137794

REMEDIAL INVESTIGATION REPORT

VOLUME II - APPENDICES A-B

Virginia Wood Preserving Site
Richmond, Virginia

Prepared for:

Virginia Properties, Inc.

DAMES & MOORE
7101 Wisconisn Avenue, Suite 700, Bethesda, Maryland 20814

May 31, 1990

CONTENTS

APPENDIX A

Memoranda Related to Field Activities

DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP
7101 WISCONSIN AVENUE, SUITE 700, BETHESDA, MARYLAND 20814-4870
(301) 652-2215 TELEX: 315528

June 22, 1989

Mr. Randy Sturgeon
Remedial Enforcement Section (3HW16)
U.S. Environmental Protection Agency
Region III
841 Chestnut Building
Philadelphia, PA 19107

Re: Packer Testing at the
Virginia Wood Preserving Site
Richmond, Virginia

Dear Randy:

We have completed our evaluation of the downhole geophysical logs developed from the two deep production wells on June 9, 1989, and the two downhole videotapes obtained on June 15, 1989. As a result, the intervals identified on the attached sheet have been selected for packer settings in the testing scheduled to commence on June 26, 1989. As per your request, copies of the geophysical logs were previously sent to Mr. Alan Giles of GRC for his evaluation.

Should you have any questions or comments regarding the attached information, please contact either Mark McBride of this office or myself.

Sincerely,

DAMES & MOORE

John O. Osgood
Project Manager

JOO/kmb

Attachment

cc: Tucker Mooreshead, Earth Data Inc.
Al Giles, GRC
Chris Kupfer, Dames & Moore

AR301314

RECOMMENDED PACKER TESTING INTERVALS, VA WOOD PRESERVERS

Well PW-01
Depths are to TOP of packer

From (ft)	To (ft)	Comments
15	65	To test leakage at bottom of casing.
65	115	(Bottom of casing 48 ft.)
115	165	
165	215	
165	243	Deflate bottom packer; same setting above.

Well PW-02
Depths are to TOP of packer

From (ft)	To (ft)	Comments
15	65	To test leakage at bottom of casing.
65	115	(Bottom of casing 24 ft.)
115	165	
165	215	
215	265	
265	315	
315	365	
365	415	
415	465	
415	484	Deflate bottom packer; same setting above.

Samples will be collected from each interval, from the water table surface and the bottom of each well.

DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP
7101 WISCONSIN AVENUE, SUITE 700, BETHESDA, MARYLAND 20814-4570
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July 5, 1989

Mr. Randy Sturgeon
Remedial Enforcement Section (3HW16)
U.S. Environmental Protection Agency
Region III
841 Chestnut Building
Philadelphia, PA 19107

Re: Modifications to
Rentokil Work Plans

Dear Randy:

This letter summarizes the major deviations to approved work plan procedures that were made during field activities at the Virginia Wood Preserving Site in Richmond, Virginia. All of these changes were discussed previously with you and were accomplished under the observation of the EPA oversight contractor.

1. Well DM-11(B) was moved approximately 50 feet closer to the rear fence line than was originally planned. This was due to excessively wet field conditions which prevented access to the original staked point.

2. Well CM-16 was moved approximately 50 feet north of the originally planned location. This was due to wet field conditions, limited accessibility and potential interference with the railroad right-of-way.

3. It was not possible to collect shallow (0-12 inches) soil samples using a hand auger due to hard ground conditions. Consequently, these samples were collected using a pickax.

4. All shallow wells designed to monitor groundwater above the hardpan were constructed without protective casings. Water tables encountered during drilling were high and would have been above the base of the protective casings. If the casings had been utilized, potential LAPLES would have been excluded from the wells and, therefore, could not have been monitored.

   Protective posts were placed in appropriate locations around the shallow wells to substitute for the protective casings. Locking caps were welded to the 2-inch casings since the protective casings were not used.

5. All shallow borings which did not penetrate the hardpan were backfilled with cuttings instead of with clean fill materials. No adverse conditions are expected to result from this action since the borings did not breach the integrity of the hardpan and they were only 3 to 5 feet in depth. All borings and wells which penetrated the hardpan were backfilled with grout.

6. All wastewaters produced during drilling and well development were drummed and/or discharged to the concrete holding pond. They were subsequently consumed during ongoing wood preservation processes.

7. Sample containers used were modified according to the revised Table B.III.9-1 (see attached). These changes were necessary in order to add requirements for analytical parameters that were not previously identified, to provide additional samples for the subcontracted chemical laboratories, and to provide substitutes for container sizes which were not available through CompuChem Laboratories.

8. The volume of soil sample collected and the number of containers required for each sample were modified as presented in Table B.III.9-2 (see attached). These changes were made in order to provide split samples with EPA for duplicate chemical analysis.

9. The split soil sample collected by the EPA oversight contractor above the hardpan at DM-15 was taken from an offset sampling position which was not the same as that collected by Dames & Moore. Consequently, the sample was not a duplicate of the sample collected by Dames & Moore at this location. This was due to the fact that the EPA schedule for split sampling was unavailable at the time the shallow portion of DM-15 was constructed.

10. The jar headspace test was used to screen samples collected from DM 11B at 6-8 ft and 8-10 ft in place of the UV Spectrofluorometer immediately after collection due to difficulties encountered in setting up the UV Spectrofluorometer. Portions of these samples were subsequently containerized, refrigerated, and rescreened with the UV Spectrofluorometer the next day for confirmation purposes.

Sample DM 11B 6-8 ft, which was a nondiscriminatory sample, was sent for analysis upon collection. Sample DM 11B 8-10 ft registered negatively by both screening methods and was not sent for analysis.

11. Two of the three wells evaluated during Task 1 were abandoned by removing the steel casings while backfilling the holes with grout. This was done in coordination with you and the oversight contractor. The remaining well, a large diameter concrete cased well, is to be abandoned by methods previously approved by you. This will be accomplished upon completion of subcontractor negotiations. We will notify you prior to any action taken.

Please contact me if you have any questions or comments regarding these issues.

Sincerely,

DAMES & MOORE

John O. Osgood
Project Manager

JOO/kmb

cc: D. Anderson
J. Przybylinski

TABLE B.III.9-1

Sample Container, Volume, Preservation, and Holding Time Requirements for Water

Parameter	Container	Preservation	Holding Time
COMPUCHEM LABORATORIES			
Volatiles	2 x 40 ml;G	4°C	7 days
Semivolatiles	3 x 1 liter;G	4°C	5 days extraction, 40 days analysis
Pesticides/PCBs	2 x 1 liter;AG	4°C	10 days extraction, 40 days analysis
Metals	2 x 500 ml;P	Filter 0.45 um pH 2 (HNO_3) 4°C	180 days
CHEMWEST ANALYTICAL LABORATORIES			
Dioxins and Furans	3 x 1 liter;AG	4°C	10 days extraction, 40 days analysis
COD	1 x 1 liter;G	pH 2 (H_2SO_4) 4°C	28 days
Hardness	1 x 500 ml;P	pH 2 (HNO_3) 4°C	180 days
Alkalinity	1 x 500 ml;P	4°C	14 days
Thiocyanate	1 x 1 liter;G	pH 12 (NaOH) 4°C	14 days

TABLE B.III.9-1 (CONT.)

Sample Container, Volume, Preservation, and Holding Time Requirements for Water

Parameter	Container	Preservation	Holding Time
NORTHEASTERN ANALYTICAL CORPORATION			
TOC	1 x 1 liter;AG	pH 2 (H_2SO_4) 4°C	28 days
TKN	1 x 1 liter;G	pH 2 (H_2SO_4)	28 days
BOD	1 x 1 liter;G	4°C	48 hours
Total Phosphorus	1 x 1 liter;G	4°C (H_2SO_4) pH 2	48 hours
TDS, TSS	1 x 1 liter;G	4°C	7 days

Notes: AG - amber glass
G - clear glass
P - plastic

TABLE B.III.9-2

Sample Container, Volume, Preservation, and Holding Time Requirements for Soil and Sediment

Parameter	Container	Preservation	Holding Time
COMPUCHEM LABORATORIES			
Volatiles	2 x 40 ml VOA vial;G	4°C	10 days
Semivolatiles, Pesticides/PCBS, Metals	1 x 1 liter;G (a)	4°C	10 days extraction, 40 days analysis
CHEMWEST ANALYTICAL LABORATORIES			
Dioxins and Furans	1 x 4 oz;AG (b)	4°C	10 days extraction, 40 days analysis
NORTHEASTERN ANALYTICAL CORPORATION			
TOC	1 x 4 oz;G	4°C	28 days

Notes: AG - amber glass
G - clear glass
P - plastic

(a) These samples may be placed in a common 1-liter glass container for shipment to the laboratory. That is, one 1-liter filled bottle provides sufficient sample for all three analyses.

(b) In the event that an amber bottle is unavailable, wrap a clear bottle in aluminum foil to keep out light.

DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP
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June 19, 1989

Mr. Randy Sturgeon
Remedial Enforcement Section (3HW16)
U.S. Environmental Protection Agency
Region III
841 Chestnut Building
Philadelphia, PA 19107

Re: Modifications to
Rentokil QAPjP

Dear Mr. Sturgeon:

This letter is related to changes which must be made to the Quality Assurance Project Plan (QAPjP) as currently written. The changes are necessitated as a result of corrections requested by our laboratory subcontractor, CompuChem Laboratories to information they supplied us which was subsequently discovered to be in error. The changes are minor and will have no impact on the scope of work or quality assurance objectives for the project.

The following required changes should be made to Table 8-2 found on page 8-3 of the QAPjP:

- The TOC analysis will be performed by Northeastern Analytical Corporation (NAC) rather than CompuChem Laboratories;
- The BOD analysis will be performed following EPA method #405.1, which is equivalent to SM #507 and for which an SOP was provided in Appendix D;
- The COD analysis will be performed following EPA method #410.4, the SOP of which was provided in Appendix D, rather than #410.1;
- The TKN analysis will be performed following EPA method #351.3 rather than #351.2, and a replacement SOP is enclosed;
- The CLP-Organics SOW was last revised on 2/88 and this methodology will be followed; and
- The CLP-Inorganics SOW was last revised on 7/88 and this methodology will be followed.

The following change should be made to Section 6.3, which is found on page 6-5:

- The sentence "Samples will be shipped directly from the field to the laboratory performing the analysis in order to minimize shipping times and, thus, minimize the chance of holding times being exceeded" should be changed to read "Samples will be shipped from the field to CompuChem Laboratories where they will receive a CompuChem identification number for sample tracking purposes. Samples to be analyzed by one of CompuChem's subcontracting laboratories (i.e., ChemWest Analytical Laboratories or Northeastern Analytical Corporation) will in general be repackaged and shipped to the subcontractor laboratory by CompuChem after having received CompuChem's identification number. The only exception will be samples for analyses that have sensitive holding times (e.g., BOD, total phosphorus), which will be shipped directly to the laboratory performing the analysis so that holding times are not exceeded."

Amended copies of page 6-5 and Table 8-2 containing these changes are enclosed for your review and the project record.

Dames & Moore assumes that EPA will find these modifications acceptable, since they do not materially affect the data collection effort. Please call if this assumption is incorrect, or if you have questions or comments.

Sincerely,

DAMES & MOORE

John O. Osgood
Project Manager

/cmm

cc: J. Przybylinski
D. Anderson

TABLE 8-2

Analytical Methods

Analytical Group	Method[a]	Laboratory Performing Analysis
TCL volatiles	CLP - Organics SOW	CompuChem
TCL semivolatiles	CLP - Organics SOW	CompuChem
TCL pesticides/PCBs	CLP - Organics SOW	CompuChem
TAL metals including, arsenic, chromium, copper, and zinc	CLP - Inorganics SOW	CompuChem
Dioxins and furans	EPA-SW-846 - Method 8280, Isomer Specific	ChemWest
TOC	EPA-600 #415.1	NAC
BOD	EPA-600 #405.1	NAC
COD	EPA-600 #410.4	ChemWest
TKN	EPA-600 #351.3	NAC
TSS	EPA-600 #160.2	NAC
TDS	EPA-600 #160.1	NAC
Hardness	EPA-600 #130.2	ChemWest
Phosphorus, Total	EPA-600 #365.2, Procedure (00665)	NAC
Alkalinity	EPA-600 #310.1	ChemWest
Thiocyanate	SM #412K	ChemWest

[a]References:

1. CLP SOW - Organics
   EPA Contract Laboratory Program. Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration. 10/86. Revised 1/87, 2/87, 7/87, 8/87, 2/88.

2. CLP SOW - Inorganics
   EPA Contract Laboratory Program. Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration. SOW No. 787. Revised 7/88.

3. EPA-SW-846 - Test Methods for Evaluating Solid Waste, 3rd edition, Nov. 1986.

4. EPA 600/4-79-200 - Methods for Chemical Analysis of Water and Waste, March 1979.

5. SM = Standard Methods for the Examination of Water and Wastewater, 16th edition. Approved by EPA in 40 CFR 136.3, Table 1B.

When the laboratory receives the samples, the chain-of-custody forms will be signed and the date and time recorded by the laboratory sample custodian. The sample custodian will immediately inspect the shipment for damage and completeness, and report any problems to the Dames & Moore sample shipper. The laboratory sample custodian will then complete all the appropriate lab tracking sheets and logs.

6.3 LABORATORIES

The laboratory sample custodian is responsible for the custody of samples from the time of sample receipt to the time of sample discard. The contracted analytical laboratories have established SOPs for sample handling, storage, and dispersement for analysis. These are detailed in laboratory SOPs and include examples of the Sample Receiving and Tracking Information Sheet, Sample Logging Sheets, and Laboratory Assignment Sheet, etc. Samples will be shipped from the field to CompuChem Laboratories where they will receive a CompuChem identification number for sample tracking purposes. Samples to be analyzed by one of CompuChem's subcontracting laboratories (i.e., ChemWest Analytical Laboratories or Northeastern Analytical Corporation) will in general be repackaged and shipped to the subcontractor laboratory by CompuChem after having received CompuChem's identification number. The only exception will be samples for analyses that have sensitive holding times (e.g., BOD, total phosphorus), which will be shipped directly to the laboratory preforming the analysis so that holding times are not exceeded. The chain-of-custody procedures employed by the laboratories are detailed in their respective Quality Assurance Plans.

NITROGEN, KJELDAHL, TOTAL

Method 351.3 (Colorimetric; Titrimetric; Potentiometric)

STORET NO. 00625

1. Scope and Application
   1.1 This method covers the determination of total Kjeldahl nitrogen in drinking, surface and saline waters, domestic and industrial wastes. The procedure converts nitrogen components of biological origin such as amino acids, proteins and peptides to ammonia, but may not convert the nitrogenous compounds of some industrial wastes such as amines, nitro compounds, hydrazones, oximes, semicarbazones and some refractory tertiary amines.
   1.2 Three alternatives are listed for the determination of ammonia after distillation: the titrimetric method which is applicable to concentrations above 1 mg N/liter; the Nesslerization method which is applicable to concentrations below 1 mg N/liter; and the potentiometric method applicable to the range 0.05 to 1400 mg/1.
   1.3 This method is described for macro and micro glassware systems.
2. Definitions
   2.1 Total Kjeldahl nitrogen is defined as the sum of free-ammonia and organic nitrogen compounds which are converted to ammonium sulfate $(NH_4)_2SO_4$, under the conditions of digestion described below.
   2.2 Organic Kjeldahl nitrogen is defined as the difference obtained by subtracting the free-ammonia value (Method 350.2, Nitrogen, Ammonia, this manual) from the total Kjeldahl nitrogen value. This may be determined directly by removal of ammonia before digestion.
3. Summary of Method
   3.1 The sample is heated in the presence of conc. sulfuric acid, K_2SO_4 and $HgSO_4$ and evaporated until SO_3 fumes are obtained and the solution becomes colorless or pale yellow. The residue is cooled, diluted, and is treated and made alkaline with a hydroxide-thiosulfate solution. The ammonia is distilled and determined after distillation by Nesslerization, titration or potentiometry.
4. Sample Handling and Preservation
   4.1 Samples may be preserved by addition of 2 ml of conc. H_2SO_4 per liter and stored at 4°C. Even when preserved in this manner, conversion of organic nitrogen to ammonia may occur. Preserved samples should be analyzed as soon as possible.
5. Interference
   5.1 High nitrate concentrations (10X or more than the TKN level) result in low TKN values. The reaction between nitrate and ammonia can be prevented by the use of an anion exchange resin (chloride form) to remove the nitrate prior to the TKN analysis.

Approved for NPDES
Issued 1971
Editorial revision 1974 and 1978

6. Apparatus

6.1 Digestion apparatus: A Kjeldahl digestion apparatus with 800 or 100 ml flasks and suction takeoff to remove SO_3 fumes and water.

6.2 Distillation apparatus: The macro Kjeldahl flask is connected to a condenser and an adaptor so that the distillate can be collected. Micro Kjeldahl steam distillation apparatus is commercially available.

6.3 Spectrophotometer for use at 400 to 425 nm with a light path of 1 cm or longer.

7. Reagents

7.1 Distilled water should be free of ammonia. Such water is best prepared by the passage of distilled water through an ion exchange column containing a strongly acidic cation exchange resin mixed with a strongly basic anion exchange resin. Regeneration of the column should be carried out according to the manufacturer's instructions.

NOTE 1: All solutions must be made with ammonia-free water.

7.2 Mercuric sulfate solution: Dissolve 8 g red mercuric oxide (HgO) in 50 ml of 1:4 sulfuric acid (10.0 ml conc. H_2SO_4 : 40 ml distilled water) and dilute to 100 ml with distilled water.

7.3 Sulfuric acid-mercuric sulfate-potassium sulfate solution: Dissolve 267 g K_2SO_4 in 1300 ml distilled water and 400 ml conc. H_2SO_4. Add 50 ml mercuric sulfate solution (7.2) and dilute to 2 liters with distilled water.

7.4 Sodium hydroxide-sodium thiosulfate solution: Dissolve 500 g NaOH and 25 g $Na_2S_2O_3 \cdot 5H_2O$ in distilled water and dilute to 1 liter.

7.5 Mixed indicator: Mix 2 volumes of 0.2% methyl red in 95% ethanol with 1 volume of 0.2% methylene blue in ethanol. Prepare fresh every 30 days.

7.6 Boric acid solution: Dissolve 20 g boric acid, H_3BO_3, in water and dilute to 1 liter with distilled water.

7.7 Sulfuric acid, standard solution: (0.02 N) 1 ml = 0.28 mg NH_3–N. Prepare a stock solution of approximately 0.1 N acid by diluting 3 ml of conc. H_2SO_4 (sp. gr. 1.84) to 1 liter with CO_2-free distilled water. Dilute 200 ml of this solution to 1 liter with CO_2-free distilled water. Standardize the approximately 0.02 N acid so prepared against 0.0200 N Na_2CO_3 solution. This last solution is prepared by dissolving 1.060 g anhydrous Na_2CO_3, oven-dried at 140°C, and diluting to 1 liter with CO_2-free distilled water.

NOTE 2: An alternate and perhaps preferable method is to standardize the approximately 0.1 N H_2SO_4 solution against a 0.100 N Na_2CO_3 solution. By proper dilution the 0.02 N acid can the be prepared.

7.8 Ammonium chloride, stock solution: 1.0 ml = 1.0 mg NH_3–N. Dissolve 3.819 g NH_4Cl in water and make up to 1 liter in a volumetric flask with distilled water.

7.9 Ammonium chloride, standard solution: 1.0 ml = 0.01 mg NH_3–N. Dilute 10.0 ml of the stock solution (7.8) with distilled water to 1 liter in a volumetric flask.

7.10 Nessler reagent: Dissolve 100 g of mercuric iodide and 70 g potassium iodide in a small volume of distilled water. Add this mixture slowly, with stirring, to a cooled solution of 160 g of NaOH in 500 ml of distilled water. Dilute the mixture to 1 liter. The solution is stable for at least one year if stored in a pyrex bottle out of direct sunlight.

NOTE 3: Reagents 7.7, 7.8, 7.9, and 7.10 are identical to reagents 6.8, 6.2, 6.3, and 6.6 described under Nitrogen, Ammonia (Colorimetric; Titrimetric; Potentiometric-Distillation Procedure, Method 350.2).

8. Procedure

8.1 The distillation apparatus should be pre-steamed before use by distilling a 1:1 mixture of distilled water and sodium hydroxide-sodium thiosulfate solution (7.4) until the distillate is ammonia-free. This operation should be repeated each time the apparatus is out of service long enough to accumulate ammonia (usually 4 hours or more).

8.2 Macro Kjeldahl system

8.2.1 Place a measured sample or the residue from the distillation in the ammonia determination (for Organic Kjeldahl only) into an 800 ml Kjeldahl flask. The sample size can be determined from the following table:

Kjeldahl Nitrogen in Sample, mg/l	Sample Size ml
0–5	500
5–10	250
10–20	100
20–50	50.0
50–500	25.0

Dilute the sample, if required, to 500 ml with distilled water, and add 100 ml sulfuric acid-mercuric sulfate-potassium sulfate solution (7.3). Evaporate the mixture in the Kjeldahl apparatus until SO_3 fumes are given off and the solution turns colorless or pale yellow. Continue heating for 30 additional minutes. Cool the residue and add 300 ml distilled water.

8.2.2 Make the digestate alkaline by careful addition of 100 ml of sodium hydroxide – thiosulfate solution (7.4) without mixing.

NOTE 5: Slow addition of the heavy caustic solution down the tilted neck of the digestion flask will cause heavier solution to underlay the aqueous sulfuric acid solution without loss of free-ammonia. Do not mix until the digestion flask has been connected to the distillation apparatus.

8.2.3 Connect the Kjeldahl flask to the condenser with the tip of condenser or an extension of the condenser tip below the level of the boric acid solution (7.6) in the receiving flask.

8.2.4 Distill 300 ml at the rate of 6–10 ml/min., into 50 ml of 2% boric acid (7.6) contained in a 500 ml Erlenmeyer flask.

8.2.5 Dilute the distillate to 500 ml in the flask. These flasks should be marked at the 350 and the 500 ml volumes. With such marking, it is not necessary to transfer the distillate to volumetric flasks. For concentrations above 1 mg/1, the ammonia can be determined titrimetrically. For concentrations below this value, it is determined colorimetrically. The potentiometric method is applicable to the range 0.05 to 1400 mg/1.

8.3 Micro Kjeldahl system

8.3.1 Place 50.0 ml of sample or an aliquot diluted to 50 ml in a 100 ml Kjeldahl flask and add 10 ml sulfuric acid-mercuric sulfate-potassium sulfate solution (7.3). Evaporate the mixture in the Kjeldahl apparatus until SO_3 fumes are given off and the solution turns colorless or pale yellow. Then digest for an additional 30 minutes. Cool the residue and add 30 ml distilled water.

8.3.2 Make the digestate alkaline by careful addition of 10 ml of sodium hydroxide-thiosulfate solution (7.4) without mixing. Do not mix until the digestion flask has been connected to the distillation apparatus.

8.3.3 Connect the Kjeldahl flask to the condenser with the tip of condenser or an extension of the condenser tip below the level of the boric acid solution (7.6) in the receiving flask or 50 ml short-form Nessler tube.

8.3.4 Steam distill 30 ml at the rate of 6–10 ml/min., into 5 ml of 2% boric acid (7.6).

8.3.5 Dilute the distillate to 50 ml. For concentrations above 1 mg/l the ammonia can be determined titrimetrically. For concentrations below this value, it is determined colorimetrically. The potentiometric method is applicable to the range 0.05 to 1400 mg/l.

8.4 Determination of ammonia in distillate: Determine the ammonia content of the distillate titrimetrically, colorimetrically, or potentiometrically, as described below.

8.4.1 Titrimetric determination: Add 3 drops of the mixed indicator (7.5) to the distillate and titrate the ammonia with the 0.02 N H_2SO_4 (7.7), matching the endpoint against a blank containing the same volume of distilled water and H_3BO_3 (7.6) solution.

8.4.2 Colorimetric determination: Prepare a series of Nessler tube standards as follows:

ml of Standard 1.0 ml = 0.01 mg NH_3–N	mg NH_3–N/50.0 ml
0.0	0.0
0.5	0.005
1.0	0.010
2.0	0.020
4.0	0.040
5.0	0.050
8.0	0.080
10.0	0.10

Dilute each tube to 50 ml with ammonia free water, add 1 ml of Nessler Reagent (7.10) and mix. After 20 minutes read the absorbance at 425 nm against the blank. From the values obtained for the standards plot absorbance vs. mg NH_3-N for the standard curve. Develop color in the 50 ml diluted distillate in exactly the same manner and read mg NH_3-N from the standard curve.

8.4.3 Potentiometric determination: Consult the method entitled Nitrogen, Ammonia: Potentiometric, Ion Selective Electrode Method, (Method 350.3) in this manual.

8.4.4 It is not imperative that all standards be treated in the same manner as the samples. It is recommended that at least 2 standards (a high and low) be digested, distilled,

and compared to similar values on the curve to insure that the digestion-distillation technique is reliable. If treated standards do not agree with untreated standards the operator should find the cause of the apparent error before proceeding.

9. Calculation

9.1 If the titrimetric procedure is used, calculate Total Kjeldahl Nitrogen, in mg/l, in the original sample as follows:

$$\text{TKN, } mg/l = \frac{(A - B)N \times F \times 1{,}000}{S}$$

where:

A = milliliters of standard 0.020 N H_2SO_4 solution used in titrating sample.

B = milliliters of standard 0.020 N H_2SO_4 solution used in titrating blank.

N = normality of sulfuric acid solution.

F = milliequivalent weight of nitrogen (14 mg).

S = milliliters of sample digested.

If the sulfuric acid is exactly 0.02 N the formula is shortened to:

$$\text{TKN, } mg/l = \frac{(A - B) \times 280}{S}$$

9.2 If the Nessler procedure is used, calculate the Total Kjeldahl Nitrogen, in mg/l, in the original sample as follows:

$$\text{TKN, } mg/l = \frac{A \times 1{,}000}{D} \times \frac{B}{C}$$

where:

A = mg NH_3–N read from curve.

B = ml total distillate collected including the H_3BO_3.

C = ml distillate taken for Nesslerization.

D = ml of original sample taken.

9.3 Calculate Organic Kjeldahl Nitrogen in mg/l, as follows:
Organic Kjeldahl Nitrogen = TKN –(NH_3–N.)

9.4 Potentiometric determination: Calculate Total Kjeldahl Nitrogen, in mg/l, in the original sample as follows:

$$\text{TKN, mg/l} = \frac{B}{D} \times A$$

where:
A = mg NH_3–N/l from electrode method standard curve.
B = volume of diluted distillate in ml.
D = ml of original sample taken.

10. Precision

10.1 Thirty-one analysts in twenty laboratories analyzed natural water samples containing exact increments of organic nitrogen, with the following results:

Increment as Nitrogen, Kjeldahl mg N/liter	Precision as Standard Deviation mg N/liter	Accuracy as Bias, %	Accuracy as Bias, mg N/liter
0.20	0.197	+15.54	+0.03
0.31	0.247	+ 5.45	+0.02
4.10	1.056	+ 1.03	+0.04
4.61	1.191	− 1.67	−0.08

(FWPCA Method Study 2, Nutrient Analyses)

Bibliography

1. Standard Methods for the Examination of Water and Wastewater, 14th Edition, p 437, Method 421 (1975).
2. Schlueter, Albert, "Nitrate Interference In Total Kjeldahl Nitrogen Determinations and Its Removal by Anion Exchange Resins", EPA Report 600/7–77–017.

APPENDIX B

Analytical Data

and

Quality Control/Quality Assurance Evaluation Reports

APPENDIX B-1

Chemical Analytical Summary Reports

APPENDIX B-1

The following tables (B-1.2 through B-1.29) present the chemical anlaysis data from samples collected from soils (2 through 11), groundwater (12 through 21), surface water (22 through 24), bottom sediment (25 and 26), and sewer water (27 and 28). Only the analytes that were detected at least once are reported in these tables. Table 29 presents the resuts of field physical/chemical analyses (e.g., temperature, pH, conductivity).

The CLP laboratory uses a number of data qualifiers, which are found to be right of table values. These qualifiers are presented in Table B-1.1. With regard to organic analytes, the letter to the left of the chemical name indicates the following:

V = Volatile compounds.

B and A = Semivolatile compounds.

P = Pesticides and PCBs.

In addition, the following are used in the data tables:

NA = Not analyzed.

BDL = Below Detection limit (BDL is accompanied by the detection limit in groundwater, surface water, and sediment tables).

Blank Space = Below Detection Limit.

[ ] = Value is greater than or equal to instrument detection limit, but less than the contract required limit.

P or F = Indicates the Method of Analysis (inorganics only).

TABLE B-1.1

CLP Laboratory Data Qualifiers
That May be Used in the Datatables

Qualifier	Definition	Qualifier	Definition
Inorganic Chemical Data[a]		Organic Chemical Data[b]	
B	Reported value is less than CRQL, but greater than IDL.	U	Analyzed for, but not detected.
U	Compound was analyzed for, but not detected.	J	Value is estimated, either for a tentatively identified compound (TIC) or when a compound is present, spectral identification criteria are met, but the value is less than CRQL.
E	Value is estimated due to matrix interferences.	C	Pesticide results were confirmed by GC/MS.
M	Duplicate injection precision criteria not met.		
N	Spiked sample recovery not within control limits.	B	Analyte found in associated blank as well as in sample.
S	Reported value was determined by the Method of Standard Additions (MSA).	E	Concentration exceeds calibration range of GC/MS instrument.
W	Post-digestion spike AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.	D	Compound identified in an analysis at a secondary dilution factor.
*	Duplicate analysis was not within control limits.	A	The TIC is a suspected aldolcondensation product.
+	Correlation coefficient MSA was less than 0.995.	X	Additional flags defined separately.

[a]CLP SWO for Inorganics (EPA, 1987).
[b]CLP SOW for Organics (EPA, 1987).

TABLE B-1.2

CONCENTRATIONS OF INORGANICS (mg/kg)
IN SURFACE SOILS
(0-2 feet)

POINT	BCKGRND-1		BCKGRND-2		SO-1-1		SO-2-1		SO-3-1		SO-4-1	
Antimony	NA		NA				NA		NA		NA	
Arsenic	1.6	[]F	1.1	[]F	248	P *	173	P *	42.6	P *	116	P *
Beryllium	NA		NA		0.24	[]P	NA		NA		NA	
Cadmium	NA		NA				NA		NA		NA	
Chromium	3	P	2.1	[]P	215	P *	172	P *	34	P *	96.1	P *
Copper	6.4	P E	6.8	P E	99.8	P *	122	P *	14.3	P *	94.5	P *
Lead	NA		NA		13.5	F	NA		NA		NA	
Mercury	NA		NA				NA		NA		NA	
Nickel	NA		NA				NA		NA		NA	
Selenium	NA		NA				NA		NA		NA	
Silver	NA		NA				NA		NA		NA	
Thallium	NA		NA				NA		NA		NA	
Zinc	12.1	P	17.3	P	57.9	P *	50.3	P *	15.3	P *	24.2	P *
Barium	NA		NA		24.6	[]P	NA		NA		NA	
Iron	NA		NA		4370	P	NA		NA		NA	
Manganese	NA		NA		13.2	P	NA		NA		NA	
Vanadium	NA		NA		13.3	P	NA		NA		NA	
Aluminum	NA		NA		4260	P *	NA		NA		NA	
Cobalt	NA		NA		1.8	[]P	NA		NA		NA	
Magnesium	NA		NA		285	[]P	NA		NA		NA	
Calcium	NA		NA		273	[]P	NA		NA		NA	
Sodium	NA		NA				NA		NA		NA	
Potassium	NA		NA		655	[]P	NA		NA		NA	
Organic Carbon	NA		NA		NA		NA		NA		NA	
pH	6.3		6.7		5.9		8.3		7.2		7.4	
Percent Solids	93.6		87		87.1		97.2		86.8		92.3	
Percent Moisture	6		13		13		3		13		8	

TABLE B-1.2 (continued)

CONCENTRATIONS OF INORGANICS (mg/kg)
IN SURFACE SOILS
(0-2 feet)

POINT	SO-5-1		SO-6-1		SO-7-1		SO-8-1		SO-9		Duplicate SO-9D	
Antimony	NA		NA				NA		NA		NA	
Arsenic	194	P *	554	P *	138	P	4.9	F N	1140	P	757	P
Beryllium	NA		NA		0.34	[]P	NA		NA		NA	
Cadmium	NA		NA				NA		NA		NA	
Chromium	150	P *	348	P *	109	P	13.9	P	1120	P	565	P
Copper	92.6	P	238	P *	76.8	P E	10.3	P	525	P E	274	P E
Lead	NA		NA		11.6	F	NA		NA		NA	
Mercury	NA		NA				NA		NA		NA	
Nickel	NA		NA		4.4	[]P	NA		NA		NA	
Selenium	NA		NA				NA		NA		NA	
Silver	NA		NA		1.2	[]P	NA		NA		NA	
Thallium	NA		NA				NA		NA		NA	
Zinc	63.7	P	43.5	P *	38.5	P	24.9	P *	83.4	P	38	P
Barium	NA		NA		20.4	[]P	NA		NA		NA	
Iron	NA		NA		16100	P *	NA		NA		NA	
Manganese	NA		NA		66.9	P	NA		NA		NA	
Vanadium	NA		NA		35.5	P	NA		NA		NA	
Aluminum	NA		NA		5650	P *	NA		NA		NA	
Cobalt	NA		NA		3.3	[]P	NA		NA		NA	
Magnesium	NA		NA		358	[]P	NA		NA		NA	
Calcium	NA		NA		643	[]P	NA		NA		NA	
Sodium	NA		NA				NA		NA		NA	
Potassium	NA		NA		469	[]P	NA		NA		NA	
Organic Carbon	4800		13000		34000		NA		3600		31000	
pH	8.2		8.2		7.5		6.6		6		7.1	
Percent Solids	95.6		92		86.5		78.8		76.6		73.7	
Percent Moisture	3		8		13		21		23		26	

TABLE B-1.2 (continued)

CONCENTRATIONS OF INORGANICS (mg/kg)
IN SURFACE SOILS
(0-2 feet)

POINT	SO-10		SO-11		SO-12		SO-13-1		SO-14-1		SO-15-1	
Antimony	NA		NA		NA				NA		NA	
Arsenic	2.7	F	6.7	[]F	812	P	158	P	5.6	F	267	P
Beryllium	NA		NA		NA				NA		NA	
Cadmium	NA		NA		NA				NA		NA	
Chromium	3.1	P	15.1	P	767	P	113	P	17.5	P *	184	P
Copper	7	P E	8.4	P E	680	P E	52.9	P E	10.4	P *	101	P
Lead	NA		NA		NA		5.1	F	NA		NA	
Mercury	NA		NA		NA				NA		NA	
Nickel	NA		NA		NA				NA		NA	
Selenium	NA		NA		NA				NA		NA	
Silver	NA		NA		NA		1.6	[]P	NA		NA	
Thallium	NA		NA		NA				NA		NA	
Zinc	12.2	P	16.5	P	70.3	P	15.8	P	21.9	P *	76	P *
Barium	NA		NA		NA		16	[]P	NA		NA	
Iron	NA		NA		NA		15800	P *	NA		NA	
Manganese	NA		NA		NA		9.3	P	NA		NA	
Vanadium	NA		NA		NA		25.8	P	NA		NA	
Aluminum	NA		NA		NA		11100	P *	NA		NA	
Cobalt	NA		NA		NA		2.8	[]P	NA		NA	
Magnesium	NA		NA		NA		334	[]P	NA		NA	
Calcium	NA		NA		NA		135	[]P	NA		NA	
Sodium	NA		NA		NA				NA		NA	
Potassium	NA		NA		NA				NA		NA	
Organic Carbon	NA		NA		NA		2300		2000		19000	
pH	7.2		7.2		6.7		6.5		6.4		8.1	
Percent Solids	84		97		92.6		87.4		88.1		98.4	
Percent Moisture	16		3		7		12		12		2	

TABLE B-1.2 (continued)

CONCENTRATIONS OF INORGANICS (mg/kg)
IN SURFACE SOILS
(0-2 feet)

POINT	SO-16-1		SO-17-1		SO-18-1	DM-15A-1		DM-1R-1		DM-2R-1	
Antimony	NA		NA		NA			NA		NA	
Arsenic	37.5	P	453	P *	62.7	170	P	41.6	P *	2.7	F N
Beryllium	NA		NA		NA	0.68	[]P	NA		NA	
Cadmium	NA		NA		NA			NA		NA	
Chromium	31.7	P	354	P *	20.3	281	P	30.9	P *	15.5	P *
Copper	19.7	P	220	P *	8.5	94.5	P E	19.9	P	7.6	P
Lead	NA		NA		NA	7.9	F	NA		NA	
Mercury	NA		NA		NA	0.59	CV	NA		NA	
Nickel	NA		NA		NA			NA		NA	
Selenium	NA		NA		NA			NA		NA	
Silver	NA		NA		NA	1.6	[]P	NA		NA	
Thallium	NA		NA		NA			NA		NA	
Zinc	24.4	P *	64.2	P *	45.1	50.1	P	31.4	P	16.4	P
Barium	NA		NA		NA	9.2	[]P	NA		NA	
Iron	NA		NA		NA	10500	P *	NA		NA	
Manganese	NA		NA		NA	190	P	NA		NA	
Vanadium	NA		NA		NA	13.7	P	NA		NA	
Aluminum	NA		NA		NA	6170	P *	NA		NA	
Cobalt	NA		NA		NA	6.9	[]P	NA		NA	
Magnesium	NA		NA		NA	2480	P E	NA		NA	
Calcium	NA		NA		NA	4490	P *	NA		NA	
Sodium	NA		NA		NA			NA		NA	
Potassium	NA		NA		NA	508	[]P	NA		NA	
Organic Carbon	1500		NA		NA	30000		NA		NA	
pH	6.8		7.3		7.2	7.6		7.7		7	
Percent Solids	91		94.6		90.2	93		92		83.4	
Percent Moisture	9		5		10	12		8		17	

TABLE B-1.2 (continued)

CONCENTRATIONS OF INORGANICS (mg/kg)
IN SURFACE SOILS
(0-2 feet)

POINT	DM-3R-1		Duplicate DM-3R-1D		DM-4R-1		DM-5-1		DM-11B-1		DM-15-1	
Antimony	NA		NA		NA		NA		NA		NA	
Arsenic	113	P *	202	P *	94.5	P *	1	[]F	546	P *	880	P *
Beryllium	NA		NA		NA		NA		NA		NA	
Cadmium	NA		NA		NA		NA		NA		NA	
Chromium	71.3	P *	124	P *	61	P *	8.2	P *	484	P *	810	P *
Copper	34.6	P *	56.1	P *	38.1	P	5.4	[]P	260	P	600	P
Lead	NA		NA		NA		NA		NA		NA	
Mercury	NA		NA		NA		NA		NA		NA	
Nickel	NA		NA		NA		NA		NA		NA	
Selenium	NA		NA		NA		NA		NA		NA	
Silver	NA		NA		NA		NA		NA		NA	
Thallium	NA		NA		NA		NA		NA		NA	
Zinc	33.7	P *	38.3	P *	23.5	P	47.4	P	82.9	P	85.4	P
Barium	NA		NA		NA		NA		NA		NA	
Iron	NA		NA		NA		NA		NA		NA	
Manganese	NA		NA		NA		NA		NA		NA	
Vanadium	NA		NA		NA		NA		NA		NA	
Aluminum	NA		NA		NA		NA		NA		NA	
Cobalt	NA		NA		NA		NA		NA		NA	
Magnesium	NA		NA		NA		NA		NA		NA	
Calcium	NA		NA		NA		NA		NA		NA	
Sodium	NA		NA		NA		NA		NA		NA	
Potassium	NA		NA		NA		NA		NA		NA	
Organic Carbon	NA		NA		NA		NA		NA		NA	
pH	7.1		7.3		7.5		6.7		6.7		7.5	
Percent Solids	92.2		92.4		92.2		88.4		87.6		91.6	
Percent Moisture	8		8		8		12		12		8	

TABLE B-1.2 (continued)

CONCENTRATIONS OF INORGANICS (mg/kg)
IN SURFACE SOILS
(0-2 feet)

POINT	DM-16-1		DM-18A-1	
Antimony	NA		NA	
Arsenic	72	P *	63.7	P *
Beryllium	NA		NA	
Cadmium	NA		NA	
Chromium	55.5	P *	58.3	P *
Copper	26.6	P	26.2	P
Lead	NA		NA	
Mercury	NA		NA	
Nickel	NA		NA	
Selenium	NA		NA	
Silver	NA		NA	
Thallium	NA		NA	
Zinc	41.4	P	4.6	P
Barium	NA		NA	
Iron	NA		NA	
Manganese	NA		NA	
Vanadium	NA		NA	
Aluminum	NA		NA	
Cobalt	NA		NA	
Magnesium	NA		NA	
Calcium	NA		NA	
Sodium	NA		NA	
Potassium	NA		NA	
Organic Carbon	NA		NA	
pH	6.9		7.2	
Percent Solids	83.9		93.8	
Percent Moisture	16		6	

TABLE B-1.3

CONCENTRATIONS OF INORGANICS
IN UTILITY TRENCH SAMPLES

POINT	UT-1		UT-2		UT-3		Duplicate UT-3D		UT-4		UT-5	
Antimony	NA		NA		NA		NA		NA		NA	
Arsenic	2.8	F N	16.6	F N	5.7	F N	5	F N	5	F N	5.6	F N *
Beryllium	NA		NA		NA		NA		NA		NA	
Cadmium	NA		NA		NA		NA		NA		NA	
Chromium	21.5	P	38.6	P	10.8	P	9.6	P	16.1	P	39.4	P
Copper	4.2	[]P	10.3	P	5	[]P	4.2	[]P	4.6	[]P	4.1	[]P
Lead	NA		NA		NA		NA		NA		NA	
Mercury	NA		NA		NA		NA		NA		NA	
Nickel	NA		NA		NA		NA		NA		NA	
Selenium	NA		NA		NA		NA		NA		NA	
Silver	NA		NA		NA		NA		NA		NA	
Thallium	NA		NA		NA		NA		NA		NA	
Zinc	12.5	P *	28.1	P *	11.1	P *	19.1	P *	13.5	P *	9	P *
Barium	NA		NA		NA		NA		NA		NA	
Iron	NA		NA		NA		NA		NA		NA	
Manganese	NA		NA		NA		NA		NA		NA	
Vanadium	NA		NA		NA		NA		NA		NA	
Aluminum	NA		NA		NA		NA		NA		NA	
Cobalt	NA		NA		NA		NA		NA		NA	
Magnesium	NA		NA		NA		NA		NA		NA	
Calcium	NA		NA		NA		NA		NA		NA	
Sodium	NA		NA		NA		NA		NA		NA	
Potassium	NA		NA		NA		NA		NA		NA	
Organic Carbon	NA		NA		NA		NA		NA		NA	
pH	6.7		6.7		7.2		7		7.2		7.2	
Percent Solids	85.4		86.6		89.6		87.4		78.4		87.8	
Percent Moisture	15		13		10		13		22		12	

TABLE 6-1.4
CONCENTRATIONS OF ORGANICS (ug/kg) IN
SURFACE SOILS (0-2 feet)

	POINT	BCKGRND-1	BCKGRND-2	SO-1-1	SO-2-1	SO-3-1	SO-4-1	SO-5-1	SO-6-1	SO-7-1
V	Benzene									
V	Chloroform	2 J	2 J		2 J	3 J	2 J		2 J	5 B J
V	Ethylbenzene				10				1 J	
V	Methylene chloride	9 B	18 B	29 B	21 B	29 B	16 B	38 B	22 B	28 B
V	Toluene				2 J					
V	Styrene				5 J					
V	Acetone	20 B	22 B	54 B	210 B	40 B	42 B	42 B	62 B	84 B
V	2-Butanone									
V	Carbon disulfide									
V	4-Methyl-2-pentanone									
V	Xylenes (Total)				25			1 J	3 J	
B	Acenaphthene				240000 D	96 J	26000 D	4100	3200	NA
B	Acenaphthylene			310 J	8400		1100	220 J	360 J	NA
B	Anthracene			710 J	190000 D	70 J	14000 D	2200	2500 J	NA
B	Benzo(a)anthracene			580 J	73000 D	95 J	10000 D	1500	1900 J	NA
B	Benzo(a)pyrene			2400	27000 D J		3400	800	1600 J	NA
B	Benzo(b)fluoranthene			8400 X	65000 D X	200 J X	9600 D X	1800	7300 X	NA
B	Benzo(g,h,i)perylene			770	3800		1200	390	1000 J	NA
B	Benzo(k)fluoranthene			8400 X	65000 D X	200 J X	9600 D X	2100	7300 X	NA
B	bis(2-Ethylhexyl)phthalate			180 J		130 B J		500	550 B J	NA
B	Butyl benzyl phthalate									NA
B	Chrysene			1000	74000 D	190 J	13000 D	2500	4100	NA
B	Dibenzo(a,h)anthracene			370 J	2100		530	93 J	350 J	NA
B	1,2-Dichlorobenzene									NA
B	1,4-Dichlorobenzene									NA
B	Di-n-butyl phthalate									NA
B	Di-n-octyl phthalate									NA
B	Fluoranthene			640 J	360000 D	730	65000 D	6200 D	13000	NA
B	Fluorene				210000 D	140 J	14000 D	3400	3100	NA
B	Indeno(1,2,3-cd)pyrene			910	4600		1400	550	1100 J	NA
B	Naphthalene				100000 D		650	5900 D	1100 J	NA
B	N-Nitrosodiphenylamine(1)									NA
B	Phenanthrene			250 J	590000 D	600	43000 D	8300 D	8800	NA
B	Pyrene			990	300000 D	510	44000 D	6200 D	9300	NA
B	1,2,4-Trichlorobenzene						550 D J			NA
B	Dibenzofuran				180000 D	120 J	5400	3000	2100 J	NA
B	2-Methylnaphthalene				110000 D	40 J	640	3200	1000 J	NA
A	2,4-Dimethylphenol									NA
A	4-Nitrophenol									NA
A	Pentachlorophenol			22000 D	5500	4300	2900 D J	710 J	16000	NA
A	Phenol									NA
A	2-Methylphenol				170 J					NA
A	4-Methylphenol				390 J					NA
A	Benzoic acid		77 J							NA
A	2,4,5-Trichlorophenol									NA

TABLE B-1.4 (continued)
CONCENTRATIONS OF ORGANICS (ug/kg) IN
SURFACE SOILS (0-2 feet)

	POINT	SO-8-1		SO-9		Duplicate SO-9D		SO-10		SO-11		SO-12		SO-13-1		SO-14-1		SO-15-1	
V	Benzene																	6	J
V	Chloroform					1	J			1	J	1	J			2	J		
V	Ethylbenzene																	430	
V	Methylene chloride	59	B	13	B	14	B	11	B	11	B	16	B	20	B	17	B	54	B
V	Toluene																	75	
V	Styrene																	150	
V	Acetone	110	B	25	B	38	B	15	B	11	B	10	B J	29	B	34	B	180	B
V	2-Butanone																		
V	Carbon disulfide																		
V	4-Methyl-2-pentanone																		
V	Xylenes (Total)																	280	
B	Acenaphthene													NA		90	J	550000	D
B	Acenaphthylene			450		460						430	J	NA				26000	
B	Anthracene			1200		1200						640	J	NA		51	J	220000	
B	Benzo(a)anthracene			560		380	J					4600		NA				100000	
B	Benzo(a)pyrene			3900		720						4600		NA				38000	
B	Benzo(b)fluoranthene			6900	X	9200	E X	44	J X	82	J X	17000	X	NA				94000	X
B	Benzo(g,h,i)perylene			1700		770						2000		NA				13000	J
B	Benzo(k)fluoranthene			6900	X	9200	E X	44	J X	82	J X	17000	X	NA				94000	X
B	bis(2-Ethylhexyl)phthalate	100	J	320	J	150	J			36	J			NA		230	B J		
B	Butyl benzyl phthalate					88	J							NA					
B	Chrysene			970		760				48	J	8900		NA		39	J	110000	
B	Dibenzo(a,h)anthracene			520		250	J					780	J	NA				4900	J
B	1,2-Dichlorobenzene													NA					
B	1,4-Dichlorobenzene													NA					
B	Di-n-butyl phthalate					72	J							NA					
B	Di-n-octyl phthalate					76	J							NA					
B	Fluoranthene	54	J	520		310	J					6300		NA		160	J	610000	D
B	Fluorene					45	J							NA		79	J	550000	D
B	Indeno(1,2,3-cd)pyrene			1800		820						2300		NA				14000	J
B	Naphthalene					54	J							NA		79	J	730000	D
B	N-Nitrosodiphenylamine(1)													NA					
B	Phenanthrene	83	J	180	J	230	J	66	J			210	J	NA		240	J	820000	D
B	Pyrene			450		290	J					12000		NA		110	J	310000	
B	1,2,4-Trichlorobenzene													NA					
B	Dibenzofuran													NA		70	J	280000	
B	2-Methylnaphthalene													NA				480000	D
A	2,4-Dimethylphenol					55	J							NA				3300	J
A	4-Nitrophenol													NA					
A	Pentachlorophenol			6100		5900						640	J	NA		110	J	220000	
A	Phenol					60	J							NA					
A	2-Methylphenol													NA					
A	4-Methylphenol					46	J							NA				2200	J
A	Benzoic acid	220	J			260	J	590	J					NA					
A	2,4,5-Trichlorophenol													NA					

TABLE B-1.4 (continued)
CONCENTRATIONS OF ORGANICS (ug/kg) IN
SURFACE SOILS (0-2 feet)

	POINT	SO-16-1		SO-17-1		SO-18-1		DM-15A-1		DM-1R-1		DM-2R-1		DM-3R-1		Duplicate DM-3R-1D		DM-4R-1	
V Benzene								2	J										
V Chloroform						1	J	2	J										
V Ethylbenzene								31											
V Methylene chloride		19	B	13	B	32	B	27	B	5	B J	9	B	20	B	17	B	4	B J
V Toluene								14											
V Styrene								32											
V Acetone		24	B	32	B	61	B	43	B					28	B	35	B	85	
V 2-Butanone																			
V Carbon disulfide																			
V 4-Methyl-2-pentanone																			
V Xylenes (Total)								89											
B Acenaphthene				1700		51	J	NA											
B Acenaphthylene				470				NA						89	J			51	J
B Anthracene				1400		110	J	NA		44	J			150	J			89	J
B Benzo(a)anthracene				3500		470		NA		98	J	100	J	160	J			250	J
B Benzo(a)pyrene				1800		230	J	NA		150	J	56	J	290	J	68	J	370	
B Benzo(b)fluoranthene		93	J X	6300	D J	520	X	NA		240	J	200	J	2100	X	430	X	540	
B Benzo(g,h,i)perylene				690		65	J	NA		100	J			290	J	60	J	290	J
B Benzo(k)fluoranthene		93	J X	6300	D J	520	X	NA		270	J	160	J	2100	X	430	X	640	
B bis(2-Ethylhexyl)phthalate				420				NA		340	B J	230	B J	130	J	55	J	330	B J
B Butyl benzyl phthalate								NA											
B Chrysene		62	J	3900	D J	500		NA		190	J	300	J	430		90	J	410	
B Dibenzo(a,h)anthracene				260	J			NA						78	J			81	J
B 1,2-Dichlorobenzene								NA											
B 1,4-Dichlorobenzene								NA											
B Di-n-butyl phthalate								NA		63	J								
B Di-n-octyl phthalate								NA											
B Fluoranthene		53	J	10000	D	1000		NA		100	J	510		280	J	66	J	450	
B Fluorene				1200		57	J	NA											
B Indeno(1,2,3-cd)pyrene				750		62	J	NA		110	J			300	J	45	J	320	J
B Naphthalene		61	J	1200		72	J	NA											
B N-Nitrosodiphenylamine(1)								NA											
B Phenanthrene		56	J	4100		390		NA				180	J	130	J	37	J	62	J
B Pyrene		62	J	10000	D	1000		NA		120	J	690		320	J	110	J	470	
B 1,2,4-Trichlorobenzene								NA											
B Dibenzofuran				950		49	J	NA											
B 2-Methylnaphthalene				590		50	J	NA											
A 2,4-Dimethylphenol								NA											
A 4-Nitrophenol								NA											
A Pentachlorophenol		410	J	19000	D J			NA		270	J			1700	J	970	J	1200	J
A Phenol								NA											
A 2-Methylphenol								NA											
A 4-Methylphenol								NA											
A Benzoic acid								NA											
A 2,4,5-Trichlorophenol								NA											

TABLE B-1.4 (continued)
CONCENTRATIONS OF ORGANICS (ug/kg) IN
SURFACE SOILS (0-2 feet)

	POINT	DM-5-1		DM-11B-1		DM-15-1		DM-16-1		DM-18A-1	
V	Benzene										
V	Chloroform			1	J	1	J	2	J	2	B J
V	Ethylbenzene					3	J				
V	Methylene chloride	6	B	18	B	28	B	39	B	27	B
V	Toluene					2	J				
V	Styrene					1	J				
V	Acetone			21	B	72	B	53		55	B
V	2-Butanone					8	J				
V	Carbon disulfide										
V	4-Methyl-2-pentanone										
V	Xylenes (Total)					15					
B	Acenaphthene			270	J	200000	D				
B	Acenaphthylene			1000		8000					
B	Anthracene			2000		28000				44	J
B	Benzo(a)anthracene			1700		59000	D	160	J		
B	Benzo(a)pyrene			3800		17000		130	J		
B	Benzo(b)fluoranthene			9800	D X	47000	D J	770	X	230	J X
B	Benzo(g,h,i)perylene			1800		5800		82	J	72	J
B	Benzo(k)fluoranthene			3100		47000	D J	770	X	230	J X
B	bis(2-Ethylhexyl)phthalate	330	B J	150	J					46	J
B	Butyl benzyl phthalate										
B	Chrysene			3600		72000	D	600		130	J
B	Dibenzo(a,h)anthracene			600		2900					
B	1,2-Dichlorobenzene					420	J				
B	1,4-Dichlorobenzene					200	J				
B	Di-n-butyl phthalate	680								42	B J
B	Di-n-octyl phthalate										
B	Fluoranthene			4500		520000	D	1100		140	J
B	Fluorene			180	J	69000	D				
B	Indeno(1,2,3-cd)pyrene			2300		6000		92	J	78	J
B	Naphthalene			49	J	3600					
B	N-Nitrosodiphenylamine(1)										
B	Phenanthrene			880		140000	D	390	J	47	J
B	Pyrene			4800	D	260000	D	1000		220	J
B	1,2,4-Trichlorobenzene										
B	Dibenzofuran			170	J	48000	D J				
B	2-Methylnaphthalene			56	J	7600					
A	2,4-Dimethylphenol			42	J	580	J				
A	4-Nitrophenol										
A	Pentachlorophenol			47000	D	140000	D J			3600	
A	Phenol			39	J	950	J				
A	2-Methylphenol					410	J				
A	4-Methylphenol			55	J	1000	J				
A	Benzoic acid			64	J	210	J				
A	2,4,5-Trichlorophenol										

TABLE B-1.5

DIOXINS AND FURANS (ug/kg) IN SURFACE SOILS (0-2 feet)

POINT	BCKGRND-1	BCKGRND-2	SO-2-1	SO-3-1	SO-5-1	SO-6-1	SO-7-1	SO-9	Duplicate SO-9D	SO-10	SO-11	SO-12	SO-13-1	SO-14-1	SO-16-1	SO-18-1	DM-15-1	DM-18A-1
ug/kg (ppb)																		
• Tetrachlorodibenzodioxins	ND	ND	ND	ND	ND	ND	0.14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2378 TCDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
• Pentachlorodibenzodioxins	ND	ND	ND	ND	ND	0.47	0.32	0.37	0.44	ND	ND	ND	ND	ND	ND	ND	ND	ND
12378 PeCDD	ND	ND	ND	ND	ND	0.26	0.19	0.26	0.25	ND	ND	ND	ND	ND	ND	ND	ND	ND
• Pentachlorodibenzofurans	ND	ND	ND	ND	ND	1	1	1	1.1	ND	ND	0.34	0.2	ND	ND	ND	ND	0.064
12378 PeCDF	ND	ND	ND	ND	ND	0.14	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
23478 PeCDF	ND	ND	ND	ND	ND	ND	0.026	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
• Hexachlorodibenzodioxins	ND	ND	7.6	ND	ND	36.7	33.2	20.4	17.8	ND	ND	3.2	2.9	ND	ND	ND	1.5	4.9
123478 HxCDD	ND	ND	ND	ND	ND	2	1.6	1.3	1.4	ND	ND	ND	ND	ND	ND	ND	ND	0.19
123678 HxCDD	ND	ND	ND	ND	ND	12.6	11.1	4.5	3.7	ND	ND	ND	1	ND	ND	ND	0.58	1.5
123789 HxCDD	ND	ND	0.93	ND	ND	3.9	3.2	2.4	2.3	ND	ND	0.47	0.31	ND	ND	ND	ND	ND
• Hexachlorodibenzofurans	ND	ND	6.7	0.37	1.3	39.5	43.4	17.1	14.5	ND	ND	ND	5.9	ND	0.5	ND	3.2	6.8
123478 HxCDF	ND	ND	0.26	ND	ND	1.5	1.4	0.59	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
123678 HxCDF	ND	ND	0.12	ND	ND	0.44	0.38	0.26	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
124678 HxCDF	ND	ND	ND	ND	ND	0.73	0.61	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
123789 HxCDF	ND	ND	ND	ND	ND	0.28	0.28	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
• Heptachlorodibenzodioxins	ND	ND	117	8.2	23.5	561	451	227	186	0.69	2.5	31.6	41.5	0.99	7.8	ND	26.9	100
1234678 HpCDD	ND	ND	66.1	4.7	12.6	446	320	234	145	0.43	1.5	20.9	26.1	0.64	5	0.59	15.9	79.8
• Heptachlorodibenzofurans	ND	ND	54	3.1	8.4	307	317	111	81.8	ND	1.4	12	41.2	ND	3.9	0.5	19.4	55.8
1234678 HpCDF	ND	ND	12.1	0.67	2.1	86.8	67.6	35	20.7	ND	0.38	3.5	8.1	ND	0.89	0.14	3.7	9.6
1234789 HpCDF	ND	ND	0.99	ND	ND	6.2	4.1	3.7	2.5	ND	ND	ND	ND	ND	ND	ND	0.26	0.88
• Octachlorodibenzodioxin	2.1	ND	574	37.4	113	2380	2420	1140	945	2.9	15.4	141	139	11.9	34.6	5.5	126	622
• Octachlorodibenzofuran	ND	ND	52.5	2.9	7	393	716	148	80.6	0.32	1.4	10.2	40.1	ND	3.4	ND	16.4	57.8

ND: Not Detected

• Value for total dioxin or furan concentration; may be followed by specific isomer concentrations.

TABLE B-1.6
CONCENTRATIONS OF ORGANICS (ug/kg) IN
UTILITY TRENCH SAMPLES

	POINT	UT-1		UT-2		UT-3		Duplicate UT-3D		UT-4		UT-5	
V	Benzene												
V	Chloroform	2	J	4	B J	1	J	1	J	2	J	2	J
V	Ethylbenzene												
V	Methylene chloride	23	B	34	B	21	B	21	B	36	B	27	B
V	Toluene												
V	Styrene												
V	Acetone	59	B	38	B	34	B	38	B			62	B
V	2-Butanone												
V	Carbon disulfide												
V	4-Methyl-2-pentanone												
V	Xylenes (Total)												
B	Acenaphthene					74	J	310	J				
B	Acenaphthylene												
B	Anthracene							75	J				
B	*Benzo(a)anthracene*					58	J	130	J				
B	Benzo(a)pyrene												
B	Benzo(b)fluoranthene			80	J X	49	J X	130	J X				
B	Benzo(g,h,i)perylene												
B	Benzo(k)fluoranthene			80	J X	49	J X	130	J X				
B	bis(2-Ethylhexyl)phthalate												
B	Butyl benzyl phthalate												
B	Chrysene			70	J	69	J	140	J				
B	Dibenzo(a,h)anthracene												
B	1,2-Dichlorobenzene												
B	1,4-Dichlorobenzene												
B	Di-n-butyl phthalate												
B	Di-n-octyl phthalate	120	J										
B	Fluoranthene			85	J	330	J	610				55	J
B	Fluorene					56	J	240	J				
B	Indeno(1,2,3-cd)pyrene												
B	Naphthalene												
B	N-Nitrosodiphenylamine(1)												
B	Phenanthrene	65	J	67	J	370		730				57	J
B	*Pyrene*			51	J	260	J	480				53	J
B	1,2,4-Trichlorobenzene												
B	Dibenzofuran					48	J	210	J				
B	2-Methylnaphthalene												
B	Tetrachlorodibenzodioxins	NA		NA		NA		NA		NA		NA	
B	Pentachlorodibenzodioxins	NA		NA		NA		NA		NA		NA	
B	Pentachlorodibenzofurans	NA		NA		NA		NA		NA		NA	
B	Hexachlorodibenzodioxins	NA		NA		NA		NA		NA		NA	
B	Hexachlorodibenzofurans	NA		NA		NA		NA		NA		NA	
B	Heptachlorodibenzodioxins	NA		NA		NA		NA		NA		NA	
B	Heptachlorodibenzofurans	NA		NA		NA		NA		NA		NA	
B	Octachlorodibenzodioxin	NA		NA		NA		NA		NA		NA	
B	Octachlorodibenzofuran	NA		NA		NA		NA		NA		NA	
A	2,4-Dimethylphenol												
A	4-Nitrophenol												
A	Pentachlorophenol												
A	Phenol												
A	2-Methylphenol												
A	4-Methylphenol												
A	*Benzoic acid*												
A	2,4,5-Trichlorophenol												

TABLE B-1.7

INORGANICS AT THE HARDPAN
(mg/kg)

POINT	SO-1-2		SO-2-2		SO-3-2		SO-3-2D		SO-4-2		SO-5-2		SO-6-2	
Antimony	NA		NA		NA		NA		NA		NA		NA	
Arsenic	1.6	[]F	56.8	P *	40.9	P *	55.4	P *	80.3	P *	2.4	F N	9.2	F
Beryllium	NA		NA		NA		NA		NA		NA		NA	
Cadmium	NA		NA		NA		NA		NA		NA		NA	
Chromium	6.9	P *	35	P *	43.9	P *	50	P *	69.2	P *	10.9	P *	10.1	P *
Copper	3	[]P	27.5	P *	10.9	P *	14.7	P *	49.2	P *			5.7	P *
Lead	NA		NA		NA		NA		NA		NA		NA	
Mercury	NA		NA		NA		NA		NA		NA		NA	
Nickel	NA		NA		NA		NA		NA		NA		NA	
Selenium	NA		NA		NA		NA		NA		NA		NA	
Silver	NA		NA		NA		NA		NA		NA		NA	
Thallium	NA		NA		NA		NA		NA		NA		NA	
Zinc	21.4	P	27.5	P *	20.1	P *	16	P *	18.1	P *	5.4	P	13.8	P *
Barium	NA		NA		NA		NA		NA		NA		NA	
Iron	NA		NA		NA		NA		NA		NA		NA	
Manganese	NA		NA		NA		NA		NA		NA		NA	
Vanadium	NA		NA		NA		NA		NA		NA		NA	
Aluminum	NA		NA		NA		NA		NA		NA		NA	
Cobalt	NA		NA		NA		NA		NA		NA		NA	
Magnesium	NA		NA		NA		NA		NA		NA		NA	
Calcium	NA		NA		NA		NA		NA		NA		NA	
Sodium	NA		NA		NA		NA		NA		NA		NA	
Potassium	NA		NA		NA		NA		NA		NA		NA	
Organic Carbon	NA		NA		NA		NA		NA		NA		NA	
pH	7.3		7.3		7.8		7.5		7.4		7.5		7	
Percent Solids	87.8		83.1		85.5		84.9		83		90.2		88.4	
Percent Moisture	12		9		15		15		17		10		12	

TABLE B-1.7 (continued)

INORGANICS AT THE HARDPAN
(mg/kg)

POINT	SO-7-2		SO-8-2		SO-13-2		SO-14-2		DM-15A-2		SO-15-2		SO-16-2	
Antimony			NA		NA		NA		NA		NA		NA	
Arsenic	345	P	0.63	[]F	6.8	F	2.4	F	89	P *	3.1	F N	5.6	F N
Beryllium			NA		NA		NA		NA		NA		NA	
Cadmium			NA		NA		NA		NA		NA		NA	
Chromium	252	P	7.2	P	15.1	P *	10.6	P *	65	P *	14.5	P	20.5	P
Copper	229	P E	3.1	[]P	3.4	[]P	1.8	[]P	25.7	P *	4.1	[]P	4.8	[]P
Lead	15.1	F	NA		NA		NA		NA		NA		NA	
Mercury			NA		NA		NA		NA		NA		NA	
Nickel	6.8	[]P	NA		NA		NA		NA		NA		NA	
Selenium			NA		NA		NA		NA		NA		NA	
Silver			NA		NA		NA		NA		NA		NA	
Thallium			NA		NA		NA		NA		NA		NA	
Zinc	33.6	P	9	P *	11.4	P *	17.6	P *	40.1	P *	8.4	P *	13.4	P *
Barium	34.9	[]P	NA		NA		NA		NA		NA		NA	
Iron	5670	P *	NA		NA		NA		NA		NA		NA	
Manganese	38.2	P	NA		NA		NA		NA		NA		NA	
Vanadium	12.1	[]P	NA		NA		NA		NA		NA		NA	
Aluminum	7200	P *	NA		NA		NA		NA		NA		NA	
Cobalt	2	[]P	NA		NA		NA		NA		NA		NA	
Magnesium	565	[]P	NA		NA		NA		NA		NA		NA	
Calcium	6340	P *	NA		NA		NA		NA		NA		NA	
Sodium			NA		NA		NA		NA		NA		NA	
Potassium			NA		NA		NA		NA		NA		NA	
Organic Carbon	NA		NA		NA		NA		NA		NA		NA	
pH	7.8		6.7		6.7		7.6		7.6		6.8		7.3	
Percent Solids	78		88.3		88.5		87.5		81.5		87.6		84.7	
Percent Moisture	22		12		12		13		19		12		15	

TABLE B-1.7 (continued)

INORGANICS AT THE HARDPAN
(mg/kg)

POINT	Duplicate SO-16-2D		SO-17-2		SO-18-2		DM-1R-2		DM-2R-2		DM-3R-2		DM-4R-2	
Antimony	NA		NA		NA		NA				NA		NA	
Arsenic	2.6	F N	37.6	P *	1.8	[]F	116	P *	1.2	[]F	9.2	F	0.51	[]F
Beryllium	NA		NA		NA		NA				NA		NA	
Cadmium	NA		NA		NA		NA				NA		NA	
Chromium	21.9	P	38.5	P *	20.3	P *	22.5	P *	17.4	P *	30.5	P *	8.8	P *
Copper	4	[]P	5.4	[]P	7.1	P *	18.5	P	4.8	[]P	5.3	[]P	4.6	[]P
Lead	NA		NA		NA		NA				NA		NA	
Mercury	NA		NA		NA		NA				NA		NA	
Nickel	NA		NA		NA		NA				NA		NA	
Selenium	NA		NA		NA		NA				NA		NA	
Silver	NA		NA		NA		NA				NA		NA	
Thallium	NA		NA		NA		NA				NA		NA	
Zinc	11.7	P *	12.2	P *	18.5	P *	38.8	P	15.4	P	28.4	P *	38.9	P
Barium	NA		NA		NA		NA				NA		NA	
Iron	NA		NA		NA		NA				NA		NA	
Manganese	NA		NA		NA		NA				NA		NA	
Vanadium	NA		NA		NA		NA				NA		NA	
Aluminum	NA		NA		NA		NA				NA		NA	
Cobalt	NA		NA		NA		NA				NA		NA	
Magnesium	NA		NA		NA		NA				NA		NA	
Calcium	NA		NA		NA		NA				NA		NA	
Sodium	NA		NA		NA		NA				NA		NA	
Potassium	NA		NA		NA		NA				NA		NA	
Organic Carbon	NA		NA		NA		NA		NA		NA		NA	
pH	7.4		7.5		7.6		7.4		7.1		7.8		6.5	
Percent Solids	89.2		83.3		87.1		86.2		88		84.9		88.8	
Percent Moisture	14		17		13		14		12		15		11	

TABLE B-1.7 (continued)

INORGANICS AT THE HARDPAN
(mg/kg)

POINT	DM-5-2		DM-11B-2		DM-15-2		DM-16-2		DM-18A-2	
Antimony			NA		NA				NA	
Arsenic	0.84	[]F N	47.3	F N	1.7	[]F N	1.9	[]F N	27	F N
Beryllium			NA		NA				NA	
Cadmium			NA		NA				NA	
Chromium	17.8	P *	33.2	P *	5	P *	11.8	P *	40.4	P *
Copper	2.5	[]P	17.7	P	2.8	[]P	2.4	[]P	10.3	P
Lead			NA		NA				NA	
Mercury			NA		NA				NA	
Nickel			NA		NA				NA	
Selenium			NA		NA				NA	
Silver			NA		NA				NA	
Thallium			NA		NA				NA	
Zinc	11.8	P	7.7	P	1.7	[]P	13.1	P	5.3	P
Barium			NA		NA				NA	
Iron			NA		NA				NA	
Manganese			NA		NA				NA	
Vanadium			NA		NA				NA	
Aluminum			NA		NA				NA	
Cobalt			NA		NA				NA	
Magnesium			NA		NA				NA	
Calcium			NA		NA				NA	
Sodium			NA		NA				NA	
Potassium			NA		NA				NA	
Organic Carbon	NA		NA		NA				NA	
pH	7		6.3		7.7				7.1	
Percent Solids	83.8		88		88.2				92	
Percent Moisture	16		12		12				8	

TABLE B-1.8
ORGANICS AT THE HARDPAN (ug/kg)

POINT	SO-1-2		SO-2-2		SO-3-2		Duplicate SO-3-2D		SO-4-2		SO-5-2		SO-6-2		SO-7-2		SO-8-2	
Benzene											28							
Chloroform					7		1	J	4	J			3	J				
Ethylbenzene											3300							
Methylene chloride	25	B	12	B	37	B	16	B	39	B	23	B	59	B	18	B	27	B
Toluene											200				5	J		
Styrene											63							
Acetone	25	B	42	B	44	B	44	B	77	B	120	B	140	B	76	B	46	B
2-Butanone																		
Carbon disulfide			5	J														
4-Methyl-2-pentanone																		
Xylenes (Total)			1	J							7900							
Acenaphthene	58	J	NA						3100		330000	D	1500		16000	E		
Acenaphthylene			NA						100	J	12000	J	74	J	530			
Anthracene	64	J	NA						6300		100000		1100		5800			
Benzo(a)anthracene	46	J	NA				71	J	1600		83000		630		7500	E		
Benzo(a)pyrene	48	J	NA				78	J	520		27000		200	J	2200			
Benzo(b)fluoranthene	210	J X	NA		63	J	260	J X	1400	X	25000		970	X	6400			
Benzo(g,h,i)perylene			NA						210	J	5500	J	100	J	450			
Benzo(k)fluoranthene	210	J X	NA		72	J	260	J X	1800	X	34000		970	X	6400			
bis(2-Ethylhexyl)phthalate			NA		110	B J	110	B J	210	B J			300	B J			64	J
Butyl benzyl phthalate			NA															
Chrysene	110	J	NA		95	J	160	J	2100		80000		1000		11000	E		
Dibenzo(a,h)anthracene			NA						74	J			45	J	130	J		
1,2-Dichlorobenzene			NA															
1,4-Dichlorobenzene			NA															
Di-n-butyl phthalate			NA															
Di-n-octyl phthalate	77	J	NA															
Fluoranthene	200	J	NA		280	J	380	J	11000	D	350000	D	6100		84000	E		
Fluorene	83	J	NA						2000		270000	D	2000		9800	E		
Indeno(1,2,3-cd)pyrene			NA						230	J	5600	J	120	J	640			
Naphthalene			NA						67	J	700000	D	1600		2800			
N-Nitrosodiphenylamine(1)			NA						140	J					5300			
Phenanthrene	380		NA		73	J	120	J	5900		860000	D	4800		28000	E		
Pyrene	160	J	NA		240	J	410		6600	D	330000	D	3400		27000	E		
1,2,4-Trichlorobenzene			NA															
Dibenzofuran	64	J	NA						510		240000	D	1500		6500			
2-Methylnaphthalene			NA						73	J	310000	D	1300		2300			
2,4-Dimethylphenol			NA												150	J		
4-Nitrophenol			NA															
Pentachlorophenol	110	J	NA		88	J			470	J	100000	J	11000	D	50000	E		
Phenol			NA										160	J	230	J		
2-Methylphenol			NA										46	J	130	J		
4-Methylphenol			NA										240	J	320	J		
Benzoic acid			NA								7200	J						
2,4,5-Trichlorophenol			NA												350	J		

TABLE B-1.8 (continued)
ORGANICS AT THE HARDPAN (ug/kg)

POINT	SO-13-2	SO-14-2	SO-15-2	SO-16-2	Duplicate SO-16-2D	SO-17-2	SO-18-2	DM-15A-2	DM-1R-2
Benzene				2 J					
Chloroform	2 J	9	2 J		2 J	2 J			
Ethylbenzene			12	150	960 D			14	
Methylene chloride	29 B	31 B	45 B	27 B	310 B D	19 B	14 B	22 B	7 B
Toluene			6	120	510 D J	2 J		4 J	15
Styrene			4 J					7	
Acetone	33 B	57 B	61 B	29 B	440 B D	81 B	34 B	62 B	
2-Butanone						12 J			
Carbon disulfide									
4-Methyl-2-pentanone									
Xylenes (Total)			37	750 E	4700 D			36	
Acenaphthene	370 J	98 J	1800	6800	4800	47 J	5200	190000 D	670 J
Acenaphthylene			130 J				250 J	6200	
Anthracene	150 J	74 J	1700	3100	2400		3700	91000 D	250 J
Benzo(a)anthracene	54 J	78 J	340 J	1200	870		730	40000 D	810
Benzo(a)pyrene	49 J		150 J	550 J	210 J		160 J	15000 D J	170 J
Benzo(b)fluoranthene	200 J X	110 J X	420 X	620 J X	550 X		400 X	32000 D J	380 J
Benzo(g,h,i)perylene								2800	
Benzo(k)fluoranthene	200 J X	110 J X	420 X	620 J X	550 X		400 X	32000 D J	470 J
bis(2-Ethylhexyl)phthalate	290 B J	170 B J							440 B J
Butyl benzyl phthalate									
Chrysene	96 J	130 J	390	2300	880		660	44000 D	1400
Dibenzo(a,h)anthracene								1500	
1,2-Dichlorobenzene								140 J	
1,4-Dichlorobenzene								43 J	
Di-n-butyl phthalate									360 J
Di-n-octyl phthalate	220 J		92 J						
Fluoranthene	210 J	480	2800	6700	5600	80 J	4100	220000 D	8700
Fluorene	400	69 J	2500	9300	6700 E	41 J	7300 D	170000 D	130 J
Indeno(1,2,3-cd)pyrene			39 J		44 J			3100	
Naphthalene	1200		24000 D	11000	6200	98 J	11000 D	270000 D	
N-Nitrosodiphenylamine(1)							4700 D		640 J
Phenanthrene	780	210 J	5900	17000 E	13000 E	140 J	13000 D	450000 D	310 J
Pyrene	220 J	360 J	1700	3400	2700	75 J	3400	160000 D	5700
1,2,4-Trichlorobenzene									
Dibenzofuran	390	56 J	1900	7000	5100	44 J	5400	140000 D	81 J
2-Methylnaphthalene	540		1200	15000 E	9600 E		17000 D	120000 D	
2,4-Dimethylphenol			62 J			160 J			
4-Nitrophenol									
Pentachlorophenol	1100 J	100 J	1200 J	74000 E	48000 E		11000 D	4900	3600 J
Phenol			99 J	570 J	390	1300		660	
2-Methylphenol				170 J	120 J	200 J		420	
4-Methylphenol			82 J	410 J	310 J	530			150 J
Benzoic acid									
2,4,5-Trichlorophenol									

TABLE B-1.8 (continued)
ORGANICS AT THE HARDPAN (ug/kg)

POINT	DM-2R-2		DM-3R-2		DM-4R-2		DM-5-2		DM-11B-2		DM-15-2		DM-16-2		DM-18A-2	
Benzene											1	J				
Chloroform					2	J	2	B J	2	J	3	B J			2	J
Ethylbenzene											43					
Methylene chloride	7	B	19	B	7	B	16	B	22	B	18	B	10	B	24	B
Toluene											22					
Styrene											21					
Acetone			44	B			25	B	35	B	49	B	25	B	45	B
2-Butanone																
Carbon disulfide	1	J														
4-Methyl-2-pentanone																
Xylenes (Total)											140					
Acenaphthene			230	J							58000	D	12000	D		
Acenaphthylene									120	J	1200					
Anthracene			200	J					170	J	16000	D	2600		42	J
Benzo(a)anthracene			110	J					160	J	7800	D J	1700		49	J
Benzo(a)pyrene			62	J					580		2400		330	J		
Benzo(b)fluoranthene			310	J X					1500	X	5800	X	1300	X	150	J
Benzo(g,h,i)perylene									370	J	550		79	J	77	J
Benzo(k)fluoranthene			310	J X					1500	X	5800	X	1300	X	77	J
bis(2-Ethylhexyl)phthalate	510	B	80	J	260	B J	260	B J	68	J					39	J
Butyl benzyl phthalate																
Chrysene			140	J					340	J	6500	D J	2000		160	J
Dibenzo(a,h)anthracene									81	J	160	J				
1,2-Dichlorobenzene																
1,4-Dichlorobenzene																
Di-n-butyl phthalate	54	J	44	J			57	J							37	B J
Di-n-octyl phthalate																
Fluoranthene			640						260	J	48000	D	13000	D	330	J
Fluorene			240	J							52000	D	14000	D		
Indeno(1,2,3-cd)pyrene									400		7.10				77	J
Naphthalene			69	J							160000	D	20000	D		
N-Nitrosodiphenylamine(1)																
Phenanthrene			740								130000	D	38000	D	45	J
Pyrene			420						370	J	32000	D	8600	D	380	
1,2,4-Trichlorobenzene																
Dibenzofuran			150	J							50000	D	13000	D		
2-Methylnaphthalene			140	J							68000	D	14000	D		
2,4-Dimethylphenol											1300					
4-Nitrophenol																
Pentachlorophenol			2500						1600	J	30000	D J			5400	
Phenol											900					
2-Methylphenol																
4-Methylphenol											1500					
Benzoic acid																
2,4,5-Trichlorophenol																

TABLE B-I.9
DIOXINS AND FURANS IN SOILS AT THE HARDPAN (ug/kg)

POINT	SO-1-2	SO-4-2	SO-8-2	SO-17-2	DM-2R-2	DM-16-2
ug/kg (ppb)						
* Tetrachlorodibenzodioxins	ND	ND	ND	ND	ND	ND
2378 TCDD	ND	ND	ND	ND	ND	ND
* Pentachlorodibenzodioxins	ND	ND	ND	ND	ND	ND
12378 PeCDD	ND	ND	ND	ND	ND	ND
* Pentachlorodibenzofurans	ND	ND	ND	ND	ND	ND
12378 PeCDF	ND	ND	ND	ND	ND	ND
23478 PeCDF	ND	ND	ND	ND	ND	ND
* Hexachlorodibenzodioxins	ND	ND	ND	ND	ND	ND
123478 HxCDD	ND	ND	ND	ND	ND	ND
123678 HxCDD	ND	ND	ND	ND	ND	0.22
123789 HxCDD	ND	ND	ND	ND	ND	ND
* Hexachlorodibenzofurans	ND	ND	ND	ND	ND	0.99
123478 HxCDF	ND	ND	ND	ND	ND	ND
123678 HxCDF	ND	ND	ND	ND	ND	ND
124678 HxCDF	ND	ND	ND	ND	ND	ND
123789 HxCDF	ND	ND	ND	ND	ND	ND
* Heptachlorodibenzodioxins	0.68	13.5	ND	0.47	ND	11.8
1234678 HpCDD	0.45	9.2	ND	0.28	ND	7.4
* Heptachlorodibenzofurans	0.69	6.3	ND	0.3	ND	5.6
1234678 HpCDF	ND	1.2	ND	ND	ND	1.6
1234789 HpCDF	ND	0.12	ND	ND	ND	ND
* Octachlorodibenzodioxin	3.1	83.1	1.2	5	10.1	53.9
* Octachlorodibenzofuran	0.46	5.9	ND	ND	ND	5.1

ND: NOT DETECTED
* VALUES FOR TOTAL DIOXIN OR FURAN; MAY BE FOLLOWED BY SPECIFIC ISOMER CONCENTRATIONS

TABLE B-1.10

INORGANICS AT THE TOP OF THE SAPROLITE (mg/kg)

POINT	DM-1R-3		DM-2R-3	DM-3R-3		DM-4R-3		DM-11B-3		DM-15-3		DM-16-3	
Antimony	NA		NA	NA		NA				NA		NA	
Arsenic	0.69	[]F	NA	1.6	[]F	0.75	[]F	13.3	F	11.5	F	0.75	[]F
Beryllium	NA		NA	NA		NA		1.5	P	NA		NA	
Cadmium	NA		NA	NA		NA				NA		NA	
Chromium	2.3	P	NA	3.2	P	4	P	17.3	P	11.8	P	4.2	P
Copper	6.8	P E	NA			4.6	[]P	13.7	P E	4.9	[]P	2.4	[]P
Lead	NA		NA	NA		NA		10.8	F	NA		NA	
Mercury	NA		NA	NA		NA				NA		NA	
Nickel	NA		NA	NA		NA				NA		NA	
Selenium	NA		NA	NA		NA		0.79	[]F	NA		NA	
Silver	NA		NA	NA		NA		1.3	[]P	NA		NA	
Thallium	NA		NA	NA		NA		0.26	[]F	NA		NA	
Zinc	6.3	P	NA	17.5	P	15.4	P	39.3	P	8.3	P	52.7	P
Barium	NA		NA	NA		NA		270	P	NA		NA	
Iron	NA		NA	NA		NA		14500	P *	NA		NA	
Manganese	NA		NA	NA		NA		75.2	P	NA		NA	
Vanadium	NA		NA	NA		NA		27.1	P	NA		NA	
Aluminum	NA		NA	NA		NA		8770	P *	NA		NA	
Cobalt	NA		NA	NA		NA		6.7	[]P	NA		NA	
Magnesium	NA		NA	NA		NA		2550	P E	NA		NA	
Calcium	NA		NA	NA		NA		1500	P *	NA		NA	
Sodium	NA		NA	NA		NA		392	[]P	NA		NA	
Potassium	NA		NA	NA		NA		2860	P	NA		NA	
Organic Carbon	NA		NA	NA		NA		NA		NA		NA	
pH	6.8		7.3	7.9		6.9		7.3		7.1		6.5	
Percent Solids	83.2		NA	82.2		87.2		84.6		81.2		74.5	
Percent Moisture	17		17	18		13		15		21		26	

TABLE B-1.11
ORGANICS AT THE TOP AND MIDDLE OF THE SAPROLITE (ug/kg) (Sampling depth is indicated for those from the middle of the saprolite.)

POINT	DM-1R-3		DM-2R-3		DM-3R-3		DM-4R-3		DM-11B-3		DM-15-3		DM-16-3		(12-14') DM-3R-D1		(14-16') DM-3R-D2	
Benzene											8		6					
Chloroform	4	B J			2	J	3	J			5	B J	5	J	3	B J	8	B
Ethylbenzene											8		6					
Methylene chloride	24	B	14	B	19	B	48	B	23	B	31	B	24	B	21	B	18	B
Toluene											8							
Styrene											5	J	2	J				
Acetone	77	B	16	B	32	B	36		31	B	120	B	30	B	38	B	19	B
2-Butanone											13							
Carbon disulfide											25							
4-Methyl-2-pentanone											26		14		3	J		
Xylenes (Total)											8700	E	810	D				
Acenaphthene											450		530		79	J		
Acenaphthylene											4900		190	J	45	J		
Anthracene									47	J	2500		120	J				
Benzo(a)anthracene									74	J	810		330	J				
Benzo(a)pyrene									270	J X	2200	X	66	J X				
Benzo(b)fluoranthene											270	J	79	J				
Benzo(g,h,i)perylene									270	J X	2200	X	66	J X				
Benzo(k)fluoranthene					99	J												
bis(2-Ethylhexyl)phthalate																		
Butyl benzyl phthalate									120	J	2600		130	J				
Chrysene											130	J	41	J				
Dibenzo(a,h)anthracene																		
1,2-Dichlorobenzene																		
1,4-Dichlorobenzene																		
Di-n-butyl phthalate																		
Di-n-octyl phthalate	83	J			120	J												
Fluoranthene									170	J	13000	E	1000	D	160	J		
Fluorene											9400	E	900	D	89	J		
Indeno(1,2,3-cd)pyrene											270	J	91	J				
Naphthalene											15000	E	1600	D	86	J		
N-Nitrosodiphenylamine(1)													110	J				
Phenanthrene									59	J	16000	E	2600	D	240	J	55	J
Pyrene									200	J	8100	E	770	D	79	J		
1,2,4-Trichlorobenzene																		
Dibenzofuran											8900	E	750	D	68	J		
2-Methylnaphthalene											11000	E	710	D	81	J		
2,4-Dimethylphenol											1500							
4-Nitrophenol																		
Pentachlorophenol									750	J	20000	E	1100	J				
Phenol											3000		170	J				
2-Methylphenol											1400							
4-Methylphenol											4800		70	J				
Benzoic acid																		
2,4,5-Trichlorophenol																		

TABLE B-1.11 (continued)
ORGANICS AT THE TOP AND MIDDLE OF THE SAPROLITE (ug/kg) (Sampling depth is indicated for those from the middle of the Saprolite.)

	POINT	(8-10') DM-4R-D1		(8-10') DM-11B-D1		(10-12') DM-11B-D2		(12-14') DM-15-D1		(14-16') DM-15-D2		(12-14') DM-16-D1		(16-18') DM-16-D2	
Benzene						NA		2	J	4	J				
Chloroform						NA		4	B J	3	B J	2	J	5	B J
Ethylbenzene						NA		15		31					
Methylene chloride		14	B	27	B	NA		22	B	22	B	15	B	33	B
Toluene						NA		11		23					
Styrene						NA		3	J	7					
Acetone		23		58		NA		47	B	37	B	73		40	B
2-Butanone						NA									
Carbon disulfide						NA									
4-Methyl-2-pentanone						NA				11	J				
Xylenes (Total)						NA		46		92					
Acenaphthene								2700		8900	E	84	J	110	J
Acenaphthylene								67	J	230	J				
Anthracene								940		1700					
Benzo(a)anthracene								440		1900					
Benzo(a)pyrene								150	J	460					
Benzo(b)fluoranthene						44	J X	470	X	550					
Benzo(g,h,i)perylene										65	J				
Benzo(k)fluoranthene						44	J X	470	X	520					
bis(2-Ethylhexyl)phthalate						45	J							43	J
Butyl benzyl phthalate															
Chrysene								640		1400					
Dibenzo(a,h)anthracene															
1,2-Dichlorobenzene															
1,4-Dichlorobenzene															
Di-n-butyl phthalate															
Di-n-octyl phthalate												70	J		
Fluoranthene				39	J	46	J	4300		9700	E	54	J	110	J
Fluorene								2800		7400	E	93	J	110	J
Indeno(1,2,3-cd)pyrene										82	J				
Naphthalene								5400		13000	E	140	J	61	J
N-Nitrosodiphenylamine(1)															
Phenanthrene								6200		17000	E	240	J	440	
Pyrene						44	J	2500		7400	E			85	J
1,2,4-Trichlorobenzene															
Dibenzofuran								2400		7900	E	83	J	110	J
2-Methylnaphthalene								2300		9000	E	50	J	43	J
2,4-Dimethylphenol								750		1300		63	J		
4-Nitrophenol						50	J								
Pentachlorophenol						65	J	3700		12000	E			60	J
Phenol								1800		1000		110	J	88	J
2-Methylphenol								1000		1000					
4-Methylphenol								3100		2900		91	J		
Benzoic acid															
2,4,5-Trichlorophenol															

TABLE B-1.12

INORGANICS AT TOP OF BEDROCK (mg/kg)

POINT	DM-2R-4		DM-3R-4	DM-15-4	DM-16-4
Antimony			NA	NA	NA
Arsenic	2	[]F	NA	NA	NA
Beryllium	0.62	[]P	NA	NA	NA
Cadmium			NA	NA	NA
Chromium	10.6	P	NA	NA	NA
Copper	6.9	P E	NA	NA	NA
Lead	10.1	F	NA	NA	NA
Mercury			NA	NA	NA
Nickel			NA	NA	NA
Selenium	0.32	[]F	NA	NA	NA
Silver			NA	NA	NA
Thallium			NA	NA	NA
Zinc	6.7	P	NA	NA	NA
Barium	25.2	[]P	NA	NA	NA
Iron	17500	P *	NA	NA	NA
Manganese	11.3	P	NA	NA	NA
Vanadium	35.5	P	NA	NA	NA
Aluminum	9220	P *	NA	NA	NA
Cobalt	3.1	[]P	NA	NA	NA
Magnesium	310	[]P	NA	NA	NA
Calcium	42.3	[]P	NA	NA	NA
Sodium	459	[]P	NA	NA	NA
Potassium			NA	NA	NA
Organic Carbon	NA		NA	NA	NA
pH	7.8		7.3	7.6	7.4
Percent Solids	85		NA	NA	NA
Percent Moisture	15		15	11	12

TABLE B-1.13

ORGANICS AT THE TOP OF BEDROCK (ug/kg)

	POINT	DM-2R-4		DM-3R-4		DM-15-4		DM-16-4	
Benzene									
Chloroform						4	B J	2	J
Ethylbenzene						45			
Methylene chloride		13	B	18	B	26	B	27	B
Toluene						13			
Styrene						25			
Acetone		13	B	18		34	B	61	
2-Butanone									
Carbon disulfide									
4-Methyl-2-pentanone									
Xylenes (Total)						130			
Acenaphthene						100000	E		
Acenaphthylene						3000			
Anthracene						32000	E		
Benzo(a)anthracene						16000			
Benzo(a)pyrene						5100			
Benzo(b)fluoranthene						12000	X		
Benzo(g,h,i)perylene						940	J		
Benzo(k)fluoranthene						12000	X		
bis(2-Ethylhexyl)phthalate									
Butyl benzyl phthalate									
Chrysene						16000			
Dibenzo(a,h)anthracene						530	J		
1,2-Dichlorobenzene									
1,4-Dichlorobenzene									
Di-n-butyl phthalate									
Di-n-octyl phthalate									
Fluoranthene						98000	E		
Fluorene						93000	E		
Indeno(1,2,3-cd)pyrene						1200	J		
Naphthalene						140000	E		
N-Nitrosodiphenylamine(1)									
Phenanthrene						200000	E	56	J
Pyrene						45000	E		
1,2,4-Trichlorobenzene									
Dibenzofuran						78000	E		
2-Methylnaphthalene						87000	E		
2,4-Dimethylphenol						3400			
4-Nitrophenol									
Pentachlorophenol						82000	E		
Phenol				140	J	680	J		
2-Methylphenol						1200	J		
4-Methylphenol						3000			
Benzoic acid									
2,4,5-Trichlorophenol									

TABLE B-1.14

CHEMICAL ANALYSIS RESULTS (ug/kg) FROM LIGHT AND DENSE NAPLs

	POINT	BW-3A-F		DM-15A-S		DM-15-S	
V	Benzene	170	J	320	J	2200	
V	Ethylbenzene	1300		7400		25000	
V	Methylene chloride	780	B	270	B J	490	B J
V	Toluene	650		2000		14000	
V	Styrene	BDL	630	6900		10000	
V	Xylenes (Total)	6500		20000		56000	
B	Acenaphthene	100000		NA		6900000	D
B	Acenaphthylene	4300	J	NA		220000	
B	Anthracene	46000		NA		1600000	D J
B	Benzo(a)anthracene	48000		NA		1100000	D J
B	Benzo(a)pyrene	26000		NA		540000	
B	Benzo(b)fluoranthene	48000	X	NA		280000	D J
B	Benzo(g,h,i)perylene	6900	J	NA		74000	
B	Benzo(k)fluoranthene	48000	X	NA		BDL	20000
B	bis(2-Ethylhexyl)phthalate	10000000	D	NA		24000	J
B	Chrysene	40000		NA		910000	D J
B	Dibenzo(a,h)anthracene	BDL	990000	NA		36000	J
B	Fluoranthene	200000		NA		4900000	D
B	Fluorene	110000		NA		6200000	D
B	Indeno(1,2,3-cd)pyrene	7400	J	NA		86000	
B	Naphthalene	46000		NA		21000000	D
B	N-Nitrosodiphenylamine(1)	BDL	990000	NA		690000	D J
B	Phenanthrene	250000		NA		19000000	D
B	Pyrene	220000		NA		4800000	D
B	Dibenzofuran	65000		NA		5100000	D
B	2-Methylnaphthalene	110000		NA		7600000	D
B	Heptachlorodibenzodioxins	193		NA		NA	
B	Heptachlorodibenzofurans	140		NA		NA	
B	Octachlorodibenzodioxin	909		NA		NA	
B	Octachlorodibenzofuran	319		NA		NA	
A	2-Methylphenol	BDL	990000	NA		8800	J

TABLE B-1.15

INORGANICS IN THE PERCHED AQUIFER (ug/l)

	POINT	BW-2A	BW-3A		BW-3A-D		DM-1A		BW-9A		BW-10A		BW-8		BW-11A		DM-15A		DM-18A		Total unfiltered inorganics BW-11A	
M	Antimony	NA	BDL	50.2	BDL	50.2	NA		NA		NA		NA		BDL	50	NA		NA		BDL	50.2
M	Arsenic	NA	13.2	F N	30.9	F + N	223	P	2.7	B W	679	P	BDL	22	BDL	22	868	P	274	P	839	P
M	Beryllium	NA	BDL	0.7	BDL	0.7	NA		NA		NA		NA		BDL	0.7	NA		NA		5.1	P
M	Cadmium	NA	BDL	4.4	BDL	4.4	NA		NA		NA		NA		BDL	4.4	NA		NA		BDL	4.4
M	Chromium	NA	BDL	6.2	BDL	6.2	10.4	P	BDL	6.2	25.6	P	27.8		23.7	P	15.3	P	51.8	P	266	P
M	Copper	NA	11.6	[ ]P	11.6	[ ]P	15.2	B P	10.2	B P	10.2	B P	326		37.6	P	17	[ ]P	119	P	81	P
M	Lead	NA	2.6	[ ]F W	1.6	[ ]F W	NA		NA		NA		NA		1.5	[ ]F W	NA		NA		13.9	F
M	Mercury	NA	BDL	0.2	BDL	0.2	NA		NA		NA		NA		BDL	0.2	NA		NA		BDL	0.2
M	Nickel	NA	BDL	35.8	BDL	35.8	NA		NA		NA		NA		BDL	35	NA		NA		55.5	P
M	Selenium	NA	BDL	16	BDL	16	NA		NA		NA		NA		BDL	16	NA		NA		BDL	16
M	Silver	NA	BDL	5.7	BDL	5.7	NA		NA		NA		NA		BDL	5.7	NA		NA		BDL	5.7
M	Thallium	NA	BDL	1.3	BDL	1.3	NA		NA		NA		NA		BDL	1.3	NA		NA		BDL	1.3
M	Zinc	NA	38.8	P *	35.9	P *	23.5	P	164	P	537	P	29.8		282	P E *	49.6	P	49.3	P *	423	P E
M	Barium	NA	25.3	[ ]P	27.2	[ ]P	NA		NA		NA		NA		5.6	[ ]P	NA		NA		75.7	[ ]P
M	Iron	NA	1310	P	1290	P	NA		NA		NA		NA		1330	P	NA		NA		51500	P
M	Manganese	NA	51	P	51	P	NA		NA		NA		NA		100	P	NA		NA		341	P
M	Vanadium	NA	BDL	2.1	BDL	2.1	NA		NA		NA		NA		BDL	2.1	NA		NA		50.8	P
M	Aluminum	NA	41.3	[ ]P	36.8	[ ]P	NA		NA		NA		NA		330	P	NA		NA		18200	P
M	Cobalt	NA	BDL	3.9	BDL	3.9	NA		NA		NA		NA		BDL	3.9	NA		NA		BDL	3.9
M	Magnesium	NA	373	[ ]P	336	[ ]P	NA		NA		NA		NA		243	[ ]P	NA		NA		1860	[ ]P
M	Calcium	NA	1740	[ ]P	1730	[ ]P	NA		NA		NA		NA		1150	[ ]P E	NA		NA		2760	[ ]P
M	Sodium	NA	7610	P	6990	P	NA		NA		NA		NA		127000	P	NA		NA		133000	P
M	Potassium	NA	BDL	2020	BDL	2020	NA		NA		NA		NA		BDL	2020	NA		NA		BDL	2020

TABLE 8-1.16
ORGANICS IN THE PERCHED AQUIFER (ug/l)(1)

	POINT	BW-2A		BW-3A		BW-3A-D		DW-1A		BW-8		BW-9A		BW-10A		BW-11A		DW-15A		DW-18A	
V	Benzene	BDL	23	41		36		BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	44		BDL	5
V	Chloroform	BDL	23	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	9	BDL	5
V	1,2-Dichloroethane	BDL	23	7		6		BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	9	BDL	5
V	1,2-Dichloropropane	BDL	23	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	9	BDL	5
V	Ethylbenzene	BDL	23	18		17		1	J	BDL	5	BDL	5	BDL	5	BDL	5	68		BDL	5
V	Chloromethane	BDL	45	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	19	BDL	10
V	Methylene chloride	18	J	BDL	5	2	B J	2	J	2	B J	1	J	BDL	5	2	J	3	D J	BDL	5
V	Toluene	BDL	23	46		44		BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	45		BDL	5
V	Styrene	BDL	23	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	34		BDL	5
V	Acetone	790		80		75		BDL	10	BDL	10	BDL	10	150		19		290	D	BDL	10
V	2-Butanone	BDL	45	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	17		BDL	10
V	Carbon disulfide	BDL	23	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	2	J	BDL	5
V	4-Methyl-2-pentanone	BDL	45	40		35		BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	19	BDL	10
V	Xylenes (Total)	BDL	23	67		63		BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	130		BDL	5
B	Acenaphthene	NA		BDL	40	18		BDL	10	BDL	10	BDL	10	5	J	BDL	10	2900	D	BDL	10
B	Acenaphthylene	NA		BDL	40	BDL	40	BDL	10	BDL	10	BDL	10	BDL	50	BDL	10	130		BDL	10
B	Anthracene	NA		2	J	3	J	BDL	10	BDL	10	BDL	10	BDL	50	BDL	10	770	D	BDL	10
B	Benzo(a)anthracene	NA		BDL	40	3	J	BDL	10	BDL	10	BDL	10	BDL	50	BDL	10	550	D	BDL	10
B	Benzo(a)pyrene	NA		BDL	40	BDL	40	BDL	10	BDL	10	BDL	10	BDL	50	BDL	10	230		BDL	10
B	Benzo(b)fluoranthene	NA		BDL	40	BDL	40	BDL	10	BDL	10	BDL	10	BDL	50	BDL	10	440	D X	BDL	10
B	Benzo(g,h,i)perylene	NA		BDL	40	BDL	40	BDL	10	BDL	10	BDL	10	BDL	50	BDL	10	57		BDL	10
B	Benzo(k)fluoranthene	NA		BDL	40	BDL	40	BDL	10	BDL	10	BDL	10	BDL	50	BDL	10	440	D X	BDL	10
B	bis(2-Ethylhexyl)phthalate	NA		250		390	D	BDL	10	BDL	10	7	J	4	J	BDL	10	BDL	400	BDL	10
B	Chrysene	NA		BDL	40	2	J	BDL	10	BDL	10	BDL	10	3	J	BDL	10	570	D	BDL	10
B	Dibenzo(a,h)anthracene	NA		BDL	40	BDL	40	BDL	10	BDL	10	BDL	10	BDL	50	BDL	10	47		BDL	10
B	1,2-Dichlorobenzene	NA		BDL	40	BDL	40	BDL	10	BDL	10	BDL	10	BDL	50	BDL	10	11		BDL	10
B	1,4-Dichlorobenzene	NA		BDL	40	BDL	40	BDL	10	BDL	10	BDL	10	BDL	50	BDL	10	3	J	BDL	10
B	Di-n-butyl phthalate	NA		BDL	40	BDL	40	BDL	10	BDL	10	BDL	10	BDL	50	BDL	10	BDL	400	BDL	10
B	Fluoranthene	NA		7	J	13		BDL	10	BDL	10	BDL	10	13		BDL	10	2900	D	BDL	10
B	Fluorene	NA		6	J	7	J	2	J	BDL	10	BDL	10	BDL	50	BDL	10	2200	D	BDL	10
B	Indeno(1,2,3-cd)pyrene	NA		BDL	40	BDL	40	BDL	10	BDL	10	BDL	10	BDL	50	BDL	10	71		BDL	10
B	Naphthalene	NA		66		72		4	J	BDL	10	BDL	10	BDL	50	BDL	10	8100	D	BDL	10
B	Phenanthrene	NA		11		16		BDL	10	BDL	10	BDL	10	BDL	50	BDL	10	6200	D	BDL	10
B	Pyrene	NA		5	J	9	J	BDL	10	BDL	10	BDL	10	15		BDL	10	2600	D	BDL	10
B	Dibenzofuran	NA		4	J	5	J	BDL	10	BDL	10	BDL	10	BDL	50	BDL	10	2100	D	BDL	10
B	2-Methylnaphthalene	NA		13		17		BDL	10	BDL	10	BDL	10	BDL	50	BDL	10	2400	D	BDL	10
A	2,4-Dimethylphenol	NA		230		230		BDL	10	BDL	10	BDL	10	BDL	50	BDL	10	980	D	BDL	10
A	Pentachlorophenol	NA		250	D	370	D	BDL	50	BDL	50	BDL	50	790	D	BDL	50	330	D J	BDL	50
A	Phenol	NA		360	D	500	D	BDL	10	BDL	10	BDL	10	7	J	BDL	10	810	D	BDL	10
A	2-Methylphenol	NA		250	D	340	D	BDL	10	BDL	10	BDL	10	BDL	50	BDL	10	810	D	BDL	10
A	4-Methylphenol	NA		620	D	800	D	BDL	10	BDL	10	BDL	10	5	J	BDL	10	1600	D	BDL	10
A	Benzoic acid	NA		BDL	200	BDL	200	BDL	50	BDL	50	BDL	50	22	J	BDL	50	BDL	2000	BDL	50
A	2,4,5-Trichlorophenol	NA		50		44	J	BDL	50	BDL	50	BDL	50	51		BDL	50	BDL	2000	BDL	50
P	Alpha-BHC	NA		BDL	0.0	BDL	0.0	NA		NA		NA		NA		NA		NA		NA	
P	Endrin	NA		0.15	0.1	BDL	0.1	NA		NA		NA		NA		NA		NA		NA	

(1) All concentrations are reported on ug/l

TABLE B-1.17

DIOXINS AND FURANS IN PERCHED AQUIFER GROUNDWATER (ng/l)

POINT	BW-3A	BW-3A-D	BW-10A	BW-11A	DM-15A
ng/l (ppt)					
* Hexachlorodibenzodioxins	ND	ND	ND	ND	32.5
123478 HxCDD	ND	ND	ND	ND	ND
123678 HxCDD	ND	ND	ND	ND	6
123789 HxCDD	ND	ND	ND	ND	1.8
* Hexachlorodibenzofurans	2	2.7	ND	ND	2.1
123478 HxCDF	ND	ND	ND	ND	ND
123678 HxCDF	ND	ND	ND	ND	ND
124678 HxCDF	ND	ND	ND	ND	2
123789 HxCDF	ND	ND	ND	ND	ND
* Heptachlorodibenzodioxins	25.2	27.5	7.3	ND	731
1234678 HpCDD	17	17.8	4.5	ND	232
* Heptachlorodibenzofurans	20	21.3	ND	7.4	210
1234678 HpCDF	4.5	3.3	1	1.7	31.4
1234789 HpCDF	ND	ND	ND	ND	3.4
* Octachlorodibenzodioxin	111	130	31.2	ND	2270
* Octachlorodibenzofuran	42.9	50	9.2	10.7	421

ND: NOT DETECTED

* VALUES FOR TOTAL DIOXIN OR FURAN CONCENTRATIONS MAY BE FOLLOWED BY SPECIFIC ISOMER CONCENTRATIONS

TABLE B-1.18

RESULTS OF ANALYSES FROM THE PERCHED AQUIFER FOR USE IN THE TREATABILITY ANALYSIS OF THE FEASIBILITY STUDY (mg/l)

POINT	BW-2A	BW-3A	BW-3A-D	DW-1A	BW-9A	BW-10A	BW-11A	DW-15A	DW-18A
C Organic Carbon	NA	22	21	NA	NA	NA	NA	NA	NA
C Kjeldahl Nitrogen	NA	2.2	2.1	NA	NA	NA	NA	NA	NA
C Hardness as Calcium Carbonate	NA	7.2	NA	NA	NA	NA	NA	NA	NA
C Dissolved Solids	NA	41	60	NA	NA	NA	NA	NA	NA
C Suspended Solids	NA	64	60	NA	NA	NA	NA	NA	NA
C Alkalinity as Calcium Carbonate	NA	7.4	NA	NA	NA	NA	NA	NA	NA
C Chemical Oxygen Demand (COD)	NA	120	NA	NA	NA	NA	NA	NA	NA
C Biochemical Oxygen Demand (BOD)	NA	21	NA	NA	NA	NA	NA	BDL 0.2	BDL 0.2
C Phosphate as P	NA	0.06	NA	NA	NA	NA	NA		

TABLE B-1.19 (continued)

INORGANICS IN THE SAPROLITE AQUIFER (ug/l)(1)

	POINT	DM-1R		DM-2R		DM-3R		DM-3R-D		DM-4R		DM-5		BW-13		BW-9		BW-10		BW-10-D		BW-11		BW-12	
M	Antimony	NA		BDL		BDL	50	NA		NA		NA		NA		NA		NA		NA		NA		NA	
M	Arsenic	5.6	B F	BDL		BDL	22	BDL	2.2	BDL	22	BDL	2.2	BDL	2.2	2.3	B W	3	B W	3.1	B W	BDL	2.2	BDL	2.2
M	Beryllium	NA		BDL		2.6	[]P	NA		NA		NA		NA		NA		NA		NA		NA		NA	
M	Cadmium	NA		BDL		BDL	4.4	NA		NA		NA		NA		NA		NA		NA		NA		NA	
M	Chromium	BDL	3.8	BDL		12.1	P	BDL	6.2	BDL	6.2	BDL	6.2	BDL	6.2	BDL	6.2	BDL	6.2	BDL	6.2	13.2	P	BDL	6.2
M	Copper	10.1	B P	BDL		11.6	[]P	22.8	[]P	17	[]P	BDL	7.2	80	P	39	P	BDL	7.2	BDL	7.2	15.3	B P	14.6	B P
M	Lead	NA		BDL		2	[]F W	NA		NA		NA		NA		NA		NA		NA		NA		NA	
M	Mercury	NA		BDL		BDL	0.2	NA		NA		NA		NA		NA		NA		NA		NA		NA	
M	Nickel	NA		BDL		BDL	35	NA		NA		NA		NA		NA		NA		NA		NA		NA	
M	Selenium	NA		BDL		BDL	16	NA		NA		NA		NA		NA		NA		NA		NA		NA	
M	Silver	NA		BDL		BDL	5.7	NA		NA		NA		NA		NA		NA		NA		NA		NA	
M	Thallium	NA		BDL		BDL	1.3	NA		NA		NA		NA		NA		NA		NA		NA		NA	
M	Zinc	21.9		62.3		238	P E *	12	[]P	18.1	[]P	8.9	[]P	34.4	P	21.1	P	26.6	P	20	B P	24.7	P	37.9	P
M	Barium	NA		5.4		67.3	[]P	NA		NA		NA		NA		NA		NA		NA		NA		NA	
M	Iron	NA		299		221	P	NA		NA		NA		NA		NA		NA		NA		NA		NA	
M	Manganese	NA		42.2		34.7	P	NA		NA		NA		NA		NA		NA		NA		NA		NA	
M	Vanadium	NA		BDL		BDL	2.1	NA		NA		NA		NA		NA		NA		NA		NA		NA	
M	Aluminum	NA		45.8		40.4	[]P	NA		NA		NA		NA		NA		NA		NA		NA		NA	
M	Cobalt	NA		BDL		BDL	3.9	NA		NA		NA		NA		NA		NA		NA		NA		NA	
M	Magnesium	NA		350		1970	[]P	NA		NA		NA		NA		NA		NA		NA		NA		NA	
M	Calcium	NA		1,750		6980	P E	NA		NA		NA		NA		NA		NA		NA		NA		NA	
M	Sodium	NA		6,850		8560	P	NA		NA		NA		NA		NA		NA		NA		NA		NA	
M	Potassium	NA		BDL		BDL	2020	NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE B-1.19 (continued)

INORGANICS IN THE SAPROLITE AQUIFER (ug/l)(1)

	POINT	BW-14		DH-15		DH-16		OFFSITE-6		Total Unfiltered Inorganics DH-3R		Total Unfiltered Inorganics DH-5	
M	Antimony	NA		BDL	50.2	BDL	50	NA		BDL	50	NA	
M	Arsenic	BDL	2.2	5	[]F W	3.2	[]F	BDL	2.2	9.2	[]F W	11.9	F
M	Beryllium	NA		BDL	0.7	BDL	0.7	NA		20.7	P	NA	
M	Cadmium	NA		BDL	4.4	BDL	4.4	NA		BDL	4.4	NA	
M	Chromium	BDL	6.2	BDL	6.2	BDL	6.2	BDL	6.2	66.4	P	393	P
M	Copper	7.3	B P	BDL	7.2	BDL	7.2	17	[]P	46.3	P	68.2	P
M	Lead	NA		BDL	1.1	BDL	5.5	NA		15.5	F	NA	
M	Mercury	NA		BDL	0.2	BDL	0.2	NA		BDL	0.2	NA	
M	Nickel	NA		BDL	35.8	BDL	36	NA		BDL	35	NA	
M	Selenium	NA		BDL	16	BDL	16	NA		BDL	16	NA	
M	Silver	NA		BDL	5.7	BDL	5.7	NA		BDL	5.7	NA	
M	Thallium	NA		BDL	1.3	BDL	1.3	NA		BDL	1.3	NA	
M	Zinc	22.1	P	17.9	[]P *	56.8	P *	18.2	[]P	263	P E	262	P
M	Barium	NA		55.8	[]P	151	[]P	NA		1290	P	NA	
M	Iron	NA		865	P	14400	P	NA		66800	P	NA	
M	Manganese	NA		637	P	2880	P	NA		537	P	NA	
M	Vanadium	NA		BDL	2.1	BDL	2.1	NA		138	P	NA	
M	Aluminum	NA		48.5	[]P	BDL	23	NA		71000	P	NA	
M	Cobalt	NA		16.3	[]P	26.9	[]P	NA		34.7	[]P	NA	
M	Magnesium	NA		2390	[]P	15400	P	NA		17400	P	NA	
M	Calcium	NA		7460	P	43700	P	NA		13400	P	NA	
M	Sodium	NA		11800	P	25300	P	NA		9000	P	NA	
M	Potassium	NA		BDL	2020	3920	[]P	NA		18400	P	NA	

TABLE B-1.20 (continued)

ORGANICS IN THE SAPROLITE AQUIFER
(ug/l)

	POINT	DM-1R		DM-2R		DM-3R		DM-3R-D		DM-4R		DM-5		BW-13		BW-9		BW-10		BW-10-D		BW-11		BW-12	
	ug/l (PPB)																								
V	Benzene	BDL	5	BDL	5	130		140		BDL	7	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5
V	Chloroform	BDL	5	BDL	5	BDL	5	BDL	5	BDL	7	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5
V	1,2-Dichloroethane	BDL	5	BDL	5	12		14		BDL	7	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5
V	1,2-Dichloropropane	BDL	5	BDL	5	BDL	5	1	J	BDL	7	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5
V	Ethylbenzene	BDL	5	BDL	5	4	J	4	J	BDL	7	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5
V	Chloromethane	BDL	10	BDL	10	BDL	10	BDL	10	BDL	14	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
V	Methylene chloride	BDL	5	5	B	BDL	5	1	B J	BDL	7	BDL	5	1	J	3	B J	BDL	5	BDL	5	BDL	5	2	B J
V	Toluene	BDL	5	BDL	5	5		5		BDL	7	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5
V	Styrene	BDL	5	BDL	5	BDL	5	BDL	5	BDL	7	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5
V	Acetone	BDL	10	39		18		BDL	10	220		29		BDL	10	5	B J	BDL	10	BDL	10	9	J	3	B J
V	2-Butanone	BDL	10	BDL	10	BDL	10	BDL	10	BDL	14	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
V	Carbon disulfide	BDL	5	BDL	5	12		BDL	5	BDL	7	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5
V	4-Methyl-2-pentanone	BDL	10	BDL	10	BDL	10	BDL	10	BDL	14	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
V	Xylenes (Total)	BDL	5	BDL	5	61		66		BDL	7	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5
B	Acenaphthene	BDL	10	BDL	10	BDL	100	BDL	20	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Acenaphthylene	BDL	10	BDL	10	BDL	100	BDL	20	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Anthracene	BDL	10	BDL	10	BDL	100	BDL	20	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Benzo(a)anthracene	BDL	10	BDL	10	BDL	100	BDL	20	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Benzo(a)pyrene	BDL	10	BDL	10	BDL	100	BDL	20	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Benzo(b)fluoranthene	BDL	10	BDL	10	BDL	100	BDL	20	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Benzo(g,h,i)perylene	BDL	10	BDL	10	BDL	100	BDL	20	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Benzo(k)fluoranthene	BDL	10	BDL	10	BDL	100	BDL	20	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	bis(2-Ethylhexyl)phthalate	BDL	10	3	J	BDL	100	BDL	20	14		BDL	10	3	J	BDL	10	BDL	10	BDL	10	2	J	BDL	10
B	Chrysene	BDL	10	BDL	10	BDL	100	BDL	20	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Dibenzo(a,h)anthracene	BDL	10	BDL	10	BDL	100	BDL	20	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	1,2-Dichlorobenzene	BDL	10	BDL	10	BDL	100	BDL	20	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	1,4-Dichlorobenzene	BDL	10	BDL	10	BDL	100	BDL	20	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Di-n-butyl phthalate	BDL	10	BDL	10	BDL	100	BDL	20	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Fluoranthene	BDL	10	BDL	10	BDL	100	BDL	20	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Fluorene	BDL	10	BDL	10	7	J	6	J	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Indeno(1,2,3-cd)pyrene	BDL	10	BDL	10	BDL	100	BDL	20	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Naphthalene	BDL	10	BDL	10	1200	D	630		BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Phenanthrene	BDL	10	4	J	20		7	J	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Pyrene	BDL	10	BDL	10	BDL	100	BDL	20	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Dibenzofuran	BDL	10	BDL	10	61		50		BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	2-Methylnaphthalene	BDL	10	BDL	10	160		110		BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
A	2,4-Dimethylphenol	BDL	10	BDL	10	BDL	100	BDL	20	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
A	Pentachlorophenol	BDL	50	BDL	50	240	D J	290		18	J	BDL	50	BDL	50	BDL	50	BDL	50	BDL	50	3	J	BDL	50
A	Phenol	BDL	10	BDL	10	BDL	100	BDL	20	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
A	2-Methylphenol	BDL	10	BDL	10	BDL	100	BDL	20	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
A	4-Methylphenol	BDL	10	BDL	10	BDL	100	BDL	20	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
A	Benzoic acid	BDL	50	BDL	50	BDL	500	4	J	BDL	50	BDL	50	BDL	50	BDL	50	BDL	50	BDL	50	12	J	BDL	50
A	2,4,5-Trichlorophenol	BDL	50	BDL	50	BDL	500	BDL	100	BDL	50	BDL	50	BDL	50	BDL	50	BDL	50	BDL	50	BDL	50	BDL	50
P	Alpha-BHC	NA		BDL	0.0	BDL	0.05	NA		NA		NA		NA		NA		NA		NA		NA		NA	
P	Endrin	NA		BDL	0.1	BDL	0.1	NA		NA		NA		NA		NA		NA		NA		NA		NA	

TABLE B-1.20 (continued)

ORGANICS IN THE SAPROLITE AQUIFER
(ug/l)

	POINT	DW-14		DW-15		DW-16		OFFSITE-6	
	ug/l (PPB)								
V	Benzene	BDL	5	80		18		BDL	5
V	Chloroform	BDL	5	BDL	5	BDL	5	BDL	5
V	1,2-Dichloroethane	BDL	5	BDL	5	BDL	5	BDL	5
V	1,2-Dichloropropane	BDL	5	BDL	5	BDL	5	BDL	5
V	Ethylbenzene	BDL	5	85		33		BDL	5
V	Chloromethane	BDL	10	BDL	10	3	J	BDL	10
V	Methylene chloride	3	J	BDL	5	BDL	5	3	B J
V	Toluene	BDL	5	170		54		BDL	5
V	Styrene	BDL	5	44		11		BDL	5
V	Acetone	BDL	10	20		47		16	B
V	2-Butanone	BDL	10	BDL	10	BDL	10	BDL	10
V	Carbon disulfide	BDL	5	BDL	5	5		BDL	5
V	4-Methyl-2-pentanone	BDL	10	BDL	10	BDL	10	BDL	10
V	Xylenes (Total)	BDL	5	300	E	85		BDL	5
B	Acenaphthene	BDL	10	880		280		BDL	10
B	Acenaphthylene	BDL	10	40	J	17		BDL	10
B	Anthracene	BDL	10	110		10		BDL	10
B	Benzo(a)anthracene	BDL	10	51		BDL	200	BDL	10
B	Benzo(a)pyrene	BDL	10	12	J	BDL	200	BDL	10
B	Benzo(b)fluoranthene	BDL	10	28	J X	BDL	200	BDL	10
B	Benzo(g,h,i)perylene	BDL	10	BDL	300	BDL	200	BDL	10
B	Benzo(k)fluoranthene	BDL	10	28	J X	BDL	200	BDL	10
B	bis(2-Ethylhexyl)phthalate	5	J	BDL	300	BDL	200	BDL	10
B	Chrysene	BDL	10	53		BDL	200	BDL	10
B	Dibenzo(a,h)anthracene	BDL	10	BDL	300	BDL	200	BDL	10
B	1,2-Dichlorobenzene	BDL	10	BDL	300	BDL	200	BDL	10
B	1,4-Dichlorobenzene	BDL	10	BDL	300	BDL	200	BDL	10
B	Di-n-butyl phthalate	BDL	10	BDL	300	23		BDL	10
B	Fluoranthene	BDL	10	380		15		BDL	10
B	Fluorene	BDL	10	530		160		BDL	10
B	Indeno(1,2,3-cd)pyrene	BDL	10	BDL	300	BDL	200	BDL	10
B	Naphthalene	BDL	10	7600	D	4000	D	BDL	10
B	Phenanthrene	BDL	10	1100		130		BDL	10
B	Pyrene	BDL	10	250		8	J	BDL	10
B	Dibenzofuran	BDL	10	540		160		BDL	10
B	2-Methylnaphthalene	BDL	10	740		370	D	BDL	10
A	2,4-Dimethylphenol	BDL	10	930		37		BDL	10
A	Pentachlorophenol	BDL	50	2500	D	140	D J	BDL	50
A	Phenol	BDL	10	150		81		BDL	10
A	2-Methylphenol	BDL	10	710		130		BDL	10
A	4-Methylphenol	BDL	10	1600		310		BDL	10
A	Benzoic acid	BDL	50	BDL	1500	BDL	1000	BDL	50
A	2,4,5-Trichlorophenol	BDL	50	BDL	1500	51		BDL	50
P	Alpha-BHC	NA		BDL	0.1	BDL	0.1	NA	
P	Endrin	NA		BDL	0.2	BDL	0.2	NA	

TABLE B-1.21

DIOXINS AND FURANS IN SAPROLITE GROUNDWATER (ng/l)

POINT	DM-3R	DM-5	BW-10	DM-15	DM-16
ng/l (ppt)					
* Hexachlorodibenzodioxins	ND	ND	41.2	18.5	ND
123478 HxCDD	ND	ND	ND	ND	ND
123678 HxCDD	ND	ND	15.4	5.1	ND
123789 HxCDD	ND	ND	4.1	ND	ND
* Hexachlorodibenzofurans	ND	ND	97.7	29.6	ND
123478 HxCDF	ND	ND	1.8	ND	ND
123678 HxCDF	ND	ND	ND	ND	ND
124678 HxCDF	ND	ND	ND	ND	ND
123789 HxCDF	ND	ND	ND	ND	ND
* Heptachlorodibenzodioxins	ND	ND	1135	390	10.4
1234678 HpCDD	ND	ND	683	226	6.8
* Heptachlorodibenzofurans	ND	ND	594	229	3.9
1234678 HpCDF	ND	ND	109	34.9	1
1234789 HpCDF	ND	ND	7.5	2.8	ND
* Octachlorodibenzodioxin	ND	8.4	2620	1840	55.1
* Octachlorodibenzofuran	ND	ND	1300	358	7.3

ND: NOT DETECTED

* VALUES FOR TOTAL DIOXIN OR FURAN CONCENTRATION; MAY BE FOLLOWED BY SPECIFIC ISOMER CONCENTRATIONS

TABLE B-1.22

RESULTS OF ANALYSES FROM THE SAPROLITE AQUIFER FOR USE IN THE TREATABILITY ANALYSIS OF THE FEASIBILITY STUDY (mg/l)(1)

POINT mg/l	DM-1R	DM-2R	DM-3R	DM-3R-D	DM-4R	DM-5	BW-13	BW-9	BW-10	BW-10-D	BW-11	BW-12
C Organic Carbon	NA	1.9	3.4	NA	NA	NA	NA	NA	NA	NA	NA	NA
C Kjeldahl Nitrogen	NA	3.6	3.9	NA	NA	NA	NA	NA	NA	NA	NA	NA
C Hardness as Calcium Carbonate	NA	320	310	NA	NA	NA	NA	NA	NA	NA	NA	NA
C Dissolved Solids	NA	2300	4300	NA	NA	NA	NA	NA	NA	NA	NA	NA
C Suspended Solids	NA	27	NA	NA	NA	NA						
C Alkalinity as Calcium Carbonate												
C Chemical Oxygen Demand (COD)	NA	NA	NA	NA	NA	9.6	NA	NA	NA	NA	NA	NA
C Biochemical Oxygen Demand (BOD)	NA	NA	NA	NA	NA	2	NA	NA	NA	NA	NA	NA
C Phosphate as P												

(1) All concentrations are reported in mg/l.

TABLE B-1.22 (continued)

RESULTS OF ANALYSES FROM THE SAPROLITE AQUIFER FOR USE IN THE TREATABILITY ANALYSIS OF THE FEASIBILITY STUDY (mg/l)(1)

	POINT mg/l	BW-8	BW-14	DM-15	DM-16	OFFSITE-6
C	Organic Carbon	NA	NA	200	50	NA
C	Kjeldahl Nitrogen	NA	NA	7	2.5	NA
C	Hardness as Calcium Carbonate				NA	NA
C	Dissolved Solids	NA	NA	39	280	NA
C	Suspended Solids	NA	NA	1000	850	NA
C	Alkalinity as Calcium Carbonate				NA	NA
C	Chemical Oxygen Demand (COD)				NA	NA
C	Biochemical Oxygen Demand (BOD)	NA	NA	64	65	NA
C	Phosphate as P	NA	NA	0.72	0.06	NA

TABLE B-1.23

INORGANICS IN BEDROCK
GROUNDWATER (ug/l)

	POINT ug/l (PPB)	DW-11B		DW-1B		Duplicate DW-1B-D		PW-1E		PW-2A		Duplicate PW-2A-D		PW-2C		Total Unfiltered Inorganics DW-11B	
M	Antimony	BDL	50.2	NA		NA		NA		BDL	31.	BDL	31.	BDL	31.5	BDL	50
M	Arsenic	BDL	2.2	2.3	B W	BDL	2.2	BDL	22	1.3	[ ]F	BDL	1.2	4.9	[ ]F W N	12.7	F S
M	Beryllium	BDL	0.7	NA		NA		NA		118	P E	118	P E	17.1	P E	15.8	P
M	Cadmium	BDL	4.4	NA		NA		NA		BDL	4.2	BDL	4.2	BDL	4.2	BDL	4.4
M	Chromium	BDL	6.2	BDL	6.2	10.2	P	BDL	6.2	BDL	3.8	BDL	3.8	BDL	3.8	36.5	P
M	Copper	BDL	7.2	BDL	7.2	12.1	B P	BDL	7.2	18.3	[ ]P	29.7	P	BDL	7.3	63.6	P
M	Lead	BDL	1.1	NA		NA		NA		BDL	4.5	BDL	4.5	BDL	4.5	31.7	F
M	Mercury	BDL	0.2	NA		NA		NA		BDL	0.2	BDL	0.2	BDL	0.2	BDL	0.2
M	Nickel	BDL	35	NA		NA		NA		48.2	P	39.4	[ ]P	29.9	[ ]P	BDL	35
M	Selenium	BDL	16	NA		NA		NA		BDL	10	BDL	10	BDL	10	BDL	16
M	Silver	BDL	5.7	NA		NA		NA		BDL	4.9	BDL	4.9	BDL	4.9	BDL	5.7
M	Thallium	BDL	1.3	NA		NA		NA		BDL	1.1	BDL	1.1	BDL	5.5	BDL	1.3
M	Zinc	20.1		27.2	P	39.3	P	429	P	2940	P	2920	P	471	P	163	P E
M	Barium	98		NA		NA		NA		18.2	[ ]P	21	[ ]P	5.3	[ ]P	2340	P
M	Iron	69.3		NA		NA		NA		35700	P	35500	P	57900	P	24200	P
M	Manganese	229		NA		NA		NA		2790	P	2770	P	2000	P	520	P
M	Vanadium	BDL	2.1	NA		NA		NA		4.7	[ ]P	4.5	[ ]P	6.7	[ ]P	38.9	[ ]P
M	Aluminum	BDL	23	NA		NA		NA		10100	P	10100	P	1210	P	32700	P
M	Cobalt	8.1		NA		NA		NA		58.8	P	59.8	P	18.6	[ ]P	41	[ ]P
M	Magnesium	1420		NA		NA		NA		51100	P	50800	P	39400	P	5350	P
M	Calcium	4150		NA		NA		NA		93500	P	92800	P	92400	P	8160	P
M	Sodium	20300		NA		NA		NA		85700	P E	84800	P E	173000	P E	22000	P
M	Potassium	BDL	[ ]P	NA		NA		NA		7510	P	7250	P	6770	P	2500	[ ]P

TABLE B-1.24

ORGANICS IN BEDROCK GROUNDWATER (ug/l)

	POINT	DM-11B		DM-1B		DM-1B-D		PW-1E		PW-2A		PW-2A-D		PW-2C	
	ug/l (PPB)														
V	Benzene	5		BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5
V	Chloroform	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5
V	1,2-Dichloroethane	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5
V	1,2-Dichloropropane	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5
V	Ethylbenzene	BDL	5	BDL	5	BDL	5	3	J	BDL	5	BDL	5	BDL	5
V	Chloromethane	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
V	Methylene chloride	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5
V	Toluene	BDL	5	BDL	5	BDL	5	4	J	BDL	5	BDL	5	BDL	5
V	Styrene	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5
V	Acetone	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
V	2-Butanone	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
V	Carbon disulfide	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5
V	4-Methyl-2-pentanone	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
V	Xylenes (Total)	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5	BDL	5
B	Acenaphthene	BDL	10	BDL	10	BDL	10	9	J	BDL	10	BDL	10	BDL	10
B	Acenaphthylene	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Anthracene	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Benzo(a)anthracene	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Benzo(a)pyrene	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Benzo(b)fluoranthene	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Benzo(g,h,i)perylene	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Benzo(k)fluoranthene	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	bis(2-Ethylhexyl)phthalate	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Chrysene	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Dibenzo(a,h)anthracene	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	1,2-Dichlorobenzene	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	1,4-Dichlorobenzene	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Di-n-butyl phthalate	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Fluoranthene	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Fluorene	4	J	BDL	10	BDL	10	5	J	BDL	10	BDL	10	BDL	10
B	Indeno(1,2,3-cd)pyrene	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Naphthalene	BDL	10	BDL	10	BDL	10	BDL	10	7	J	4	J	BDL	10
B	Phenanthrene	3	J	BDL	10	BDL	10	3	J	BDL	10	BDL	10	BDL	10
B	Pyrene	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
B	Dibenzofuran	8	J	BDL	10	BDL	10	5	J	BDL	10	BDL	10	BDL	10
B	2-Methylnaphthalene	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
A	2,4-Dimethylphenol	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
A	Pentachlorophenol	8	J	BDL	50	BDL	50	BDL	50	BDL	50	BDL	50	7	J
A	Phenol	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
A	2-Methylphenol	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
A	4-Methylphenol	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10
A	Benzoic acid	BDL	50	BDL	50	BDL	50	BDL	50	BDL	50	BDL	50	BDL	50
A	2,4,5-Trichlorophenol	BDL	50	BDL	50	BDL	50	BDL	50	BDL	50	BDL	50	BDL	50
P	Alpha-BHC	NA		NA		NA		NA		BDL	0.0	BDL	0.0	NA	
P	Endrin	NA		NA		NA		NA		BDL	0.1	BDL	0.1	NA	

TABLE B-1.25

RESULTS OF GROUNDWATER ANALYSES FROM THE BEDROCK TO BE USED IN THE TREATABILITY ANALYSIS OF THE FEASIBILITY STUDY (mg/l)

	POINT mg/l	DW-11B	DW-18	DW-18-D	PW-1E	PW-2A		PW-2A-D		PW-2C
C	Organic Carbon	NA	NA	NA	NA	1	*	2.6		NA
C	*Kjeldahl Nitrogen*	NA	NA	NA	NA	1	*	1	*	NA
C	Hardness as Calcium Carbonate	NA	NA	NA	NA	460		480		NA
C	Dissolved Solids	NA	NA	NA	NA	1200		1200		NA
C	Suspended Solids	NA	NA	NA	NA	7.9		7.4		NA
C	*Alkalinity as Calcium Carbonate*	NA	NA	NA	NA	BDL	1	BDL	1	NA
C	Chemical Oxygen Demand (COD)	NA	NA	NA	NA	BDL	12	BDL	12	NA
C	Biochemical Oxygen Demand (BOD)	NA	NA	NA	NA	4		4		NA
C	Phosphate as P	NA	NA	NA	NA	0.02	*	0.02	*	NA

TABLE B-1.26

INORGANICS IN SURFACE WATER
(ug/l)

	POINT	SW-1		SW-2		SW-3		SW-4		SW-5		SW-6		SW-7		Duplicate SW-7-D		SW-8		SW-9		SW-11	
	ug/l (PPB)																						
M	Antimony	NA		NA		NA		BDL	50.	NA		NA		BDL	50.	NA		NA		NA		NA	
M	Arsenic	BDL	22	BDL	22	1640	P	192	P	120	F	1760	P	778	P	765	P	6300	P	51.1	F	193	P
M	Beryllium	NA		NA		NA		BDL	0.7	NA		NA		BDL	0.7	NA		NA		NA		NA	
M	Cadmium	NA		NA		NA		BDL	4.4	NA		NA		BDL	4.4	NA		NA		NA		NA	
M	Chromium	BDL	6.2	BDL	6.2	68	P	12.6	P	10.6	P	95.1	P	132	P	130	P	94.8	P	BDL	6.2	39.5	P
M	Copper	17	[]P	17	[]P	79.5	P	17.9	[]P	17.1	[]P	85.4	P	107	P	102	P	299	P	17.1	[]P	17	[]P
M	Lead	NA		NA		NA		1.4	[]F	NA		NA		2.2	[]F	NA		NA		NA		NA	
M	Mercury	NA		NA		NA		BDL	0.2	NA		NA		BDL	0.2	NA		NA		NA		NA	
M	Nickel	NA		NA		NA		BDL	35.	NA		NA		BDL	35.	NA		NA		NA		NA	
M	Selenium	NA		NA		NA		BDL	8	NA		NA		BDL	16	NA		NA		NA		NA	
M	Silver	NA		NA		NA		BDL	5.7	NA		NA		BDL	5.7	NA		NA		NA		NA	
M	Thallium	NA		NA		NA		BDL	1.3	NA		NA		BDL	1.3	NA		NA		NA		NA	
M	Zinc	80.9	P	114	P	95.4	P	57.4	P	30.6	P	124	P	82.2	P	70.5	P	73.6	P	35.4	P	98.8	P
M	Barium	NA		NA		NA		38.1	[]P	NA		NA		27.9	[]P	NA		NA		NA		NA	
M	Iron	NA		NA		NA		2060	P	NA		NA		3190	P	NA		NA		NA		NA	
M	Manganese	NA		NA		NA		15.7	P	NA		NA		146	P	NA		NA		NA		NA	
M	Vanadium	NA		NA		NA		BDL	2.1	NA		NA		2.4	[]P	NA		NA		NA		NA	
M	Aluminum	NA		NA		NA		1080	P	NA		NA		1200	P	NA		NA		NA		NA	
M	Cobalt	NA		NA		NA		BDL	3.9	NA		NA		BDL	3.9	NA		NA		NA		NA	
M	Magnesium	NA		NA		NA		2390	[]P	NA		NA		1480	[]P	NA		NA		NA		NA	
M	Calcium	NA		NA		NA		13300	P	NA		NA		13300	P	NA		NA		NA		NA	
M	Sodium	NA		NA		NA		15800	P	NA		NA		3150	[]P	NA		NA		NA		NA	
M	Potassium	NA		NA		NA		3000	[]P	NA		NA		2060	[]P	NA		NA		NA		NA	

TABLE B-1.27

ORGANICS IN SURFACE WATER (ug/l)

	POINT	SW-1		SW-2		SW-3		SW-4		SW-5		SW-6		SW-7		Duplicate SW-7-D		SW-8		SW-9		SW-11	
	ug/l (PPB)																						
V	Methylene chloride	BDL	5	3	J	BDL	5	1	J	1	J	BDL	5	BDL	5	BDL	5	BDL	5	4	J	2	J
V	Acetone	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	BDL	10	62		BDL	10	BDL	10	BDL	10	BDL	10
A	Pentachlorophenol	BDL	50	BDL	50	BDL	50	BDL	50	BDL	50	6	J	BDL	50	BDL	50	2	J	BDL	50	BDL	50
A	Benzoic acid	BDL	50	BDL	50	BDL	50	BDL	50	BDL	50	25	J	BDL	50	BDL	50	17	J	BDL	50	18	J

TABLE B-1.28

RESULTS OF ANALYSES FROM SURFACE WATER SAMPLES FOR USE IN THE TREATABILITY ANALYSIS OF THE FEASIBILITY STUDY (mg/l)

	POINT mg/l	SW-1	SW-2	SW-3	SW-4	SW-5	SW-6	SW-7	Duplicate SW-7-D	SW-8	SW-9	SW-11
C	Organic Carbon	NA	NA	NA	13	NA	NA	NA	NA	NA	NA	NA
C	Kjeldahl Nitrogen	1.6	1.5	1.5	1.6	1 <	1 <	2	2.7	1 <	1	2
C	Hardness as Calcium Carbonate	57	59	13	NA	55	55	44	44	50	50	56
C	Dissolved Solids	140	140	180	140	120	98	94	88	110	150	140
C	Suspended Solids	13	10	12	50	8.3	57	33	33	14	5	34
C	Alkalinity as Calcium Carbonate	39	47	60	NA	49	42	20	22	22	37	6.8
C	Chemical Oxygen Demand (COD)	27	13	58	NA	24	54	50	45	58	27	120
C	Biochemical Oxygen Demand (BOD)	5.7	4 <	4 <	5	0.14	4 <	7.9	9.9	4 <	0.08	7
C	Phosphate as P	0.08	0.016	0.16	0.1	4.9	0.72	0.4	0.42	2.2	5	0.54
IO	Thiocyanate	BDL 0.2	BDL 0.2	BDL 0.2	BDL 0.2	BDL 0.2	BDL 0.2	BDL 0.2	BDL 0.2	BDL 0.2	BDL	BDL

TABLE 8-1.29

INORGANICS IN BOTTOM SEDIMENT
(mg/kg)

	POINT	SE-1		SE-2		SE-3		SE-4		SE-5		SE-6		SE-7		Duplicate SE-7-D		SE-8		SE-9		SE-10		SE-11	
	mg/kg																								
M	Antimony	BDL	13	NA		NA		BDL	12.	NA		NA		BDL	13	BDL	10.	NA		NA		NA		NA	
M	Arsenic	0.6	[]F	2.2	[]F	322	P *	3.2	F *	12.7	F *	871	P *	20.9	F *	1.1	[]F	1320	P *	0.93	[]F	469	P *	6.5	F *
M	Beryllium	BDL	0.1	NA		NA		BDL	0.1	NA		NA		BDL	0.1	BDL	0.1	NA		NA		NA		NA	
M	Cadmium	BDL	1.1	NA		NA		BDL	1.1	NA		NA		BDL	1.1	BDL	0.9	NA		NA		NA		NA	
M	Chromium	BDL	1.6	BDL	1.7	618	P	6.1	P	17	P	1260	P	14.7	P	7.7	P	2070	P	BDL	1.8	178	P	3.6	P
M	Copper	BDL	1.9	4.8	[]P	294	P	4.5	[]P	16	P	660	P	9.3	P	BDL	1.5	917	P	4.8	[]P	55	P	4.7	[]P
M	Lead	2.1	F N	NA		NA		4.3	F N	NA		NA		15.3	F N	6.6	F N	NA		NA		NA		NA	
M	Mercury	BDL	0.1	NA		NA		BDL	0.1	NA		NA		BDL	0.1	BDL	0.1	NA		NA		NA		NA	
M	Nickel	BDL	9.3	NA		NA		BDL	9.1	NA		NA		BDL	9.3	BDL	7.6	NA		NA		NA		NA	
M	Selenium	BDL	0.4	NA		NA		BDL	0.4	NA		NA		BDL	0.8	BDL	1.7	NA		NA		NA		NA	
M	Silver	BDL	1.5	NA		NA		BDL	1.5	NA		NA		BDL	1.5	BDL	1.2	NA		NA		NA		NA	
M	Thallium	BDL	0.3	NA		NA		BDL	0.3	NA		NA		BDL	0.3	BDL	0.2	NA		NA		NA		NA	
M	Zinc	22.1	P	26.5	P	52.6	P	14.1	P	55.3	P	182	P	40.3	P	31.4	P	87.4	P	244	P	111	P	16.4	P
M	Barium	5.7	[]P	NA		NA		19.8	[]P	NA		NA		29	[]P	19	[]P	NA		NA		NA		NA	
M	Iron	1540	P	NA		NA		1550	P	NA		NA		1470	P	7180	P	NA		NA		NA		NA	
M	Manganese	15.1	P	NA		NA		8.5	P	NA		NA		5.7	P	4.1	P	NA		NA		NA		NA	
M	Vanadium	3.8	[]P	NA		NA		5.8	[]P	NA		NA		8	[]P	17	P	NA		NA		NA		NA	
M	Aluminum	728	P	NA		NA		2780	P	NA		NA		5880	P	6840	P	NA		NA		NA		NA	
M	Cobalt	1.4	[]P	NA		NA		1.6	[]P	NA		NA		1.5	[]P	1.5	[]P	NA		NA		NA		NA	
M	Magnesium	227	[]P	NA		NA		141	[]P	NA		NA		236	[]P	211	[]P	NA		NA		NA		NA	
M	Calcium	226	[]P	NA		NA		196	[]P	NA		NA		332	[]P	65.3	[]P	NA		NA		NA		NA	
M	Sodium	BDL	484	NA		NA		BDL	476	NA		NA		BDL	486	BDL	398	NA		NA		NA		NA	
M	Potassium	648	[]P	NA		NA		634	[]P	NA		NA		BDL	525	566	[]P	NA		NA		NA		NA	
	Organic Carbon	300		17000		23000		1800		16000		42000		1700		1000		54000		560		8400		8300	
	pH	6.9		7.5		7.1		5.5		6.9		6.6		7.3		7.7		5.7		6.5		5.3		7.8	
	Percent Solids	77.3		71		58.2		78.6		63.9		60.8		75.5		89.5		53.7		70.7		82.8		71.9	
	Percent Moisture, Decanted	15		29		NA		NA		30		38		NA		NA		44		23		NA		NA	
	Percent Moisture, Undecanted	23		39		42		21		39		39		24		11		46		29		17		28	

TABLE B-1.30

ORGANICS IN BOTTOM SEDIMENT (ug/kg)

	POINT	SE-1		SE-2		SE-3		SE-4		SE-5		SE-6		SE-7	
	ug/kg (PPB)														
V	Benzene	BDL	6	BDL	8	BDL	9	BDL	6	BDL	8	BDL	8	BDL	7
V	Chloroform	1	J	BDL	8	BDL	9	1	B J	BDL	8	3	B J	BDL	7
V	Ethylbenzene	BDL	6	BDL	8	BDL	9	BDL	6	BDL	8	BDL	8	BDL	7
V	Methylene chloride	73	B	20	B	21	B	12	B	29	B	40	B	34	B
V	Toluene	BDL	6	BDL	8	BDL	9	BDL	6	BDL	8	93		BDL	7
V	Styrene	BDL	6	BDL	8	BDL	9	BDL	6	BDL	8	BDL	8	BDL	7
V	Acetone	95	B	46	B	46	B	25	B	13	B J	68	B	48	B
V	Xylenes (Total)	BDL	6	BDL	8	BDL	9	BDL	6	BDL	8	BDL	8	BDL	7
B	Acenaphthene	BDL	390	74	J	BDL	570	BDL	420	BDL	470	BDL	5300	BDL	430
B	Acenaphthylene	BDL	390	BDL	460	150	J	BDL	420	BDL	470	890	J	BDL	430
B	Anthracene	BDL	390	300	J	570		BDL	420	BDL	470	3100	J	BDL	430
B	Benzo(a)anthracene	BDL	390	180	J	300	J	BDL	420	BDL	470	7200		BDL	430
B	*Benzo(a)pyrene*	BDL	390	140	J	570		BDL	420	BDL	470	5200	J	BDL	430
B	Benzo(b)fluoranthene	BDL	390	210	J	1300		BDL	420	65	J	34000	X	BDL	430
B	Benzo(g,h,i)perylene	BDL	390	48	J	490	J	BDL	420	BDL	470	2500	J	BDL	430
B	Benzo(k)fluoranthene	BDL	390	230	J	1100		BDL	420	BDL	470	34000	X	BDL	430
B	bis(2-Ethylhexyl)phthalate	BDL	390	140	J	BDL	570	BDL	420	BDL	470	1500	J	BDL	430
B	Chrysene	BDL	390	260	J	910		BDL	420	53	J	17000		BDL	430
B	Dibenzo(a,h)anthracene	BDL	390	BDL	460	140	J	BDL	420	BDL	470	910	J	BDL	430
B	Fluoranthene	BDL	390	550		220	J	BDL	420	BDL	470	21000		BDL	430
B	*Fluorene*	BDL	390	97	J	BDL	570	BDL	420	BDL	470	BDL	5300	BDL	430
B	Indeno(1,2,3-cd)pyrene	BDL	390	48	J	530	J	BDL	420	BDL	470	3000	J	BDL	430
B	Naphthalene	BDL	390	BDL	460	BDL	570	BDL	420	BDL	470	BDL	5300	BDL	430
B	Phenanthrene	BDL	390	360	J	200	J	BDL	420	BDL	470	1500	J	BDL	430
B	Pyrene	BDL	390	430	J	210	J	BDL	420	49	J	15000		BDL	430
B	Dibenzofuran	BDL	390	70	J	60	J	BDL	420	BDL	470	BDL	5300	BDL	430
B	2-Methylnaphthalene	BDL	390	BDL	460	BDL	570	BDL	420	BDL	470	BDL	5300	BDL	430
A	2,4-Dimethylphenol	BDL	390	BDL	460	BDL	570	BDL	420	BDL	470	BDL	5300	BDL	430
A	*Pentachlorophenol*	BDL	1900	100	J	7600		BDL	2000	BDL	2300	6900	J	BDL	2100
A	Phenol	BDL	390	BDL	460	BDL	570	BDL	420	BDL	470	BDL	5300	BDL	430
A	2-Methylphenol	BDL	390	BDL	460	BDL	570	BDL	420	BDL	470	BDL	5300	BDL	430
A	4-Methylphenol	BDL	390	BDL	460	BDL	570	BDL	420	BDL	470	BDL	5300	BDL	430
A	Benzoic acid	BDL	1900	170	J	89	J	BDL	2000	280	J	BDL	26000	280	J

TABLE B-1.30 (continued)

ORGANICS IN BOTTOM SEDIMENT (ug/kg)

	POINT	Duplicate SE-7-D		SE-8		SE-9		SE-10		SE-11	
	ug/kg (PPB)										
V	Benzene	BDL	6	BDL	9	BDL	7	2 J		BDL	7
V	Chloroform	2	B J	3	B J	2	J	BDL	6	3	J
V	Ethylbenzene	BDL	6	BDL	9	BDL	7	31		BDL	7
V	Methylene chloride	26	B	46	B	42	B	29	B	19	B
V	Toluene	BDL	6	BDL	9	BDL	7	20		1	J
V	Styrene	BDL	6	BDL	9	BDL	7	14		BDL	7
V	Acetone	60	B	64	B	69	B	100	B	30	B
V	Xylenes (Total)	BDL	6	BDL	9	BDL	7	110		BDL	7
B	Acenaphthene	BDL	370	BDL	1200	BDL	430	190000 D		BDL	460
B	Acenaphthylene	BDL	370	1600		BDL	430	21000		BDL	460
B	Anthracene	BDL	370	4800		BDL	430	98000		BDL	460
B	Benzo(a)anthracene	BDL	370	5300		BDL	430	65000		BDL	460
B	Benzo(a)pyrene	BDL	370	14000		BDL	430	17000		BDL	460
B	Benzo(b)fluoranthene	BDL	370	38000	E X	BDL	430	36000		BDL	460
B	Benzo(g,h,i)perylene	BDL	370	2500		BDL	430	3700	J	BDL	460
B	Benzo(k)fluoranthene	BDL	370	38000	E X	BDL	430	22000		BDL	460
B	bis(2-Ethylhexyl)phthalate	BDL	370	730	J	BDL	430	1500	J	BDL	460
B	Chrysene	BDL	370	12000		BDL	430	76000		BDL	460
B	Dibenzo(a,h)anthracene	BDL	370	980	J	BDL	430	2100	J	BDL	460
B	Fluoranthene	BDL	370	1900		BDL	430	300000 D		BDL	460
B	Fluorene	BDL	370	BDL	1200	BDL	430	250000 D		BDL	460
B	Indeno(1,2,3-cd)pyrene	BDL	370	3000		BDL	430	4300	J	BDL	460
B	Naphthalene	BDL	370	BDL	1200	BDL	430	600000 D		BDL	460
B	Phenanthrene	BDL	370	930	J	BDL	430	810000 D		BDL	460
B	Pyrene	BDL	370	1400		BDL	430	180000 D		BDL	460
B	Dibenzofuran	BDL	370	BDL	1200	BDL	430	210000 D		BDL	460
B	2-Methylnaphthalene	BDL	370	BDL	1200	BDL	430	230000 D		BDL	460
A	2,4-Dimethylphenol	BDL	370	BDL	1200	BDL	430	7100	J	BDL	460
A	Pentachlorophenol	BDL	1800	19000		BDL	2100	540000 D	J	BDL	2200
A	Phenol	BDL	370	BDL	1200	BDL	430	4900	J	BDL	330
A	2-Methylphenol	BDL	370	BDL	1200	BDL	430	3400	J	BDL	460
A	4-Methylphenol	BDL	370	180	J	BDL	430	9100		BDL	460
A	Benzoic acid	250	J	1100	J	BDL	2100	BDL	580000	480	J

TABLE B-1.31

DIOXINS AND FURANS IN BOTTOM SEDIMENT (ug/kg)

	POINT	SE-1	SE-4	SE-7	Duplicate SE-7-D
	ug/kg (ppb)				
*	Heptachlorodibenzodioxins	ND	0.64	4.2	1.5
	1234678 HpCDD	ND	0.43	2.7	0.91
*	Heptachlorodibenzofuran	ND	ND	1.7	0.54
	1234678 HpCDF	ND	ND	0.39	0.15
	1234789 HpCDF	ND	ND	ND	ND
*	Octachlorodibenzodioxin	ND	3.5	21.5	13.9
*	Octachlorodibenzofuran	ND	0.54	2.7	1

ND: NOT DETECTED
* VALUE FOR TOTAL DIOXIN OR FURAN CONCENTRATION; MAY BE FOLLOWED BY SPECIFIC ISOMER CONCENTRATIONS

TABLE B-1.32

INORGANICS IN SEWER SAMPLES (ug/l)

		POINT ug/l	MANHOLE-1		MANHOLE-2		MANHOLE-3		MANHOLE-4	
M	Antimony		NA		NA		NA		NA	
M	Arsenic		BDL	22	BDL	22	4.7	[ ]F	24.3	F
M	Beryllium		NA		NA		NA		NA	
M	Cadmium		NA		NA		NA		NA	
M	Chromium		BDL	6.2	BDL	6.2	BDL	6.2	8.4	[ ]P
M	Copper		34.1	P	73.9	P	68.3	P	39.1	P
M	Lead		NA		NA		NA		NA	
M	Mercury		NA		NA		NA		NA	
M	Nickel		NA		NA		NA		NA	
M	Selenium		NA		NA		NA		NA	
M	Silver		NA		NA		NA		NA	
M	Thallium		NA		NA		NA		NA	
M	Zinc		66.9	P	74.4	P	75.7	P *	137	P E *
M	Barium		NA		NA		NA		NA	
M	Iron		NA		NA		NA		NA	
M	Manganese		NA		NA		NA		NA	
M	Vanadium		NA		NA		NA		NA	
M	Aluminum		NA		NA		NA		NA	
M	Cobalt		NA		NA		NA		NA	
M	Magnesium		NA		NA		NA		NA	
M	Calcium		NA		NA		NA		NA	
M	Sodium		NA		NA		NA		NA	
M	Potassium		NA		NA		NA		NA	

TABLE B-1.33

ORGANICS IN SEWER SAMPLES (ug/l)

		POINT ug/l (PPB)	MANHOLE-1		MANHOLE-2		MANHOLE-3		MANHOLE-4	
V	Benzene		BDL	14	1	J	4	J	BDL	15
V	Chloroform		BDL	14	2	J	BDL	10	1	J
V	Ethylbenzene		BDL	14	2	J	3	J	BDL	15
V	Methylene chloride		BDL	14	BDL	43	3	J	BDL	15
V	Toluene		BDL	14	2	J	9	J	BDL	15
V	Acetone		420		1400	D	250		430	D
V	Carbon disulfide		BDL	14	BDL	43	82		BDL	15
V	Xylenes (Total)		BDL	14	15		16		8	
B	Acenaphthene		BDL	10	3	J	BDL	10	BDL	10
B	Naphthalene		BDL	10	BDL	10	4	J	BDL	10
B	Phenanthrene		BDL	10	4	J	BDL	10	BDL	10
B	Pyrene		BDL	10	BDL	10	BDL	10	BDL	10
A	2,4-Dimethylphenol		2	J	5	J	3	J	BDL	10

TABLE B-1.34

Summary of Field Analyses

WELL	Temp (cent)	pH S.U.	Conductivity umhos/sq cm	Redox MV	O2 mg/l	Eh
Perched Water Table Aquifer						
BW-2A	NA	NA	NA	NA	NA	
BW-3A	24	4.35	98	144	2.6	
DM-1A	22	5.44	470	77.3	2.6	
DM-4A	NA	NA	NA	NA	NA	
DM5-5A	DRY	DRY	DRY	DRY	DRY	
BW-9A	19.8	4.54	312	127	5	
BW-10A	22.5	4.82	98	106	3.2	
BW-11A	22.5	6.19	574	276	5.4	
DM-15A	24.7	6.14	599	28	2.4	
DM-17A	DRY	DRY	DRY	DRY	DRY	
DM-18A	25.1	7.07	744	25.8	4.8	
DM-18a	25.7	6.88	509	15.4	4.2	
Saprolite Aquifer						
DM-1R	21.1	5.5	266	73	2.3	
DM-2R	18.5	6.07	72	39.2	4	
DM-3R	18	5.7	113	53.7	3.4	
DM-4R	19.9	7.82	717	-73.1	4.2	
DM-5	18.2	5.52	139	42.1	3.8	
BW-8	19.8	4.31	1,651	138.7	5.2	
BW-9	18.8	4.94	178	93.1	4.6	
BW-10	18.6	5.25	198	81.5	4.5	
BW-11	17.9	4.92	3,430	96.8	5.8	
BW-12	16.6	4.02	33	123.3	6.8	
BW-13	17.1	4.46	804	122.8	4.2	
BW-14	18	6.18	233	40.0	4.8	
DM-15	20	5.7	144.6	53.0	3.2	
DM-16	18.4	6.34	568	16.4	5	
Merkel	21.5	6.05	374	30	3.4	
Bedrock						
DM-1B	17.3	5.83	263	48.3	3.8	
DM-11B	18.9	5.82	162	34	3.8	
Surface Water						
SW-1	25.6*	6.59	202	10.3	4.4	
SW-2	23.9*	6.55	201	14.2	4.8	
SW-3	24*	5.64	230	68.3	1.8	
SW-4	27.6*	6.6	196	4.3	4.2	
SW-5	23.7*	6.33	202	15.5	3.5	
SW-6	25.1*	6.45	138	22.0	3	
SW-7	24.9*	5.92	119	56	2.4	
SW-8	27.7*	7.11	140	-30.7	6.6	
SW-9	23.8*	6.68	197	-.8	4.9	
SW-11	31.2*	5.4	62	73.2	6	
Bottom Sediment						
SE-1	23.8	6.26				20.7
SE-2	23.1	6.4				6
SE-3	22.5	6.06				35.6
SE-4	23.3	5.04				90
SE-5	21.0	5.95				30.6
SE-6	NA	6.27				17.5
SE-7	23.6	5.4				70.8
SE-8	26.5	4.8				108
SE-9	21.6	5.97				37.6
SE-10	NA	5.01				95.4
SE-11	23.5	4.92				103

* measured in lab

APPENDIX B-2

Quality Assurance/Quality Control Evaluation Reports

APPENDIX B-2

Quality Assurance and Quality Control Activities and Evaluation Results

B.2.1 Overview

This Appendix summarizes the findings of Quality Assurance (QA) and Quality Control (QC) activities carried out during the groundwater investigation for the VWP Site. It also summarizes the laboratory audit results and the chemical data quality assurance review of laboratory reported data for the analyses of environmental media including soils, sediments, surface water and groundwater. Audits conducted during the investigations included a field audit during groundwater sampling and onsite laboratory audits of contract laboratories--namely ChemWest Analytical Laboratories, Inc., Sacramento, California, and Northeastern Analytical Corporation, Marlton, New Jersey. These two laboratories were subcontracted by CompuChem Laboratories, Inc., Research Triangle Park, North Carolina, which is a participant in EPA Contract Laboratory Program (CLP). As such, CompuChem Laboratories, Inc. is subject to EPA's quarterly performance sample analysis evaluation. A copy of each audit report for the field operations during groundwater sampling, as well as laboratory audits and performance evaluation report by EPA for CompuChem Laboratories, Inc., is presented in attachments B.2-1, B.2-2, B.2-3, and B.2-4 respectively. Review findings for each audit activity, as well as chemical data review, is discussed below.

B.2.2 Sampling Procedures and Custody

Special sampling procedures were observed to minimize the chances of sample contamination and cross-contamination and to maintain integrity as specified in the QA Project Plan. These procedures included the following techniques:

- Use of decontaminated sampling equipment (teflon bailer) at each sampling point and/or well.
- Use of decontaminated sampling equipment. Before use, the equipment was wrapped to preseve decontamination measures.
- Use of sample containers prepared by the Contractor laboratory, CompuChem Laboratories, Inc., which were accompanied by chain-of-

custody forms. Chain-of-custody procedures followed each container from sampling to the laboratory.

- Use of overnight delivery service for shipment of samples to the analytical laboratory.
- Use of "trip blank" samples to monitor potential contamination of the samples from and en route to the laboratory.
- Use of "field blank" (rinse blank) samples to monitor ambient conditions at the Site during sampling.

A field audit by the Dames & Moore Project Quality Assurance Officer (QAO) was conducted on July 11, 1989, during groundwater sampling to ensure compliance of procedures stated in the Work Plan and QA Project Plan (Audit Report is presented as Attachment B.2-1). Items that required clarification and/or corrections were minor, did not compromise data quality, and were resolved by the project team in a timely manner. Oversight during groundwater sampling was conducted by EPA contractor representative, Sandy M. Czarnecki of CDM Federal Programs Corporation, Fairfax, Virginia.

B.2.3 Laboratory Analysis

The laboratories involved in the analysis of environmental samples, analytical parameters, container requirement, preservation, and holding time requirements for analysis of water and soil and sediment are summarized in Tables B.3-1 and B.3-2. A list of analytical parameters and/or the analytical group and the methods employed for analyses and the laboratory performing the analyses are summarized in Table B.3-3. These analytical methods, especially organic analytical procedures, including dioxins and furans analyses, as well as the inorganic (metals) analyses, involve QA/QC procedures to ensure data quality. The QA/QC procedures include frequent instrument calibration and tuning, the use of method blank samples to monitor for laboratory contaminants, and the use of matrix spike samples to monitor matrix interference effects.

Dames & Moore conducted an audit of ChemWest Laboratories, Inc., Sacramento, California, on June 26, 1989, and Northeast Analytical Corporation, Marlton, New Jersey on July 17, 1989, to ensure compliance of procedures stated in the Work Plan, QA Project Plan and the laboratory QA plans. Report of these

6. Selected multi-media environmental samples and their duplicates summarized in Table B.3-8 were submitted for analysis to the laboratory to verify the consistency of field sampling and laboratory analytical methods. The concentrations of analytes detected in the sample and its coresponding duplicate are presented in Attachment B-1 data tables. Data reproducibility appears satisfactory for the majority of the samples and their corresponding duplicates. Only a few metals, volatile and semiviolatile organic compounds show disparity in concentration or identification between the sample and its duplicate soil and groundwater samples. This suggests the possibility of a contribution of these constituents from laboratory or field sources. Variation in concentration of dibenzofuran, as well as other organic and metal constituents in soil, may be associated with the heterogeneity of soil matrix. No pesticides were detected in the groundwater sample and its duplicate. Disparity in concentrations of iron and calcium in sediment sample and its duplicate may be associated with the variations in natural background levels at the sediment sampling location(s). Acetone detection in surface water samples may be associated with laboratory contamination.

7. Some groundwater samples required dilution to adequately quantify certain analytes present at elevated concentrations. The laboratory diluted these samples to ensure that the analyte in question is within the established linear range of the standard calibration curve, as well as to prevent instrument saturation. All data were reported for the established concentration of the original sample.

8. Laboratory reported information on each environmental matrix sample analysis was reviewed to check the matrix spike recoveries, surrogate compound recoveries, instrument calibration, and the use of proper CLP flags. These checks were to ensure that no QC problems exist in the data to question their validity. In cases when clarifications were necessary, they were resolved with the laboratory or laboratories in a timely manner to ensure data validity and data quality.

B.2.5 Data Management

The data generated during the investigation were reduced by Dames & Moore through a process of review and interpretation by professional geologists, environmental scientists, and engineers. The laboratory data were compiled from the original laboratory reported data into a Dames & Moore computer system to summarize the results. The data entry sheets were reviewed for any transcription errors, and corrections were made as necessary.

ATTACHMENT B.2-1

Field Audit Report
Groundwater Sampling

TABLE 11-1

System Audit Checklist

Field Operations

Project No. 17000-001 Date 7/11/89

Project Name & Location: Virginia Wood Preserving Site, Richmond, Virginia Rentokil, Inc.

Name & Signature of Auditor/Quality Assurance Officer: J. Jack Parrott S. Surya Prasad

Team Members: Jack Parrott, Jeff Nejedly

Field Team Leader: Jack Parrott

Yes x No____ 1) Is there a set of accountable field documents checked out to the Site Manager?
Comments: _____

Yes x No____ 2) Is the transfer of field operations from the Site Manager to field participants documented in a log book?
Comments: _____

Yes x No____ 3) Is there a writtern list of sampling locations and descriptions?
Comments: _____

Yes x No____ 4) Are samples collected as stated in the project plan or as directed by the Site Manager?
Comments:
1) External pump used in purging - Honda WB-1
2) Purge Water Data
Well #DM-1A: (Turbid water, tan to brown)

Purged Volume (gallons)	Temp. (°C)	Conductivity (umhos)	pH (units)
2.5	31.9	870	6.16
1.0	28.3	531	6.20
1.0	37.3	399	6.12

TABLE 11-1 (cont'd)

Well #DM-1R: (1125 hours) (olive gray water)

Purged Volume (gallons)	Temp. (°C)	Conductivity (umhos)	pH (units)
As noted	20.3	747	6.28
in samplers	19.6	407	6.0
field log	19.0	330	5.63

3) Bailer: Supplier: Long Island Pollution Services, Hauppauge, New York

4) Filtration of samples for metals:
- o Filter used - Sample Pro High Capacity Field Filter 0.45μ, FF-8200 GED Environmental Systems Ann Arbor, Michigan
- o Masterflex silicone tubing used.
- o Portable Masterflex Sampling Pump - Cole Palmer filtration equipment used

Yes X No ____ 5) Are samples collected in the type of containers specified in the project plan or as directed by the Site Manager?
Comments: Containers are supplied by Compuchem Laboratories, Research Triangle Park, NC. One gallon plastic container for metals filtration are procured from Scientific Suppliers vendor-Cole-Palmer Company.

Yes X No ____ 6) Are samples preserved as specified in the project plan or as directed by the Site Manager?
Comments:
- o Water samples for metals analysis are preserved with H_2SO_4 to maintain pH 2.0.
- o Water samples for thiocyanate analysis are preserved with NAOH to maintain pH 12.0.

Yes X No ____ 7) Are the number, frequency, and type of samples collected as specified in the project plan or as directed by the Site Manager?
Comments: Groundwater samples collected from DM-1A are identified with sample number 2002. Number of containers and parameters are listed below.
Two glass vials for VOA's. Three glass bottles for SVOA's. Two plastic bottles for metals (arsenic, chromium, copper, and zinc). One glass bottle for thiocyanate.

TABLE 11-1 (cont'd)

Yes x No ____ 8) Are the number, frequency, and type of measurements taken as specified in the project plan or as directed by the Site Manager?
Comments: Field measurements included temperature, pH, conductivity, Eh (oxidation-reduction potential), Dissolved Oxygen (DO)
pH meter: Digi-Sense model 5985-80
pH buffers used, 4.0, 7.0, and 10.0
Conductivity meter: Cole-Palmer 1481-55

Yes x No ____ 9) Are samples identified with sample labels?
Comments: ____

Yes x No ____ 10) Are blank and duplicate samples properly identified?
Comments: One trip blank (vial) was identified as TB71189. Duplicate samples are to be assigned letter D next to the sample number.

Yes ____ No ____ 11) Are sample and serial numbers for samples split with other organizations recorded in a log book or on a chain-of-custody record?
Comments: Not applicable for 7/11/89 sampling. Oversight during groundwater sampling was provided by EPA contractor representative, Sandy M. Czarnecki of CDM Federal Programs Corporation, Fairfax, Virginia

Yes x No ____ 12) Are samples listed on a chain-of-custody record?
Comments: ____

Yes x No ____ 13) Is chain-of-custody documented and maintained?
Comments: ____

Yes x No ____ 14) Are quality assurance checks performed as directed?
Comments: ____
o Oversight during groundwater sampling was provided by EPA contractor representative, Sandy M. Czarnecki of CDM Federal Programs Corporation, Fairfax, Virginia
o One trip blank per shipment - #TB71189

Yes ____ No ____ 15) Are photographs documented in logbooks as required?
Comments: Not Applicable

TABLE 11-1 (cont'd)

Yes X No ____ 16) Are all documents accounted for?
Comments: _____

Yes ____ No X 17) Have any documents been voided?
Comments: _____

Yes ____ No X 18) Have any documents been destroyed?
Comments: _____

ATTACHMENT B.2-2

Laboratory Audit
ChemWest Analytical Laboratories, Inc.
Sacramento, California

SACRAMENTO

OFFICE MEMORANDUM

Reviewed SP 7/12/89

	ACTION	INFO	
To:	John Osgood - WAS ~~Surya Prasad - WAS~~		File:
			X-Ref:
			Date: July 5, 1989
From	Ken Strom - SAC		Reply Required By:
Subject:	Laboratory Audit - CHEMWEST, Sacramento, CA		

Reference(s):

On 26 June, 1989 I audited CHEMWEST Analytical Laboratories in Sacramento, CA. I found no deficiencies except that they do not refrigerate their dioxin samples. SW846 calls for cooling non-waste dioxin samples to 4°C. The lab says that cooling these samples is unnecessary, and I don't disagree. However, D&M should be aware that these samples are not cooled.

The laboratory personnel that participated in the audit are shown in Attachment 1. CHEMWEST's equipment is listed in Appendix A and Appendix B.

I completed the laboratory audit forms as you requested (see Attachment 2). I also prepared the following notes.

1. Sample Control (Audit items 1, 2, 3, 4, 8, 14)

   I audited their sample control system. The sample custodian was able to quickly locate our sample (#3923) for this project. The storage room is not refrigerated.

   Chain of custody forms accompany each sample and its extracts throughout the analysis. The lab staff all expressed a good understanding of their responsibilities for sample and data control. Samples are kept in locked storage or in secured lab areas throughout the life of the sample.

2. Safety (Audit item 5)

   They have a separate sample preparation room for dioxin samples. All glassware used for dioxin work and dioxin standards are kept in this room.

KS04.062

3. SOP's (Audit items 6, 7, 12, 13)

CHEMWEST employs CompuChem's SOPs, which are detailed and thorough. CHEMWEST follows these SOPs, as shown by:

- The presence of appropriate SOPs in each lab area,
- Use of standard forms that document the sample preparation and analysis steps taken, with supervisor check-off,
- Instrument logbooks at each instrument,
- Management review indicated by sign-off of reports,
- Completed project files available for review.

Our project file for sample #3923 includes:

- Cover letter with four data summary tables,
- Raw data from analysis of the "window defining" standards mix,
- Raw data from multi-point calibration runs,
- "Toxicity equivalency" calculations,
- Sample raw data,
- Shift standards raw data,
- GC/MS instrument logbook page copies,
- Chain of custody sheet.

4. Waste Disposal (Audit item 9)

All wastes are incinerated or returned to the customer. All dioxin samples are returned to the customer.

5. Glassware Cleaning Procedures (Audit item 10)

Standard SOPs are followed per EPA and CompuChem protocols.

6. Data Handling, Analysis, and Reporting

Data packages are put together by the data control manager. Each package is reviewed by the GC/MS manager and the VP of Technical Services before issuing the reports.

7. Method Detection Limit

Detection limits for dioxin are established for each sample following EPA protocol.

8. Sample Holding Time

The times between sampling, receipt at the laboratory, extraction, and analysis are recorded and reported. There is no computerized sample control system at CHEMWEST, so all such records are produced manually.

EVENT SEQUENCE FOR ON-SITE LABORATORY AUDIT

I. Meeting with Laboratory Quality Assurance Officer and Project Manager

Introduction; discuss purpose of visit and audit scope.

II. Verification of Personnel

Review qualification of personnel in place and committed to project.

III. Verification of Instrumentation

Review equipment in place and committed to project.

IV. Quality Control Procedures

Walk through laboratory to review:

1. Sample receiving and logging procedures.
2. Sample and extract storage area.
3. Procedures to prevent sample contamination.
4. Security procedure for laboratory and samples.
5. Safety procedures.
6. Conformance to written SOPs.
7. Instrument records and logbooks.
8. Sample and data control systems.
9. Procedures for handling and disposing of hazardous materials.
10. Glassware cleaning procedures.
11. Status of equipment and its availability.
12. Technical and managerial review of laboratory operation and data package preparation.
13. Procedures for data handling, analysis, and reporting.
14. Chain-of-custody procedures.

V. Review of Standard Operating Procedures (SOPs)

Review of SOPs to assure compliance per Work Plan and Quality Assurance Project Plan, Laboratory QA Plan and requirements of the project.

VI. Review of Laboratory Analysis and Data Package

(May be performed upon receipt of analysis data of environmental samples.)

VII. Completion of Audit Checklist

The auditor(s) walks through the audit checklist for report preparation purposes with the Laboratory Quality Assurance Officer and Project Manager or their representative(s).

ON-SITE LABORATORY AUDIT

Audit Conducted By: Dames & Moore
7101 Wisconsin Avenue, Suite 700
Bethesda, Maryland 20814

Names of Audit Team: Kenneth A. Strom, Ph.D.
(auditor, technical expert)

Signature of Quality Assurance Officer: Kenneth A Strom
(auditor, technical expert)

S. Surya Prasad
1/5/90

I. INTRODUCTION

1. Project Name Rentokill RI/FS

2. Project Site Location Richmond, VA

3. Project Number 17000-001

4. Name and Location of Contract Laboratory Being Audited
   CHEMWEST Analytical Laboratories, Inc., Sacramento, CA

5. Date of Audit 26 June 1989

6. Time of Audit 10:00 a.m.

7. Laboratory Personnel Present During Audit (See attached sheet of business cards)

8. Other Personnel or Observers Present and Their Affiliation None

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II. VERIFICATION OF PERSONNEL

Laboratory Personnel Committed to Project:

1. Project Manager (responsible for overall technical effort)

   Name: Dr. Jill B. Henes, Ph.D.

   Title: Vice-President of Technical Services

Organic Parameters (Dioxins and Furans):

2. GC/MS Operator: Annette Oleski
   Experience:* 1 1/2 yr months/years

3. GC/MS Data Interpreter: John Medina
   Experience:* 4 yr months/years

4. Person responsible for sample extraction, column chromatography and extract concentration: Tom Kwoka
   Experience:* 5 yr

5. Person(s) responsible for calculations and report preparation:
   Hardcopy Reports: Peter Geinger
   Magnetic Tape Reports:** Elaine Wong

Inorganic and Other Water Quality Parameters (see Section V for Parameter Listing:

Name	Duties/Responsibilities	Experience
Linda Schneider	Wet Chem Supervisor	3yr
Steven Crisp-Greiser	Wet Chem Analyst	6yr

*Experience is deemed to mean "more than 50% of the person's productive work time".
**To be specified only when magnetic tape reports are required.

III. VERIFICATION OF INSTRUMENTATION

1. Gas Chromatograph(s)* (see Appendix A)

   Manufacturer & Model _____

   Installation Date _____

   Type of Capillary Column Injection System _____

   Capillary Column to be Used (length, ID, coating, etc.) _____

   _____

   Necessary Ancillary Equipment (gases, syringes, etc.) _____

   _____

2. Mass Spectrometer(s)* (see Appendix A)

   Manufacturer & Model _____

   Installation Date _____

   Pertinent Modifications _____

3. Data System(s)* (see Appendix A)

   Manufacturer & Model _____

   Installation Date _____

   Software Version Identifier _____

   Yes X No ___ Capability to produce hardcopies of computer-generated information.

4. Evidence that at least one GC/MS/DS system can be reasonably expected to be operated acceptably at any given time:

   (x) More than one adequate GC/MS system is available in-house

   (x) Extensive in-house replacement parts and trained service personnel available.

   ( ) Other (specify) _____

*If more than one GC/MS/DS, indicate systems 1, 2, 3, etc., by numbering components with 1, 2, 3, etc.

IV. AUDITOR CHECKLIST: QUALITY CONTROL PROCEDURES

Record Comments on separate sheet and include in report. Any entry checked "no" indicating a deficiency must be explained.

1. Sample Control

Yes X	No ___	N/A ___	Sample and extract accounting procedures are established.
Yes X	No ___	N/A ___	Person responsible for sample control. (Name) Bill McBenge
Yes X	No ___	N/A ___	Storage area for samples and sample extracts when not being used is secured (locked).
Yes X	No ___	N/A ___	Adhere to chain-of-custody procedures.

2. Analysis Control

Yes X	No ___	N/A ___	Project personnel have SOPs for required activities.
Yes X	No ___	N/A ___	A logbook is maintained for each instrument; information such as calibration data and maintenance is continually recorded.
Yes X	No ___	N/A ___	Facility is designed for hazardous organic chemical analysis.
Yes X	No ___	N/A ___	Ventilation is provided in sample preparation area.
Yes X	No ___	N/A ___	Vented hoods are available and adequately vented in sample preparation areas.
Yes X	No ___	N/A ___	Instruments, including GC/MS pumps, are vented into hoods or control devices such as charcoal traps.
Yes X	No ___	N/A ___	Storage is available for hazardous samples in a secure area.
			Person responsible for Analysis Control - QA/QC: Steven C. Madden

3. Document Control

Yes X	No ___	N/A ___	Every person participating in project maintains a notebook to record activities.
Yes X	No ___	N/A ___	One individual is responsible for maintaining records and documents. Name: Robert T. Hart
Yes X	No ___	N/A ___	Adherence to Good Laboratory Practices is documented; SOPs are documented.
Yes X	No ___	N/A ___	Evidence of EPA standards obtained or used such as documented EPA sample number, seal, date, etc.
Yes X	No ___	N/A ___	All documents are stored or archived in a secure location.

V. REVIEW OF STANDARD OPERATING PROCEDURES - METHOD SPECIFIC COMPONENTS

Parameters:

_____	Alkalinity
_____	Biological Oxygen Demand
_____	Chemical Oxygen Demand
X	Dioxins
_____	Filterable Residue
_____	Non-filterable Residue
_____	Furans
_____	Hardness
_____	Thiocyanate
_____	Total Dissolved Solids
_____	Total Kieldahl Nitrogen
_____	Total Organic Carbon
_____	Total Phosphorus
_____	Total Suspended Solids

Yes X No___ N/A ___ Evidence of lab proficiency tests on published procedures, i.e., full anlayte spike addition to laboratory pure water or "blank" soil and processing it as a sample.

VI. REVIEW OF LABORATORY ANALYSIS AND DATA PACKAGE

(May be performed upon receipt of analysis data of environmental samples)

1. Examinaiton of data package.

2. QA/QC procedures such as protocol for instrument calibration and maintenance schedules, standard operating procedures, when the analysis was performed.

3. Method used in the analysis (method number - EPA or ASTM or other; stated modifications, if any, etc.)

4. Method detection limit.

5. Laboratory procedure used in establishing the method detection limit.

6. Chain-of-custody sheet with the sample identified.

7. Length of time between sampling and analysis for each sample.

8. Sample holding time (time between validated time of sample receipt (VTSR) and analysis, time between reanalysis due to dilution(s), review of chromatogram is not considered.

VII. SUMMARY CHECKLIST OF FINDINGS

Yes X No ___ N/A ___ 1. Have a Program manager and/or QA Officer been appointed?

Comments: _____

Yes ___ No ___ N/A X 2. Were project plans and QA/QC plans prepared?

Comments: SOP's followed

Yes X No ___ N/A ___ 3. Have the individual files (QA/QC for laboratory) been assembled?

Comments: _____

Yes X No ___ N/A ___ 4. Is there a list of accountable lab documents?

Comments: _____

Yes X No ___ N/A ___ 5. Are SOP's and other documentation of established procedures available?

Comments: _____

Yes ___ No ___ N/A ___ 6. Has coordination been established with Dames & Moore project personnel and the laboratory?

Comments: Project results have been reported.

Yes X No ___ N/A ___ 7. Have data review responsibilities been assigned?

Comments: _____

Yes X No ___ N/A ___ 8. Have reporting requirements been reviewed?

Comments: _____

Yes X No ___ N/A ___ 9. Is there a set of accountable QA/QC documents checked out to the Laboratory Manager/Analyst(s), etc.?

Comments: _____

Yes X No___ N/A ___ 10. Is there a written list of parameters and descriptions?

Comments: _____

Yes X No___ N/A ___ 11. Have sample preservation methods as specified in the Work or QA Project Plan?

Comments: _____

Yes X No___ N/A ___ 12. Are the number, frequency, and type of laboratory measurements taken as specified in the work or QA project plan or as directed by the Project Manager?

Comments: _____

Yes X No___ N/A ___ 13. Are samples identified with sample numbers?

Comments: _____

Yes X No___ N/A ___ 14. Are laboratory blank and duplicate samples properly identified?

Comments: _____

Yes X No___ N/A ___ 15. Are sample and serial numbers for laboratory samples recorded in a log book or on a chain-of-custody record?

Comments: _____

Yes X No___ N/A ___ 16. Were samples assigned I.D. numbers by the client on the chain-of-custody record provided?

Comments: _____

Yes X No___ N/A ___ 17. Is chain-of-custody documented and maintained?

Comments: _____

Yes X No___ N/A ___ 18. Are quality assurance checks performed as directed in SOPs?

Comments: _____

Yes X No ___ N/A ___ 19. Are all documents accounted for?

Comments: _____

Yes ___ No X N/A ___ 20. Have any documents been voided?

Comments: _____

Yes ___ No X N/A ___ 21. Have any documents been destroyed?

Comments: _____

Yes X No ___ N/A ___ 22. Were personnel operations assignments appropriate with expertise?

Comments: _____

Yes X No ___ N/A ___ 23. Were all laboratory analytical equipment available as stated in SOPs?

Comments: _____

Yes X No ___ N/A ___ 24. Were QA/QC samples used or prepared in laboratory per SOPs?

Comments: _____

Yes X No ___ N/A ___ 25. Were equipment decontamination procedures employed?

Comments: _____

Yes X No ___ N/A ___ 26. Were all QA/QC requirements documented including instrument calibration, etc.?

Comments: _____

Yes X No ___ N/A ___ 27. Is a most recent EPA performance evaluation (PE) report available?

Comments: _____

VIII. CORRECTIVE ACTION (as necessary)

This form to be filed with the project files/QA files for permanent record.

Date 26 June 1989

Problem/Deficiency: Sample Preservation

CHEMWEST does not cool any samples to be analyzed for dioxins.

Identified by: Kenneth Strom

Referred to: ChemWest/CompuChem Lab.

Corrective Action to be Taken: **Target Date:** ASAP and/or before RI Completio

CHEMWEST should provide documentation that samples do not have to be refrigerated. According to SW846: Concentrated waste samples-no preservative

Liquids-Cool, 4°C

Soil-Cool, 4°C

Sediments, sludges-Cool, 4°C

Follow-up Audit Findings:

Samples do not need to be cooled because dioxins are stable. This is the revised sample handling procedure for SW 846 (September 1986) - method 8280. This information was furnished by the U.S. Environmental Protection Agency (EPA) sample management office-contractor. Phone: (703) 557-2490

Resolved? Yes SP 1/5/90 **Date :** January 5, 1990

IX. REFERENCES

Dames & Moore, Ltd. 1989. Work Plan and Quality Assurance Project Plan. Virginia Wood Perserving Site, Richmond, Virginia. April 3, 1989. Dames & Moore, Ltd., Bethesda, Maryland.

American Association for Laboratory Accreditation. 1987. Environmental Field of Testing, Assessor Checklists. AALA A9070987, July 1987. American Association for Laboratory Accreditation, Gaithersburg, Maryland.

U.S. Environmental Protection Agency, December 1980. Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans. Document No. EPA-60014-83-004 (QAMS - 005/80), Office of Monitoring Systems and Quality Assurance, Office of Research and Development, Washington, D.C.

APPENDIX A

CHEMWEST GC/MS/DS INSTRUMENTATION

CHEMWEST GAS CHROMATOGRAPHIC/MASS SPECTROMETER/ DATA SYSTEM (GC/MS/DS) INSTRUMENTATION

October 1988

Instrument	Manufacturer	Analyses Performed	Model/Revision	Installation Date (Updates)
GC/MS ID# CW-1 SN# 13955-0986	Finnigan	Dioxin, ABN, CLP	5100SP	2/87
Data System ID# w/ CW-1	Finnigan & Data General	NA	SuperIncos w/ IDOS III/Nova 4X	2/87
EPA/NIH Mass Spectral Library (# Compounds)	NBS	NA	42222 Cmpds.	2/87
GC/MS ID# CW-2 SN# 19355-1-0986	Finnigan	ABN, CLP	5100SP	2/87
Data System ID# w/ CW-2	Finnigan & Data General	NA	SuperIncos w/ IDOS III/Nova 4X	2/87
EPA/NIH Mass Spectral Library (# Compounds)	NBS	NA	42222 Cmpds.	2/87
GC/MS ID# CW-3 SN# 13378-1284	Finnigan	Dioxin, ABN	5100EF	10/88
Data System ID# w/ CW-3	Finnigan & Data General	NA	SuperIncos w/ IDOS III/Nova 4X	10/88

CHEMWEST GAS CHROMATOGRAPHIC/MASS SPECTROMETER/

DATA SYSTEM (GC/MS/DS) INSTRUMENTATION

October 1988 (Continued)

Instrument	Manufacturer	Analyses Performed	Model/Revision	Installation Date (Updates)
EPA/NIH Mass Spectral Library (# Compounds)	NBS	NA	42222 Cmpds.	4/87
GC/MS ID# CW-4 (FINEX)	Extrel	VOA, CLP	ELQ-4001 w/ Varian 3400 GC	9/87
Data System ID# w/ CW-4	Finnigan & Data General	NA	SuperIncos w/ IDOS III/Nova 4X	9/87
EPA/NIH Mass Spectral Library & # Compounds	NBS	NA	42222 Cmpds.	9/87
Purge & Trap ID# - SN# 87278006 & 546	Tekmar	NA	LSC-2 w/ ALS	9/87
Data System ID# stand alone	Finnigan & Data General	NA	Super-Incos w/ IDOS II	6/87
Data System ID# stand alone	Finnigan & Data General	NA	Super-Incos w/ IDOS II	8/88
Data System ID# PC	Epson & Finnigan	NA	Equity III w/ Formaster	12/87

AR30/4/6

CHEMWEST GAS CHROMATOGRAPHIC INSTRUMENTATION

October 1988

Instrument	Manufacturer	Analyses Performed	Model/Revision	Installation Date (Updates)	Columns
GC ID# 1 SN# 3400-4035	Varian	OC PEST, HERB, CLP-PEST	3400 w/ dual ECD & 8035 ALS	6/87	Packed
GC ID# 2 SN# 3400-2534	Varian	TPH,HERB	3400 w/ FID, ECD, cap inj., & 8035 ALS	12/86	Capillary
GC ID# 3 SN# 3400-3356	Varian	VOA	3400 w/ dual ELCD	6/87	Megabore Capillary
GC ID# 4 SN# 3400-3414	Varian	VOA	3400 w/ ELCD, PID, & FID	1/87	Packed
GC ID# 5 SN# 3300-4034	Varian	VOA, TFH	3300 w/ ELCD, PID, & FID	6/87	Packed
GC ID# 6 SN# 3400-3415	Varian	OC PEST, HERB, CLP-PEST	3400 w/ dual ECD, cap. inj., & 8035 ALS	12/86	Packed
GC ID# 7 SN# 3400-2533	Varian	OP PEST	3400 w/ dual TSD, cap. inj. (FPD available)	12/86	Megabore Capillary

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CHEMWEST GAS CHROMATOGRAPHIC INSTRUMENTATION

October 1988 (Continued)

Instrument	Manufacturer	Analyses Performed	Model/Revision	Installation Date (Updates)	Columns
GC ID# 8 SN# 3400-0613	Varian	TPH, PHENOL, PNA	3400 w/ dual FID & 8035 ALS	1/88	Megabore Capillary
GC ID# 9 SN# 3400-5781	Varian	VOA, TFH	3400 w/ ELCD & PID	5/88	Megabore Capillary
GC ID# 10 SN# 3400-6043C	Varian	VOA	3400 w/ FID & PID	7/88	Megabore Capillary
GC ID# Screen 1 SN# 2151A03378	Hewlett-Packard	CLP-PEST SCREEN	5880 w/ Dual ECD, dual cap. inj., dual PP, & Data System	2/88	Capillary
GC ID# Screen 2 SN# -	Hewlett-Packard	CLP-VOA & ABN SCREEN	5790 w/ FID, cap. inj.	2/88	Capillary
Data System ID# - SN# 1001A01043	Hewlett-Packard	All Data Aq. for GC Lab	3357	1/87	NA
Purge & Trap ID# - SN# 357 & 1209	Tekmar	NA	LSC-2 w/ ALS	1/87	NA

AR301418

CHEMWEST GAS CHROMATOGRAPHIC INSTRUMENTATION

October 1988 (Continued)

Instrument	Manufacturer	Analyses Performed	Model/Revision	Installation Date (Updates)	Columns
Purge & Trap ID# - SN# 2229 & 1108	Tekmar	NA	LSC-2 w/ ALS	6/87	NA
Purge & Trap ID# - SN# - & -	Tekmar	NA	LSC-4000 w/ ALS	6/87	NA
Purge & Trap ID# - SN# - & -	Tekmar	NA	LSC-2 w/ ALS	5/88	NA
Purge & Trap ID# - SN# - & -	Tekmar	NA	LSC-2000 w/ ALS	10/88	NA

AR301419

APPENDIX B

CHEMWEST FACILITY AND EQUIPMENT INVENTORIES

CHEMWEST ANALYTICAL LABORATORIES, INC.

FACILITY AND EQUIPMENT INVENTORIES

March 1989 Revision

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CHEMWEST ANALYTICAL INSTRUMENTATION

AND EQUIPMENT - March 1989

GC/MS Analytical Instrumentation and Equipment

2 - Finnigan 5100SP GC/MS Systems with Turbomolecular Pumps, Incos III/Nova 4X Data Systems, including the NBS 42000 compound Mass Spectral Library, and Printronix Printers

1 - Finnigan 5100EF GC/MS System with Turbomolecular Pump, Incos III/Nova 4X Data System, including the NBS 42000 compound Mass Spectral Library, and Printronix Printer

1 - Extrel ELQ-4001 GC/MS System with Diffusion Pump, Incos III/Nova 4X Data System, including the NBS 42000 compound Mass Spectral Library, and Printronix Printer

2 - Finnigan Stand Alone Incos III/Nova 4X Data System, including the NBS 42000 compound Mass Spectral Library, and Printronix Printers

1 - Tekmar LSC-2 Purge and Trap Unit with 10-Port Automatic Sampler

1 - Tekmar LSC-2000 Purge and Trap System with 16-Port Automatic Sampler

1 - IBM-AT Compatible Computer with Dot Matrix Printer, Interface to Finnigan GC/MS Data Systems, and Finnigan Formaster Software for CLP Forms Generation

2 - IBM-AT Compatible Computers with Dot Matrix Printers

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CHEMWEST ANALYTICAL INSTRUMENTATION

AND EQUIPMENT - March 1989

Gas Chromatographic Analytical Instrumentation and Equipment

1 - Varian 5560 High Performance Liquid Chromatograph with Variable Wavelength UV Detector, Fluorescence Detector, and Automatic Sampler

11 - Varian 3400 Gas Chromatographs

1 - Varian 3300 Gas Chromatograph

6 - Varian Electron Capture Detectors (ECD)

4 - Varian Flame Ionization Detectors (FID)

4 - Tracor Photoionization Detectors (PID)

5 - OI Electrolytic Conductivity Detectors (ELCD - Hall type)

2 - Tracor Electrolytic Conductivity Detectors (ELCD - Hall type)

2 - Varian Thermionic Specific Detectors (TSD)

1 - Varian Flame Photometric Detector (FPD)

3 - Varian Split/Splitless Capillary Injectors

5 - Tekmar LSC-2 Purge and Trap Systems with 10-Port Automatic Samplers

1 - Tekmar LSC-4000 Purge and Trap System with 10-Port Automatic Sampler

4 - Varian 8035 Automatic Liquid Samplers

1 - Perkin-Elmer/Nelson "TurboChrome" Data Acquisition System with 386 Computer and Dot Matrix Printers

1 - Hewlett-Packard 3357 Laboratory Data Acquisition System

1 - Hewlett-Packard "A" Series Laboratory Data Acquisition System

1 - Varian 654 Data Acquisition System

1 - IBM-AT Compatible Computer with Dot Matrix Printer

1 - IBM-XT Compatible Computer with Dot Matrix Printer

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CHEMWEST ANALYTICAL INSTRUMENTATION

AND EQUIPMENT - March 1989

Inorganic Analytical Instrumentation and Equipment

1 - Thermo Jarrel-Ash Model 61 ICP with Autosampler and IBM PS-2 Model 50 Data System and Dot Matrix Printer

2 - Perkin-Elmer 5100Z Graphite Furnace AAs with Autosamplers and IBM-AT Compatible Data Systems with Dot Matrix Printers

1 - Instrumentation Laboratories Video 12E AA with Graphite Furnace, 440 Organic Vapor Accessory, and Data System

1 - Perkin-Elmer 50B Mercury Analyzer

1 - Varian VGA95 Hydride Generation Apparatus

1 - Perkin-Elmer 1310 Infared Spectrophotometer

1 - Technicon TRAAC 800 Autoanalyzer with IBM XT Data System and Dot Matrix Printer

1 - Dionex Ion Chromatograph with Automatic Sampler and Hitachi Integrator

1 - Milton-Roy Spectronic 21 UV/VIS Spectrophotometer

1 - Sequoia-Turner 390 UV/VIS Spectrophotometer

1 - Orion 940 Ionanalyzer with RS232 Computer Interface and Specific Ion Electrodes for pH, F^-, NH_3, Cl_2, ClO_3, and Oxygen (DO and BOD)

1 - Monitek 21 Nephelometer (Turbimeter)

1 - YSI 35 Conductivity Meter

1 - Rotary Extractor for TCLP/EP Tox Extractions

1 - Labconco COD Digestion Unit (plus Hach COD Kit)

1 - Penske-Martens Closed Cup Flashpoint Apparatus

1 - Labconco Rapid Still II Auto Distillation/Digestion System (Kjeldahl)

1 - Blue M Fecal Coliform Incubator

1 - Barnstead Nanopure II with Corning MegaPure MP-3A Still

1 - Barnstead Nanopure II with Barnstead Fistreen #2 Still

1 - Top Loading Balance, Scientific Products TL1600

CHEMWEST ANALYTICAL INSTRUMENTATION

AND EQUIPMENT - March 1989

Inorganic Analytical Instrumentation and Equipment (continued)

1 - Boekel Desiccator

2 - Blue M Water Baths

Miscellaneous Laboratory Glassware and Method Apparatus

- CN Distillation Apparatus
- Imhoff Cones
- Nessler Tubes
- Titration Apparatus
- Certified Thermometer (Fisher Scientific 14985-5E)

CHEMWEST ANALYTICAL INSTRUMENTATION AND EQUIPMENT - March 1989

Sample Preparation Instrumentation and Equipment

1 - Hewlett-Packard 5880 Gas Chromatograph with dual Electron Capture Detectors (ECD) and dual Split/Splitless Injectors

1 - Hewlett-Packard 5790 Gas Chromatograph with Flame Ionization Detector (FID) and Split/Splitless Injector

3 - Top Loading Balances, 2 Scientific Products TL1600 and 1 Mettler 3200

1 - Analytical Balance, Scientific Products SP180

1 - pH Meter, Scientific Products

2 - Rotary Evaporators, Haake Buchler

2 - Steam Baths, 10 Place, Custom

2 - Sonic Dismembrator, Artek Model 300

32 - Soxhlet Extraction Apparatus

20 - Kuderna-Danish Concentration Apparatus

1 - Muffle Furnace, Thermolyne 1400

3 - Ovens, VWR Scientific 1305U

1 - 40 Place Orbital Shaker, Labline

4 - Nitrogen Blowdown Apparatus

1 - Dry Bath, Thermolyne

1 - Centrifuge

Various Sizes of the Following Laboratory Glassware:

- Separatory Funnels
- Flasks
- Beakers
- Chromatography Columns

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CHEMWEST ANALYTICAL INSTRUMENTATION

AND EQUIPMENT - March 1989

Additional Computer Instrumentation and Equipment

15 - IBM-AT Compatible Computers

2 - IBM-XT Compatible Computers

2 - IBM-AT Compatible Lap Top Computers

2 - Epson GQ-3500 Laser Printers

1 - Hewlett-Packard Laser Jet II Laser Printer

7 - Daisy Wheel Letter Quality Printers

14 - Dot Matrix Printers

4 - 1200 Baud Modems

1 - Stand Alone FAX Machine

1 - Internal FAX Board for AT-Compatible Computer

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ATTACHMENT B.2-3

Laboratory Audit

Northeastern Analytical Corporation, Marlton, New Jersey

EVENT SEQUENCE FOR ON-SITE LABORATORY AUDIT

I. Meeting with Laboratory Quality Assurance Officer and Project Manager

Introduction; discuss purpose of visit and audit scope.

II. Verification of Personnel

Review qualification of personnel in place and committed to project.

III. Verification of Instrumentation

Review equipment in place and committed to project.

IV. Quality Control Procedures

Walk through laboratory to review:

1. Sample receiving and logging procedures.
2. Sample and extract storage area.
3. Procedures to prevent sample contamination.
4. Security procedure for laboratory and samples.
5. Safety procedures.
6. Conformance to written SOPs.
7. Instrument records and logbooks.
8. Sample and data control systems.
9. Procedures for handling and disposing of hazardous materials.
10. Glassware cleaning procedures.
11. Status of equipment and its availability.
12. Technical and managerial review of laboratory operation and data package preparation.
13. Procedures for data handling, analysis, and reporting.
14. Chain-of-custody procedures.

V. Review of Standard Operating Procedures (SOPs)

Review of SOPs to assure compliance per Work Plan and Quality Assurance Project Plan, Laboratory QA Plan and requirements of the project.

VI. Review of Laboratory Analysis and Data Package

(Data package review of each sample may be performed upon receipt of analysis data of environmental samples.)

VII. Completion of Audit Checklist

The auditor(s) walks through the audit checklist for report preparation purposes with the Laboratory Quality Assurance Officer and Project Manager or their representative(s).

ON-SITE LABORATORY AUDIT

Audit Conducted by:

Dames & Moore
7101 Wisconsin Avenue, Suite 700
Bethesda, Maryland 20814

Names of Audit Team: Surya Prasad, Quality Assurance Officer
(auditor, technical expert)

Signature of Quality Assurance Officer: S. Surya PRINTED 7/25/89
(auditor, technical expert)

I. INTRODUCTION

1. Project Name Virginia Wood Preserving Site

2. Project Site Location Richmond, Virginia

3. Project Number 17000-001

4. Name and Location of Contract Laboratory Being Audited Northeastern Analytical Corporation, Marlton, New Jersey

5. Date of Audit July 17, 1989 (See Attachment 1)

6. Time of Audit 11:15 hours

7. Laboratory Personnel Present During Audit Donald J. Goebel, John M. Rissel, Paul P. Painter (see Attachment 2 for business cards)

8. Other Personnel or Observers Present and Their Affiliation N/A

II. VERIFICATION OF PERSONNEL

Laboratory Personnel Committed to Project:

1. Project Manager (responsible for overall technical effort)

   Name: Don Goebel/John Rissel

   Title: _____

2. Quality Assurance/Quality Control Officer (responsible for overall QA/QC)

   Name: Karin Barbito/John Rissel

Inorganic and Other Water Quality Parameters (see Section V for Parameter Listing:

Name	Duties/Responsibilities	Experience
B. Joanne Shivers	BOD, COD, T-PO_4, Alkalinity	6 years
Bill Lewis	TSS, TDS	6 years
Debbie Eachus	TKN, Hardness	3 years

Person(s) responsible for calculations and report preparation:

Hardcopy Reports: Karin Barbito

Magnetic Tape Reports: —

III. VERIFICATION OF INSTRUMENTATION

Equipment necessary to conduct analysis per SOPs:

As identified in Quality Assurance/Quality Control Plan, Laboratory Division

IV. AUDITOR CHECKLIST: QUALITY CONTROL PROCEDURES

Record Comments on separate sheet and include in report. Any entry checked "no" indicating a deficiency must be explained.

1. Sample Control

Yes	No	N/A	
Yes ✓	No ___	N/A ___	Sample and extract accounting procedures established.
Yes ✓	No ___	N/A ___	Person responsible for sample control. (Name) Chuck Childers
Yes ✓	No ___	N/A ___	Storage area for samples and sample extracts when not being used is secured (locked). Walk in area is secured-building locked; cold storage or sample preservation room access is limited to analysts.
Yes ✓	No ___	N/A ___	Adhere to chain-of-custody procedures. (Chuck Childers-sample log in) - (see Attachment 3 for copies of logs).

2. Analysis Control

Yes	No	N/A	
Yes ✓	No ___	N/A ___	Project personnel have SOPs for required activities.
Yes ✓	No ___	N/A ___	A logbook is maintained for each instrument; information such as calibration data and maintenance is continually recorded.
Yes ___	No ___	N/A ✓	Facility is designed for hazardous organic chemical analysis.
Yes ✓	No ___	N/A ___	Ventilation is provided in sample preparation area.
Yes ✓	No ___	N/A ___	Vented hoods are available and adequately vented in sample preparation areas.
Yes ✓	No ___	N/A ___	Instruments are vented into hoods or control devices such as charcoal traps as needed.
Yes ___	No ___	N/A ✓	Storage is available for hazardous samples in a secure area.
			Person responsible for Analysis Control - QA/QC: Karin Barbito

3. Document Control

Yes	No	N/A	
Yes ✓	No ___	N/A ___	Every person participating in project maintains a notebook to record activities.
Yes ✓	No ___	N/A ___	One individual is responsible for maintaining records and documents. Name: John Rissel/Paul Painter

Yes ✓	No ___	N/A ___	Adherence to Good Laboratory Practices is documented; SOPs are documented.
Yes ✓	No ___	N/A ___	Evidence of EPA standards obtained or used such as documented EPA sample number, seal, date, etc. (See Attachment 4 for PE (evaluation report).
Yes ✓	No ___	N/A ___	All documents are stored or archived in a secure location.

V. REVIEW OF STANDARD OPERATING PROCEDURES - METHOD SPECIFIC COMPONENTS

EPA method numbers used for analysis are noted below.

Parameters:

N/A	Alkalinity
EPA #405.1	Biological Oxygen Demand
N/A	Chemical Oxygen Demand
N/A	Hardness
EPA #160.1	Total Dissolved Solids
EPA #351.3	Total Kjeldahl Nitrogen
EPA #415.1	Total Organic Carbon
EPA #365.2	Total Phosphorus
EPA #160.2	Total Suspended Solids

Yes ✓ No ___ N/A ___ Evidence of lab proficiency tests on published procedures, i.e., full analyte spike addition to laboratory pure water or "blank" soil and processing it as a sample.

VI. REVIEW OF LABORATORY ANALYSIS AND DATA PACKAGE

(Data package review of each sample may be performed upon receipt of analysis data of environmental samples.)

1. Examination of data package.

2. QA/QC procedures such as protocol for instrument calibration and maintenance schedules, standard operating procedures, when the analysis was performed.

3. Method used in the analysis (method number - EPA or ASTM or other; stated modifications, if any, etc.)

4. Method detection limit.

5. Laboratory procedure used in establishing the method detection limit.

6. Chain-of-custody sheet with the sample identified.

7. Length of time between sampling and analysis for each sample.

8. Sample holding time (time between validated time of sample receipt (VTSR) and analysis, time between reanalysis due to dilution(s), when required.

An example data package was examined during onsite laboratory audit and it was found to contain elements identified above and/or those identified in NAC's QA/QC manual.

VII. SUMMARY CHECKLIST OF FINDINGS

Yes___ No___ N/A ✓ 1. Have a Program Manager and/or QA Officer been appointed?

Comments: Don Goebel/Karin Barbito

Yes ✓ No___ N/A___ 2. Were project plans and QA/QC plans prepared?

Comments: _____

Yes ✓ No___ N/A___ 3. Have the individual files (QA/QC for laboratory) been assembled?

Comments: _____

Yes ✓ No___ N/A___ 4. Is there a list of accountable lab documents?

Comments: _____

Yes ✓ No___ N/A___ 5. Are SOP's and other documentation of established procedures available?

Comments: D&M samples are analyzed during second shift.

Yes ✓ No___ N/A___ 6. Has coordination been established with Dames & Moore project personnel and the laboratory?

Comments: NAC holds subcontract with CompuChem Laboratories, Research Triangle Park, North Carolina. As such, NAC interfaces with CompuChem labs.

Yes ✓ No___ N/A___ 7. Have data review responsibilities been assigned?

Comments: Karin Barbito, John Rissel, Paul Painter, Ilene Lobenz.

Yes ✓ No___ N/A___ 8. Have reporting requirements been reviewed?

Comments: _____

Yes ✓ No___ N/A___ 9. Is there a set of accountable QA/QC documents checked out to the Laboratory Manager/ Analyst(s), etc.?

Comments: _____

Yes ✓ No___ N/A___ 10. Is there a written list of parameters and descriptions?

Comments: _____

Yes ✓ No___ N/A___ 11. Have sample preservation methods as specified in the Work or QA Project Plan?

Comments: _____

Yes ✓ No___ N/A___ 12. Are the number, frequency, and type of laboratory measurements taken as specified in the work or QA project plan or as directed by the Project Manager?

Comments: _____

Yes ✓ No___ N/A___ 13. Are samples identified with sample numbers?

Comments: Example: NAC #89-1103 or 89A1218; samples are stored in a shelf assigned with a number. See Attachment 3.

Yes ✓ No___ N/A___ 14. Are laboratory blank and duplicate samples properly identified?

Comments:

Parameter	Blank	Matrix Spike and Matrix Spike Duplicate
BOD	X	X
TDS	X	NA
TKN	X	X
TOC	X	X
Total Phosphorus	X	X
TSS	X	NA

Yes ✓ No___ N/A___ 15. Are sample and serial numbers for laboratory samples recorded in a log book or on a chain-of-custody record?

Comments: _____

Yes ✓ No___ N/A___ 16. Were samples assigned I.D. numbers by the client on the chain-of-custody record provided?

Comments: NAC provides copies of COC with data package.

Yes ✓ No___ N/A___ 17. Is chain-of-custody documented and maintained?

Comments: _____

Yes ✓ No___ N/A___ 18. Are quality assurance checks performed as directed in SOPs?

Comments: _____

Yes ✓ No ___ N/A ___ 19. Are all documents accounted for?
Comments: ___

Yes ___ No ✓ N/A ___ 20. Have any documents been voided?
Comments: ___

Yes ___ No ✓ N/A ___ 21. Have any documents been destroyed?
Comments: ___

Yes ✓ No ___ N/A ___ 22. Were personnel operations assignments appropriate with expertise?
Comments: ___

Yes ✓ No ___ N/A ___ 23. Were all laboratory analytical equipment available as stated in SOPs?
Comments: ___

Yes ✓ No ___ N/A ___ 24. Were QA/QC samples used or prepared in laboratory per SOPs?
Comments: Performance evaluation samples are obtained from Environmental Monitoring Systems Laboratory (EMSL), Cincinnati, Ohio. Laboratory generates distilled water onsite.

Yes ✓ No ___ N/A ___ 25. Were equipment decontamination procedures employed?
Comments: ___

Yes ✓ No ___ N/A ___ 26. Were all QA/QC requirements documented including instrument calibration, etc.?
Comments: Individual logs are maintained.

Yes ✓ No ___ N/A ___ 27. Is a most recent EPA performance evaluation (PE) report available?
Comments: PE report(s) dated 7/22/88 and 11/25/88 as well as correspondence from the State of New Jersey Department of Environmental Protection are attached.

VIII. CORRECTIVE ACTION (as necessary)

This form to be filed with the project files/QA files for permanent record.

Date _____

Problem/Deficiency: _____

_____

_____

_____

_____

_____

Identified by: _____

Referred to: _____

Corrective Action to be Taken: Target Date: _____

_____

_____

_____

_____

_____

Follow-up Audit Findings:

_____

_____

_____

_____

_____

Resolved? _____ Date: _____

IX. REFERENCES

Dames & Moore, Ltd. 1989. Work Plan and Quality Assurance Project Plan. Virginia Wood Preserving Site, Richmond, Virginia. April 3, 1989. Dames & Moore, Ltd., Bethesda, Maryland.

American Association for Laboratory Accreditation. 1987. Environmental Field of Testing, Assessor Checklists. AALA A9070987, July 1987. American Association for Laboratory Accreditation, Gaithersburg, Maryland.

U.S. Environmental Protection Agency, December 1980. Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans. Document No. EPA-60014-83-004 (QAMS - 005/80), Office of Monitoring Systems and Quality Assurance, Office of Research and Development, Washington, D.C.

ATTACHMENT 1

DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP
[illegible] WISCONSIN AVENUE, SUITE 700, BETHESDA, MD [illegible]
[illegible] 2218 TELEX 89552

June 26, 1989

Mr. Don Goebel
Director, Environmental Services
Northeastern Analytical Corporation
Evesham Corporate Center
4 East Stow Road
Marlton, NJ 08053

Re: Laboratory Audit

Dear Mr. Goebel:

This is to confirm our telephone conversation this morning concerning laboratory audit which I wish to schedule for 10:30 a.m. on July 17, 1989 instead of July 14, 1989. For your information, enclosed is a copy of the agenda.

Thank you in advance for your cooperation and I look forward to meeting you soon. In the meantime, if you have any questions, please contact me or Mr. John Osgood.

Sincerely,

DAMES & MOORE

S. Surya Ph.D. Prasad

Surya S. Prasad, Ph.D.
Quality Assurance Officer

SSP:am

cc: J. Osgood

EVENT SEQUENCE FOR ON-SITE LABORATORY AUDIT

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Introduction; discuss purpose of visit and audit scope.

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Review qualification of personnel in place and committed to project.

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Review equipment in place and committed to project.

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Walk through laboratory to review:

1. Sample receiving and logging procedures.
2. Sample and extract storage area.
3. Procedures to prevent sample contamination.
4. Security procedure for laboratory and samples.
5. Safety procedures.
6. Conformance to written SOPs.
7. Instrument records and logbooks.
8. Sample and data control systems.
9. Procedures for handling and disposing of hazardous materials.
10. Glassware cleaning procedures.
11. Status of equipment and its availability.
12. Technical and managerial review of laboratory operation and data package preparation.
13. Procedures for data handling, analysis, and reporting.
14. Chain-of-custody procedures.

V. Review of Standard Operating Procedures (SOPs)

Review of SOPs to assure compliance per Work Plan and Quality Assurance Project Plan, Laboratory QA Plan and requirements of the project.

VI. Review of Laboratory Analysis and Data Package

(Data package review of each sample may be performed upon receipt of analysis data of environmental samples.)

VII. Completion of Audit Checklist

The auditor(s) walks through the audit checklist for report preparation purposes with the Laboratory Quality Assurance Officer and Project Manager or their representative(s).

ATTACHMENT 2

NAC Northeastern Analytical Corp.

Professional Analysis, Sampling and Testing

Evesham Corporate Center, 4 East Stow Road, Marlton, NJ 08053

Donald J. Goebel
Director of Sales
Environmental Services

(609) 985-8000
FAX (609) 985-9700

NAC Northeastern Analytical Corp.

Professional Analysis, Sampling and Testing

Evesham Corporate Center, 4 East Stow Road, Marlton, NJ 08053

Paul P. Painter III
Asst. Laboratory Manager

(609) 985-8000
FAX (609) 985-9700

NAC Northeastern Analytical Corp.

Professional Analysis, Sampling and Testing

Evesham Corporate Center, 4 East Stow Road, Marlton, NJ 08053

John M. Rissel
Laboratory Manager

(609) 985-8000
FAX (609) 985-9700

ATTACHMENT 3

NAC Northeastern Analytical Corp.

RCVD 7/24/89

Dames and Moore
7101 Wisconsin Avenue, Suite 700
Bethesda, Maryland 20814

Attention: Surya S. Prasad

Analysis, Sampling and Testing for the Environmental and Safety Professional
Evesham Corporate Center, 4 East Stow Road, Marlton, New Jersey 08053

NAC Northeastern Analytical Corp.

ANALYTICAL REPORT

for

COMPUCHEM LABORATORIES
P.O. Box 12652
3308 Chapel Hill/Nelson Hwy
Research Triangle Park, NC 27709

Attention: Ms. Angela Childress, Manager Planning and Control

TEST REPORT NO. NAC89L-1103

PROJECT NO. 89-116

Client Designation	NAC Designation	Date Received	Matrix
270492	89L-1103-1	6-29-89	Aqueous
270493	89L-1103-2	6-29-89	Aqueous

Laboratory Name: Northeastern Analytical Corp.

Certification No: 03117

Name: John M. Rissel

Title: Laboratory Manager

Date: July 18, 1989

AR301455

TABLE OF CONTENTS

File: 9L\COMPUCHM\89L-1103

I. SAMPLING INFORMATION

Not submitted.

audits are presented in Attachment B.2-2 and B.2-3. Report of Quarterly Laboratory Performance Evaluation conducted by EPA under CLP requirements of CompuChem Laboratories, Research Triangle Park, North Carolina, is presented in Attachment B.2-4. During audits of these laboratories, items that required clarification and/or corrections were minor, did not compromise data quality, and were resolved by the project team in a timely manner.

B.2.4 Chemical Data Quality Assurance Review

A review of the laboratory data reported deliverable(s) was conducted to evaluate and ensure data quality. The laboratory QA/QC procedures for the evaluation and documentation of analytical methodologies were performed according to EPA CLP protocols for samples analyzed under CLP analytical procedures (Attachment B.3, Table B.3-3). A certain number of samples were duplicates and blanks in order to serve the Quality Control needs.

Review Elements. The QA review and findings from laboratory-reported data are summarized in this section. The data package of results from each sample or group of samples was checked for: completeness of reporting, adherence to chain-of-custody procedures, completion of analysis within appropriate holding times for each parameter, analysis and comparison of duplicate samples, the presence of laboratory contaminants, necessity for sample dilution for analysis, detection or quantitation limits and completion of internal laboratory QA/QC checks per CLP protocols. The internal laboratory QA/QC procedures included matrix spike recoveries, surrogate compound recoveries, initial and continuing instrument calibration, and reagent and sample blank analyses. The reported tentatively identified compounds (TICs) were noted.

Review Findings. A review of case narratives, as well as required data sheets, of each sample, resulted in findings that are summarized below:

1. With the exception of slight exceedence of holding times for thiocyanate and phosphorous analyses, the majority of the samples were extracted and analyzed for other analytes within the appropriate holding times. Exceedence of holding times for thiocyanate and phosphorus analyses for some samples were discussed with EPA, and it was mutually agreed that no significant impacts are associated with the acceptability of the data for the purpose of Qualitative Assessment.

2. Results of analysis of volatile, semivolatile, and TICs, as well as pesticides, detected in laboratory blanks associated with soil sampling and analysis are summarized in Table B.3-4. The table provides information related to the blank identification number, laboratory case number and sample delivery group (SDG) number, date of sample analysis, and the units. Concentration of parameter detected in each constituent group is shown next to the name of the detected compound. Methylene chloride was detected in all laboratory blanks with a low detection of 5 ug/kg and a high detection of 610 ug/kg in soil. Acetone was detected in the majority of laboratory blanks with the exception of VBLKY4, VBLKP1, VBLKY5, VBLKC4, VBLKD8, and VBLKG4. The detected lowest concentration range was at an estimated 8 ug/kg and a high concentration of 1,500 ug/kg. Chloroform was detected at a low concentration ranging from 1 to 2 ug/kg in laboratory blanks, VBLKM5, VBLKP4, VBLKR4, VBLKJ8, VBLKL8, VBLKG7, VBLKG8, VBLKZ5, VBLKB8, VBLKI2, and VBLKX2. The only other contaminant found in volatile laboratory blanks was 2-Hexanone in VBLKZ5 and VBLKX2 at an estimated concentration of 2 and 3 ug/kg respectively. With the exception of occasional instrument artifacts in some laboratory blanks, no TICs were detected.

   The major semivolatile contaminants in laboratory blanks were bis(2-ethyl hexyl) phthalate in SBLK40 at a concentration of 110 ug/kg and SBLK10 at a concentration of 230 ug/kg; di-n-butyl phthalate in SBLK10 and SBLK23 at a concentration of 45 ug/kg and 84 ug/kg respectively. Numerous blanks were found to contain other semi-volatiles and TICs. No pesticides were detected in laboratory blanks.

3. Results of analysis of trip blanks, method blanks and field blanks associated with water sampling and analysis, are summarized in Table B.3-5. Methylene Chloride was detected in the majority of the trip blanks and method blanks, as well as a field blank, 5000 derived from bailer rinsate. Acetone was also detected in a few laboratory method blanks and 1,1,2,2-tetrachlorethane was detected in one laboratory method blank at a low concentration of 2 ug/l. The former two constituents, methylene chloride and acetone are known to be

common laboratory contaminants while the later appears to be from an unknown source.

Chloroform at a concentration of 53 ug/l and bromodichloromethane at a concentration of 5 ug/l were detected in a background tap water sample. These constituents are commonly present in chlorinated public water supplies, which was the source of this sample. The only known semivolatile organic compound detected in one laboratory method blank, SBLK09 was naphthalene at a low concentration of 3 ug/l. Benzoic acid as well as two unknown semivolatile TICs were detected at an estimated concentration of 7 ug/l, 234 ug/l, and 20 ug/l in a background tap water sample. It appears that the low levels of these detected compounds appear to be either laboratory or field contaminants and not necessarily constituents in groundwater. No pesticides were detected in any of the field blanks and laboratory method blanks.

4. Results of analysis of laboratory blanks for dioxins and furans associated with soil and water sampling and analysis, are summarized in Table B.3-6. No dioxions and furans were detected in the blanks. Also, no detections were found in field blanks.

5. Table B.3-7 shows the summary results of inorganic constituents in field blanks, 5000 and 5001 as well as a background tap water sample, 4000. Water for use in generating field blanks was derived from public water supply. Detectable levels of beryllium, calcium, copper and zinc found in field blanks 5000 and 5001 reflect the natural levels expected in public water used in creating the field blanks. Field blank 5001 was a rinsate of soil sampling spoon with deionized water. The low detection of mercury (0.23 ug/l) and nickel (48.9 ug/l) in the rinsate is likely the result of decontamination of soil sampling spoon. Copper and zinc in tap water sample, 4000, although below State of Virginia groundwater standards, reflect the natural levels expected in public water. No significant abnormality is noted in the general water quality of field blanks. Slight variation in water quality in terms of alkalinity, hardness, and organic carbon content in tap water may be the result of probable laboratory contamination.

II. CHAIN OF CUSTODY DOCUMENTATION

№ 028332

NAC Sgz-1103

CHAIN OF CUSTODY RECORD

COMPUCHEM LABORATORIES

PROJ. NO.	PROJECT NAME
89-116	CompuChem Labs

SAMPLERS: (Signature)

116866

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	Total suspended solids	Total organic carbon	Total dissolved solids	Total Kjeldahl nitrogen			REMARKS
PW-2ADUP	6-27				270492	3	X	X	X	X			
PW-2A	"				270493	3	X	X	X	X			
													3-liters water
													~~Hardness~~ TKN 8.2089 + TOC has phos
													35 day TAT

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Joan Purdie	6-28-89 2:40pm	[illegible] 1300			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	

Distribution: Original Accompanies Shipment; Copy to Field

AR301462

III. METHODOLOGY

The samples were analyzed using methods as adopted from:

- EPA Methods for the Chemical Analysis of Water and Wastes, March, 1979.
- Standard Methods for the Examination of Water and Wastewater, 15th and/or 16th Edition.

IV. LABORATORY CHRONICLE

A. Date of Sampling: 6-27-89

B. Date of Receipt/Refrigeration: 6-29-89

C. Date of Analysis:

Parameter	Date Analyzed
Total Organic Carbon	6-29-89
Total Kjeldahl Nitrogen	7-5-89
Total Suspended Solids	6-29-89
Total Dissolved Solids	6-29-89

V. NON-COMPLIANCE/QA REPORT

None.

Supervisor Review and Approval: _____

VI. ANALYTICAL RESULTS

Parameter	Sample Designation 89L-1103-1 270492	89L-1103-2 270493
Total Organic Carbon	2.6	<1
Total Kjeldahl Nitrogen	<1	<1
Total Suspended Solids	7.4	7.9
Total Dissolved Solids	1,200	1,200
Units	(mg/l)	(mg/l)

VII. QUALITY ASSURANCE DATA

. Matrix Spike and Matrix Spike Duplicate Recoveries

Parameter	Sample Spiked	Amount of Spike, ug	Initial % Recovery	Duplicate % Recovery	Relative % Difference
TOC	1103-1	1,000	104	112	7.4
TKN	1103-2	5,000	91	94	3.2
TSS	1103-1	Duplicate	88	---	---
TDS	1103-1	Duplicate	100	---	---

NAC 89L-1103 DATE SAMPLED 6/27/89 DATE RECEIVED 6/28/89

WALK IN LOC D-1 SAMPLED BY: NAC (CLIENT) DATE DUE 7/26/89

CLIENT Compachem Labs

ADDRESS 3308 Chapel Hill/Nelson Hwy
Research Triangle Park
NC 27709

COC: (YES) NO

QUANTITY	MATRIX
2	Aqueous
	Solid/Slud./Oil
	Air/Filter/Tube

CONTACT/TITLE Angela Childress ECRA: YES NO

NAC NUMBER	CLIENT DESIGNATION	NAC NUMBER	CLEINT DESIGNATION
89L-1103-1	270492		
-2	270493		

Project: 89-116

ANALYTICAL TESTS

HT Input

ORGANIC	METALS	WET CHEM	WET CHEM
A280	PP	ACID	MBAS
502.1	SDW1	ALK	%SOL
503.1	SDW2	NH3	TS
502.2	Sb	pH	2 TSS 1-2
601	As	BOD	2 TDS 1-2
602	Ba	CO2	TVS
603	Be	COD	SO4
608	Al	CL	SO3
624	Au	CLDE	S
625	Cd	CLRE	L.I.
PCB	Ca	COLR	
HERB	Cr	COND	EP TOXICITY
PHC	HEX	CN	
O&G	Co	DO	OLD
2 TOC 1-2	Cu	F	NEW
TOX	Fe	HARD	MET
BTEX	Pb	FP	PEST
	Mg	REAC	HERB
Other Tests:	Mn	CN	VOA
	Hg	S	AEBN
	Ni	2 TKN 1-2	
	Se	NO3	BACTERIA
	Ag	NO2	
	Na	ODOR	TCMF
	Tl	PHEN	FCMF
	Sn	OPO4	FSMF
	K	TPO4	SPC
	Zn	TURB	

REMARKS:

NAC 8L4103

DATA REPORT FORM
WET CHEMISTRY

ANALYTICAL PARAMETER	NAC NUMBER -1	-2	MB			DUPLICATE SAMPLE #	SPIKE AMOUNT	% RECOVERY	% RECOVERY	RPD	ANALYSIS DATE	ANALYSIS TIME	NOTE BOOK #	ANALYST INITIALS
ALKALINITY														
AMMONIA-N														
pH														
BOD														
COD														
COLOR														
CONDUCTIVITY														
CYANIDE														
FLUORIDE														
HARDNESS														
FLASHPOINT														
REACTIVITY														
TKN	<1	<1	.28			1103-1	5.00 mg/l	91	94	3.2	7/5	9:00	527	DE
NITRATE-N														
NITRITE-N														
ODOR														
PHENOLICS														
O-PO4														
T-PO4														
TURBIDITY														
MBAS														
TS														
TSS	7.4 mg/l	7.9 mg/l	<5 mg/l			89L 1103-1	DUPL	88%			6/29/89	1900	515	[illegible]
TDS	1200 mg/l	1200 mg/l	<5 mg/l			89L 1103-1	DUPL	100%			6/29/89	1800	<15	[illegible]
TVS														
S. GRAVITY														
SO4														
SULFIDE														
T. COLIFORM														
F. COLIFORM														
F. STREP.														
CHLORIDE														

ARB01467

ARB01467

NAC 89L-1103

DATA REPORT FORM

ORGANIC

ANALYTICAL PARAMETER	NAC NUMBER -1	-2	MB			DUPLICATE SAMPLE #	DUPLICATE AMOUNT	SPIKE % RECOVERY	SPIKE % RECOVERY	DATA RPD	ANALYSIS DATE	ANALYSIS TIME	NOTEBOOK Page #	IN
ENDRIN														
LINDANE														
METHOXYCHLOR														
TOXAPHENE														
2,4-D														
2,4,5-TP														
EP TOX														
PET HYD														
O & G														
TOC	2.6	<1	<1			89L 1103-1	1mg	104	112	7.4	6/29	1900	495	BJ
TOX														
ALDRIN														
A-BHC														
B-BHC														
G-BHC														
D-BHC														
CHLORDANE														
DIELDRIN														
P,P'-DDE														
P,P'-DDT														
P,P'-DDD														
ENDOSULFAN														
ENDOSULF II														
ENDO. SULF														
ENDRIN														
ENDRIN ALD														
HEPTACHLOR														
HEPT. EPOX														
TOXAPHENE														
PCBs														
FORMALDEHYDE														
AIR-CHLD.														

INSTRUCTIONS:
1. Place an X in box if okay
2. Record actual pH if outside acceptable range
3. Record corrective action in remarks.
4. Temperature: Record actual temperature

PRESERVATIVE CHECKLIST
ENTER DATA TO INDICATE COMPLIANCE WITH
NJDEP REQUIREMENTS

pH ≤ 2											pH ≥ 12	TEMP	SAMPLES	
COD	NH3	TKN	TOX	VOA	PHENOL	TOC	PHC/O&G	METALS	HARD	TPO_4	CN	C	NAC #	REMARKS
		X				X						4°C	1103-1	
		X				X						↓	-2	

SPECIAL INSTRUCTIONS/NONCOMPLIANCE AND QA NOTATIONS

AR301469

SUBCONTRACT ANALYSIS REQUEST FORM

CLIENT ACCOUNT NO. 152905

ORDER NO. 16866 APPLIES TO REQ(S 931, 932

TO BE SUBCONTRACTED TO: (circle one) CHEMWEST,CA WEBB,NC EC JORDAN,ME (NAC,NJ) WARZYN,WI OTHER (indicate)

ID	CCN(1)	ANALYSIS	METHOD(2)	QA/QC(2)	DET.LIMIT(2)	HOLD TIME
PW-2A		TSS, VDS, TKN			* Normal	
PW-2A dup		TOC, TSS, VDS, TKN				

SPECIAL INSTRUCTIONS 3.

ATT: (contact at subcontract lab) ARE SAMPLES INVOLVED IN LITIGATION YES (NO) (circle one)

TURNAROUND REQ'D 33 REPORTING REQUIREMENTS(3)

(1)TO BE FILLED OUT BY RECEIVING
(2)IF PREFERRED OR KNOWN
(3)IF OTHER THAN STYLE "1"

AR301470

NAC Northeastern Analytical Corp.

ANALYTICAL REPORT

for

COMPUCHEM LABORATORIES
P.O. Box 12652
3308 Chapel Hill/Nelson Hwy
Research Triangle Park, NC 27709

Attention: Ms. Angela Childress, Manager Planning and Control

TEST REPORT NO. NAC89L-1098

PROJECT: Dames & Moore
Virginia Wood Preserves
17000-001

Client Designation	NAC Designation	Date Received	Matrix
270513, PW-2A	89L-1098-1	6-28-89	Aqueous
270514, PW-2A Duplicate	89L-1098-2	6-28-89	Aqueous

Laboratory Name: Northeastern Analytical Corp.

Certification No: 03117

Name: John M. Rissel

Title: Laboratory Manager

Date: July 18, 1989

AR301471

TABLE OF CONTENTS

File: 9L\COMPUCHM\89L-1098

I. SAMPLING INFORMATION

Not submitted.

II. CHAIN OF CUSTODY DOCUMENTATION

№ 011[redacted]4

CHAIN OF CUSTODY RECORD

COMPUCHEM LABO[redacted]ORIES

PROJ. NO.	PROJECT NAME
17000-001	Virginia Wood Preserving

SAMPLERS: (Signature) C. Kupec

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	TdvLP	220	REMARKS
	6/27/89	1400		X	PW-2A	1	✓		
		1410		X	PW-2A	1		✓	
		1400		X	PW-2ADUP	1	✓		
		1410		X	PW-2ADUP	1		✓	

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
C. Kupec	6/27/89 1900	FedEx			Richard Chitwood 6/28/89 1300
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	

Distribution: Original Accompanies Shipment; Copy to Field Files

AR301475

III. METHODOLOGY

The samples were analyzed using methods as adopted from:

- EPA Methods for the Chemical Analysis of Water and Wastes, March, 1979.
- Standard Methods for the Examination of Water and Wastewater, 15th and/or 16th Edition.

IV. LABORATORY CHRONICLE

A. Date of Sampling: 6-27-89

B. Date of Receipt/Refrigeration: 6-28-89

C. Date of Analysis:

Parameter	Date Analyzed
Total Phosphorus	6-28-89
Biochemical Oxygen Demand	6-28-89

V. NON-COMPLIANCE/QA REPORT

Samples for total phosphorus analysis were received unpreserved.

Supervisor Review and Approval: _____

VI. ANALYTICAL RESULTS

Parameter	Sample Designation 89L-1098-1 270513 (PW-2A)	89L-1098-2 270514 (PW-2A DUP)
Total Phosphorus, mg/l	<0.02	<0.02
Biochemical Oxygen Demand, 5 day total, mg/l	4.0	4.0

VII. QUALITY ASSURANCE DATA

Matrix Spike and Matrix Spike Duplicate Recoveries

Parameter	Sample Spiked	Amount of Spike, ug	Initial % Recovery	Duplicate % Recovery	Relative % Difference
TPO_4	0998-1	50	100	100	0
BOD	1098-2	1,000	104	106	1.9

NAC 89L4098 DATE SAMPLED 6/28/89 DATE RECEIVED 6/28/89

WALK IN LOC B-2 SAMPLED BY: NAC (CLIENT) DATE DUE 7/19/89

CLIENT Compuchem Labs COC: (YES) NO

ADDRESS 3308 Chapel Hill/Nelson Hwy
Research Triangle Park
NC 27709

QUANTITY	MATRIX
2	Aqueous
	Solid/Slud./Oil
	Air/Filter/Tube

CONTACT/TITLE Angela Childress ECRA: YES ___ NO ✓

NAC NUMBER	CLIENT DESIGNATION	NAC NUMBER	CLEINT DESIGNATION
89L4098-1	270513 (PW-2A)		
-2	270514 (PW-2ADUP)		

Project: Dames + Moore
Virginia Wood Preserves
17000-001

ANALYTICAL TESTS

ORGANIC	METALS	WET CHEM	WET CHEM
___A280	__PP	__ACID	__MBAS
___502.1	__SDW1	__ALK	__%SOL
___503.1	__SDW2	__NH3	__TS
___502.2	__Sb	__pH	__TSS
___601	__As	2 BOD 1-2	__TDS
___602	__Ba	__CO2	__TVS
___603	__Be	__COD	__SO4
___608	__Al	__CL	__SO3
___624	__Au	__CLDE	__S
___625	__Cd	__CLRE	__L.I.
___PCB	__Ca	__COLR	
___HERB	__Cr	__COND	EP TOXICITY
___PHC	__HEX	__CN	
___O&G	__Co	__DO	___OLD
___TOC	__Cu	__F	___NEW
___TOX	__Fe	__HARD	___MET
___BTEX	__Pb	__FP	___PEST
	__Mg	__REAC	___HERB
Other Tests:	__Mn	__CN	___VOA
	__Hg	__S	___AEBN
	__Ni	__TKN	
	__Se	__NO3	BACTERIA
	__Ag	__NO2	
	__Na	__ODOR	___TCMF
	__Tl	__PHEN	___FCMF
	__Sn	__OPO4	___FSMF
	__K	2 TPO4 1-2	___SPC
	__Zn	__TURB	

REMARKS:

6/28 @ 1530 Called Don Tower about getting a Compuchem project number, but he didn't have one available. He will get one and call back. DJT

16:30 Called Don back because TPO4 samples came in unpreserved. He authorized me to preserve as necessary, and said to notify Natalie as such. I called and left a message on her Tape. DJT

NAC 89L-1098

DATA REPORT FORM
WET CHEMISTRY

ANALYTICAL PARAMETER	NAC NUMBER -1	-2	MS	Control	DUPLICATE SPIKE DATA SAMPLE #	AMOUNT	% RECOVERY	% RECOVERY	RPD	ANALYSIS DATE	ANALYSIS TIME	NOTE BOOK #	ANALYST INITIALS
ALKALINITY													
AMMONIA-N													
pH													
BOD	4.0	4.0	<4	97%	89L-1098-2	1mg	104	106	1.9	6/28	1500	BOD	BJS
COD													
COLOR													
CONDUCTIVITY													
CYANIDE													
FLUORIDE													
HARDNESS													
FLASHPOINT													
REACTIVITY													
TKN													
NITRATE-N													
NITRITE-N													
ODOR													
PHENOLICS													
O-PO4													
T-PO4	<0.02	<0.02	<0.02	106%	89L-0998-1	50ug	100	100	0	6/28	1700	470	BJS
TURBIDITY													
MBAS													
TS													
TSS													
TDS													
TVS													
S. GRAVITY													
SO4													
SULFIDE													
T. COLIFORM													
F. COLIFORM													
F. STREP.													
CHLORIDE													

REV 11-88

CLIENT INFORMATION SHEET

COMPUCHEM LABORATORIES
3308 Chapel Hill/Nelson Highway
P.O. Box 12652
Research Triangle Park,
North Carolina 27709
Telephone 919/549-8263

At the end of the sampling period, it is vital to ship the sample via express transportation.

Please complete this form and return with the SampleSaver.

Thank you.

Sampling period

From:

Date 6/27/89

Time 1100

To:

Date 6/27/89

Time 1410

Company Dames & Moore

Address 7101 Wisconsin Ave.

City & State Bethesda MD Zip Code 20814

Sample Name/Number* P W - 2 A

*(sample ID can be no longer than 10 characters in length)

9 PW-2A DUP

IMPORTANT!!
All preservatives to be added at the time of sampling by the client!!!

INSTRUCTIONS:
1. Place an X in box if okay
2. Record actual pH if outside acceptable range
3. Record corrective action in remarks.
4. Temperature: Record actual temperature

PRESERVATIVE CHECKLIST
ENTER DATA TO INDICATE COMPLIANCE WITH
NJDEP REQUIREMENTS

pH ≤ 2											pH ≥ 12	TEMP	SAMPLES	
COD	NH3	TKN	TOX	VOA	PHENOL	TOC	PHC/O&G	METALS	HARD	TPO_4	CN	C	NAC #	REMARKS
										7.0		4°	1098-1	Preserved w/ H_2SO_4, pH<2
										7.0		↓	-2	↓
														Authorized by Don Tomel.

SPECIAL INSTRUCTIONS/NONCOMPLIANCE AND QA NOTATIONS

AR301483

NAC Northeastern Analytical Corp.

NORTHEASTERN ANALYTICAL CORPORATION

EVESHAM CORPORATE CENTER

4 EAST STOW ROAD

MARLTON, NJ 08053

FACSIMILE--TRANSMITTAL FORM

FAX NO. (609) 985-9700

CONFIRM NO. (609) 985-8000

DATE: 6/28/89 TIME SENDING: 10:15

TO: Don Tomec FROM: Chuck Childers

NUMBER OF PAGES FOLLOWING 2

CONFIRMATION REQUIRED: YES X NO ___

PLEASE NOTE: IF YOU DO NOT RECEIVE ALL OF THE PAGES INDICATED ABOVE, PLEASE CALL AS SOON AS POSSIBLE

COMPUCHEM LABORATORIES

FACSIMILE COVER PAGE

TO: Chuck Childers

COMPANY: NAC

FROM: Don Tomec Dept

Phone #: 1-800-833-5097

Number of pages including cover: 2.
Please contact sender directly if you did not receive all pages.

Facsimile Number: 919-248-6462

SUBCONTRACT ANALYSIS REQUEST FORM

CLIENT ACCOUNT NO. 152905

ORDER NO. 16866 APPLIES TO REQ(S 901, 902

89L-1098

TO BE SUBCONTRACTED TO: (circle one) CHEMWEST,CA WEBB,NC EC JORDAN,ME (NAC,NJ)
WARZYN,WI OTHER (indicate)

ID	CCN(1)	ANALYSIS	METHOD(2)	QA/QC(2)	DET. LIMIT(2)	HOLD TIME
PW-2A	270513	BOD, Total P			*	
PW-2A dup	270514	BOD, Total P				

SPECIAL INSTRUCTIONS Samples sent directly to NAC for analysis. Receiving to fill blanking with associated CCNS

ATT: _____ ARE SAMPLES INVOLVED IN LITIGATION YES (NO)
(contact at subcontract lab) (circle one)

TURNAROUND REQ'D 33 REPORTING REQUIREMENTS(3) NAC to generate reports

(1)TO BE FILLED OUT BY RECEIVING
(2)IF PREFERRED OR KNOWN
(3)IF OTHER THAN STYLE "I"

Donald F. Gau

Example:

NAC 89A1250 DATE SAMPLED _____ DATE RECEIVED _____

WALK IN ~~LOC~~ _____ SAMPLED BY: NAC CLIENT DATE DUE _____

CLIENT _____ COC: YES NO

ADDRESS _____ QUANTITY MATRIX

_____ ✓ Aqueous
_____ Solid/Slud./Oil
_____ Air/Filter/Tube

CONTACT/TITLE _____ ECRA: YES___ NO___

NAC NUMBER	CLIENT DESIGNATION	NAC NUMBER	CLEINT DESIGNATION

ANALYTICAL TESTS

ORGANIC	METALS	✓ WET CHEM	✓ WET CHEM
___A280 _____	__PP_____	__ACID___	__MBAS_____
___502.1_____	__SDW1____	__ALK ___	__%SOL_____
___503.1_____	__SDW2____	__NH3 ___	__TS _____
___502.2_____	__Sb _____	__pH ___	✓__TSS _____
___601 _____	__As _____	✓__BOD ___	✓__TDS _____
___602 _____	__Ba _____	__CO2 ___	__TVS _____
___603 _____	__Be _____	__COD ___	__SO4 _____
___608 _____	__Al _____	__CL ___	__SO3 _____
___624 _____	__Au _____	__CLDE___	__S _____
___625 _____	__Cd _____	__CLRE___	__L.I._____
___PCB _____	__Ca _____	__COLR___	
___HERB _____	__Cr _____	__COND___	EP TOXICITY
___PHC _____	__HEX_____	__CN ___	
___O&G _____	__Co _____	__DO ___	___OLD_____
___TOC _____	__Cu _____	__F ___	___NEW_____
___TOX _____	__Fe _____	__HARD___	___MET_____
___BTEX _____	__Pb _____	__FP ___	___PEST_____
	__Mg _____	__REAC___	___HERB_____
Other Tests:	__Mn _____	__ CN___	___VOA_____
_____	__Hg _____	__ S___	___AEBN_____
_____	__Ni _____	✓__TKN ___	
_____	__Se _____	__NO3 ___	BACTERIA
_____	__Ag _____	__NO2 ___	
_____	__Na _____	__ODOR___	___TCMF_____
_____	__Tl _____	__PHEN___	___FCMF_____
_____	__Sn _____	__OPO4___	___FSMF_____
_____	__K _____	✓__TPO4___	___SPC _____
_____	__Zn _____	__TURB___	

REMARKS: _____

AR301487

INSTRUCTIONS:

1. Place an X in box if okay
2. Record actual pH if outside acceptable range
3. Record corrective action in remarks.
4. Temperature: Record actual temperature

PRESERVATIVE CHECKLIST
ENTER DATA TO INDICATE COMPLIANCE WITH NJDEP REQUIREMENTS

pH ≤ 2											pH ≥ 12	TEMP	SAMPLES	REMARKS
COD	NH3	TKN	TOX	VOA	PHENOL	TOC	PHC/O&G	METALS	HARD	TPO_4	CN	C	NAC #	

SPECIAL INSTRUCTIONS/NONCOMPLIANCE AND QA NOTATIONS

AR301488

NAC

DATA REPORT FORM

METALS

ALYTICAL PARAMETER	NAC NUMBER					DUPLICATE SAMPLE #	DUPLICATE AMOUNT	SPIKE % RECOVERY	SPIKE % RECOVERY	DATA RPD	ANALYSIS DATE	ANALYSIS TIME	NOTE BOOK #	
ANTIMONY														
ARSENIC														
BARIUM														
BERYLLIUM														
CADMIUM														
CHROMIUM														
COPPER														
IRON														
LEAD														
MANGANESE														
MERCURY														
NICKEL														
SELENIUM														
SODIUM														
SILVER														
THALLIUM														
ZINC														
EP TOX														

AR301489

NAC

DATA REPORT FORM

WET CHEMISTRY

ANALYTICAL PARAMETER	NAC NUMBER					DUPLICATE SAMPLE #	DUPLICATE AMOUNT	SPIKE % RECOVERY	SPIKE % RECOVERY	DATA RPD	ANALYSIS DATE	ANALYSIS TIME	NOTE BOOK #	INI
ALKALINITY														
AMMONIA-N														
pH														
BOD														
COD														
COLOR														
CONDUCTIVITY														
CYANIDE														
FLUORIDE														
HARDNESS														
FLASHPOINT														
REACTIVITY														
TKN														
NITRATE-N														
NITRITE-N														
ODOR														
PHENOLICS														
O-PO4														
T-PO4														
TURBIDITY														
MBAS														
TS														
TSS														
TDS														
TVS														
S. GRAVITY														
SO4														
SULFIDE														
T. COLIFORM														
F. COLIFORM														
F. STREP.														
CHLORIDE														

AR301490

ATTACHMENT 4

P, KC, RE, RC, RD, JR, JR, IC

Rcld. 51 during Lab. Audit 7/17/89

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF ENVIRONMENTAL QUALITY
CN 027, TRENTON, N.J. 08625-0027

Jorge H. Berkowitz, Ph.D.
Director

(609) 292-5383

January 15, 1989

ATTN: Laboratory Manager

Enclosed is a copy of your laboratory's USEPA water pollution parameter proficiency results for WP-021. If you have not received an acceptable evaluation for any parameter you should:

1. Try to determine the cause of the unacceptable results and correct it.

2. Run quality control samples from EMSL-Cincinnati or in-house controls to assure yourself that the problem is corrected.

3. Write to this office outlining the steps that have been taken to correct the problem.

Failure to correct analytical problems which cause unacceptable performance evaluations may lead to suspension and/or decertification of your laboratory as a result of future water pollution studies.

Yours truly,

C. Don Bowyer

C. Don Bowyer
Principal Environmental Specialist

Office of Quality Assurance

CDB/mjr

Enclosure

NJ101 VALUATION REPORT DATE: 11/25/88
NORTHEASTERN ANALYTICAL CORP.
03117 STUDY NUMBER WP021

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
ARSENIC	1	409	390	298- 469	319- 447	ACCEPTABLE
	2	53.7	54.2	39.2- 67.4	42.8- 63.8	ACCEPTABLE
CADMIUM	1	224	222	189- 246	196- 239	ACCEPTABLE
	2	23.7	24.0	18.6- 27.6	19.8- 26.5	ACCEPTABLE
CHROMIUM	1	112	125	98.0- 149	104- 143	ACCEPTABLE
	2	38.7	41.7	30.7- 51.4	33.3- 48.8	ACCEPTABLE
COPPER	1	93.3	96.0	80.2- 111	84.1- 107	ACCEPTABLE
	2	7.79	8.00	3.03- 13.1	4.29- 11.9	ACCEPTABLE
IRON	1	213	210	174- 245	183- 236	ACCEPTABLE
	2	41.6	42.0	24.9- 58.5	29.1- 54.3	ACCEPTABLE
MERCURY	1	11.0	10.7	7.80- 12.9	8.44- 12.3	ACCEPTABLE
	2	1.61	1.47	.868- 2.07	1.02- 1.92	ACCEPTABLE
MANGANESE	1	311	315	281- 345	289- 337	ACCEPTABLE
	2	70.2	70.0	59.5- 79.0	61.9- 76.6	ACCEPTABLE
LEAD	1	127	126	100- 151	107- 145	ACCEPTABLE
	2	22.8	21.0	14.5- 29.2	16.4- 27.3	ACCEPTABLE
SELENIUM	1	179	180	129- 219	141- 207	ACCEPTABLE
	2	40.5	40.0	27.2- 49.1	30.0- 46.3	ACCEPTABLE
ZINC	1	192	190	163- 214	169- 207	ACCEPTABLE
	2	63.2	63.3	51.9- 73.2	54.5- 70.6	ACCEPTABLE
SILVER	3	1.03	0.95	.176- 1.77	.378- 1.57	ACCEPTABLE
	4	11.6	11.7	8.30- 14.9	9.12- 14.1	ACCEPTABLE
MINERALS IN MILLIGRAMS PER LITER: (EXCEPT AS NOTED)						
PH UNITS	3	5.57	5.61	5.47- 5.73	5.50- 5.70	ACCEPTABLE
	4	8.41	8.35	8.02- 8.58	8.09- 8.51	ACCEPTABLE

*BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT DATE: 11/25/88

WATER POLLUTION STUDY NUMBER WP021

LABORATORY: NJ101 Northeastern Analytical Corp. (02117)

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
MINERALS IN MILLIGRAMS PER LITER: (EXCEPT AS NOTED)						
CALCIUM	1	11.6	11.0	9.43- 12.5	9.82- 12.2	ACCEPTABLE
	2	85.9	95.0	81.7- 104	84.5- 101	ACCEPTABLE
NUTRIENTS IN MILLIGRAMS PER LITER:						
AMMONIA-NITROGEN (TKN) ✓	1	.295	0.270	.0896- .517	.141- .466	ACCEPTABLE ✓
	2	1.23	1.20	.856- 1.56	.942- 1.48	ACCEPTABLE ✓
NITRATE-NITROGEN	1	.255	0.250	.163- .334	.183- .313	ACCEPTABLE
	2	1.86	1.90	1.51- 2.26	1.60- 2.17	ACCEPTABLE
ORTHOPHOSPHATE	1	.0657	0.065	.0380-.0922	.0445-.0857	ACCEPTABLE
	2	.915	0.900	.762- 1.04	.796- 1.01	ACCEPTABLE
TOTAL PHOSPHORUS ✓	3	.163	0.150	.0960- .216	.110- .202	ACCEPTABLE ✓
	4	3.56	3.50	2.85- 4.33	3.03- 4.15	ACCEPTABLE ✓
DEMANDS IN MILLIGRAMS PER LITER:						
COD	1	41.5	43.5	29.1- 54.6	31.4- 51.2	ACCEPTABLE
	2	215	229	182- 252	191- 244	ACCEPTABLE
TOC ✓	1	16.6	17.2	14.4- 19.9	15.1- 19.2	ACCEPTABLE ✓
	2	89.8	90.5	73.1- 107	77.6- 103	ACCEPTABLE ✓
5-DAY BOD ✓	1	25.6	27.9	15.2- 40.1	18.3- 37.0	ACCEPTABLE ✓
	2	136	146	87.3- 199	101- 185	ACCEPTABLE ✓
PCB'S IN MICROGRAMS PER LITER:						
PCB-AROCLOR 1016/1242	1	3.46 42		D.L.- D.L. 13 - 51	D.L.- D.L. 15 42	NOT ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.
D.L. STANDS FOR DETECTION LIMIT

34.6

Meth WP023 1 Passed

2

1232 Trace -3.15-9.16 MISIDENTIFIED

PERFORMANCE EVALUATION REPORT DATE: 11/25/88

WATER POLLUTION STUDY NUMBER WP021

ORATORY: NJ101

NALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
PCB'S IN MICROGRAMS PER LITER:						
PCB-AROCLOR 1260	2	3.32	3.75	.994- 5.32	1.62- 4.69	ACCEPTABLE
PCB'S IN OIL IN MILLIGRAMS PER KILOGRAM:						
:B IN OIL- 1016/1242	2	37.0	42.6	13.3- 51.7	18.2- 46.9	ACCEPTABLE
:B IN OIL- 1260	1	7.53	7.12	2.14- 10.8	3.24- 9.69	ACCEPTABLE
PESTICIDES IN MICROGRAMS PER LITER:						
:HLORDANE	3	6.97	7.42	3.51- 9.75	4.31- 8.97	ACCEPTABLE
	4	1.97	2.48	.967- 3.56	1.30- 3.23	ACCEPTABLE
:LDRIN	1	.105	0.131	.0183- .209	.0424- .185	ACCEPTABLE
	2	.654	0.783	.152- 1.13	.275- 1.00	ACCEPTABLE
: :DRIN	1	.264	0.348	.193- .463	.227- .429	ACCEPTABLE
	2	.835	0.986	.512- 1.34	.616- 1.23	ACCEPTABLE
: D	1	.487	0.518	.175- .800	.254- .721	ACCEPTABLE
	2	.213	0.207	.0548- .458	.106- .407	ACCEPTABLE
E	1	.147	0.183	.0516- .307	.0839- .275	ACCEPTABLE
	2	.663	0.710	.335- 1.03	.423- .942	ACCEPTABLE
:T	1	.233	0.290	.110- .447	.153- .404	ACCEPTABLE
	2	1.06	1.13	.529- 1.60	.666- 1.47	ACCEPTABLE
EPTACHLOR	1	.547	0.651	.241- .902	.325- .819	ACCEPTABLE
	2	.0628	0.081	.0215- .133	.0355- .118	ACCEPTABLE

BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT DATE: 11/25/8

WATER POLLUTION STUDY NUMBER WP021

LABORATORY: NJ101

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
VOLATILE HALOCARBONS IN MICROGRAMS PER LITER:						
1,2 DICHLOROETHANE	1	5.82	7.31	4.21- 10.8	5.06- 9.95	ACCEPTABL
	2	44.7	59.4	38.4- 82.6	44.1- 76.9	ACCEPTABL
CHLOROFORM	1	4.68	5.38	2.50- 9.06	3.34- 8.22	ACCEPTABL
	2	30.7	34.2	23.1- 45.5	25.9- 42.6	ACCEPTABL
1,1,1 TRICHLOROETHANE	1	4.31	5.31	1.76- 9.55	2.75- 8.55	ACCEPTABL
	2	48.4	61.2	36.5- 91.6	43.5- 84.5	ACCEPTABL
TRICHLOROETHENE	1	2.20	4.82	2.30- 7.19	2.92- 6.57	NOT ACCEPTABL
	2	17.2	44.2	26.4- 61.4	30.9- 56.9	NOT ACCEPTABL
CARBONTETRACHLORIDE	1	5.75	8.63	4.32- 12.8	5.41- 11.8	ACCEPTABL
	2	50.9	68.1	42.2- 98.5	49.4- 91.3	ACCEPTABL
TETRACHLOROETHENE	1	1.70	2.88	1.26- 4.60	1.68- 4.17	ACCEPTABL
	2	34.8	61.9	37.4- 84.4	43.4- 78.4	NOT ACCEPTABL
BROMODICHLOROMETHANE	1	9.35	10.0	6.43- 13.7	7.35- 12.8	ACCEPTABL
	2	64.0	60.3	43.3- 82.8	48.4- 77.7	ACCEPTABL
DIBROMOCHLOROMETHANE	1	3.14	3.61	1.53- 5.41	2.02- 4.91	ACCEPTABL
	2	50.7	49.2	31.1- 71.5	36.3- 66.3	ACCEPTABL
BROMOFORM	1	2.27	3.29	.348- 5.55	1.01- 4.89	ACCEPTABL
	2	31.2	24.7	8.71- 41.7	12.9- 37.5	ACCEPTABL
METHYLENE CHLORIDE	1	53.0	71.1	39.1- 103	47.3- 95.1	ACCEPTABL
	2	3.16	4.26	1.28- 8.32	2.19- 7.41	ACCEPTABL
CHLOROBENZENE	1	8.10	9.63	5.89- 13.3	6.84- 12.3	ACCEPTABL
	2	27.8	38.5	25.9- 51.5	29.2- 48.2	CHECK FOR ER
VOLATILE AROMATICS IN MICROGRAMS PER LITER:						
BENZENE	1	69.8	59.4	35.0- 81.7	40.9- 75.8	ACCEPTAB
	2	10.3	11.5	7.26- 15.1	8.25- 14.1	ACCEPTAB

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY

PERFORMANCE EVALUATION REPORT DATE: 11/25/88

WATER POLLUTION STUDY NUMBER WP021

LABORATORY: NJ101

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
VOLATILE AROMATICS IN MICROGRAMS PER LITER:						
ETHYLBENZENE	1	30.3	35.9	24.5- 46.5	27.4- 43.6	ACCEPTABLE
	2	4.34	4.89	2.69- 6.40	3.17- 5.93	ACCEPTABLE
TOLUENE	1	52.3	56.4	39.8- 70.5	43.7- 66.6	ACCEPTABLE
	2	7.18	8.92	5.54- 11.7	6.32- 10.9	ACCEPTABLE
1,2-DICHLOROBENZENE	1	53.2	54.2	28.7- 78.5	35.4- 71.8	ACCEPTABLE
	2	3.82	4.34	2.17- 6.62	2.77- 6.02	ACCEPTABLE
1,3-DICHLOROBENZENE	1	40.6	43.3	24.2- 58.9	28.9- 54.2	ACCEPTABLE
	2	4.56	5.20	1.86- 8.26	2.72- 7.40	ACCEPTABLE
1,4-DICHLOROBENZENE	1	60.9	59.6	36.0- 82.9	42.1- 76.9	ACCEPTABLE
	2	5.51	6.26	2.31- 10.0	3.79- 9.03	ACCEPTABLE
MISCELLANEOUS PARAMETERS:						
TOTAL CYANIDE	1	.128	0.150	.0844- .196	.0986- .182	ACCEPTABLE
(MG/L)	2	.200	0.225	.128- .297	.150- .276	ACCEPTABLE
TOTAL RESIDUAL CHLORINE	1	.330	0.301	.107- .510	.165- .452	ACCEPTABLE
(MG/L)	2	1.80	1.91	1.29- 2.33	1.42- 2.19	ACCEPTABLE

*BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT DATE: 7/22/88

WATER SUPPLY STUDY NUMBER WS022

LABORATORY WJ101 Northeastern Analytical Corp. (03117)

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
TRACE METALS IN MICROGRAMS PER LITER:					
ARSENIC	1	5.28	5.33	3.49- 7.57	ACCEPTABLE
	2	27.3	28.4	22.7- 33.3	ACCEPTABLE
BARIUM	1	552	567	485.- 632.	ACCEPTABLE
	2	83.7	86.7	66.2- 105.	ACCEPTABLE
CADMIUM	1	41.4	** 42.0	32.5- 45.8	ACCEPTABLE
	2	3.26	3.36	2.60- 4.11	ACCEPTABLE
CHROMIUM	1	39.9	39.4	33.7- 45.3	ACCEPTABLE
	2	128	118	103.- 133.	ACCEPTABLE
COPPER	1	1290	1320	1220.-1400.	ACCEPTABLE
	2	22.6	22.0	18.5- 25.3	ACCEPTABLE
LEAD	1	5.67	5.28	3.31- 7.63	ACCEPTABLE
	2	66.6	66.0	54.9- 75.9	ACCEPTABLE
MERCURY	1	1.01	1.00	.656- 1.32	ACCEPTABLE
	2	6.86	7.50	5.57- 9.07	ACCEPTABLE
SELENIUM	1	26.7	26.6	20.4- 32.1	ACCEPTABLE
	2	81.4	76.0	58.3- 91.1	ACCEPTABLE
SILVER	1	71.2	73.3	65.2- 83.0	ACCEPTABLE
	2	5.43	5.38	3.98- 7.16	ACCEPTABLE
NITRATE/NITRITE/FLUORIDE IN MILLIGRAMS PER LITER:					
NITRATE AS N	1	1.46	1.50	1.27- 1.76	ACCEPTABLE
	2	5.90	6.02	4.98- 7.37	ACCEPTABLE
NITRITE AS N	1	.105	0.104	.0857- .122	ACCEPTABLE
	2	1.01	1.00	.871- 1.13	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.
** SIGNIFICANT GENERAL METHOD BIAS IS ANTICIPATED FOR THIS RESULT.

PERFORMANCE EVALUATION REPORT

DATE: 7/22/88

WATER SUPPLY STUDY NUMBER WS022

LABORATORY NJ101

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
NITRATE/NITRITE/FLUORIDE IN MILLIGRAMS PER LITER:					
FLUORIDE	1	.685	0.701	.631- .771	ACCEPTABLE
	2	1.48	1.46	1.31- 1.61	ACCEPTABLE
INSECTICIDES IN MICROGRAMS PER LITER:					
ALACHLOR	1	9.87	10.1	6.69- 12.7	ACCEPTABLE
	2	1.07	1.13	.624- 1.55	ACCEPTABLE
ENDRIN	1	6.75	6.71	4.32- 8.51	ACCEPTABLE
	2	.592	0.479	.333- .617	ACCEPTABLE
HEPTACHLOR	1	1.73	1.91	.897- 2.65	ACCEPTABLE
	2	.327	0.334	.141- .452	ACCEPTABLE
HEPTACHLOR EPOXIDE	1	1.47	1.55	1.01- 2.02	ACCEPTABLE
	2	.261	0.233	.150- .292	ACCEPTABLE
LINDANE	1	3.76	3.47	2.04- 4.74	ACCEPTABLE
	2	.101	0.116	.0629- .159	ACCEPTABLE
METHOXYCHLOR	1	108	65.4	32.7- 84.4	NOT ACCEPTABLE
	2	3.62	2.62	1.67- 3.54	NOT ACCEPTABLE
TOXAPHENE	3	9.47	8.94	5.04- 11.5	ACCEPTABLE
	4	2.60	2.58	1.26- 3.49	ACCEPTABLE
CHLORDANE	5	1.51	** 1.65	.851- 2.09	ACCEPTABLE
	6	6.25	** 6.60	4.15- 7.90	ACCEPTABLE
HERBICIDES IN MICROGRAMS PER LITER:					
2,4-D	1	73.7	** 89.6	34.6- 121.	ACCEPTABLE
	2	2.02	2.87	.498- 4.87	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

** SIGNIFICANT GENERAL METHOD BIAS IS ANTICIPATED FOR THIS RESULT.

PERFORMANCE EVALUATION REPORT

DATE: 7/22/88

WATER SUPPLY STUDY NUMBER WS022

LABORATORY NJ101

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
HERBICIDES IN MICROGRAMS PER LITER:					
2,4,5-TP (SILVEX)	1	21.3	** 25.0	8.47- 33.6	ACCEPTABLE
	2	.910	** 1.20	.409- 1.59	ACCEPTABLE
POLYCHLORINATED BIPHENYLS IN MICROGRAMS PER LITER:					
PCB-AROCLOR 1016/1242	1	.745	0.981	.544- 1.36	ACCEPTABLE
PCB-AROCLOR 1254	2	2.25	2.66	1.35- 3.45	ACCEPTABLE
TRIHALOMETHANES IN MICROGRAMS PER LITER:					
BROMODICHLOROMETHANE	1	14.0	16.7	13.4- 20.0	ACCEPTABLE
	2	46.0	55.7	44.6- 66.8	ACCEPTABLE
BROMOFORM	1	49.3	54.9	43.9- 65.9	ACCEPTABLE
	2	21.2	23.2	18.6- 27.8	ACCEPTABLE
CHLORODIBROMOMETHANE	1	64.6	67.6	54.1- 81.1	ACCEPTABLE
	2	16.4	14.2	11.4- 17.0	ACCEPTABLE
CHLOROFORM	1	34.1	42.4	33.9- 50.9	ACCEPTABLE
	2	17.0	21.2	17.0- 25.4	ACCEPTABLE
TOTAL TRIHALOMETHANE	1	162.0	181.6	145.- 218.	ACCEPTABLE
	2	100.6	114.3	91.4- 137.	ACCEPTABLE
VOLATILE ORGANIC COMPOUNDS IN MICROGRAMS PER LITER:					
BENZENE	1	5.42	6.32	3.79- 8.85	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.
** SIGNIFICANT GENERAL METHOD BIAS IS ANTICIPATED FOR THIS RESULT.

PERFORMANCE EVALUATION REPORT DATE: 7/22/88

WATER SUPPLY STUDY NUMBER WS022

LABORATORY NJ101

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
VOLATILE ORGANIC COMPOUNDS IN MICROGRAMS PER LITER:					
CARBON TETRACHLORIDE	1	3.79	3.65	2.19- 5.11	ACCEPTABLE
	2	7.35	8.36	5.02- 11.7	ACCEPTABLE
1,4-DICHLOROBENZENE	1	7.00	8.72	5.23- 12.2	ACCEPTABLE
	2	7.40	11.1	8.88- 13.3	NOT ACCEPTABLE
1,2-DICHLOROETHANE	1	2.04	2.56	1.54- 3.58	ACCEPTABLE
1,1-DICHLOROETHYLENE	1	4.02	4.35	2.61- 6.09	ACCEPTABLE
	2	11.2	13.5	10.8- 16.2	ACCEPTABLE
1,1,1-TRICHLOROETHANE	1	7.02	6.41	3.85- 8.97	ACCEPTABLE
TRICHLOROETHYLENE	1	2.58	2.57	1.54- 3.60	ACCEPTABLE
	2	9.89	11.0	8.80- 13.2	ACCEPTABLE
VINYL CHLORIDE	1	2.12	3.04	1.82- 4.26	ACCEPTABLE
CHLOROBENZENE	2	6.85	7.50	4.50- 10.5	ACCEPTABLE
1,2DIBROMO3CHLOROPROPANE	2	.260	0.235	.141- .329	ACCEPTABLE
DIBROMOMETHANE	2	4.18	5.12	3.07- 7.17	ACCEPTABLE
1,2 DICHLOROBENZENE	2	10.7	12.1	9.68- 14.5	ACCEPTABLE
T 1,2 DICHLOROETHYLENE	2	4.74	5.45	3.27- 7.63	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT DATE: 7/22/88

WATER SUPPLY STUDY NUMBER WS022

LABORATORY WJ101

ANALYTES	SAMPLE NUMBER	REPORTED VALUE		TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
VOLATILE ORGANIC COMPOUNDS IN MICROGRAMS PER LITER:						
DICHLOROMETHANE	2	2.52		2.60	1.56- 3.64	ACCEPTABLE
1,2 DICHLOROPROPANE	2	2.89		3.41	2.05- 4.77	ACCEPTABLE
ETHYLENE DIBROMIDE (EDB)	2	.200		0.150	.0900- .210	ACCEPTABLE
TETRACHLOROETHYLENE	2	4.04		4.52	2.71- 6.33	ACCEPTABLE
MISCELLANEOUS ANALYTES:						
RESIDUAL FREE CHLORINE (MILLIGRAMS PER LITER)	1	.450		0.521	.281- .773	ACCEPTABLE
	2	1.35		1.42	1.01- 1.79	ACCEPTABLE
TURBIDITY (NTU'S)	1	3.90		3.75	3.21- 4.29	ACCEPTABLE
	2	.370	**	0.350	.250- .612	ACCEPTABLE
TDS: TOTAL FILTERABLE RESIDUE (MILLIGRAMS PER LITER)	1	305	**	301	192.- 485.	ACCEPTABLE
CALCIUM (MG. CACO3/L)	1	155		148	136.- 159.	ACCEPTABLE
PH-UNITS	1	9.26		9.10	8.77- 9.34	ACCEPTABLE
ALKALINITY (MG. CACO3/L)	1	44.1	**	42.0	38.4- 48.0	ACCEPTABLE
CORROSIVITY (LANGELIER IND. AT 20C)	1	+1.15		0.92	.498- 1.24	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.
** SIGNIFICANT GENERAL METHOD BIAS IS ANTICIPATED FOR THIS RESULT.

PERFORMANCE EVALUATION REPORT

DATE: 7/22/88

WATER SUPPLY STUDY NUMBER WS022

LABORATORY NJ101

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
MISCELLANEOUS ANALYTES:					
SODIUM (MILLIGRAMS PER LITER)	1	20.1	19.3	17.7- 21.0	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

RLA 85 7/24/89

SEP. 0 3 1986

PERFORMANCE EVALUATION REPORT DATE: 07/09/86

DMR-QA STUDY NUMBER 006

RMITTEE: NJ0026565 ; BOROUGH OF FREEHOLD WWTP CX NJ0027545

ALYTES	V P	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
RSENIC	X	282	342	244.- 419.	266.- 397.	ACCEPTABLE
ADMIUM	X	310	307	269.- 348.	279.- 338.	ACCEPTABLE
ROMIUM	X	300	274	213.- 331.	227.- 316.	ACCEPTABLE
PPER	X	403	380	332.- 422.	344.- 411.	ACCEPTABLE
ON	X	1340	1311	1120.-1480.	1170.-1440.	ACCEPTABLE
AD	X	123	118.8	89.0- 146.	96.1- 139.	ACCEPTABLE
NGANESE	X	560	510	448.- 564.	463.- 550.	CHECK FOR ERROR
RCURY	X	51.0	50.0	34.4- 65.9	38.3- 61.9	ACCEPTABLE
INC	X	375	383	333.- 429.	345.- 417.	ACCEPTABLE
MISCELLANEOUS ANALYTES:						
-UNITS		6.66	6.70	6.54- 6.83	6.58- 6.80	ACCEPTABLE
TAL SUSPENDED SOLIDS N MG/L)		32.7	35.6	26.6- 37.5	28.0- 36.1	ACCEPTABLE

BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

ATTACHMENT B.2-4

Laboratory Performance Evaluation Report
CompuChem Laboratories, Inc.
Research Triangle Park, North Carolina

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL MONITORING SYSTEMS LABORATORY-LAS VEGAS
P.O. BOX 93478
LAS VEGAS, NEVADA 89193-3478
(702/798-2100 · FTS 545-2100)

Received 81 August 7, '89

APR 17 1989

Mr. Richard Bloom
CompuChem Lab
3308 Chapel Hill/Nelson Hwy.
Research Triangle Park, NC 27709

Dear Mr. Bloom:

The Individual Laboratory Summary Report (ILSR) summarizing your laboratory's results for the Second Quarter Organic Performance Evaluation Sample (QB2, FY89) is enclosed for your information and review. Please review your score as listed on the ILSR to determine the actions which are required to correct any deficiencies. Performance categories:

- Acceptable, No Response Required (Score--90 or above):

  Data meets most or all of the scoring criteria. No response is required.

- Acceptable, Response Explaining Deficiency(ies)Required (Score--Greater than or equal to 70, less than 90):

  Deficiencies exist in your performance.

  Within 14 days of receipt of this letter, please describe the deficiency(ies) and the action(s) taken to correct the deficiency(ies) listed on the ILSR in a letter to the Project Officer, the Deputy Project Officer and the EMSL-LV.

- Unacceptable, Response Explaining Deficiency(ies) Required (Score--Less than 70):

  Deficiencies exist in the your performance to the extent that the National Program Office has determined that you have not demonstrated the capability to meet the contract requirements.

Within 14 days of receipt of this letter, please describe the deficiency(ies) and the action(s) taken to correct the deficiency(ies) listed on the ILSR in a letter to the Project Officer, the Deputy Project Officer, and the EMSL-LV.

Note: These instructions are for advisory purposes only. If any apparent conflict exists between these instructions and the contract, follow the contract.

INSTRUCTIONS: Second Quarter Organic Performance Evaluation Sample Set (QB2,FY89)
Superfund Contract Laboratory (CLP) program

A) Sample Description -

Enclosed is the Second Quarter Organic Performance Evaluation (PE) sample set (QB2,FY89). The Performance Evaluation Materials (PEM's) are described here so that you can determine if the set is complete. The set consists of water samples. The water samples consist of four (4) 80-ounce Base, Neutral, Acid, and Pesticide (BNAP) bottles and six (6) 40-mL Volatile Organic Analyses (VOA) vials. All organic sample materials MUST be kept cold. Following examination of these materials, they MUST be transferred to a refrigerator for storage at four (4) degrees centigrade. Do not allow freezing to occur. Note that three (3) of the BNAP bottles are marked "Sample," and one (1) is marked "Blank." Likewise, four (4) of the VOA vials are marked "Sample," and two (2) are marked "Blank." Sample containers, in each category (semi-volatile/pesticide or volatile), contain identical samples from the same batch aliquoted into either 80-ounce bottles for semi-volatiles/pesticide or 40-mL vials for volatiles. This means that all three (3) semi-volatile/pesticide sample bottles are identical, and that all four (4) of the volatile sample vials are identical. Likewise, the volatiles blank containers are identical.

The volatile organic analysis materials (VOA) (40-mL vials) MUST NOT be opened until the analysis is to occur as the analytes may be lost. The semi-volatile/pesticide analysis materials (80-ounce bottles) must be shaken thoroughly prior to extraction.

If you hold a VOA only contract, and do not hold a full organics contract, you have received only the VOA PEM's.

B) Breakage and Missing items -

Upon examining the enclosed materials, any broken or missing items must be reported to Dr. Larry Butler at the EMSL-LV at (702) 798-2114 or FTS: 545-2114.

C) Standards -

You must provide your own working standards and calibration solutions and demonstrate traceability to Quality Assurance Materials Bank (QAMB) standards. EPA supplies standards for purposes of traceability only, and cannot supply you with working standards. Your laboratory must obtain its own QAMB standards for the purposes of traceability. Contact the QAMB or the QAMB Project Officer to make those arrangements.

D) Analysis Requirements and Modifications to Protocol -

The samples and blanks are to be processed as described in the statement-of-work contained in your current contract. Forms needed for data reporting are in your contract. Forms must be filled out completely in the exact order and format provided as required by your contract. No modifications to your contract are intended by these instructions unless specifically mentioned above. The EMSL-LV is performing method checks for the CLP. We request that you identify the method used in the final concentration step (either Nitrogen (N_2) blow-down or micro Kuderna Danish) in your case narrative. It would also be most helpful if you identify whether you use continuous extractors or separatory funnel extractions. If you decide to provide this information please note it in your cover letter.

E) Deadlines and Data Shipping Addressees -

The complete data package for this PE analysis is required in its entirety to be delivered to the EMSL-LV by the contractually required deadline. This includes, but may not be limited to, all contract requirements for the use of EPA forms submitted in the required order, all QA/QC, and the delivery of raw data. Please study your contract carefully before submitting the complete data package to:

Dr. Larry Butler, Supervisor
Performance Evaluation Program
Quality Assurance Research Branch (QAB)
Quality Assurance and Methods Development Division (QAD)
Environmental Protection Agency
P.O. Box 93478
Las Vegas, NV 89193-3478

The above address is for U. S. Mail. Those laboratories wishing to use private carriers for overnight delivery must use the street address
below:

Dr. Larry Butler, Supervisor
Performance Evaluation Program
Quality Assurance Research Branch (QAB)
Quality Assurance and Methods Development Division (QAD)
Environmental Protection Agency
944 E. Harmon
Las Vegas, NV 89119

Other addressees, which are listed in your contract, must also receive data packages as required by contract.

Note that Saturday delivery is not possible at the EMSL-LV since no personnel are on duty to receive such packages. Packages marked for Saturday Delivery will not be received until the following Monday or business day.

(EMSL-LV FILE: QB2089IN)

You shall be notified by the Project Officer or Deputy Project Officer concerning the remedy for your unacceptable performance. You may expect, but the Agency is not limited to, the following actions: reduction of the number of samples sent under the contract, suspension of sample shipment to you, a site visit, a full data audit, and/or analysis of remedial PE samples.

NOTE: Your prompt response demonstrating that corrective action has been taken to ensure your capability to meet contract requirements will facilitate continuation of full sample delivery.

Questions concerning the appropriate response to this letter must be forwarded to your Deputy Project Officer. Questions concerning the scoring procedure used in QB2 or errors in scoring the QB2 sample must be directed to the EMSL-LV. Thank you for your cooperation in this study.

Sincerely,

Larry Butler, Ph.D., Supervisor
Performance Evaluation Program
Quality Assurance Research Branch
Quality Assurance and Methods
Development Division

Enclosures:

Individual Laboratory Summary Report
Performance Evaluation Material Preparation Instructions
Organic Performance Evaluation Material Scoring Procedure
Description of the Individual Laboratory Summary Report

ORGANIC PERFORMANCE EVALUATION MATERIAL SCORING PROCEDURE

OVERVIEW:

An integral responsibility of the Contract Laboratory Program's (CLP) quality assurance program is the monitoring of the CLP contractor's continuing ability to produce acceptable analytical data. To assist in this process, the EMSL-LV, under the direction of the CLP National Program Office (NPO), prepares and ships Performance Evaluation Materials (PEM) each quarter to all contract laboratories. Contractors are required to analyze the PEM and return data packages within the contract-required turn-around time. The PEM results are evaluated and summarized by the EMSL-LV. The EMSL-LV forwards the PEM results to the NPO and the Deputy Project Officers (DPO). The NPO, in conjunction with the DPO, determines the appropriate remedial action(s) when the PEM results are unacceptable.

NOTE: If determined that unusual problems occurred with either the PEM or the scoring procedures, the CLP National Program Office reserves the right to adjust scores for any PEM study.

COMPOUNDS ADDED TO THE PEM:

Compounds added to the PEM are classified into two different groups:

1) Target Compound List (TCL) Compounds -- Compounds included on the Target Compound List in Exhibit C of the contract Statement-of-Work. The EMSL-LV adds TCL compounds to matrices that mimic the type of samples analyzed by the CLP. Points are deducted when a TCL compound is not identified, when a TCL compound is mis-quantified, or when a TCL compound that has not been added to the matrix is identified by the contractor (See, "Scoring Procedures Used for Classifying a TCL Compound as a TCL Contaminant").

2) Non-TCL Compounds (non-TCL), also referred to as Tentatively Identified Compounds (TIC) -- Compounds which are not included on the Target Compound List in Exhibit C of the contract Statement-of-Work, but are contaminants found in the environment. A contractor identifies the compounds using a forward library search routine which compares the sample compound spectra against spectra in the National Bureau of Standards (NBS) Mass Spectral Library. The EMSL-LV adds TIC compounds to matrices that mimic the type of samples analyzed by the CLP. Points are deducted when a TIC compound is not identified or when a TIC compound that has not been added to the matrix is identified by the contractor (See, "Scoring Procedures Used for Classifying a Non-TCL Compound as a Non-TCL Contaminant").

GENERAL SCORING PROCEDURE COMMENTS:

The following comments apply to the scoring procedure discussed in this enclosure.

For the TCL and TIC identification scoring procedures, the NPO reserves the right to delete compounds from the study if a large percentage of the contractors do not identify the compounds.

Confidence intervals (CI) for TCL compounds are derived from the CLP contractor-submitted values, using statistical procedures. When determining the CI for a TCL compound, if the lower CI limit is less than the Contract Required Quantitation Limit (CRQL) for the compound, the lower CI limit is set to the CRQL. If the upper CI limit is less than the CRQL for the compound, the compound is not included in the scoring procedure. For information concerning the statistical procedures used to develop the CI for the CLP PEM program, contact Larry Butler, at the EMSL-LV.

For the TCL and TIC contaminant classification procedures, the NPO will not deduct points if the NPO determines that the contaminant was a breakdown product from the compounds added to the PEM or that the matrix used to prepare the PEM contained the contaminant.

SCORING ALGORITHMS:

The following algorithms are used to score the full-organic and the volatiles (VOA)-only PEM:

Algorithm 1 (Full-organic PEM):

$$\text{Score} = 100 - \left[\left[\frac{150 * (2A + B + C)}{X} \right] + \left[2.2 * (D + E) \right] \right]$$

Algorithm 2 (VOA-only PEM):

$$\text{Score} = 100 - \left[\left[\frac{100 * (2A + B + C)}{X} \right] + \left[2.2 * (D + E) \right] \right]$$

Where:

X = The number of TCL compounds, added to the PEM, which were included and scored in the PEM.

A = The number of TCL compounds, added to the PEM, which the contractor did not identify.

B = The number of TCL compounds, added to the PEM, which the contractor did not correctly quantify (value is not within the action CI).

C = The number of TCL compounds, not added to the PEM (contaminants), which the contractor identified.

D = The number of non-TCL (TIC) compounds, added to the PEM, which the contractor did not identify.

E = The number of TIC contaminants which the contractor identified.

The TIC term, [2.2 * (D + E)], is limited to a maximum deduction of 11 points.

SCORING PROCEDURES USED WHEN A CONTRACTOR DOES NOT IDENTIFY A TCL COMPOUND:

The following scoring procedures are used when a contractor does not identify a TCL compound added to the PEM:

1) If a contractor reports the CRQL (e.g., 10 U) for a TCL compound, and the CRQL is less than the lower limit of the action CI (e.g., 40 to 100), points are deducted.

2) If a contractor reports a detection limit value (e.g., 50 U) for a TCL compound, greater than the compound's CRQL (e.g., 20), and the contractor's detection limit value is included within or is greater than the limits of the action CI (e.g., 40 to 100), points are deducted.

SCORING PROCEDURES USED WHEN A CONTRACTOR DOES NOT IDENTIFY A NON-TCL COMPOUND:

The following scoring procedures are used when a contractor does not identify a TIC compound added to the PEM:

1) If a contractor does not identify a TIC compound added to the PEM, points are deducted.

2) For those TIC compounds which have similar mass spectra, if a contractor reports an isomer of the compound, points are not deducted.

SCORING PROCEDURE USED WHEN A CONTRACTOR DOES NOT CORRECTLY QUANTIFY A TCL COMPOUND:

The following scoring procedure is used when a contractor does not correctly quantify a TCL compound added to the PEM:

1) If a contractor reports a value for a TCL compound, not within the limits of the action CI, points are deducted.

SCORING PROCEDURES USED FOR CLASSIFYING A TCL COMPOUND AS A TCL CONTAMINANT:

A TCL contaminant is defined as an identification of a TCL compound that was not added to the PEM and was not in the matrix material used to prepare the PEM. The following scoring procedures are used when a contractor identifies a TCL contaminant.

1) If the TCL contaminant's concentration is reported as greater than the limit for the TCL compound, points are deducted. For the common solvents and the phthalate esters, the limit is defined as five times the compound's CRQL. For all other TCL compounds, the limit is defined as the compound's CRQL.

2) Note: Identification of TCL compounds added to the PEM will be classified as TCL contaminants when a) a CI was not calculated for the compound and b) the contractor reported an unusually high concentration of the compound.

SCORING PROCEDURES USED FOR CLASSIFYING A NON-TCL COMPOUND AS A NON-TCL CONTAMINANT:

A TIC contaminant is defined as an identification of a TIC compound that was not added to the PEM and was not in the matrix material used to prepare the PEM. The following scoring procedures are used when a contractor identifies a TIC contaminant.

1) If the TIC contaminant's concentration is reported as greater than the limit, points are deducted. For the TIC contaminants, the limits are: VOA water, 5 ppb; VOA soil, 5 ppb; semivolatiles (BNA) water, 10 ppb, and BNA soil, 330 ppb, at low concentrations.

2) Note: The TIC compounds added to the PEM are scored for identification only, regardless of reported concentration.

DESCRIPTION OF THE INDIVIDUAL LABORATORY SUMMARY REPORT

OVERVIEW:

The Individual Laboratory Summary Report (ILSR) summarizes the information from the CLP's quarterly PEM study. The report is comprised of two parts: contractor data summary and program data summary. Information from an individual CLP contractor is summarized in the contractor data summary. Information from all CLP contractors is summarized in the program data summary.

EXPLANATION OF ILSR HEADER INFORMATION:

Contractor Data Summary:

Header	Definition
LABORATORY	The contractor's name and location (state)
PERFORMANCE	A contractor's performance is classified into one of three categories. ACCEPTABLE, No Reponse Required: Score greater than or equal to 90 percent. ACCEPTABLE, Response Explaining Deficiency(ies) Required: Score greater than or equal to 70 percent and less than 90 percent. UNACCEPTABLE, Response Explaining Deficiency(ies) Required: Score less than 70 percent.
RANK	Ranking of CLP contractors' scores. Above = : Number of contractors whose scores were greater than that contractor's score. Same = : Number of contractors whose scores were equal to that contractor's score. Below = : Number of contractors whose scores were less than that contractor's score.
% SCORE	Percent score calculated using either the full-organic or the VOA-only PEM algorithm.
REPORT DATE	The date that the ILSR was printed. Format (month/day/year).
MATRIX	PEM matrix.

Contractor Data Summary (cont.):

Header	Definition
COMPOUND	The name of the compound. Compounds are categorized into 10 categories. TCL VOLATILE: All TCL VOA compounds added to the PEM are listed. TCL SEMIVOLATILE: All TCL BNA compounds added to the PEM are listed. TCL PESTICIDE: All TCL pesticide (PES) compounds added to the PEM are listed. NON-TCL VOLATILE: All TIC VOA compounds added to the PEM are listed. NON-TCL SEMIVOLATILE: All TIC BNA compounds added to the PEM are listed. TCL VOLATILE (Contaminants): All TCL VOA contaminants are listed. (For the definition of a TCL contaminant, see "Scoring Procedures Used for Classifying a TCL Compound as a TCL Contaminant".) TCL SEMIVOLATILE (Contaminants): All TCL BNA contaminants are listed. TCL PESTICIDE (Contaminants): All TCL PES contaminants are listed. NON-TCL VOLATILE (Contaminants): All TIC VOA contaminants are listed. (For the definition of a TIC contaminant, see "Scoring Procedures Used for Classifying a Non-TCL Compound as a Non-TCL Contaminant".) NON-TCL SEMIVOLATILE (Contaminants): All TIC BNA contaminants are listed.

Contractor Data Summary (cont.):

Header	Definition
CONFIDENCE INTERVALS	Confidence intervals (CI) calculated for each TCL compound using the statistical procedure. WARNING: Warning limits - LOWER: The lower CI limit. UPPER: The upper CI limit. ACTION: Action limits - LOWER: The lower CI limit. UPPER: The upper CI limit.
LABORATORY DATA	Contractor-reported values and EMSL-LV qualifiers. CONC: Contractor-reported concentration. Q: Qualifier codes.
# OF TCL COMPOUNDS NOT-IDENTIFIED	The number of TCL compounds the contractor did not identify in the PEM -- points deducted.
# OF TCL COMPOUNDS MIS-QUANTIFIED	The number of TCL compounds the contractor did not correctly quantify -- points deducted.
# OF TCL CONTAMINANTS	The number of TCL contaminants the contractor identified -- points deducted.
# OF NON-TCL COMPOUNDS NOT-IDENTIFIED	The number of TIC compounds the contractor did not identify - points deducted.
# OF NON-TCL CONTAMINANTS	The number of TIC contaminants the contractor identified -- points deducted.

Program Summary Data:

Header	Definition
# LABS MIS-QNT:	The number of CLP contractors who did not correctly quantify a TCL compound added to the PEM.
# LABS NOT-ID:	The number of CLP contractors who did not identify a TCL or TIC compound added to the PEM.

Contractor Data Summary (cont.):

Header	Definition
# LABS ID-CPD:	The number of CLP contractors who identified a TCL or TIC compound in the PEM.
TOTAL # LABS:	The number of CLP contractors who analyzed the PEM.
ILSR CODES:	The following codes are used on the ILSR.

U -- Compound analyzed for but not detected.

& -- Compound not identified -- points deducted for identification.

X -- Compound correctly identified but the reported value is not within the action limit -- points deducted for quantification.

$ -- The reported value for the compound is not within the warning limit but is within the action limit -- points not deducted.

C -- Contaminant -- points deducted.

CO -- Contaminant which may have been introduced during preparation of the PEM or during shipment -- points not deducted.

NS -- Data required but not submitted -- points deducted.

NR -- Data not required.

NU -- Data not used; insufficient amount of usable data for scoring submitted by the contractors.

ORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 2 FY 89

LABORATORY: CompuChem Laboratories (NC)
PERFORMANCE: ACCEPTABLE - Response Explaining Deficiency(ies) Required
RANK: Above = 29 Same = 4 Below = 31

% SCORE: 88.0
REPORT DATE: 03/21/89
MATRIX: WATER

COMPOUND	CONFIDENCE INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY DATA CONC	Q	#LABS MIS-QNT	PROGRAM #LABS NOT-ID	DATA #LABS ID-CPD	TOTAL #LABS
TCL VOLATILE										
CHLOROMETHANE	36	96	28	105	39		8	0	65	65
VINYL CHLORIDE	15	29	13	31	15		6	0	65	65
METHYLENE CHLORIDE	NU	NU	NU	NU	20		0	0	65	65
ACETONE	NU	NU	NU	NU	20		0	16	49	65
1,1-DICHLOROETHANE	10	14	9	15	11		4	0	65	65
1,2-DICHLOROETHENE (TOTAL)	15	22	14	23	17		6	0	65	65
CHLOROFORM	9	12	8	13	11		2	0	65	65
1,2-DICHLOROETHANE	8	13	8	13	11		5	3	62	65
2-BUTANONE	NU	NU	NU	NU	10	B	0	26	39	65
1,1,1-TRICHLOROETHANE	8	11	7	11	8		5	0	65	65
CARBON TETRACHLORIDE	6	11	6	11	8		4	1	64	65
TRICHLOROETHENE	8	11	7	11	9		5	0	65	65
BENZENE	8	11	8	12	10		4	0	65	65
TETRACHLOROETHENE	7	11	7	12	9		4	0	65	65
TOLUENE	8	11	7	12	10		3	0	65	65
CHLOROBENZENE	8	11	8	12	9		3	0	65	65
ETHYL BENZENE	NU	NU	NU	NU	5	U	0	32	33	65
TCL SEMIVOLATILE										
PHENOL	NU	NU	NU	NU	14		0	8	57	65
BIS(2-CHLOROETHYL)ETHER	28	43	26	51	18	X	3	0	65	65
2-CHLOROPHENOL	24	42	22	51	37		2	0	65	65
1,3-DICHLOROBENZENE	NU	NU	NU	NU	10	U	0	65	0	65
1,4-DICHLOROBENZENE	21	35	20	37	30		5	0	65	65
1,2-DICHLOROBENZENE	11	18	10	21	16		1	0	65	65
N-NITROSO-DI-N-PROPYLAMINE	28	43	26	51	34		2	1	64	65
BENZOIC ACID	50	177	50	254	120		1	5	60	65
NAPHTHALENE	11	17	10	21	15		2	0	65	65
4-CHLOROANILINE	18	46	14	50	36		9	5	60	65
HEXACHLOROBUTADIENE	18	31	16	37	29		4	0	65	65
2-METHYLNAPHTHALENE	11	17	10	20	15		3	0	65	65
2,4,5-TRICHLOROPHENOL	87	138	80	165	110		3	0	65	65
2-CHLORONAPHTHALENE	11	18	10	22	17		1	0	65	65
ACENAPHTHYLENE	13	19	12	20	21	X	7	0	65	65
ACENAPHTHENE	13	19	12	20	17		6	0	65	65
4-NITROPHENOL	50	218	50	311	120		0	0	65	65
DIETHYLPHTHALATE	16	96	10	107	22		1	1	64	65
4-CHLOROPHENYL PHENYL ETHER	33	51	30	54	47		4	0	65	65
FLUORENE	13	20	12	21	18		4	0	65	65
4-NITROANILINE	51	125	50	136	78		5	0	65	65
4-BROMOPHENYL PHENYL ETHER	49	76	45	90	67		4	1	64	65
PENTACHLOROPHENOL	53	90	50	96	100	X	3	0	65	65
PHENANTHRENE	13	20	12	21	17		5	0	65	65
ANTHRACENE	13	19	12	20	17		11	0	65	65
DI-N-BUTYLPHTHALATE	16	142	10	160	40		0	0	65	65
FLUORANTHENE	12	18	11	22	17		3	0	65	65
PYRENE	12	19	11	20	21	X	5	0	65	65
BENZO(A)ANTHRACENE	11	18	10	21	16		1	1	64	65
CHRYSENE	13	20	12	21	21	$	5	0	65	65
BENZO(B)FLUORANTHENE	11	19	10	20	20	$	9	0	65	65
BENZO(K)FLUORANTHENE	11	21	10	23	18		10	0	65	65
BENZO(A)PYRENE	11	17	10	21	15		11	1	64	65
INDENO(1,2,3-CD)PYRENE	10	18	10	21	14		2	2	63	65
DIBENZ(A,H)ANTHRACENE	10	18	10	22	16		1	2	63	65
BENZO(G,H,I)PERYLENE	10	18	10	22	14		2	2	63	65
TCL PESTICIDES										
4,4'-DDE	2.6	5.7	2.2	6.1	3.8		6	0	65	65

ORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR QB 2 FY 89

LABORATORY: CompuChem Laboratories (NC)
PERFORMANCE: ACCEPTABLE - Response Explaining Deficiency(ies) Required
RANK: Above = 29 Same = 4 Below = 31

% SCORE: 88.0
REPORT DATE: 03/21/89
MATRIX: WATER

COMPOUND	CONFIDENCE INTERVALS WARNING LOWER	WARNING UPPER	ACTION LOWER	ACTION UPPER	LABORATORY DATA CONC	Q	#LABS MIS-QNT	PROGRAM #LABS NOT-ID	DATA #LABS ID-CPD	TOTAL #LABS
4,4'-DDD	2.8	6	2.3	6.5	4		8	0	65	65
TOXAPHENE	4.7	11	3.8	12	9.6		6	17	48	65
NON-TCL SEMIVOLATILE										
ATRAZINE					20			13	52	65
BENZOPHENONE					66			6	59	65
CARBAZOLE					0			25	40	65
NON-TCL SEMIVOLATILE (Contaminants)										
D-GALACTITOL,2-(ACETYLMETHY					54			63	2	65

OF TCL COMPOUNDS NOT-IDENTIFIED: 0
OF TCL COMPOUNDS MIS-QUANTIFIED: 4
OF TCL CONTAMINANTS: 0

OF NON-TCL COMPOUNDS NOT-IDENTIFIED: 0
OF NON-TCL CONTAMINANTS: 0

E87047
NC028
CompuChem Labs, Inc.

E EVALUATION REPORT DATE: 6/ 9

STUDY NUMBER WP022

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMAN EVALUATIO
TRACE METALS IN MICROGRAMS PER LITER:						
ALUMINUM	1	379	350	269- 439	290- 418	ACCEPTA
	2	1170	1150	931- 1340	982- 1290	ACCEPTA
ARSENIC	1	39.6	45.1	35.6- 55.5	38.0- 53.0	ACCEPTA
	2	206	226	171- 272	184- 259	ACCEPTA
BERYLLIUM	1	435	400	347- 449	360- 436	ACCEPTA
	2	87.5	80.1	68.4- 91.2	71.3- 88.3	ACCEPTA
CADMIUM	1	94.5	85.1	74.1- 100	77.4- 97.0	ACCEPTA
	2	336	320	277- 375	289- 363	ACCEPTA
COBALT	1	208	200	171- 229	179- 222	ACCEPTA
	2	916	900	787- 1010	816- 983	ACCEPTA
CHROMIUM	1	625	600	485- 703	512- 676	ACCEPTA
	2	153	150	118- 179	125- 171	ACCEPTA
COPPER	1	837	820	753- 893	770- 876	ACCEPTA
	2	74.0	76.2	65.4- 86.0	67.9- 83.4	ACCEPTA
IRON	1	1900	1827	1650- 2030	1690- 1980	ACCEPTA
	2	778	749	652- 859	678- 833	ACCEPTA
MERCURY	1	7.37	8.69	6.40- 11.1	6.99- 10.5	ACCEPTA
	2	0.672	0.853	.457- 1.23	.654- 1.13	ACCEPTA
MANGANESE	1	298	292	263- 318	270- 311	ACCEPTA
	2	972	970	886- 1050	906- 1030	ACCEPTA
NICKEL	1	396	370	319- 419	331- 407	ACCEPTA
	2	624	622	547- 691	565- 673	ACCEPTA
LEAD	1	403	415	361- 479	376- 464	ACCEPTA
	2	90.9	91.9	71.5- 115	77.0- 110	ACCEPTA

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSAI

PERFORMANCE EVALUATION REPORT DATE: 6/ 9/

WATER POLLUTION STUDY NUMBER WP022

LABORATORY: NC028

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
SELENIUM	1	44.2	48.0	33.0- 58.5	36.2- 55.3	ACCEPTA
	2	13.4	12.0	6.24- 16.7	7.56- 15.4	ACCEPTA
VANADIUM	1	1490	1497	1270- 1710	1330- 1650	ACCEPTA
	2	465	479	420- 553	437- 536	ACCEPTA
ZINC	1	427	401	347- 446	359- 434	ACCEPTA
	2	222	210	181- 237	188- 230	ACCEPTA
ANTIMONY	3	55.7	55.2	37.2- 76.2	42.4- 71.0	ACCEPTA
	4	20.8	20.7	11.1- 31.8	13.9- 29.1	ACCEPTA
SILVER	3	7.63	7.30	5.44- 9.15	5.91- 8.68	ACCEPTA
	4	6.75	0.73	.395- 1.12	.486- 1.03	NOT ACCEPTA
THALLIUM	3	12.1	12.8	8.92- 17.5	10.0- 16.4	ACCEPTA
	4	70.6	91.2	65.8- 119	72.9- 112	CHECK FOR E
MOLYBDENUM	3	6.99	7.04	2.68- 10.1	3.63- 9.13	ACCEPTA
	4	14.0	13.2	6.75- 19.2	8.45- 17.5	ACCEPTA
STRONTIUM	3	24.2	24.4	19.0- 29.8	20.4- 28.4	ACCEPTA
	4	6.23	6.10	4.55- 7.72	4.96- 7.31	ACCEPTA
TITANIUM	3	66.3	74.2	53.2- 94.7	58.9- 89.1	ACCEPTA
	4	171	185	142- 228	154- 216	ACCEPTA
MINERALS IN MILLIGRAMS PER LITER: (EXCEPT AS NOTED)						
PH-UNITS	3	5.83	5.80	5.66- 5.91	5.69- 5.88	ACCEPTA
	4	7.79	7.80	7.55- 7.97	7.60- 7.92	ACCEPTA
CALCIUM	1	3.30	4.47	3.84- 5.77	4.08- 5.53	NOT ACCEPTA
	2	32.3	30.2	26.0- 34.3	27.0- 33.3	ACCEPTA

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSA

PERFORMANCE EVALUATION REPORT DATE: 6/ 9

WATER POLLUTION STUDY NUMBER WP022

LABORATORY: NC028

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMAN EVALUATIC
MINERALS IN MILLIGRAMS PER LITER: (EXCEPT AS NOTED)						
MAGNESIUM	1	1.68	1.70	1.44- 1.97	1.50- 1.91	ACCEPTA
	2	24.9	23.0	19.5- 26.2	20.3- 25.4	ACCEPTA
SODIUM	1	7.24	7.58	6.31- 8.92	6.64- 8.59	ACCEPTA
	2	76.6	72.3	63.7- 80.0	65.7- 77.9	ACCEPTA
POTASSIUM	1	28.8	30.3	25.4- 34.5	26.5- 33.3	ACCEPTA
	2	5.01	5.50	4.63- 6.61	4.88- 6.36	ACCEPTA
FLUORIDE	1	1.66	1.60	1.39- 1.78	1.44- 1.73	ACCEPTA
	2	0.168	0.160	.0837- .235	.103- .216	ACCEPTA
SULFATE	1	38.5	38.0	30.6- 44.3	32.3- 42.6	ACCEPTA
	2	6.29	6.10	2.92- 8.80	3.65- 8.07	ACCEPTA
DEMANDS IN MILLIGRAMS PER LITER:						
TOC	1	8.55	11.5	9.45- 16.0	10.3- 15.2	NOT AC[illegible]TA
	2	35.0	37.0	30.6- 43.2	32.3- 41.6	AC[illegible]TA
PCB'S IN MICROGRAMS PER LITER:						
PCB-AROCLOR 1248	1	4.49	5.62	2.54- 7.16	3.11- 6.58	ACCEPT.
PCB-AROCLOR 1254	2	1.00	2.07	1.09- 3.77	1.30- 3.72	ACCEPT
PCB'S IN OIL IN MILLIGRAMS PER KILOGRAM:						
PCB IN OIL- 1254	1	6.62	12.5	3.68- 18.3	5.53- 16.4	ACCEPT

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSA

PERFORMANCE EVALUATION REPORT DATE: 6/ 9

WATER POLLUTION STUDY NUMBER WP022

LABORATORY:- NC028

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMAN EVALUATIC
PCB'S IN OIL IN MILLIGRAMS PER KILOGRAM:						
PCB IN OIL- 1260	2	21.9	36.3	3.69- 58.3	10.6- 51.4	ACCEPT/
PESTICIDES IN MICROGRAMS PER LITER:						
CHLORDANE	3	4.36	5.86	2.80- 7.74	3.43- 7.11	ACCEPT/
	4	1.40	1.60	.758- 2.12	.932- 1.95	ACCEPT.
ALDRIN	1	0.500	0.647	.170- .873	.260- .784	ACCEPT.
	2	0.220	0.265	.0646- .370	.103- .331	ACCEPT.
DIELDRIN	1	0.530	0.546	.300- .720	.354- .666	ACCEPT.
	2	0.130	0.137	.0764- .190	.0905- .176	ACCEPT/
DDD	1	1.05	0.949	.439- 1.31	.550- 1.20	ACCEPT.
	2	0.450	0.356	.155- .529	.203- .481	ACCEPT
DDE	1	0.660	0.656	.297- .912	.376- .833	ACCEPT
	2	0.250	0.234	.110- .345	.140- .315	ACCEPT
DDT	1	1.04	0.825	.370- 1.16	.468- 1.06	ACCEPT
	2	0.210	0.206	.0709- .325	.103- .292	ACCEPT
HEPTACHLOR	1	0.680	0.833	.326- 1.11	.426- 1.01	ACCEPT
	2	0.150	0.146	.0531- .210	.0732- .190	ACCEPT
HEPTACHLOR EPOXIDE	1	0.560	0.586	.332- .777	.389- .720	ACCEPT
	2	0.130	0.110	.0561- .152	.0684- .140	ACCEPT
VOLATILE HALOCARBONS IN MICROGRAMS PER LITER:						
1,2 DICHLOROETHANE	1	60.8	67.4	41.2- 96.1	48.1- 89.2	ACCEPT
	2	13.3	15.5	9.32- 22.4	11.0- 20.7	ACCEPT

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSA

PERFORMANCE EVALUATION REPORT DATE: 6/

WATER POLLUTION STUDY NUMBER WP022

LABORATORY: NC028

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORM EVALUAT
VOLATILE HALOCARBONS IN MICROGRAMS PER LITER:						
CHLOROFORM	1	67.9	74.5	49.3- 96.2	55.1- 90.3	ACCEP
	2	10.0	10.6	6.40- 15.3	7.54- 14.2	ACCEP
1,1,1 TRICHLOROETHANE	1	39.1	53.1	31.9- 73.7	37.2- 68.5	ACCEP
	2	14.5	19.9	11.4- 30.5	13.9- 28.1	ACCEP
TRICHLOROETHENE	1	65.4	61.9	37.7- 85.4	43.8- 79.3	ACCEP
	2	16.3	18.7	11.1- 26.1	13.0- 24.2	ACCEP
CARBONTETRACHLORIDE	1	68.9	75.8	40.0- 109	48.6- 100	ACCEP
	2	14.3	18.4	9.64- 26.6	11.8- 24.5	ACCEP
TETRACHLOROETHENE	1	55.7	74.8	44.6- 103	52.1- 95.4	ACCEP
	2	15.3	17.1	9.38- 24.4	11.3- 22.6	ACCEP
BROMODICHLOROMETHANE	1	56.2	54.6	35.8- 73.8	40.5- 69.0	ACCEP
	2	12.1	12.8	8.48- 18.3	9.74- 17.1	ACCEP
DIBROMOCHLOROMETHANE	1	58.5	61.3	39.6- 88.8	45.9- 82.5	[illegible]EP
	2	9.45	11.5	6.75- 17.1	8.07- 15.8	ACCEP
BROMOFORM	1	58.8	52.8	31.1- 79.4	37.3- 73.2	ACCEP
	2	22.0	24.6	13.8- 37.0	16.8- 34.1	ACCEP
METHYLENE CHLORIDE	1	48.7	47.7	25.5- 67.8	30.8- 62.5	ACCEP
	2	16.8	14.9	7.50- 23.3	9.53- 21.3	ACCEP
CHLOROBENZENE	1	61.7	67.0	43.0- 90.8	49.0- 84.8	ACCEP
	2	20.3	20.9	13.6- 28.1	15.4- 26.3	ACCEP
VOLATILE AROMATICS IN MICROGRAMS PER LITER:						
BENZENE	1	18.0	21.6	14.2- 29.6	16.1- 27.7	ACCE
	2	81.7	94.5	61.9- 125	69.8- 117	ACCE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECES

PERFORMANCE EVALUATION REPORT DATE: 6/ 9

WATER POLLUTION STUDY NUMBER WP022

LABORATORY: NC028

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMAN EVALUATIO
VOLATILE AROMATICS IN MICROGRAMS PER LITER:						
ETHYLBENZENE	1	8.45	11.3	6.53- 15.0	7.59- 14.0	ACCEPTA
	2	56.8	66.2	38.3- 88.2	44.5- 81.9	ACCEPTA
TOLUENE	1	11.9	13.4	8.75- 17.6	9.87- 16.5	ACCEPTA
	2	66.4	73.8	47.9- 96.4	54.0- 90.3	ACCEPTA
1,2-DICHLOROBENZENE	1	10.9	13.1	7.46- 18.7	8.94- 17.2	ACCEPTA
	2	36.1	41.8	24.1- 59.3	28.7- 54.7	ACCEPTA
1,3-DICHLOROBENZENE	1	11.5	13.8	7.93- 18.9	9.38- 17.4	ACCEPTA
	2	62.0	72.7	45.9- 92.7	51.8- 86.8	ACCEPTA
1,4-DICHLOROBENZENE	1	10.9	12.1	6.69- 18.0	8.20- 16.5	ACCEPTA
	2	48.6	51.7	31.2- 74.9	37.1- 69.0	ACCEPTA
MISCELLANEOUS PARAMETERS:						
TOTAL CYANIDE (IN MG/L)	1	0.795	0.890	.562- 1.14	.635- 1.07	ACCEPTA
	2	0.058	0.070	.0300-.0998	.0388-.0910	ACCEPTA
OIL AND GREASE (IN MG/L)	1	28.3	12.0	6.32- 16.4	7.57- 15.1	NOT ACCEPTA
	2	46.5	19.8	10.7- 24.8	12.5- 23.0	NOT ACCEPTA
TOTAL PHENOLICS (IN MG/L)	1	0.225	0.268	.127- .409	.162- .374	ACCEPTA
	2	0.538	0.646	.307- 1.01	.395- .920	ACCEPTA

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSAR

ATTACHMENT B.3

Summary Results of Laboratory Data Review

TABLE B.3-1

Sample Container, Volume, Preservation, and Holding Time Requirements for Water

Parameter	Container	Preservation	Holding Time
COMPUCHEM LABORATORIES			
Volatiles	2 x 40 ml; G	4°C	7 days
Semivolatiles	3 x 1 liter; G	4°C	5 days extraction, 40 days analysis,
Pesticides/PCB's	2 x 1 liter; AG	4°C	10 days extraction, 40 days analysis
Metals	2 x 500 ml; P	Filter 0.45 um pH 2 (HNO_3) 4°C	180 days
CHEMWEST ANALYTICAL LABORATORIES			
Dioxins and Furans	3 x 1 liter; AG	4°C	10 days extraction, 40 days analysis
COD	1 x 1 liter; G	pH 2 (H_2SO_4) 4°C	28 days
Hardness	1 x 500 ml; P	pH 2(HNO_3) 4°C	180 days
Alkalinity	1 x 500 ml; P	4°C	14 days
Thiocyanate	1 x 1 liter; G	pH 12 (NaOH) 4°C	14 days

TABLE B.3-1 (cont'd)

Parameter	Container	Preservation	Holding Time
NORTHEASTERN ANALYTICAL CORPORATION			
TOC	1 x 1 liter; AG	pH 2 (H_2SO_4) 4°C	28 days
TKN	1 x 1 liter; G	pH 2 (H_2SO_4) 4°C	28 days
BOD	1 x 1 liter; G	4°C	48 hours
Total Phosphorus	1 x 1 liter; G	4°C	48 hours
TDS, TSS	1 x 1 liter; G	4°C	7 days

Notes: AG - amber glass
G - clear glass
P - plastic

TABLE B.3-2

Sample Container, Volume, Preservation, and Holding Time
Requirements for Soil and Sediment

Parameter	Container	Preservation	Holding Time
COMPUCHEM LABORATORIES			
Volatiles	2 x 40 ml VOA vial; G[a]	4°C	10 days
Semivolatiles, Pesticides/PCB's	1 x 1 liter; G[b,c]	4°C	10 days extraction, 40 days analysis
Metals	1 x 1 liter; P, G[b,c]	4°C	180 days
CHEMWEST ANALYTICAL LABORATORIES			
Dioxins and Furans	1 x 4 oz; AG[d]	4°C	10 days extraction, 40 days analysis
NORTHEASTERN ANALYTICAL CORPORATION			
TOC	1 x 4 oz; G	4°C	28 days

Notes: AG - amber glass
G - glass
P - plastic

[a]One vial was used for sampling wells that had low recharge.

[b]These samples may be placed in a common 1 liter glass container for shipment to the laboratory. That is, one 1-liter filled bottle provides sufficient sample for all three analyses.

[c]One half-liter container was sufficient to provide sample volume necessary for analyses.

[d]In the event that an amber bottle is unavailable, wrap a clear bottle in aluminum foil to keep out light.

TABLE B.3-3

Analytical Methods

Analytical Group	Method[a]	Laboratory Performing Analysis
TCL volatiles	CLP - Organics SOW	CompuChem
TCL semivolatiles	CLP - Organics SOW	CompuChem
TCL pesticides/PCBs	CLP - Organics SOW	CompuChem
TAL metals including, arsenic, chromium, copper, and zinc	CLP - Inorganics SOW	CompuChem
Dioxins and furans	EPA-SW-846 - Method 8280, Isomer Specific	ChemWest
TOC	EPA-600 #415.1	NAC
BOD	EPA-600 #405.1/SM #507	NAC
COD	EPA-600 #410.4	ChemWest
TKN	EPA-600 #351.3	NAC
TSS	EPA-600 #160.2	NAC
TDS	EPA-600 #160.1	NAC
Hardness	EPA-600 #130.2	ChemWest
Phosphorus, Total	EPA-600 #365.2, Procedure (00665)	NAC
Alkalinity	EPA-600 #310.1	ChemWest
Thiocyanate	SM #412L	ChemWest

[a]References:

1. CLP SOW - Organics
   EPA Contract Laboratory Program. Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration. 10/86. Revised 1/87, 2/87, 7/87, 8/87, 2/88.
2. CLP SOW - Inorganics
   EPA Contract Laboratory Program. Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration. SOW No. 787. Revised 7/88.
3. EPA-SW-846 - Test Methods for Evaluating Solid Waste, 3rd edition, Nov. 1986.
4. EPA 600/4-79-020 - Methods for Chemical Analysis of Water and Waste, March 1979.
5. SM = Standard Methods for the Examination of Water and Wastewater, 16th edition.

TABLE B.3-4
Summary Results of Analysis of Laboratory Blanks for Organic Parameters
Associated with Soil Sampling and Analysis
Virginia Wood Preserving Site, Richmond, Virginia

Blank I.D. (a)	Case No.	SDG No. (b)	Analysis Date	Units	Volatiles	Volatile TICs	Semi-volatiles	Semi-volatile TICs	Pesticides
SBLK57	16759	159	6/1/89	ug/kg	NA (c)	NA	ND (d)	Blank Contaminant - 200J	NA
VBLKY3	16866	1115	8/8/89	ug/kg	Methylene chloride - 610J Acetone - 1500	Instrument artifact - 630J	NA	NA	NA
VBLKY4	16866	1115	8/9/89	ug/kg	Methylene chloride - 480J	Instrument artifact - 1000J	NA	NA	NA
PBLK27	16866	1115	8/8/89	ug/kg	NA	NA	NA	NA	ND
PBLK09	16866	1115	8/11/89	ug/kg	NA	NA	NA	NA	ND
VBLKM5	16866	525	6/6/89	ug/kg	Methylene chloride - 18 Acetone - 11 Chloroform - 1J	ND	NA	NA	NA
VBLKM6	16866	525, 17	6/8/89	ug/kg	Methylene chloride - 10 Acetone - 12	ND	NA	NA	NA
VBLKP4	16866	525, 17	6/8/89	ug/kg	Methylene chloride - 14 Acetone - 13 Chloroform - 2J	ND	NA	NA	NA
VBLKR4	16866	525	6/13/89	ug/kg	Methylene chloride - 11 Acetone - 12 Chloroform - 1J	ND	NA	NA	NA
SBLK61	16866	525	6/3/89	ug/kg	NA	NA	ND	Blank Contaminant - 300J Blank contaminant - 230J Tribromophenol isomer - 200J Unknown - 130J Unknown - 230J	NA
SBLK77	16866	525	6/9/89	ug/kg	NA	NA	ND	Blank Contaminant - 300J Blank Contaminant - 300J	NA
SBLK77	16866	525	6/8/89	ug/kg	NA	NA	ND	Blank Contaminant - 300J Blank Contaminant 300J Aldol - 200AJ Tribromophenol isomer - 230J	NA
PBLK28	16866	525	6/5/89	ug/kg	NA	NA	NA	NA	ND
VBLKL4	16866 16759	17, 175	6/4/89	ug/kg	Methylene chloride - 5 Acetone - 35	ND	NA	NA	NA
VBLKP1	16866	17	6/8/89	ug/kg	Methylene chloride - 14	ND	NA	NA	NA
VBLKP9	16866	17	6/10/89	ug/kg	Methylene chloride - 6 Acetone - 15	ND	NA	NA	NA
VBLKC3	16759	74	5/30/89	ug/kg	Methylene chloride - 6 Acetone - 8J	ND	NA	NA	NA
VBLKC6	16759	74	5/31/89	ug/kg	Methylene chloride - 8 Acetone - 35	ND	NA	NA	NA
SBLK47	16759	74	5/31/89	ug/kg	NA	NA	ND	Blank contaminant - 4308J Blank contaminant - 3708J	NA
SBLK40	16759	74	5/31/89	ug/kg	NA	NA	bis(2-ethylhexyl) phthalate - 110J	Blank contaminant - 370J Blank contaminant - 300J	NA
VBLKH2	16759	175	5/31/89	ug/kg	Methylene chloride - 13 Acetone - 28	ND	NA	NA	NA
VBLKH4	16759	175	6/1/89	ug/kg	Methylene chloride - 19 Acetone - 22	ND	NA	NA	NA
VBLKJ8	16759	175, 159	6/1/89	ug/kg	Methylene chloride - 11 Acetone - 21 Chloroform - 1J	ND	NA	NA	NA

TABLE 8.3-4 (Cont'd)
Summary Results of Analysis of Laboratory Blanks for Organic Parameters
Associated with Soil Sampling and Analysis
Virginia Wood Preserving Site, Richmond, Virginia

Blank I.D. (a)	Case No.	SDG No. (b)	Analysis Date	Units	Volatiles	Volatile TICs	Semi-volatiles	Semi-volatile TICs	Pesticides
SBLK50	16759	175	6/2/89	ug/kg	NA	NA	ND	Blank contaminant - 370J Blank contaminant 270J	NA
SBLK73	16759	175	6/7/89	ug/kg	NA	NA	ND	ND	NA
SBLK50	16759	175	6/2/89	ug/kg	NA	NA	ND	Blank contaminant - 430J Blank contaminant - 370J	NA
VBLKK6	16759	159	6/2/89	ug/kg	Methylene chloride - 360J Acetone 740J	Instrument artifact - 1100J	NA	NA	NA
VBLKL4	16759	159	6/4/89	ug/kg	Methylene chloride - 5 Acetone - 35	ND	NA	NA	NA
VBLKL8	16759	159	6/6/89	ug/kg	Methylene chloride - 9 Acetone - 13 Chloroform - 1J	ND	NA	NA	NA
VBLKE4	16759	159	5/31/89	ug/kg	Methylene chloride - 22 Acetone - 26	ND	NA	NA	NA
VBLKE5	16759	159	6/1/89	ug/kg	Methylene chloride - 8 Acetone - 15	ND	NA	NA	NA
VBLKG7	16759	17	5/31/89	ug/kg	Methylene chloride - 12 Acetone - 21 Chloroform - 1	ND	NA	NA	NA
VBLKE9	16759	17	5/31/89	ug/kg	Methylene chloride - 14	ND	NA	NA	NA
VBLKG8	16759	17	5/31/89	ug/kg	Methylene chloride - 19 Acetone - 25 Chloroform - 2J	ND	NA	NA	NA
VBLKC9	16759	17	5/27/89	ug/kg	Methylene chloride - 7 Acetone - 14	ND	NA	NA	NA
VBLKL6	16759	17	6/3/89	ug/kg	Methylene chloride - 760 Acetone - 1200J	Instrument artifact - 1300J	NA	NA	NA
SBLK10	16759	17	5/23/89	ug/kg	NA	NA	bis(2-ethylhexyl)phthalate - 230J	Blank contaminant - 300J Blank contaminant - 270J	NA
SBLK17	16759	17	5/24/89	ug/kg	NA	NA	DI-n-butyl-phthalate - 45J	ND	NA
SBLK36	16759	17	5/30/89	ug/kg	NA	NA	ND	Octane, 4-methyl - 370J Heptane, 4-(1-methylethyl) - 300J Blank contaminant - 270J Blank contaminant - 200J Blank contaminant - 530J Blank contaminant - 700J Aldol - 170AJ Unknown - 270J	NA
SBLK23	16759	17	5/26/89	ug/kg	NA	NA	DI-n-butyl-phthalate - 84J	ND	NA
PBLK91	16759	17	5/30/89	ug/kg	NA	NA	ND	ND	ND
SBLK25	16759	17	5/26/89	ug/kg	NA	NA	Blank contaminant - 170J Aldol - 270AJ Tribromophenol Isomer - 130J	ND	NA
SBLK54	16759	17	6/2/89	ug/kg	NA	NA	ND	ND	NA
VBLKF1	16759	74	5/31/89	ug/kg	Methylene chloride - 14 Acetone - 23	ND	NA	NA	NA
VBLKF2	16759	74	6/1/89	ug/kg	Methylene chloride - 15 Acetone - 28	ND	NA	NA	NA
VBLKH2	16759	74	5/31/89	ug/kg	Methylene chloride - 13 Acetone - 28	ND	NA	NA	NA

TABLE B.3-4 (cont'd)
Summary Results of Analysis of Laboratory Blanks for Organic Parameters
Associated with Soil Sampling and Analysis
Virginia Wood Preserving Site, Richmond, Virginia

Blank I.D. (a)	Case No.	SDG No. (b)	Analysis Date	Units	Volatiles	Volatile TICs	Semi-volatiles	Semi-volatile TICs	Pesticides
VBLKJ2	16759	74	6/2/89	ug/kg	Methylene chloride - 8 Acetone - 18	ND	NA	NA	NA
SBLK17	16866	1088	8/4/89	ug/kg	NA	NA	ND	Blank contaminant - 700BJ Blank contaminant - 730BJ Aldol - 200AJ	NA
SBLK40	16866	1088	8/8/89	ug/kg	NA	NA	ND	Blank contaminant - 270BJ Heptane, 4-(1-methylethyl) - 230J Unknown - 270J	NA
SBLK45	16866	1088	8/8/89	ug/kg	NA	NA	ND	Blank contaminant - 530BJ Blank contaminant - 800BJ Blank contaminant - 730BJ Aldol - 200AJ	NA
SBLK40	16866	1088	8/11/89	ug/kg	NA	NA	ND	Blank contaminant - 430J Blank contaminant - 370J	NA
PBLK65	16866	1088	7/31/89	ug/kg	NA	NA	NA	NA	ND
PBLK83	16866	1088	7/31/89	ug/kg	NA	NA	NA	NA	ND
PBLK14	16866	1088	8/2/89	ug/kg	NA	NA	NA	NA	ND
PBLK44	16866	1088	8/9/89	ug/kg	NA	NA	NA	NA	ND
VBLKY5	16759	17	5/23/89	ug/kg	Methylene chloride - 9	ND	NA	NA	NA
VBLKZ5	16759	17	5/25/89	ug/kg	Methylene chloride - 8 Acetone - 13 Chloroform - 1J 2-Hexanone - 1J	ND	NA	NA	NA
VBLKA9	16759	17	5/25/89	ug/kg	Methylene chloride - 9 Acetone - 8J	ND	NA	Instrument artifact - 10J	NA
VBLKB8	16759	17	5/26/89	ug/kg	Methylene chloride - 14 Acetone - 24 Chloroform - 2J	ND	NA	Instrument artifact - 10J	NA
VBLKB9	16759	17	5/27/89	ug/kg	Methylene chloride - 9 Acetone - 20	ND	NA	Instrument artifact - 12J	NA
VBLKC4	16866	1061	7/25/89	ug/kg	Methylene chloride - 390J	Instrument artifact - 880J	NA	NA	NA
VBLKD8	16866	1061	7/27/89	ug/kg	Methylene chloride - 370J	ND	NA	NA	NA
VBLKG4	16866	1061	7/27/89	ug/kg	Methylene chloride - 200J	ND	NA	NA	NA
SBLK47	16866	1061	7/25/89	ug/kg	NA	NA	ND	ND	NA
SBLK42	16866	1061	7/24/89	ug/kg	NA	NA	ND	ND	NA
PBLK95	16866	1061	7/24/89	ug/kg	NA	NA	NA	NA	ND
PBLK11	16866	1061	7/25/89	ug/kg	NA	NA	NA	NA	ND
VBLKI2	16866	1088	7/28/89	ug/kg	Methylene chloride - 7 Acetone - 12 Chloroform - 1	ND	NA	NA	NA
VBLKL6	16866	1088	8/2/89	ug/kg	Methylene chloride - 6 Acetone - 18	ND	NA	NA	NA
VBLK05	16866	1088	8/2/89	ug/kg	Methylene chloride - 16 Acetone - 21	ND	NA	NA	NA
VBLKS5	16866	1088	8/7/89	ug/kg	Methylene chloride - 8 Acetone - 37	ND	NA	NA	NA

TABLE B.3-4 (cont'd)
Summary Results of Analysis of Laboratory Blanks for Organic Parameters
Associated with Soil Sampling and Analysis
Virginia Wood Preserving Site, Richmond, Virginia

Blank I.D. (a)	Case No.	SDG No. (b)	Analysis Date	Units	Volatiles	Volatile TICs	Semi-volatiles	Semi-volatile TICs	Pesticides
VBLKX2	16866	1088	8/7/89	ug/kg	Methylene chloride - 13 Acetone - 37 Chloroform - 1j 2-Hexanone - 3j	ND	NA	NA	NA
SBLK73	16866	1088	7/30/89	ug/kg	NA	NA	ND	Blank contaminant - 630J Blank contaminant - 500J	NA
SBLK98	16866	1088	8/1/89	ug/kg	NA	NA	ND	Blank contaminant - 6000J Blank contaminant - 5300J Aldol - 1700J	NA
SBLK62	16866	17	6/2/89	ug/kg	NA	NA	ND	Blank contaminant - 430J Blank contaminant - 400J Surrogate Isomer - 270J	NA
SBLK66	16866	17	6/5/89	ug/kg	NA	NA	ND	Blank contaminant - 200J Blank contaminant - 170J	NA
SBLK72	16866	17	6/7/89	ug/kg	NA	NA	ND	Blank contaminant - 330J Blank contaminant - 270J Unknown - 170J	NA
SBLK74	16866	17	6/8/89	ug/kg	NA	NA	ND	Blank contaminant - 270J Blank contaminant - 230J	NA
SBLK74	16866	17	6/8/89	ug/kg	NA	NA	ND	Blank contaminant - 300J Blank contaminant - 270J	NA
SBLK92	16866	17	6/13/89	ug/kg	NA	NA	ND	Blank contaminant - 570J Blank contaminant - 500J Aldol - 170AJ	NA

(a) SBLK = Semivolatile blank, VBLK = volatile blank, PBLK = pesticide blank
(b) SDG = Sample delivery group
(c) NA = Not applicable.
(d) ND = None detected.

TABLE B.3-5
Summary Results of Analysis of Trip Blanks, Laboratory Method Blanks, and Field Blanks for Organic Parameters Associated with Water Sampling and Analysis
Virginia Wood Preserving Site, Richmond, Virginia

Blank I.D. (a)	Case No.	SDG No. (b)	Analysis Date	Units	Constituent Detected and Concentration	Analytical Parameter/ Group (d)
Labpure (TB-725)	16866	770	7/28/89	ug/l	Methylene chloride - 1j	VOC
Labpure (TB-726)	16866	770	7/31/89	ug/l	Methylene chloride - 3j	VOC
TB-724	16866	770	7/26/89	ug/l	Methylene chloride - 4Bj	VOC
TB-726	16866	770	7/30/89	ug/l	ND (c)	VOC
TB-727	16866	770	7/30/89	ug/l	ND	VOC
Labpure (TB-518)	16759	19	5/22/89	ug/l	ND	VOC
Labpure (TB-519)	16759	19	5/22/89	ug/l	ND	VOC
Labpure (TB-523)	16759	19	5/25/89	ug/l	Methylene chloride - 2j	VOC
Labpure (TB-524)	16759	19	5/26/89	ug/l	ND	VOC
Labwater (TB-522)	16759	19	5/24/89	ug/l	Methylene chloride - 2j	VOC
Labwater (TB-526)	16759	19	5/30/89	ug/l	Methylene chloride - 28	VOC
VBLKSD	16759	19	5/22/89	ug/l	ND	VOC
VBLKKL	16759	19	5/23/89	ug/l	ND	VOC
VBLKPR	16759	19	5/25/89	ug/l	ND	VOC
VBLKCC	16759	19	5/26/89	ug/l	ND	VOC
VBLKPC	16759	19	5/30/89	ug/l	1,1,2,2-Tetrachloroethane - 2j	VOC
TB-728	16866	1115	7/31/89	ug/l	ND	VOC
TB-731	16866	1115	8/3/89	ug/l	Methylene chloride - 7	VOC
TB-801	16866	1115	8/4/89	ug/l	Methylene chloride - 5	VOC
Labwater (TB-525)	16759	118	5/30/89	ug/l	ND	VOC
VBLKEA	16759	118	5/30/89	ug/l	ND	VOC
TB-720	16866	766	7/24/89	ug/l	ND	VOC
TB-721	16866	766	7/24/89	ug/l	Methylene chloride - 1j	VOC
Trip blank (TB-719)	16866	766	7/21/89	ug/l	ND	VOC
4000	16866	1115	8/3/89	ug/l	Chloroform - 53 Bromodichloromethane - 5	VOC
5000	16866	1115	8/5/89	ug/l	Methylene chloride - 10	VOC
5001	16866	1115	8/7/89	ug/l	ND	VOC

TABLE B.3-5 (cont'd)
Summary Results of Analysis of Trip Blanks, Laboratory Method Blanks, and Field Blanks for Organic Parameters Associated with Water Sampling and Analysis
Virginia Wood Preserving Site, Richmond, Virginia

Blank I.D. (a)	Case No.	SDG No. (b)	Analysis Date	Units	Constituent Detected and Concentration	Analytical Parameter/ Group (d)
4000	16866	1115	8/4/89	ug/l	Benzoic acid - 7J Unknown TIC - 24J Unknown TIC - 20J	SVOC and TIC
5000	16866	1115	8/5/89	ug/l	ND	SVOC and TIC
5001	16866	1115	8/5/89	ug/l	ND	SVOC and TIC
4000	16866	1115	8/4/89	ug/l	ND	Pesticide
5000	16866	1115	8/10/89	ug/l	ND	Pesticide
5001	16866	1115	8/10/89	ug/l	ND	Pesticide
VBLKXE	16866	1115	7/30/89	ug/l	ND	VOC
VBLKBB	16866	1115	7/31/89	ug/l	ND	VOC
VBLKEN	16866	1115	8/3/89	ug/l	ND	VOC
VBLKXD	16866	1115	8/4/89	ug/l	ND	VOC
VBLKIF	16866	1115	8/5/89	ug/l	ND	VOC
VBLKKX	16866	1115	8/6/89	ug/l	ND	VOC
SBLK92	16866	1115	8/1/89	ug/l	ND Unknown - 22J	SVOC
SBLK22	16866	1115	8/3/89	ug/l	ND	SVOC
SBLK09	16866	1115	8/3/89	ug/l	Naphthalene - 3J	SVOC
SBLK47	16866	1115	8/5/89	ug/l	ND	SVOC
PBLK33	16866	1115	8/4/89	ug/l	ND	Pesticide
PBLK94	16866	1115	8/6/89	ug/l	ND	Pesticide
PBLK51	16866	1115	8/10/89	ug/l	ND	Pesticide
VBLKEG	16866	766	7/21/89	ug/l	ND	VOC
VBLKKQ	16866	766	7/23/89	ug/l	ND	VOC
VBLKXA	16866	766	7/23/89	ug/l	ND	VOC
VBLKE1	16866	766	7/24/89	ug/l	ND	VOC
VBLKKS	16866	766	7/24/89	ug/l	Methylene chloride - 1J	VOC
VBLKTB	16866	766	7/26/89	ug/l	Methylene chloride - 2J	VOC
SBLK29	16866	766	7/22/89	ug/l	ND	SVOC
SBLK28	16866	766	7/22/89	ug/l	ND	SVOC
SBLK41	16866	766	7/25/89	ug/l	ND	SVOC
PBLK86	16866	766	7/23/89	ug/l	ND	Pesticide
PBLK54	16866	766	8/1/89	ug/l	ND	Pesticide

TABLE B.3-5 (cont'd)
Summary Results of Analysis of Trip Blanks, Laboratory Method Blanks, and Field Blanks for Organic Parameters Associated with Water Sampling and Analysis
Virginia Wood Preserving Site, Richmond, Virginia

Blank I.D. (a)	Case No.	SDG No. (b)	Analysis Date	Units	Constituent Detected and Concentration	Analytical Parameter/ Group (d)
TB-711	16866	748	7/13/89	ug/l	Methylene chloride - 2J	VOC
TB-713	16866	748	7/14/89	ug/l	Methylene chloride - 4BJ Acetone - 4BJ	VOC
TB-714	16866	748	7/18/89	ug/l	Methylene chloride - 2BJ	VOC
TB-717	16866	748	7/18/89	ug/l	Methylene chloride - 2BJ	VOC
TB-718	16866	748	7/19/89	ug/l	ND	VOC
VBLKZ1	16866	748	7/13/89	ug/l	Acetone - 4J	VOC
VBLKXW	16866	748	7/14/89	ug/l	Methylene chloride - 4J Acetone - 6J	VOC
VBLKKL	16866	748	7/16/89	ug/l	ND	VOC
VBLKZN	16866	748	7/17/89	ug/l	ND	VOC
VBLKKN	16866	748	7/18/89	ug/l	Methylene chloride - 2J Acetone - 13	VOC
VBLKFT	16866	748	7/19/89	ug/l	ND	VOC
VBLKBB	16866	748	7/21/89	ug/l	Methylene chloride - 2J Acetone - 13	VOC
VBLKXX	16866	748	7/19/89	ug/l	ND	VOC
SBLK70	16866	748	7/13/89	ug/l	ND	SVOC
SBLK83	16866	748	7/17/89	ug/l	ND	SVOC
SBLK89	16866	748	7/18/89	ug/l	ND	SVOC
SBLK10	16866	748	7/19/89	ug/l	ND	SVOC
SBLK17	16866	748	7/19/89	ug/l	ND	SVOC
SBLK27	16866	748	7/23/89	ug/l	ND	SVOC
Labpure (TB-530)	16866	01	6/4/89	ug/l	ND	VOC
Labpure (TB-601)	16866	01	6/4/89	ug/l	ND	VOC
Labpure (TB-606)	16866	01	6/9/89	ug/l	Methylene chloride - 6	VOC
Labwater (TB-531)	16866	01	6/4/89	ug/l	ND	VOC
Trip Blank (TB-605)	16866	01	6/7/89	ug/l	ND	VOC
Trip Blank (TB-602)	16866	01	6/9/89	ug/l	Methylene chloride - 2J	VOC
VBLKAO	16866	01	6/4/89	ug/l	ND	VOC
VBLKHS	16866	01	6/4/89	ug/l	ND	VOC
VBLKXG	16866	01	6/6/89	ug/l	Methylene chloride - 2J	VOC

TABLE B.3-5 (cont'd)
Summary Results of Analysis of Trip Blanks, Laboratory Method Blanks, and Field Blanks for Organic Parameters Associated with Water Sampling and Analysis
Virginia Wood Preserving Site, Richmond, Virginia

Blank I.D. (a)	Case No.	SDG No. (b)	Analysis Date	Units	Constituent Detected and Concentration	Analytical Parameter/ Group (d)
VBLKPR	16866	01	6/9/89	ug/l	ND	VOC

(a) Labpure/TB/Labwater refer to Trip blank, number in parentheses indicates date of shipment to laboratory.
Laboratory method blanks; VBLK - volatile blank, SBLK - semivolatile blank, PBLK - pesticide blank.
Field blanks; 4000 = tap water, 5000 = bailer rinsate, 5001 = spoon/sampling equipment rinsate.
(b) SDG = sample delivery group.
(c) ND = none detected.
(d) VOC = volatile organic compound, SVOC = semivolatile organic compound, TIC = tentatively identified organic compound.

TABLE B-3.6
Summary of Results of Analysis of Laboratory Blanks for Dioxins and Furans Associated with Soil and Water Sampling and Analysis
Virginia Wood Preserving Site, Richmond, Virginia

Method Blank I.D. (CW) No.	Analysis Date	Units (a)	Constituents Detected	
			Dioxins	Furans
3970-1MB	6/16/89	ng/g	ND (b)	ND
3970-4MBRI	6/19/89	ng/g	ND	ND
4326-1MB	9/7/89	ng/g	ND	ND
4327-1MBRI	9/14/89	ng/g	ND	ND
3923-MBRI	6/12/89	ng/g	ND	ND
3909-MB	5/31/89	ng/g	ND	ND
3899-MB	5/30/89	ng/g	ND	ND
3945-1MB	6/13/89	ng/g	ND	ND
3979-1MBRI	6/19/89	ng/g	ND	ND
4318-2MBRX	8/18/89	ng/l	ND	ND
4296-2MB	8/4/89	ng/l	ND	ND
4275-5MD	8/18/89	ng/l	ND	ND
4296-2MRBX	8/18/89	ng/l	ND	ND
4276-2MB	8/3/89	ng/l	ND	ND
4289-MB	8/3/89	ng/l	ND	ND
4380-1MB	8/18/89	ng/l	ND	ND
4408-MBRI	9/22/89	ng/l	ND	ND

(a) Units for soil analysis, ng/g or ppb.
Units for water analysis, ng/l or ppt.
(b) ND = none detected.
Also no dioxins and furans were detected in field blanks.

TABLE B-3.7
Summary Results of Analysis of Field Blanks for Inorganic Parameters
Associated with Water Sampling and Analysis
Virginia Wood Preserving Site, Richmond, Virginia

Parameter	Units	Sample Description and Number: Tap Water 4000	Bailer Rinsate 5000	Spoon Rinsate 5001
Aluminum	ug/l	NA	BDL	BDL
Antimony	ug/l	NA	BDL	BDL
Arsenic	ug/l	BDL	BDL	BDL
Barium	ug/l	NA	BDL	BDL
Beryllium	ug/l	NA	[3.9]	[2.6]
Cadmium	ug/l	NA	BDL	BDL
Calcium	ug/l	NA	[77.8]	[30.5]
Chromium	ug/l	BDL	BDL	BDL
Cobalt	ug/l	NA	BDL	BDL
Copper	ug/l	51.2	203	378
Iron	ug/l	NA	BDL	BDL
Lead	ug/l	NA	BDL	BDL
Magnesium	ug/l	NA	BDL	BDL
Manganese	ug/l	NA	BDL	BDL
Mercury	ug/l	NA	BDL	0.23
Nickel	ug/l	NA	BDL	48.9
Potassium	ug/l	NA	BDL	BDL
Selenium	ug/l	NA	BDL	BDL
Silver	ug/l	NA	BDL	BDL
Sodium	ug/l	NA	BDL	BDL
Thallium	ug/l	NA	BDL	BDL
Vanadium	ug/l	NA	BDL	BDL
Zinc	ug/l	33.6	[18.1]	35.6
Groundwater Quality:				
Alkalinity as Calcium Carbonate	mg/l	21	NA	NA
Biochemical Oxygen Demand (BOD)	mg/l	<4	<4	NA
Chemical Oxygen Demand (COD)	mg/l	BDL	NA	NA
Dissolved Solids	mg/l	95	10	NA
Hardness as Calcium Carbonate	mg/l	58	NA	NA
Kjeldahl Nitrogen	mg/l	<1	<1	NA
Organic Carbon	mg/l	2.3	<1	<1
Phosphate as P	mg/l	0.12	0.02	NA
Suspended Solids	mg/l	<5	<5	NA
Thiocyanate	mg/l	BDL	NA	NA

Qualifiers:

BDL = Below Detection Limit, DL = Detection Limit.
NA = Not available or not applicable.
[ ] = Indicates value is greater than or equal to instrument detection limit but less than the contract required detection limit.
< = Value is less than the reported value.

TABLE B.3-8

Summary List of Environmental Media Samples and Duplicates
Included in the Overall Sampling and Analysis Program
RI/FS, Virginia Wood Preserving Site, Richmond, Virginia

Sample	Associated Station Number	Duplicate	Matrix
1005	SO-32	1005D	Soil
1016	SO-9	1016D	Soil
1027	SO-16-2	1027D	Soil
1039	DM-3 (R) (0-2 feet)	1039D	Soil
1063	UT-3D	1063D	Soil
3016	SE-7	3016D	Sediment
3006	SW-7	3006D	Surface Water
2001	(BW-3A)	2001D	Groundwater
2013	(DM-3R)	2013D	Groundwater
2018	(BW-10)	2018D	Groundwater
2027	(DM-1 (B))	2027D	Groundwater
PW-2A	(PW-1 (1st Int.))	PW-2ADUP	Groundwater