceptable
trans-1,2-Dichloroethylene	µg/l	110	94.1	59.5 - 129	Acceptable
1,2-Dichloropropane	µg/l	54.2	49.7	34.2 - 62.9	Acceptable
cis-1,3-Dichloropropylene	µg/l	2.82	0.911	0.00 - 2.59	Not Acceptable
trans-1,3-Dichloropropylene	µg/l	32.3	41.4	14.9 - 61.2	Acceptable
Ethylbenzene	µg/l	52.9	47.3	31.6 - 61.8	Acceptable
2-Hexanone	µg/l	< 5.00	0	NR	Acceptable
Methylene chloride	µg/l	19.5	19.1	12.1 - 26.9	Acceptable
4-Methyl-2-pentanone (MIBK)	µg/l	< 5.00	0	NR	Acceptable
Styrene	µg/l	< 1.00	0	NR	Acceptable
1,1,1,2-Tetrachloroethane	µg/l	< 1.00	0	NR	Acceptable
1,1,2,2-Tetrachloroethane	µg/l	67.5	62.4	36.4 - 87.2	Acceptable
Tetrachloroethylene	µg/l	53.1	66.1	43.8 - 84.5	Acceptable
Toluene	µg/l	57.7	50.5	36.3 - 63.0	Acceptable
1,1,1-Trichloroethane	µg/l	27.5	26.9	17.6 - 35.5	Acceptable
1,1,2-Trichloroethane	µg/l	63.9	58.2	39.9 - 75.5	Acceptable
Trichloroethylene	µg/l	29.9	29	18.9 - 37.6	Acceptable
Trichlorofluoromethane	µg/l	69.8	65.3	14.0 - 114	Acceptable
1,2,3-Trichloropropane	µg/l	< 1.00	0	NR	Acceptable
Vinyl acetate	µg/l	NR	0	NR	No Evaluation
Vinyl chloride	µg/l	< 1.00	0	NR	Acceptable
Xylenes, total	µg/l	133	116	66.3 - 156	Acceptable
Acids					
Benzoic acid	µg/l	< 5.00	0	NR	Acceptable
4-Chloro-3-methylphenol	µg/l	128	114	44.4 - 147	Acceptable
2-Chlorophenol.	µg/l	56	65.4	20.1 - 82.9	Acceptable
2,4-Dichlorophenol	µg/l	122	112	40.4 - 135	Acceptable
2,6-Dichlorophenol	µg/l	< 5.00	0	NR	Acceptable
2,4-Dimethylphenol	µg/l	63.7	64.9	12.2 - 86.2	Acceptable
4,6-Dinitro-2-methylphenol	µg/l	< 5.00	0	NR	Acceptable
2,4-Dinitrophenol	µg/l	78.9	92.1	0.00 - 127	Acceptable
2-Methlyphenol	µg/l	< 5.00	0	NR	Acceptable
3-Methylphenol	µg/l	NR	0	NR	No Evaluation
4-Methylphenol	µg/l	< 5.00	0	NR	Acceptable
2-Nitrophenol	µg/l	27	27.6	9.16 - 35.3	Acceptable
3-Nitrophenol	µg/l	NR	0	NR	No Evaluation
4-Nitrophenol	µg/l	< 5.00	33.1	0.00 - 52.5	Acceptable
Pentachlorophenol	µg/l	102	112	29.1 - 155	Acceptable
Phenol	µg/l	34.3	95.1	0.00 - 129	Acceptable
2,4,5-Trichlorophenol	µg/l	101	87.3	35.1 - 111	Acceptable
2,4,6-Trichlorophenol	µg/l	94.5	88.3	29.4 - 117	Acceptable
Base Neturals					
Acenaphthene	µg/l	97.5	106	39.6 - 135	Acceptable
Acenaphthylene	µg/l	32.2	30.6	11.4 - 38.9	Acceptable
Aniline	µg/l	< 5.00	0	NR	Acceptable

Table 8.16 - Environmental Resource Associates® Assessment of Trace Analysis, Inc., WP-76, July 19, 2001

Parameter	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation
Anthracene	µg/l	89	0	NR	Not Acceptable
Benzidine	µg/l	< 5.00	0	NR	Acceptable
Benzo(a)anthracene	µg/l	131	96.5	49.2 - 119	Not Acceptable
Benzo(b)fluoranthene	µg/l	26.2	26.2	11.9 - 34.5	Acceptable
Benzo(k)fluoranthene	µg/l	30.7	30.3	6.61 - 47.2	Acceptable
Benzo(g,h,i)perylene	µg/l	< 5.00	0	NR	Acceptable
Benzo(a)pyrene	µg/l	32.3	33.8	5.22 - 45.0	Acceptable
Benzyl alcohol	µg/l	< 5.00	0	NR	Acceptable
4-Bromophenyl-phenylether	µg/l	124	111	47.5 - 142	Acceptable
Butylbenzylphthalate	µg/l	144	134	0.00 - 212	Acceptable
Carbazole	µg/l	NR	0	NR	No Evaluation
4-Chloroaniline	µg/l	< 5.00	0	NR	Acceptable
bis(2-Chloroethoxy)methane	µg/l	< 5.00	0	NR	Acceptable
bis(2-Chloroethyl)ether	µg/l	94.5	113	30.5 - 138	Acceptable
bis(2-Chloroisopropyl)ether	µg/l	< 5.00	0	NR	Acceptable
1-Chloronaphthalene	µg/l	< 5.00	0	NR	Acceptable
2-Chloronaphthalene	µg/l	38.6	45.6	17.7 - 55.5	Acceptable
4-Chlorophenyl-phenylether	µg/l	155	145	51.2 - 185	Acceptable
Chrysene	µg/l	52.8	36.7	16.6 - 47.2	Not Acceptable
Dibenz(a,h)anthracene	µg/l	< 5.00	0	NR	Acceptable
Dibenzofuran	µg/l	< 5.00	0	NR	Acceptable
Di-n-butylphthalate	µg/l	85.7	78.3	14.8 - 111	Acceptable
1,2-Dichlorobenzene	µg/l	< 5.00	0	NR	Acceptable
1,3-Dichlorobenzene	µg/l	< 5.00	0	NR	Acceptable
1,4-Dichlorobenzene	µg/l	< 5.00	0	NR	Acceptable
3,3'-Dichlorobenzidine	µg/l	< 5.00	0	NR	Acceptable
Diethylphthalate	µg/l	119	108	0.00 - 165	Acceptable
Dimethlyphthalate	µg/l	111	101	0.00 - 155	Acceptable
2,4-Dinitrotoluene	µg/l	34	27.7	7.23 - 35.9	Acceptable
2,6-Dinitrotoulene	µg/l	85.5	70.8	27.1 - 91.7	Acceptable
Di-n-octylphthalate	µg/l	< 5.00	80.8	13.4 - 118	Not Acceptable
bis(2-ethylhexyl)phthalate	µg/l	59.1	46.6	16.4 - 67.2	Acceptable
Fluoranthene	µg/l	27.3	23.5	12.8 - 29.8	Acceptable
Fluorene	µg/l	20.3	17.6	7.65 - 23.7	Acceptable
Hexachlorobenzene	µg/l	22	19.1	8.24 - 25.1	Acceptable
Hexachlorobutadiene	µg/l	< 5.00	0	NR	Acceptable
Hexachlorocyclopentadiene	µg/l	< 5.00	0	NR	Acceptable
Hexachloroethane	µg/l	25.9	46.6	6.28 - 57.5	Acceptable
Indeno(1,2,3-cd)pyrene	µg/l	< 5.00	0	NR	Acceptable
Isophorone	µg/l	49.3	46.2	18.2 - 60.4	Acceptable
1-Methylnaphthalene	µg/l	< 5.00	0	NR	Acceptable
2-Methylnaphthalene	µg/l	< 5.00	0	NR	Acceptable
Naphthalene	µg/l	71.2	84.4	22.2 - 110	Acceptable
2-Nitroaniline	µg/l	< 5.00	0	NR	Acceptable
3-Nitroaniline	µg/l	< 5.00	0	NR	Acceptable

Table 8.16 - Environmental Resource Associates® Assessment of Trace Analysis, Inc., WP-76, July 19, 2001

Parameter	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation
4-Nitroaniline	µg/l	< 5.00	0	NR	Acceptable
Nitrobenzene	µg/l	< 5.00	0	NR	Acceptable
N-Nitrosodiethylamine	µg/l	NR	0	NR	No Evaluation
N-Nitrosodimethylamine	µg/l	< 5.00	59.8	0.00 - 73.2	Acceptable
N-Nitrosodiphenylamine	µg/l	< 5.00	0	NR	Acceptable
N-Nitroso-di-n-propylamine	µg/l	< 5.00	0	NR	Acceptable
Phenanthrene	µg/l	89	81.3	32.6 - 105	Acceptable
Pyrene	µg/l	< 5.00	0	NR	Acceptable
Pyridine	µg/l	< 5.00	0	NR	Acceptable
1,2,4-Trichlorobenzene	µg/l	38.8	51.6	14.8 - 63.7	Acceptable

[a] Not Reported
[b] Check for Error indicates result is above the warning limit, but within the acceptance limit.

Table 8.17 - Environmental Resource Associates® Assessment of Trace Analysis, Inc., UST-34, June 15, 2001

Parameter	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation
Gasoline in Water					
Unleaded Gasoline	µg/l	3530	3910	1140 - 7260	Acceptable
Benzene	µg/l	23.6	18.5	4.67 - 34.1	Acceptable
Ethylbenzene	µg/l	87	91.5	18.7 - 148	Acceptable
Toluene	µg/l	236	249	74.8 - 365	Acceptable
Xylenes, total	µg/l	446	528	226 - 655	Acceptable
Diesel in Water					
No. 2 Diesel	µg/l	4200	3410	0.00 - 5440	Acceptable
TPH in Water					
TPH (gravimetric)	mg/bttl	NR[a]	120	28.8 - 175	NR
TPH (IR)	mg/bttl	184	144	17.5 - 309	Acceptable
BTEX in Water					
Benzene	mg/l	59.2	58.6	34.6 - 79.6	Acceptable
Ethylbenzene	mg/l	9.8	10	4.63 - 14.1	Acceptable
Toluene	mg/l	74.9	73.9	36.1 - 106	Acceptable
Xylenes, total	mg/l	197	225	99.6 - 332	Acceptable

[a] Not Reported

Table 8.18 - Environmental Resource Associates® Pesticides assessment Trace Analysis, Inc., QuiK™ Response, March 8, 2001

Parameter	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation
Aldrin	µg/l	0.92	1.16	0.295 - 1.57	Acceptable
alpha-BHC	µg/l	2.5	5.24	2.00 - 7.22	Acceptable
beta-BHC	µg/l	2.5	3.01	0.983 - 4.51	Acceptable
delta-BHC	µg/l	< 0.0001	< 0.100	NR[a]	Acceptable
gamma-BHC (Lindane)	µg/l	2.8	6.32	2.14 - 9.10	Acceptable
alpha-Chlordane	µg/l	< 0.0001	< 0.100	NR	Acceptable
gamma-Chlordane	µg/l	1.9	2.7	0.744 - 4.78	Acceptable
Chlordane, technical	µg/l	NR	< 0.100	NR	Acceptable
4,4'-DDD	µg/l	1.9	2.04	0.995 - 2.85	Acceptable
4,4'-DDE	µg/l	1.1	1.05	0.490 - 1.43	Acceptable
4,4'-DDT	µg/l	4	5.52	2.53 - 7.46	Acceptable
Dieldrin	µg/l	2.1	2.88	1.49 - 3.98	Acceptable
Endrin	µg/l	0.93	1.09	0.577 - 1.21	Acceptable
Endrin aldehyde	µg/l	< 0.0001	< 0.100	NR	Acceptable
Endrin ketone	µg/l	< 0.0001	< 0.100	NR	Acceptable
Endosulfan I	µg/l	1.5	2.19	0.886 - 2.95	Acceptable
Endosulfan II	µg/l	2.4	3.83	0.823 - 6.09	Acceptable
Endosulfan sulfate	µg/l	6	7.77	2.02 - 12.3	Acceptable
Heptachlor	µg/l	1.7	2.6	0.686 - 3.62	Acceptable
Heptachlor epoxide	µg/l	1.7	2.14	1.09 - 2.75	Acceptable
Methoxychlor	µg/l	5	6.39	2.42 - 9.64	Acceptable
Toxaphene	µg/l	NR	< 0.100	NR	Acceptable

[a] Not Reported

Table 8.19 - Environmental Resource Associates® Assessment of Wastren, May 17, 2001

Parameter	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation
pH	S.U.	8.19	8.1	7.87 - 8.33	Acceptable
Minerals					
Total Dissolved Solids	mg/l	333	329	248 - 410	Acceptable
Chloride	mg/l	103	104	94.5 - 113	Acceptable
Fluoride	mg/l	2.57	2.63	2.29 - 2.94	Acceptable
Potassium	mg/l	14.1	14.3	12.2 - 16.5	Acceptable
Sodium	mg/l	93.9	94.6	85.5 - 103	Acceptable
Sulfate	mg/l	10.5	10.9	7.86 - 13.7	Acceptable
Hardness					
Total suspended solids	mg/l	82	79.9	61.8 - 86.2	Acceptable
Calcium	mg/l	90.9	86.4	77.4 - 97.7	Acceptable
Magnesium	mg/l	12.7	12.5	10.9 - 14.1	Acceptable
Nutrients					
Ammonia as N	mg/l	14.2	13	10.1 - 15.8	Acceptable
Nitrate as N	mg/l	7.15	7.78	6.14 - 9.26	Acceptable
Ortho-phosphate as P	mg/l	5.16	3.73	3.18 - 4.31	Not Acceptable

Table 8.19 - Environmental Resource Associates® Assessment of Wastren, May 17, 2001

Parameter	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation
PCBs In Water (Standard #1)					
Aroclor 1016/1242	µg/l	4.24	4.28	1.53 - 5.77	Acceptable
Aroclor 1221	µg/l	< 1.0	0	NR[a]	Acceptable
Aroclor 1232	µg/l	< 1.0	0	NR	Acceptable
Aroclor 1248	µg/l	< 1.0	0	NR	Acceptable
Aroclor 1254	µg/l	< 1.0	0	NR	Acceptable
Aroclor 1260	µg/l	< 1.0	0	NR	Acceptable
PCBs In Water (Standard #2)					
Aroclor 1016/1242	µg/l	< 1.0	0	NR	Acceptable
Aroclor 1221	µg/l	< 1.0	0	NR	Acceptable
Aroclor 1232	µg/l	< 1.0	0	NR	Acceptable
Aroclor 1248	µg/l	4.63	4.99	2.07 - 7.05	Acceptable
Aroclor 1254	µg/l	< 1.0	0	NR	Acceptable
Aroclor 1260	µg/l	< 1.0	0	NR	Acceptable
PCBs In Oil (Standard #1)					
Aroclor 1016/1242	mg/Kg	< 9.9	0	NR	Acceptable
Aroclor 1254	mg/Kg	29.8	40.6	6.51 - 59.0	Acceptable
Aroclor 1260	mg/Kg	< 9.9	0	NR	Acceptable
PCBs In Oil (Standard #2)					
Aroclor 1016/1242	mg/Kg	< 9.9	0	NR	Acceptable
Aroclor 1254	mg/Kg	< 9.9	0	NR	Acceptable
Aroclor 1260	mg/Kg	22.1	32	5.87 - 45.3	Acceptable
Volatiles					
Acetone	µg/l	0	0	NR	Acceptable
Acetonitrile	µg/l	0	0	NR	Acceptable
Acrylonitrile	µg/l	0	0	NR	Acceptable
Acrolein	µg/l	0	0	NR	Acceptable
Benzene	µg/l	47.1	44.3	31.9 - 57.1	Acceptable
Bromodichloromethane	µg/l	48.5	45.4	32.2 - 59.1	Acceptable
Bromoform	µg/l	33.4	29.9	19.0 - 41.1	Acceptable
Bromomethane	µg/l	0	0	NR	Acceptable
2-Butanone (MEK)	µg/l	0	0	NR	Acceptable
Carbon disulfide	µg/l	0	0	NR	Acceptable
Carbon tetrachloride	µg/l	27.8	29.1	18.2 - 41.1	Acceptable
Chlorobenzene	µg/l	65.5	60.5	42.5 - 77.1	Acceptable
Chlorodibromomethane	µg/l	12.2	11.9	7.79 - 15.7	Acceptable
Chloroethane	µg/l	0	0	NR	Acceptable
2-Chloroethylvinylether	µg/l	0	0	NR	Acceptable
Chloroform	µg/l	37.5	36.7	25.6 - 47.2	Acceptable
Chloromethane	µg/l	0	0	NR	Acceptable
DBCP	µg/l	0	0	NR	Acceptable
1,2-Dibromoethane (EDB)	µg/l	0	0	NR	Acceptable
Dibromomethane	µg/l	0	0	NR	Acceptable
1,2-Dichlorobenzene	µg/l	58.7	53.1	37.5 - 67.0	Acceptable
1,3-Dichlorobenzene	µg/l	26.5	27.4	19.2 - 34.4	Acceptable

Table 8.19 - Environmental Resource Associates® Assessment of Wastren, May 17, 2001

Parameter	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation
1,4-Dichlorobenzene	µg/l	62.9	58	39.9 - 74.6	Acceptable
Dichlorodifluoromethane	µg/l	0	0	NR	Acceptable
1,1-Dichloroethane	µg/l	0	0	NR	Acceptable
1,2-Dichloroethane	µg/l	13.7	13.7	9.67 - 18.8	Acceptable
1,1-Dichloroethylene	µg/l	79.6	78.8	43.6 - 120	Acceptable
cis-1,2-Dichloroethylene	µg/l	0	0	NR	Acceptable
trans-1,2-Dichloroethylene	µg/l	21.2	20.3	11.0 - 29.4	Acceptable
1,2-Dichloropropane	µg/l	69.9	67.2	45.7 - 85.3	Acceptable
cis-1,3-Dichloropropylene	µg/l	0	1.54	0.00 - 9.46	Acceptable
trans-1,3-Dichloropropylene	µg/l	90.8	70.2	23.3 - 106	Acceptable
Ethylbenzene	µg/l	27.3	26.5	17.8 - 34.5	Acceptable
2-Hexanone	µg/l	0	0	NR	Acceptable
Methylene chloride	µg/l	65.4	63.8	40.3 - 87.6	Acceptable
4-Methyl-2-pentanone (MIBK)	µg/l	0	0	NR	Acceptable
Styrene	µg/l	0	0	NR	Acceptable
1,1,1,2-Tetrachloroethane	µg/l	0	0	NR	Acceptable
1,1,2,2-Tetrachloroethane	µg/l	63.2	53	30.8 - 74.1	Acceptable
Tetrachloroethylene	µg/l	58.2	54.6	36.1 - 69.9	Acceptable
Toluene	µg/l	41.4	37.9	27.1 - 47.5	Acceptable
1,1,1-Trichloroethane	µg/l	15.8	16.3	10.8 - 21.5	Acceptable
1,1,2-Trichloroethane	µg/l	33.4	29.1	20.4 - 37.6	Acceptable
Trichloroethylene	µg/l	18.8	14.1	9.29 - 18.4	Acceptable
Trichlorofluoromethane	µg/l	77.4	69.6	14.4 - 121	Acceptable
1,2,3-Trichloropropane	µg/l	0	0	NR	Acceptable
Vinyl acetate	µg/l	0	0	NR	Acceptable
Vinyl chloride	µg/l	0	0	NR	Acceptable
Xylenes, total	µg/l	235	210	121 - 280	Acceptable
Acids					
Benzoic acid	µg/l	< 10.0	0	NR	Acceptable
4-Chloro-3-methylphenol	µg/l	137	132	51.7 - 170	Acceptable
2-Chlorophenol	µg/l	74	78.4	23.5 - 99.1	Acceptable
2,4-Dichlorophenol	µg/l	75.2	80.4	29.0 - 98.0	Acceptable
2,6-Dichlorophenol	µg/l	NR	0	NR	Acceptable
2,4-Dimethylphenol	µg/l	82.8	99	20.6 - 130	Acceptable
4,6-Dinitro-2-methylphenol	µg/l	81.6	88.7	16.5 - 121	Acceptable
2,4-Dinitrophenol	µg/l	99.1	118	0.00 - 156	Acceptable
2-Methlyphenol	µg/l	< 10	0	NR	Acceptable
3-Methylphenol	µg/l	NR	0	NR	Acceptable
4-Methylphenol	µg/l	< 10	0	NR	Acceptable
2-Nitrophenol	µg/l	40.4	55.2	17.1 - 71.9	Acceptable
3-Nitrophenol	µg/l	NR	0	NR	Acceptable
4-Nitrophenol	µg/l	10.3	27.1	0.00 - 44.8	Acceptable
Pentachlorophenol	µg/l	59.4	67.4	15.1 - 93.2	Acceptable
Phenol	µg/l	37.2	85.6	0.00 - 116	Acceptable

Table 8.19 - Environmental Resource Associates® Assessment of Wastren, May 17, 2001

Parameter	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation
2,4,5-Trichlorophenol	µg/l	100	112	42.6 - 142	Acceptable
2,4,6-Trichlorophenol	µg/l	40.2	48.7	17.2 - 63.6	Acceptable
Base Neturals					
Acenaphthene	µg/l	15	18.5	8.24 - 23.7	Acceptable
Acenaphthylene	µg/l	< 10.0	0	NR	Acceptable
Aniline	µg/l	< 10.0	0	NR	Acceptable
Anthracene	µg/l	91.5	92.6	33.6 - 120	Acceptable
Benzidine	µg/l	NR	0	NR	Acceptable
Benzo(a)anthracene	µg/l	98.6	91.7	46.9 - 113	Acceptable
Benzo(b)fluoranthene	µg/l	43.2	43.7	14.5 - 60.3	Acceptable
Benzo(k)fluoranthene	µg/l	< 10.0	0	NR	Acceptable
Benzo(g,h,i)perylene	µg/l	27.6	27	2.14 - 40.7	Acceptable
Benzo(a)pyrene	µg/l	64.5	60.9	14.1 - 79.6	Acceptable
Benzyl alcohol	µg/l	< 10.0	0	NR	Acceptable
4-Bromophenyl-phenylether	µg/l	87.7	86.8	37.8 - 111	Acceptable
Butylbenzylphthalate	µg/l	138	149	0.00 - 235	Acceptable
Carbazole	µg/l	< 10.0	0	NR	Acceptable
4-Chloroaniline	µg/l	< 10.0	0	NR	Acceptable
bis(2-Chloroethoxy)methane	µg/l	38	45.2	17.6 - 54.9	Acceptable
bis(2-Chloroethyl)ether	µg/l	138	157	41.5 - 189	Acceptable
bis(2-Chloroisopropyl)ether	µg/l	< 10.0	0	NR	Acceptable
1-Chloronaphthalene	µg/l	NR	0	NR	Acceptable
2-Chloronaphthalene	µg/l	107	120	48.2 - 136	Acceptable
4-Chlorophenyl-phenylether	µg/l	< 10.0	0	NR	Acceptable
Chrysene	µg/l	< 10.0	0	NR	Acceptable
Dibenz(a,h)anthracene	µg/l	14.1	13.9	3.41 - 18.4	Acceptable
Dibenzofuran	µg/l	< 10.0	0	NR	Acceptable
Di-n-butylphthalate	µg/l	118	102	15.4 - 143	Acceptable
1,2-Dichlorobenzene	µg/l	< 10.0	0	NR	Acceptable
1,3-Dichlorobenzene	µg/l	< 10.0	0	NR	Acceptable
1,4-Dichlorobenzene	µg/l	< 10.0	0	NR	Acceptable
3,3'-Dichlorobenzidine	µg/l	< 10.0	0	NR	Acceptable
Diethylphthalate	µg/l	42	40.5	10.3 - 61.1	Acceptable
Dimethlyphthalate	µg/l	54.4	53.6	2.70 - 81.8	Acceptable
2,4-Dinitrotoluene	µg/l	49.1	48.9	17.1 - 64.4	Acceptable
2,6-Dinitrotoluene	µg/l	< 10.0	0	NR	Acceptable
Di-n-octylphthalate	µg/l	113	97	14.9 - 142	Acceptable
bis(2-ethylhexyl)phthalate	µg/l	57.4	57.2	16.8 - 82.9	Acceptable
Fluoranthene	µg/l	64.6	61	27.7 - 78.5	Acceptable
Fluorene	µg/l	< 10.0	0	NR	Acceptable
Hexachlorobenzene	µg/l	38.8	47.7	20.8 - 61.8	Acceptable
Hexachlorobutadiene	µg/l	< 10.0	0	NR	Acceptable
Hexachlorocyclopentadiene	µg/l	75.9	110	0.00 - 141	Acceptable
Hexachloroethane	µg/l	69.9	85.4	8.41 - 108	Acceptable
Indeno(1,2,3-cd)pyrene	µg/l	< 10.0	0	NR	Acceptable

Table 8.19 - Environmental Resource Associates® Assessment of Wastren, May 17, 2001

Parameter	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation
Isophorone	µg/l	115	123	41.9 - 164	Acceptable
1-Methylnaphthalene	µg/l	NR	0	NR	Acceptable
2-Methylnaphthalene	µg/l	< 10.0	0	NR	Acceptable
Naphthalene	µg/l	36.8	44.9	14.0 - 59.1	Acceptable
2-Nitroaniline	µg/l	< 10.0	0	NR	Acceptable
3-Nitroaniline	µg/l	< 10.0	0	NR	Acceptable
4-Nitroaniline	µg/l	< 10.0	0	NR	Acceptable
Nitrobenzene	µg/l	65.2	88.2	29.1 - 115	Acceptable
N-Nitrosodiethylamine	µg/l	NR	0	NR	Acceptable
N-Nitrosodimethylamine	µg/l	< 10.0	0	NR	Acceptable
N-Nitrosodiphenylamine	µg/l	< 10.0	0	NR	Acceptable
N-Nitroso-di-n-propylamine	µg/l	< 10.0	0	NR	Acceptable
Phenanthrene	µg/l	41.2	46.4	23.7 - 58.2	Acceptable
Pyrene	µg/l	22.7	26.9	8.55 - 40.9	Acceptable
Pyridine	µg/l	< 10.0	0	NR	Acceptable
1,2,4-Trichlorobenzene	µg/l	45.8	61.9	17.9 - 75.5	Acceptable
Bromide					
Bromide	µg/l	677	352	302 - 408	Not Acceptable

[a] Not Reported