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TRILLIUM INC

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DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

TREATMENT SYSTEM SAMPLING

VOLATILES ANALYSES DATA

METHOD 524.2 ANALYSES

Samples Collected 5/21/91

Chemical Analyses Performed By

PACE, Incorporated

August 19, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

Foaming occurred during the analyses of all samples except the trip blank and the field blank. Foaming was considerable during the analysis of Sample S5-19. The analyst was required to stop the analytical run to protect the instrument. During the reanalysis of Sample S5-19, one of the surrogates did not meet recovery criteria. Insufficient sample volume remained to reanalyze this sample as required. Positive results and detection limits for S5-19 were qualified as estimated.

Data quality for other samples in this sample delivery group was good. Methylene chloride results in two samples were corrected to "ND" because the results reported were below the MDL determined by the PQL study for this project.

Cooler temperature upon receipt of samples by the laboratory was 12°C. Temperatures outside the range of 4°C ±2°C may adversely affect the volatile compounds.

Validation of organic data is conducted in conformance with Environmental Protection Agency (EPA) Functional Guidelines for Evaluating Organics Analyses, February 1, 1988, with modifications by EPA Region I, November 1, 1988.

Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified (valid) results mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Case Narrative

Five treatment system samples were collected and submitted to PACE, Inc. on May 21, 1991. The laboratory was requested to perform volatile organics analyses (VOA) using Method 524.2. The analyte list for this method was amended pursuant to the QA/QC Plan for this project.

The samples included in this Sample Delivery Group (SDG) are:

Client ID	Lab ID	Date of Collection
S1-24FB	3782	05/21/91
S5-19	3787	05/21/91
S6-24	3788	05/21/91
S6-24DUP	3789	05/21/91
S6-24TB	3790	05/21/91

TRILLIUM INC

Volatiles

The requirements to be checked in validation are listed below.

I. Holding Times

II. GC/MS Tuning

III. Calibration

A. Initial

B. Continuing

IV. Blanks

V. Surrogate Recovery

VI. Matrix Spike/Matrix Spike Duplicate

VII. Field Duplicates

VIII. Internal Standards Performance

IX. TCL Compound Identification

X. Compound Quantitation and Reported Detection Limits

XI. Tentatively Identified Compounds

XII. System Performance

XIII. Overall Assessment

I. Holding Times

All samples were received preserved and analyzed within the 14-day holding time for preserved samples.

II. GC/MS Tuning

GC/MS tuning and mass calibrations were within criteria.

III. Calibration

Areas were manually integrated for one or more compounds in each of the standards in this data package. No evaluation of these manual integrations can be performed, as no hard copy documentation was provided. Such documentation has been requested from the laboratory. The validation has been completed on the assumption that the manual integrations done and reported by the laboratory were valid and correct. No sample data appear to be affected.

A. Initial

Initial calibration criteria were met on 5/23/91.

B. Continuing

Continuing calibration criteria were met on 5/30/91.

IV. Blanks

The trip blank, field blank, and method blanks were clean.

V. Surrogate Recovery

The percent recovery for toluene-d8 was below QC criteria for the analysis of Sample S5-19. This sample was not rerun as required because insufficient sample volume remained. Postive results and detection limits were estimated for Sample S5-19.

All other surrogate recoveries were within acceptance criteria.

VI. Matrix Spike/Matrix Spike Duplicate

A matrix spike (MS) and matrix spike duplicate (MSD) were performed on Sample S6-24. Data were within acceptance criteria.

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VII. Field Duplicates

Samples S6-24 and S6-24DUP were subitted as duplicate samples. No compounds were detected in either sample.

VIII. Internal Standards Performance

Internal standards areas and retention times were acceptable.

IX. TCL Compound Identification

TCL compound identifications were acceptable.

X. Compound Quantitation and Reported Detection Limits

The laboratory performed a practical quantitation limit (PQL) study for the Method 524.2 analyses for this project on October 15, 1990. Method detection limits (MDLs) determined through that PQL study should have been used for reporting purposes for these treatment system samples. MDLs determined through the PQL study were as follows:

Compound	MDL (ug/L)
Vinyl Chloride	0.48
Chloroethane	0.49
Methylene Chloride	4.41
1,1-Dichloroethene	0.67
1,1-Dichloroethane	0.54
trans-1,2-Dichloroethene	0.50
Chloroform	0.53
1,2-Dichloroethane	0.52
1,1,1-Trichloroethane	0.44
Carbon Tetrachloride	0.43
Bromodichloromethane	0.38
1,2-Dichloropropane	0.45
cis-1,3-Dichloropropene	0.33
Trichloroethene	0.42
Dibromochloromethane	0.33
1,1,2-Trichloroethane	0.43
Benzene	0.58
trans-1,3-Dichloropropene	0.07
Bromoform	0.49
Tetrachloroethene	0.51
1,1,2,2-Tetrachloroethane	0.44
Toluene	0.45

Compound	MDL (ug/L)
Chlorobenzene	0.44
Ethylbenzene	0.51
m-Xylene	0.48
o-, p-Xylene	0.93
1,2-Dichloroethane-d4	0.50
Toluene-d8	0.45
Bromofluorobenzene	0.36

Methylene chloride was reported in Samples S5-19 and S6-24 at concentrations below the MDL determined by the PQL study for this project. Methylene chloride concentrations in these two samples were corrected to be "ND."

The result reported for 1,1,1-trichloroethane in Sample S5-19 (29 ug/L) was beyond the calibration range of the instrument (25 ug/L). Positive results for this sample were already qualified as estimated.

All other results and detection limits were acceptable with regard to the supporting data.

XI. Tentatively Identified Compounds

No TICs were reported for this sample delivery group.

XII. System Performance

System performance was acceptable.

XIII. Overall Assessment of Data for a Case

Methylene chloride was corrected to be "ND" in Samples S5-19 and S6-24.

With the exception of the difficulties encountered by the laboratory during the analysis of Sample S5-19, data quality was good. Positive results and detection limits for Sample S5-19 were qualified as estimated.

UNIFIRST/ENSR PACE Project Number: 810522501

PACE Sample Number:			95 0037820
Date Collected:			05/21/91
Date Received:			05/22/91
Parameter	Units	MDL	S1-24 FB
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR

PACE Project Number: 810522501

00030

PACE Sample Number:			95 0037870
Date Collected:			05/21/91
Date Received:			05/22/91
Parameter	Units	MDL	S5-19
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~3.3~~ ND
1,1-Dichloroethene	ug/L	0.5	2.0 J
1,1-Dichloroethane	ug/L	0.5	4.6 J
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	29 J
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL *Method Detection Limit*
ND Not detected at or above the MDL.

UNIFIRST/ENSR

PACE Project Number: 810522501

00042

PACE Sample Number:			95 0037889
Date Collected:			05/21/91
Date Received:			05/22/91
Parameter	Units	MDL	S6-24
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.1~~ ND LKJ 7/7/91
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR

PACE Project Number: 810522501

00046

PACE Sample Number:			95 0037897
Date Collected:			05/21/91
Date Received:			05/22/91
Parameter	Units	MDL	S6-24 Dup
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR

PACE Project Number: 810522501

00051

PACE Sample Number:			95 0037900
Date Collected:			05/21/91
Date Received:			05/22/91
Parameter	Units	MDL	S6-24 TB
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

TREATMENT SYSTEMS

VOLATILES ANALYSES DATA

METHOD 524.2 ANALYSES

Samples Collected 5/21/91

Chemical Analyses Performed By

PACE, Incorporated

August 19, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

Data quality for other samples in this sample delivery group was good. Methylene chloride results in most samples were corrected to "ND" because the results reported were below the MDL determined by the PQL study for this project. Many of the results for 1,1,1-trichloroethane and one result for tetrachloroethene were qualified as estimated because the results exceeded the calibration range of the instrument.

Cooler temperature upon receipt of samples by the laboratory was 12°C. Temperatures outside the range of 4°C ±2°C may adversely affect the volatile compounds.

Validation of organic data is conducted in conformance with Environmental Protection Agency Functional Guidelines for Evaluating Organics Analyses, February 1, 1988.

Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified (valid) results mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Case Narrative

Twenty samples were collected and submitted to PACE, Inc. on May 21, 1991. The matrix spike and matrix spike duplicate were performed on Sample T1-EFF. The laboratory was requested to perform volatile organics analyses (VOA) using Method 524.2. The analyte list for this method was amended pursuant to the QA/QC Plan for this project.

The samples included in this Sample Delivery Group (SDG) are:

Client ID	Lab ID	Date of Collection
T1-L1	3792	05/21/91
T1-L2	3793	05/21/91
T1-L3	3794	05/21/91
T1-EFF	3795	05/21/91
T1-EFFDUP	3796	05/21/91
T1-EFFFB	3797	05/21/91
T1-EFFTB1	3978	05/21/91
T1-EFFTB2	3799	05/21/91
T2-L1	3801	05/21/91
T2-L2	3802	05/21/91
T2-L3	3803	05/21/91
T2-EFF	3804	05/21/91
T3-L1	3806	05/21/91
T3-L2	3807	05/21/91
T3-L3	3808	05/21/91
T3-EFF	3809	05/21/91
T4-L1	3811	05/21/91
T4-L2	3812	05/21/91
T4-L3	3813	05/21/91
T4-EFF	3814	05/21/91

TRILLIUM INC

Volatiles

The requirements to be checked in validation are listed below.

I. Holding Times

II. GC/MS Tuning

III. Calibration

A. Initial

B. Continuing

IV. Blanks

V. Surrogate Recovery

VI. Matrix Spike/Matrix Spike Duplicate

VII. Field Duplicates

VIII. Internal Standards Performance

IX. TCL Compound Identification

X. Compound Quantitation and Reported Detection Limits

XI. Tentatively Identified Compounds

XII. System Performance

XIII. Overall Assessment

I. Holding Times

All samples were analyzed within the 14-day holding time for preserved samples.

II. GC/MS Tuning

GC/MS tuning and mass calibrations were within criteria.

III. Calibration

Areas were manually integrated for one or more compounds in each of the standards in this data package. No evaluation of these manual integrations can be performed, as no hard copy documentation was provided. Such documentation has been requested from the laboratory. The validation has been completed on the assumption that the manual integrations done and reported by the laboratory were valid and correct. No positive sample data were affected.

A. Initial

Initial calibration criteria were met on 5/23/91.

B. Continuing

Continuing calibration criteria were met on 5/30/91 and 5/31/91 (14:06).

Continuing calibration criteria were met on 5/31/91 (00:46) with the exception of the % difference for trans-1,3-dichloropropene (actual 57.45; criteria 25). Detection limits for trans-1,3-dichloropropene were estimated in Samples T1-L3, T1-EFF, T2-L1, T2-L2, T2-L3, T2-EFF, T3-L1, T3-L2, and T3-L3.

IV. Blanks

The trip blanks and method blanks were clean. Trichloroethene, bromoform, and ethylbenzene were reported in the field blank. The result reported for trichloroethene in Sample T2-L3 was qualified as less than the reported value.

V. Surrogate Recovery

The percent recovery for 1,2-dichloroethane-d4 was below QC criteria in Sample T2-EFF and above QC criteria in Sample T3-L3. Sample T3-L3 was rerun with acceptable results. Sample T2-EFF sample was not rerun as required. Positive results and detection liimts were qualified as estimated in Sample T2-EFF.

All other surrogate recoveries were within acceptance criteria.

VI. Matrix Spike/Matrix Spike Duplicate

A matrix spike (MS) and matrix spike duplicate (MSD) were performed on Sample T1-EFF. Compounds were inadvertently spiked at only one-half the appropriate concentration in the MS. Percent recoveries were acceptable for the MS and MSD; however, because of the spiking error, relative percent differences were above criteria for all five spiking compounds. Since %RSD for unspiked compounds in the MS, MSD, sample, and duplicate were good, data were not qualified.

VII. Field Duplicates

Samples T1-EFF and T1-EFFDUP were subitted as duplicate samples. Compounds and concentrations (ug/L) reported were as follows:

Compound	T1-EFF	T1-EFFDUP
1,1-Dichloroethene	1.3	1.5
1,1-Dichloroethane	1.5	1.7
1,1,1-Trichloroethane	27	29

Results met QC criteria.

VIII. Internal Standards Performance

Internal standards areas and retention times were acceptable.

IX. TCL Compound Identification

TCL compound identifications were acceptable.

X. Compound Quantitation and Reported Detection Limits

The laboratory performed a practical quantitation limit (PQL) study for the Method 524.2 analyses for this project on October 15, 1990. Method detection limits (MDLs) determined through that PQL study should have been used for reporting purposes for these treatment system samples. MDLs determined through the PQL study were as follows:

Compound	MDL (ug/L)
Vinyl Chloride	0.48
Chloroethane	0.49
Methylene Chloride	4.41
1,1-Dichloroethene	0.67
1,1-Dichloroethane	0.54
trans-1,2-Dichloroethene	0.50
Chloroform	0.53
1,2-Dichloroethane	0.52
1,1,1-Trichloroethane	0.44
Carbon Tetrachloride	0.43
Bromodichloromethane	0.38
1,2-Dichloropropane	0.45
cis-1,3-Dichloropropene	0.33
Trichloroethene	0.42
Dibromochloromethane	0.33
1,1,2-Trichloroethane	0.43
Benzene	0.58
trans-1,3-Dichloropropene	0.07
Bromoform	0.49
Tetrachloroethene	0.51
1,1,2,2-Tetrachloroethane	0.44
Toluene	0.45
Chlorobenzene	0.44
Ethylbenzene	0.51
m-Xylene	0.48
o-, p-Xylene	0.93
1,2-Dichloroethane-d4	0.50
Toluene-d8	0.45
Bromofluorobenzene	0.36

Methylene chloride was reported in all samples except the trip blanks and field blank. These reported concentrations were below the MDL determined by the PQL study for this project. Methylene chloride concentrations in these samples were corrected to be "ND."

Results reported for 1,1,1-trichloroethane in all samples except the trip blanks and field blank were beyond the calibration range of the instrument (25 ug/L). Positive results for 1,1,1-trichloroethane in Samples T1-L1, T1-L2, T2-L1, T2-L3, T3-L1, T3-EFF, T4-L1, T4-L2, T4-L3, and T4-EFF were qualified as estimated. Other positive results for 1,1,1-trichloroethane met accuracy and precision criteria and were acceptable as reported.

The result reported for tetrachloroethene in Sample T4-L1 (54 ug/L) was beyond the calibration range of the instrument (25 ug/L). This result was qualified as estimated.

All other results and detection limits were acceptable with regard to the supporting data.

XI. Tentatively Identified Compounds

No TICs were reported for this sample delivery group.

XII. System Performance

System performance was acceptable.

XIII. Overall Assessment of Data for a Case

Methylene chloride was corrected to be "ND" in all samples except the field blank and trip blanks.

Tetrachloroethene was qualified as estimated in Sample T4-L1.

The compound 1,1,1-trichloroethane was qualified as estimated in the samples listed in Section X.

Detection limits for trans-1,3-dichloropropene were qualified as estimated in the samples listed in Section III.

UNIFIRST/ENSR PACE Project Number: 810522502

PACE Sample Number:			95 0037927 00033
Date Collected:			05/21/91
Date Received:			05/22/91
Parameter	Units	MDL	T1-L1
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.3~~ ND
1,1-Dichloroethene	ug/L	0.5	1.8
1,1-Dichloroethane	ug/L	0.5	4.2
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	34 J
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	8.0
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810522502

PACE Sample Number:			95 0037935 00042
Date Collected:			05/21/91
Date Received:			05/22/91
Parameter	Units	MDL	T1-L2
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.4~~ ND CKL 7/9/91
1,1-Dichloroethene	ug/L	0.5	1.9
1,1-Dichloroethane	ug/L	0.5	3.0
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	33 J
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810522502

00050

PACE Sample Number:			95 0037943
Date Collected:			05/21/91
Date Received:			05/22/91
Parameter	Units	MDL	T1-L3
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.3~~ ND
1,1-Dichloroethene	ug/L	0.5	1.4
1,1-Dichloroethane	ug/L	0.5	1.9
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	27
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810522502

00058

PACE Sample Number:			95 0037951
Date Collected:			05/21/91
Date Received:			05/22/91
Parameter	Units	MDL	T1-EFF
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.5~~ ND 2L3 7/9/91
1,1-Dichloroethene	ug/L	0.5	1.3
1,1-Dichloroethane	ug/L	0.5	1.5
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	27
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810522502

00066

PACE Sample Number:			95 0037960
Date Collected:			05/21/91
Date Received:			05/22/91
Parameter	Units	MDL	T1-EFF Dup
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.5~~ ND EKS 7/9/91
1,1-Dichloroethene	ug/L	0.5	1.5
1,1-Dichloroethane	ug/L	0.5	1.7
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	29
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810522502

00073

PACE Sample Number:			95 0037978
Date Collected:			05/21/91
Date Received:			05/22/91
Parameter	Units	MDL	T1-EFF FB
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	.91
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	1.5
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	1.5
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810522502

PACE Sample Number:			95 0037986 00080
Date Collected:			05/21/91
Date Received:			05/22/91
Parameter	Units	MDL	T1-EFF TB1
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810522502

00084

PACE Sample Number:			95 0037994
Date Collected:			05/21/91
Date Received:			05/22/91
Parameter	Units	MDL	T1-EFF TB2
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810522502

PACE Sample Number:			95 0038010
Date Collected:			05/21/91 00088
Date Received:			05/22/91
Parameter	Units	MDL	T2-L1
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.3~~ ND LKD 7/9/91
1,1-Dichloroethene	ug/L	0.5	1.5
1,1-Dichloroethane	ug/L	0.5	4.7
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	33 J
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND UJ
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	13
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810522502

00097

PACE Sample Number:			95 0038028
Date Collected:			05/21/91
Date Received:			05/22/91
Parameter	Units	MDL	T2-L2
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.4~~ ND EKS 7/9/91
1,1-Dichloroethene	ug/L	0.5	1.5
1,1-Dichloroethane	ug/L	0.5	3.0
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	30.0
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810522502

PACE Sample Number:			95 0038036
Date Collected:			05/21/91 00105
Date Received:			05/22/91
Parameter	Units	MDL	T2-L3
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.8~~ ND ekb 1/9/91
1,1-Dichloroethene	ug/L	0.5	~~.61~~ ND
1,1-Dichloroethane	ug/L	0.5	3.7
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	31
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	1.2 u
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND u
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810522502

PACE Sample Number:			95 0038044
Date Collected:			05/21/91
Date Received:			05/22/91
Parameter	Units	MDL	T2-EFF

00114

ORGANIC ANALYSIS

VOLATILE ORGANICS BY 524.2 MODIFIED

Vinyl chloride	ug/L	0.5	ND uJ
Chloroethane	ug/L	0.5	ND uJ
Methylene chloride	ug/L	0.5	~~1.5~~ ND
1,1-Dichloroethene	ug/L	0.5	1.3J
1,1-Dichloroethane	ug/L	0.5	1.7J
trans-1,2-Dichloroethene	ug/L	0.5	ND uJ
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	27.0 J
Carbon tetrachloride	ug/L	0.5	ND uJ
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND uJ
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810522502

PACE Sample Number:			95 0038060
Date Collected:			05/21/91
Date Received:			05/22/91
Parameter	Units	MDL	T3-L1

00122

ORGANIC ANALYSIS

VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.2~~ ND
1,1-Dichloroethene	ug/L	0.5	1.6
1,1-Dichloroethane	ug/L	0.5	4.4
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	31 J
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND UJ
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	13
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

ND 7/9/91

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810522502

PACE Sample Number:			95 0038079
Date Collected:			05/21/91
Date Received:			05/22/91
Parameter	Units	MDL	T3-L2

00131

ORGANIC ANALYSIS

VOLATILE ORGANICS BY 524.2 MODIFIED

Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.4~~ ND RLD 7/19/91
1,1-Dichloroethene	ug/L	0.5	1.3
1,1-Dichloroethane	ug/L	0.5	3.3
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	30.0
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND WJ
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810522502

PACE Sample Number:			95 0038087
Date Collected:			05/21/91
Date Received:			05/22/91
Parameter	Units	MDL	T3-L3

00139

ORGANIC ANALYSIS

VOLATILE ORGANICS BY 524.2 MODIFIED

Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.6~~ ND EW 1/9/91
1,1-Dichloroethene	ug/L	0.5	1.5
1,1-Dichloroethane	ug/L	0.5	~~2.3~~ ~~2.8~~ 1.8
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	~~27~~ 29
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND EW
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810522502

PACE Sample Number:			95 0038095
Date Collected:			05/21/91
Date Received:			05/22/91
Parameter	Units	MDL	T3-EFF

00153

ORGANIC ANALYSIS

VOLATILE ORGANICS BY 524.2 MODIFIED

Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.3~~ ND ELJ 7/9/91
1,1-Dichloroethene	ug/L	0.5	1.4
1,1-Dichloroethane	ug/L	0.5	2.3
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	31 J
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810522502

PACE Sample Number:			95 0038117
Date Collected:			05/21/91
Date Received:			05/22/91 00161
Parameter	Units	MDL	T4-L1
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.2~~ ND elut 1/10/91
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	4.7
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	34.0 J
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	54 J
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810522502

PACE Sample Number:			95 0038125
Date Collected:			05/21/91
Date Received:			05/22/91 00169
Parameter	Units	MDL	T4-L2
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.8~~ ND EKD 7/9/91
1,1-Dichloroethene	ug/L	0.5	1.1
1,1-Dichloroethane	ug/L	0.5	4.5
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	35
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	5.6
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810522502

PACE Sample Number:			95 0038133
Date Collected:			05/21/91
Date Received:			05/22/91
Parameter	Units	MDL	T4-L3

00178

ORGANIC ANALYSIS

VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.9~~ ND
1,1-Dichloroethene	ug/L	0.5	1.6
1,1-Dichloroethane	ug/L	0.5	3.9
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	33 J
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810522502

PACE Sample Number:			95 0038141
Date Collected:			05/21/91
Date Received:			05/22/91
Parameter	Units	MDL	T4-EFF
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~2.5~~ ND
1,1-Dichloroethene	ug/L	0.5	1.5
1,1-Dichloroethane	ug/L	0.5	4.0
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	33 J
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

TRILLIUM INC

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

TREATMENT SYSTEM SAMPLING

AND AREAL SAMPLING

VOLATILES ANALYSES DATA

Samples Collected 5/21/91 - 5/24/91

Chemical Analyses Performed By

Aquatec Inc.

August 19, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

Samples were submitted for both CLP and Method 524.2 analyses. Analytical data for both methods was submitted by the laboratory in a single data package; therefore, this validation report includes both analyses.

The analyte list for Method 524.2 analyses was reduced for the Wells G&H project. However, because of its unfamiliarity with the project, Aquatec analyzed for the full analyte list. For Method 524.2 analyses, compounds not being considered in this project were "lined out" on the Form Is submitted with this validation report.

The chain of custody (COC) form for samples collected on 5/24/91 indicates that the field sample (G16D), field duplicate, and colocated sample were collected on the same day at exactly the same time. If that is the case, the colocated sample is more appropriate considered a second field duplicate. This COC also indicates that the field blank was collected on the same day at exactly the same time as the field sample, field duplicate, and colocated sample. This does not seem possible.

Three samples, all designated G13S, were collected on each of three consecutive days. The same is true of samples designated G15D and G16D. The laboratory has distinguished these samples by adding a "1," "2," and "3" to the end of the sample name (e.g., G13S1, G13S2, G13S3). However, there is no documentation in the data package regarding the correlation of these designations with the samples (i.e., G13S1: is the sample taken on 5/25 or 5/24 or 5/23, etc.).

As noted in its case narrative, Aquatec experienced difficulties during the analysis of Sample CU1-6. The sample appeared to plug the column, and no compounds were detected. A reanalysis was attempted with the same results. Since no data were obtained, this sample was excluded from the data validation process.

Cooler temperatures were not recorded by the laboratory upon receipt of samples. Cooler temperatures outside the $4^{o}C \pm 2^{o}C$ range may adversely affect the volatile compounds.

Validation of organic data is conducted in conformance with Environmental Protection Agency (EPA) Functional Guidelines for Evaluating Organics Analyses, February 1, 1988, with modifications by EPA Region I, November 1, 1988.

Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified (valid)

results mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Case Narrative

Twelve samples were collected and submitted to Aquatec Inc. on May 25, 1991. The laboratory was requested to perform volatile organics (VOA) target compound list (TCL) analyses pursuant to the U.S. EPA Contract Laboratory Program.

The samples included for in this Sample Delivery Group (SDG) for CLP analyses are:

Client ID	Lab ID	Date of Collection
CLG16D	135385	05/24/91
FBG16D	135386	05/24/91
FDG16D	135387	05/24/91
G13S1*	135388	**
G13S2*	135389	**
G13S3*	135390	**
G15D1*	135391	**
G15D2*	135392	**
G15D3*	135393	**
G16D1*	135394	**
G16D2*	135395	**
G16D3*	135396	**

Three samples were collected and submitted to Aquatec Inc. on May 25, 1991. The laboratory was requested to perform volatile organics (VOA) analyses pursuant to Method 524.2.

The samples included for in this SDG for Method 524.2 analyses are:

Client ID	Lab ID	Date of Collection
CU1-6	135345	05/21/91
CU7-10	135346	05/21/91
V140VCU	135347	05/22/91

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*The numbers "1," "2," and "3" added to the sample designations were applied by the laboratory.

**These samples were collected on 5/23/91, 5/24/91, or 5/25/91. No documentation was provided with the data package to clarify when samples were collected.

TRILLIUM INC

Volatiles

The requirements to be checked in validation are listed below.

I. Holding Times

II. GC/MS Tuning

III. Calibration

A. Initial

B. Continuing

IV. Blanks

V. Surrogate Recovery

VI. Matrix Spike/Matrix Spike Duplicate

VII. Field Duplicates

VIII. Internal Standards Performance

IX. TCL Compound Identification

X. Compound Quantitation and Reported Detection Limits

XI. Tentatively Identified Compounds

XII. System Performance

XIII. Overall Assessment

I. Holding Times

According to the chain of custody forms, all samples were preserved with HCL at the time of collection. Samples CLG16D, FBG16D, FDG16D, G13S1, G13S2, G13S3, G15D1, G15D2, G16D1, G16D2, CU7-10, and V140VCU were analyzed within the 14-day holding time for preserved volatile aqueous samples. Sample V140VCUDL was analyzed one day outside the 14-day holding time; all positive results and detection limits for that sample were qualified as estimated.

Samples G15D3 and G16D3 were analyzed on 6/7/91. If these samples were collected on 5/23/91, the analyses would have been performed one day outside holding times. Because the sampling date is unknown, all positive results and detection limits for these two samples were qualified as estimated.

II. GC/MS Tuning

A. CLP

GC/MS tuning and mass calibrations were within criteria.

B. Method 524.2

GC/MS tuning and mass calibrations were within criteria.

III. Calibration

A. Initial

CLP

Initial calibration criteria were met on 6/4/91 (Instrument OWAC).

Initial calibration criteria were met on 5/31/91 (Instrument OWAD) with the exception of the %RSD for methylene chloride (actual 33.6; criteria 30) and acetone (actual 34.7; criteria 30). Positive results for these compounds were qualified as estimated in Samples FDG16D and G16D3.

Initial calibration criteria were met on 6/7/91 (Instrument OWAE) with the exception of the RRF for 2-butanone (actual 0.063; criteria 0.1) and the %RSD for methylene chloride (actual 33.1; criteria 30). Detection limits for 2-butanone were rejected and positive results for methylene chloride were estimated in Samples G16D2, G16D2MS, G16D2MSD, and CLG16D.

Method 524.2

Initial calibration criteria were met on 6/3/91 and 6/6/91 (Instrument 5100G).

B. Continuing

CLP

Continuing calibration criteria were met on 6/6/91 (Instrument OWAC) with the exception of the % difference for bromomethane (actual 40.3; criteria 25). Data were not affected.

Continuing calibration criteria were met on 6/7/91 (Instrument OWAD) with the exception of the % difference for bromomethane (actual 25.1). Data were not affected.

Continuing calibration criteria were met on 6/7/91 (Instrument OWAE) with the exception of the RF for 2-butanone (actual 0.054). Data were previously qualified.

Method 524.2

Continuing calibration criteria were met on 6/3/91 (Instrument 5100G).

IV. Blanks

CLP

Acetone and methylene chloride were reported in Method Blanks VBLKA6, VBLKC4, and VBLKC2. Methylene chloride was reported in Method Blank VBLKB8. Acetone and methylene chloride were reported in the field blank. Acetone and methylene chloride results were qualified as less than the reported values in the associated field samples.

Method 524.2

Methylene chloride was reported in Method Blanks VBLKY3 and VBLKA3. Results for methylene chloride were qualified as less than the reported values in the associated field samples.

No field blanks or trip blanks were submitted for Method 524.2 analyses.

V. Surrogate Recovery

CLP

Surrogate recoveries were within acceptance criteria.

Method 524.2

Surrogate recoveries were within acceptance criteria.

VI. Matrix Spike/Matrix Spike Duplicate

CLP

The matrix spike (MS) and matrix spike duplicate (MSD) were performed on Sample G16D2. Recoveries for trichloroethene were above QC criteria in the MS and the MSD. Results for trichloroethene were qualified as estimated in Samples G16D2, CLG16D, and FDG16D. Other results were within acceptance criteria.

Method 524.2

No MS or MSD were performed for Method 524.2 analyses.

VII. Field Duplicates

Samples FDG16D and CLG16D were submitted as field duplicates. A comparison of reported compounds and concentrations (in ug/L) is listed below.

Compound	G16D3	G16D1	G16D2	FDG16D	CLG16D
Vinyl chloride	150	130	130	120	99
1,2-Dichloroethenes	220	150	160	200	160
Trichloroethene	1000	790	1200	880	1100
Tetrachloroethene	6	6	20	5	17

All results met QC criteria with the exception of the relative percent difference for tetrachloroethene. Results for this compound were qualified as estimated.

VIII. Internal Standards Performance

CLP

Internal standards areas and retention times were acceptable.

Method 524.2

Internal standards areas and retention times were acceptable.

IX. TCL Compound Identification

TCL compound identifications were acceptable for both analytical methods.

X. Compound Quantitation and Reported Detection Limits

CLP

The result reported for trichloroethene in Sample CLG16D was slightly beyond the calibration range of the instrument. This result was acceptable without qualification.

All other results and detection limits were acceptable based on the supporting data.

Method 524.2

The compound cis-1,2-dichloroethene was detected at a concentration well beyond the calibration range of the instrument in Sample V140VCU. This sample was rerun at a dilution. The reported result for cis-1,2-dichloroethene was rejected in Sample V140VCU; the result reported for Sample V140VCUDL, although slightly beyond the calibration range of the instrument, was acceptable without qualification.

All other results and detection limits were acceptable based on the supporting data.

XI. Tentatively Identified Compounds

CLP

Heptanal (RT 24.25) and octanal (RT 29.45) were tentatively identified in Sample G13S1. These tentatively identified compounds were rejected because they were not duplicated in replicate samples G13S2 and G13S3.

Method 524.2

TICs were not provided for these analyses.

XII. System Performance

System performance was acceptable for both analytical methods.

XIII. Overall Assessment of Data for a Case

No field blanks, trip blanks, or field duplicates were submitted for Method 524.2 analyses, nor were MS/MSD samples requested. Although surrogate recoveries and internal area counts were acceptable, these data should be used with caution because of the lack of quality control samples.

Three samples, all designated G13S, were collected on each of three consecutive days. The same is true of samples designated G15D and G16D. The laboratory has distinguished these samples by adding a "1," "2," and "3" to the end of the sample name (e.g., G13S1, G13S2, G13S3). However, because there is no documentation in the data package regarding the rationale for applying these designations, it is impossible to determine which sample was collected on which day.

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CLG16D

Lab Name: AQUATEC, INC. Contract: 91000

Lab Code: AQUAI Case No.: 26518 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water) WATER Lab Sample ID: 135385

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: E135385D2V

Level: (low/med) LOW Date Received: 05/25/91

% Moisture: not dec. _____ Date Analyzed: 06/07/91

Column: (pack/cap) PACK Dilution Factor: 5.555

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	56	U
74-83-9	Bromomethane	56	U
75-01-4	Vinyl Chloride	99	
75-00-3	Chloroethane	56	U
75-09-2	Methylene Chloride	13	~~BJ~~ U
67-64-1	Acetone	56	U
75-15-0	Carbon Disulfide	28	U
75-35-4	1,1-Dichloroethene	28	U
75-34-3	1,1-Dichloroethane	28	U
540-59-0	1,2-Dichloroethene (total)	160	
67-66-3	Chloroform	28	U
107-06-2	1,2-Dichloroethane	28	U
78-93-3	2-Butanone	~~56~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	28	U
56-23-5	Carbon Tetrachloride	28	U
108-05-4	Vinyl Acetate	56	U
75-27-4	Bromodichloromethane	28	U
78-87-5	1,2-Dichloropropane	28	U
10061-01-5	cis-1,3-Dichloropropene	28	U
79-01-6	Trichloroethene	1100	~~E~~ J
124-48-1	Dibromochloromethane	28	U
79-00-5	1,1,2-Trichloroethane	28	U
71-43-2	Benzene	28	U
10061-02-6	trans-1,3-Dichloropropene	28	U
75-25-2	Bromoform	28	U
108-10-1	4-Methyl-2-Pentanone	56	U
591-78-6	2-Hexanone	56	U
127-18-4	Tetrachloroethene	17	J
79-34-5	1,1,2,2-Tetrachloroethane	28	U
108-88-3	Toluene	28	U
108-90-7	Chlorobenzene	28	U
100-41-4	Ethylbenzene	28	U
100-42-5	Styrene	28	U
1330-20-7	Xylene (total)	28	U

t Schultz 8/14/91

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

CLG16D

Lab Name: AQUATEC, INC. Contract: 91000

Lab Code: AQUAI Case No.: 26518 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water) WATER Lab Sample ID: 135385

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: E135385D2V

Level: (low/med) LOW Date Received: 05/25/91

% Moisture: not dec._____ Date Analyzed: 06/07/91

Column: (pack/cap) PACK Dilution Factor: 5.555

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FBG16D

Lab Name: AQUATEC, INC. Contract: 91000

Lab Code: AQUAI Case No.: 26518 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water) WATER Lab Sample ID: 135386

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: C135386I3V

Level: (low/med) LOW Date Received: 05/25/91

% Moisture: not dec. _____ Date Analyzed: 06/07/91

Column: (pack/cap) PACK Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	9	~~B~~
67-64-1	Acetone	7	~~B~~J
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	2	J
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	4	J
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

LKS 8/19/91

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

FBG16D

Lab Name:AQUATEC, INC. Contract:91000

Lab Code: AQUAI Case No.: 26518 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water)WATER Lab Sample ID: 135386

Sample wt/vol: 5.0 (g/mL)ML Lab File ID: C135386I3V

Level: (low/med) LOW Date Received: 05/25/91

% Moisture: not dec._____ Date Analyzed: 06/07/91

Column: (pack/cap) PACK Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg)UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FDG16D

Lab Name: AQUATEC, INC. Contract: 91000

Lab Code: AQUAI Case No.: 26518 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water) WATER Lab Sample ID: 135387

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: D135387V

Level: (low/med) LOW Date Received: 05/25/91

% Moisture: not dec._____ Date Analyzed: 06/07/91

Column: (pack/cap) PACK Dilution Factor: 5.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	50	U
74-83-9	Bromomethane	50	U
75-01-4	Vinyl Chloride	120	
75-00-3	Chloroethane	50	U
75-09-2	Methylene Chloride	29	~~B~~ u
67-64-1	Acetone	12	~~BJ~~ u
75-15-0	Carbon Disulfide	25	U
75-35-4	1,1-Dichloroethene	25	U
75-34-3	1,1-Dichloroethane	25	U
540-59-0	1,2-Dichloroethene (total)	200	
67-66-3	Chloroform	25	U
107-06-2	1,2-Dichloroethane	25	U
78-93-3	2-Butanone	50	U
71-55-6	1,1,1-Trichloroethane	25	U
56-23-5	Carbon Tetrachloride	25	U
108-05-4	Vinyl Acetate	50	U
75-27-4	Bromodichloromethane	25	U
78-87-5	1,2-Dichloropropane	25	U
10061-01-5	cis-1,3-Dichloropropene	25	U
79-01-6	Trichloroethene	880	J
124-48-1	Dibromochloromethane	25	U
79-00-5	1,1,2-Trichloroethane	25	U
71-43-2	Benzene	25	U
10061-02-6	trans-1,3-Dichloropropene	25	U
75-25-2	Bromoform	25	U
108-10-1	4-Methyl-2-Pentanone	50	U
591-78-6	2-Hexanone	50	U
127-18-4	Tetrachloroethene	21	J
79-34-5	1,1,2,2-Tetrachloroethane	25	U
108-88-3	Toluene	5	J
108-90-7	Chlorobenzene	25	U
100-41-4	Ethylbenzene	25	U
100-42-5	Styrene	25	U
1330-20-7	Xylene (total)	25	U

KLS 8/19/91

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

FDG16D

Lab Name:AQUATEC, INC. Contract:91000

Lab Code: AQUAI Case No.: 26518 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water)WATER Lab Sample ID: 135387

Sample wt/vol: 5.0 (g/mL)ML Lab File ID: D135387V

Level: (low/med) LOW Date Received: 05/25/91

% Moisture: not dec._____ Date Analyzed: 06/07/91

Column: (pack/cap) PACK Dilution Factor: 5.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg)UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

G13S1

Lab Name: AQUATEC, INC. Contract: 91000

Lab Code: AQUAI Case No.: 26518 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water) WATER Lab Sample ID: 135388

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: C135388V

Level: (low/med) LOW Date Received: 05/25/91

% Moisture: not dec._____ Date Analyzed: 06/06/91

Column: (pack/cap) PACK Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	19	
75-00-3	Chloroethane	2	J
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	120	
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	99	
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	7	
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

G13S1

Lab Name: AQUATEC, INC. Contract: 91000

Lab Code: AQUAI Case No.: 26518 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water) WATER Lab Sample ID: 135388

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: C135388V

Level: (low/med) LOW Date Received: 05/25/91

% Moisture: not dec._____ Date Analyzed: 06/06/91

Column: (pack/cap) PACK Dilution Factor: 1.0

Number TICs found: 2

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 111-71-7	HEPTANAL	24.25	~~7~~ 5	~~J~~ R
2. 124-13-0	OCTANAL	29.45	~~5~~ 3	~~J~~ R
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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

G13S2

Lab Name: AQUATEC, INC. Contract: 91000

Lab Code: AQUAI Case No.: 26518 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water) WATER Lab Sample ID: 135389

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: C135389V

Level: (low/med) LOW Date Received: 05/25/91

% Moisture: not dec._____ Date Analyzed: 06/06/91

Column: (pack/cap) PACK Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	38	
75-00-3	Chloroethane	3	J
75-09-2	Methylene Chloride	3	~~BJ~~ U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	170	
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	180	
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	8	
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

RCS 8/1/91

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

G13S2

Lab Name: AQUATEC, INC. Contract: 91000

Lab Code: AQUAI Case No.: 26518 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water) WATER Lab Sample ID: 135389

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: C135389V

Level: (low/med) LOW Date Received: 05/25/91

% Moisture: not dec._____ Date Analyzed: 06/06/91

Column: (pack/cap) PACK Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

G13S3

Lab Name: AQUATEC, INC. Contract: 91000

Lab Code: AQUAI Case No.: 26518 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water) WATER Lab Sample ID: 135390

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: C135390V

Level: (low/med) LOW Date Received: 05/25/91

% Moisture: not dec. _____ Date Analyzed: 06/06/91

Column: (pack/cap) PACK Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	34	
75-00-3	Chloroethane	3	J
75-09-2	Methylene Chloride	7	~~B~~ u
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	160	
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	170	
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	7	
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

LKS 8/17/91

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

G13S3

Lab Name: AQUATEC, INC. Contract: 91000

Lab Code: AQUAI Case No.: 26518 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water) WATER Lab Sample ID: 135390

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: C135390V

Level: (low/med) LOW Date Received: 05/25/91

% Moisture: not dec._____ Date Analyzed: 06/06/91

Column: (pack/cap) PACK Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

G15D1

Lab Name: AQUATEC, INC. Contract: 91000

Lab Code: AQUAI Case No.: 26518 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water) WATER Lab Sample ID: 135391

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: C135391DV

Level: (low/med) LOW Date Received: 05/25/91

% Moisture: not dec._____ Date Analyzed: 06/06/91

Column: (pack/cap) PACK Dilution Factor: 41.667

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	420	U
74-83-9	Bromomethane	420	U
75-01-4	Vinyl Chloride	6300	
75-00-3	Chloroethane	420	U
75-09-2	Methylene Chloride	140	~~BJ~~ u
67-64-1	Acetone	420	U J
75-15-0	Carbon Disulfide	210	U
75-35-4	1,1-Dichloroethene	210	U
75-34-3	1,1-Dichloroethane	210	U
540-59-0	1,2-Dichloroethene (total)	5900	
67-66-3	Chloroform	210	U
107-06-2	1,2-Dichloroethane	210	U
78-93-3	2-Butanone	420	U
71-55-6	1,1,1-Trichloroethane	210	U
56-23-5	Carbon Tetrachloride	210	U
108-05-4	Vinyl Acetate	420	U
75-27-4	Bromodichloromethane	210	U
78-87-5	1,2-Dichloropropane	210	U
10061-01-5	cis-1,3-Dichloropropene	210	U
79-01-6	Trichloroethene	78	J
124-48-1	Dibromochloromethane	210	U
79-00-5	1,1,2-Trichloroethane	210	U
71-43-2	Benzene	210	U
10061-02-6	trans-1,3-Dichloropropene	210	U
75-25-2	Bromoform	210	U
108-10-1	4-Methyl-2-Pentanone	420	U
591-78-6	2-Hexanone	420	U
127-18-4	Tetrachloroethene	210	U
79-34-5	1,1,2,2-Tetrachloroethane	210	U
108-88-3	Toluene	2200	
108-90-7	Chlorobenzene	210	U
100-41-4	Ethylbenzene	550	
100-42-5	Styrene	210	U
1330-20-7	Xylene (total)	470	

LED 8/19/91

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

G15D1

Lab Name: AQUATEC, INC. Contract: 91000

Lab Code: AQUAI Case No.: 26518 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water) WATER Lab Sample ID: 135391

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: C135391DV

Level: (low/med) LOW Date Received: 05/25/91

% Moisture: not dec._____ Date Analyzed: 06/06/91

Column: (pack/cap) PACK Dilution Factor: 41.667

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

G15D2

b Name:AQUATEC, INC. Contract:91000

b Code: AQUAI Case No.: 26518 SAS No.: _____ SDG No.: CU1-6

trix: (soil/water) WATER Lab Sample ID: 135392

mple wt/vol: 5.0 (g/mL) ML Lab File ID: C135392DV

vel: (low/med) LOW Date Received: 05/25/91

Moisture: not dec._____ Date Analyzed: 06/06/91

lumn: (pack/cap) PACK Dilution Factor: 41.667

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	420	U
74-83-9	Bromomethane	420	U
75-01-4	Vinyl Chloride	6600	
75-00-3	Chloroethane	420	U
75-09-2	Methylene Chloride	480	~~B~~ u
67-64-1	Acetone	360	~~B~~ u
75-15-0	Carbon Disulfide	210	U
75-35-4	1,1-Dichloroethene	210	U
75-34-3	1,1-Dichloroethane	210	U
540-59-0	1,2-Dichloroethene (total)	6100	
67-66-3	Chloroform	210	U
107-06-2	1,2-Dichloroethane	210	U
78-93-3	2-Butanone	420	U
71-55-6	1,1,1-Trichloroethane	210	U
56-23-5	Carbon Tetrachloride	210	U
108-05-4	Vinyl Acetate	420	U
75-27-4	Bromodichloromethane	210	U
78-87-5	1,2-Dichloropropane	210	U
10061-01-5	cis-1,3-Dichloropropene	210	U
79-01-6	Trichloroethene	100	J
124-48-1	Dibromochloromethane	210	U
79-00-5	1,1,2-Trichloroethane	210	U
71-43-2	Benzene	210	U
10061-02-6	trans-1,3-Dichloropropene	210	U
75-25-2	Bromoform	210	U
108-10-1	4-Methyl-2-Pentanone	420	U
591-78-6	2-Hexanone	420	U
127-18-4	Tetrachloroethene	210	U
79-34-5	1,1,2,2-Tetrachloroethane	210	U
108-88-3	Toluene	2200	
108-90-7	Chlorobenzene	210	U
100-41-4	Ethylbenzene	580	
100-42-5	Styrene	210	U
1330-20-7	Xylene (total)	470	

8/19/91

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

G15D2

) Name:AQUATEC, INC. Contract:91000

·b Code: AQUAI Case No.: 26518 SAS No.: _____ SDG No.: CU1-6

ıtrix: (soil/water) WATER Lab Sample ID: 135392

ıple wt/vol: 5.0 (g/mL) ML Lab File ID: C135392DV

ıvel: (low/med) LOW Date Received: 05/25/91

.oisture: not dec._____ Date Analyzed: 06/06/91

umn: (pack/cap) PACK Dilution Factor: 41.667

mber TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

G15D3

Lab Name: AQUATEC, INC. Contract: 91000

Lab Code: AQUAI Case No.: 26518 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water) WATER Lab Sample ID: 135393

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: D135393DI2V

Level: (low/med) LOW Date Received: 05/25/91

% Moisture: not dec. _____ Date Analyzed: 06/07/91

Column: (pack/cap) PACK Dilution Factor: 38.462

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	380	U J
74-83-9	Bromomethane	380	U
75-01-4	Vinyl Chloride	4600	
75-00-3	Chloroethane	380	U
75-09-2	Methylene Chloride	880	~~B~~ U J
67-64-1	Acetone	230	~~B~~ U J
75-15-0	Carbon Disulfide	190	U J
75-35-4	1,1-Dichloroethene	190	U
75-34-3	1,1-Dichloroethane	190	U
540-59-0	1,2-Dichloroethene (total)	6200	
67-66-3	Chloroform	190	U
107-06-2	1,2-Dichloroethane	190	U
78-93-3	2-Butanone	380	U
71-55-6	1,1,1-Trichloroethane	190	U
56-23-5	Carbon Tetrachloride	190	U
108-05-4	Vinyl Acetate	380	U
75-27-4	Bromodichloromethane	190	U
78-87-5	1,2-Dichloropropane	190	U
10061-01-5	cis-1,3-Dichloropropene	190	U
79-01-6	Trichloroethene	100	J
124-48-1	Dibromochloromethane	190	U J
79-00-5	1,1,2-Trichloroethane	190	U
71-43-2	Benzene	190	U
10061-02-6	trans-1,3-Dichloropropene	190	U
75-25-2	Bromoform	190	U
108-10-1	4-Methyl-2-Pentanone	380	U
591-78-6	2-Hexanone	380	U
127-18-4	Tetrachloroethene	190	U
79-34-5	1,1,2,2-Tetrachloroethane	190	U
108-88-3	Toluene	1800	
108-90-7	Chlorobenzene	190	U
100-41-4	Ethylbenzene	610	
100-42-5	Styrene	190	U
1330-20-7	Xylene (total)	470	

E. Schulz 8/19/91

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

G15D3

Lab Name: AQUATEC, INC. Contract: 91000

Lab Code: AQUAI Case No.: 26518 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water) WATER Lab Sample ID: 135393

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: D135393DI2V

Level: (low/med) LOW Date Received: 05/25/91

% Moisture: not dec._____ Date Analyzed: 06/07/91

Column: (pack/cap) PACK Dilution Factor: 38.462

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

G16D1

Lab Name: AQUATEC, INC. Contract: 91000

Lab Code: AQUAI Case No.: 26518 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water) WATER Lab Sample ID: 135394

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: C135394DV

Level: (low/med) LOW Date Received: 05/25/91

% Moisture: not dec._____ Date Analyzed: 06/06/91

Column: (pack/cap) PACK Dilution Factor: 5.102

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	51	U
74-83-9	Bromomethane	51	U
75-01-4	Vinyl Chloride	130	
75-00-3	Chloroethane	51	U
75-09-2	Methylene Chloride	12	~~B~~ U
67-64-1	Acetone	51	U
75-15-0	Carbon Disulfide	26	U
75-35-4	1,1-Dichloroethene	26	U
75-34-3	1,1-Dichloroethane	26	U
540-59-0	1,2-Dichloroethene (total)	150	
67-66-3	Chloroform	26	U
107-06-2	1,2-Dichloroethane	26	U
78-93-3	2-Butanone	51	U
71-55-6	1,1,1-Trichloroethane	26	U
56-23-5	Carbon Tetrachloride	26	U
108-05-4	Vinyl Acetate	51	U
75-27-4	Bromodichloromethane	26	U
78-87-5	1,2-Dichloropropane	26	U
10061-01-5	cis-1,3-Dichloropropene	26	U
79-01-6	Trichloroethene	790	
124-48-1	Dibromochloromethane	26	U
79-00-5	1,1,2-Trichloroethane	26	U
71-43-2	Benzene	26	U
10061-02-6	trans-1,3-Dichloropropene	26	U
75-25-2	Bromoform	26	U
108-10-1	4-Methyl-2-Pentanone	51	U
591-78-6	2-Hexanone	51	U
127-18-4	Tetrachloroethene	16	J
79-34-5	1,1,2,2-Tetrachloroethane	26	U
108-88-3	Toluene	6	J
108-90-7	Chlorobenzene	26	U
100-41-4	Ethylbenzene	26	U
100-42-5	Styrene	26	U
1330-20-7	Xylene (total)	26	U

LKS 9/19/91

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

G16D1

Lab Name: AQUATEC, INC. Contract: 91000

Lab Code: AQUAI Case No.: 26518 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water) WATER Lab Sample ID: 135394

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: C135394DV

Level: (low/med) LOW Date Received: 05/25/91

% Moisture: not dec._____ Date Analyzed: 06/06/91

Column: (pack/cap) PACK Dilution Factor: 5.102

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

G16D2

Lab Name: AQUATEC, INC. Contract: 91000

Lab Code: AQUAI Case No.: 26518 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water) WATER Lab Sample ID: 135395

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: E135395DV

Level: (low/med) LOW Date Received: 05/25/91

% Moisture: not dec._____ Date Analyzed: 06/07/91

Column: (pack/cap) PACK Dilution Factor: 8.333

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	83	U
74-83-9	Bromomethane	83	U
75-01-4	Vinyl Chloride	130	
75-00-3	Chloroethane	83	U
75-09-2	Methylene Chloride	42	U
67-64-1	Acetone	83	U
75-15-0	Carbon Disulfide	42	U
75-35-4	1,1-Dichloroethene	42	U
75-34-3	1,1-Dichloroethane	42	U
540-59-0	1,2-Dichloroethene (total)	160	
67-66-3	Chloroform	42	U
107-06-2	1,2-Dichloroethane	42	U
78-93-3	2-Butanone	~~83~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	42	U
56-23-5	Carbon Tetrachloride	42	U
108-05-4	Vinyl Acetate	83	U
75-27-4	Bromodichloromethane	42	U
78-87-5	1,2-Dichloropropane	42	U
10061-01-5	cis-1,3-Dichloropropene	42	U
79-01-6	Trichloroethene	1200	J
124-48-1	Dibromochloromethane	42	U
79-00-5	1,1,2-Trichloroethane	42	U
71-43-2	Benzene	42	U
10061-02-6	trans-1,3-Dichloropropene	42	U
75-25-2	Bromoform	42	U
108-10-1	4-Methyl-2-Pentanone	83	U
591-78-6	2-Hexanone	83	U
127-18-4	Tetrachloroethene	20	J
79-34-5	1,1,2,2-Tetrachloroethane	42	U
108-88-3	Toluene	42	U
108-90-7	Chlorobenzene	42	U
100-41-4	Ethylbenzene	42	U
100-42-5	Styrene	42	U
1330-20-7	Xylene (total)	42	U

EKS 8/19/91

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

G16D2

Lab Name: AQUATEC, INC. Contract: 91000

Lab Code: AQUAI Case No.: 26518 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water) WATER Lab Sample ID: 135395

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: E135395DV

Level: (low/med) LOW Date Received: 05/25/91

% Moisture: not dec._____ Date Analyzed: 06/07/91

Column: (pack/cap) PACK Dilution Factor: 8.333

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

G16D3

Lab Name: AQUATEC, INC. Contract: 91000

Lab Code: AQUAI Case No.: 26518 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water) WATER Lab Sample ID: 135396

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: C135396DV

Level: (low/med) LOW Date Received: 05/25/91

% Moisture: not dec._____ Date Analyzed: 06/07/91

Column: (pack/cap) PACK Dilution Factor: 5.405

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	54	U J
74-83-9	Bromomethane	54	U
75-01-4	Vinyl Chloride	150	
75-00-3	Chloroethane	54	U
75-09-2	Methylene Chloride	27	U
67-64-1	Acetone	54	U
75-15-0	Carbon Disulfide	27	U
75-35-4	1,1-Dichloroethene	27	U
75-34-3	1,1-Dichloroethane	27	U
540-59-0	1,2-Dichloroethene (total)	220	
67-66-3	Chloroform	27	U
107-06-2	1,2-Dichloroethane	27	U
78-93-3	2-Butanone	54	U
71-55-6	1,1,1-Trichloroethane	27	U
56-23-5	Carbon Tetrachloride	27	U
108-05-4	Vinyl Acetate	54	U
75-27-4	Bromodichloromethane	27	U
78-87-5	1,2-Dichloropropane	27	U
10061-01-5	cis-1,3-Dichloropropene	27	U
79-01-6	Trichloroethene	1000	
124-48-1	Dibromochloromethane	27	U
79-00-5	1,1,2-Trichloroethane	27	U
71-43-2	Benzene	27	U
10061-02-6	trans-1,3-Dichloropropene	27	U
75-25-2	Bromoform	27	U
108-10-1	4-Methyl-2-Pentanone	54	U
591-78-6	2-Hexanone	54	U
127-18-4	Tetrachloroethene	21	J
79-34-5	1,1,2,2-Tetrachloroethane	27	U J
108-88-3	Toluene	6	J
108-90-7	Chlorobenzene	27	U J
100-41-4	Ethylbenzene	27	U
100-42-5	Styrene	27	U
1330-20-7	Xylene (total)	27	U

8/19/91

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

G16D3

Lab Name:AQUATEC, INC. Contract:91000

Lab Code: AQUAI Case No.: 26518 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water)WATER Lab Sample ID: 135396

Sample wt/vol: 5.0 (g/mL)ML Lab File ID: C135396DV

Level: (low/med) LOW Date Received: 05/25/91

% Moisture: not dec._____ Date Analyzed: 06/07/91

Column: (pack/cap) PACK Dilution Factor: 5.405

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg)UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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524.2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CU 1-6

Lab Name: Aquatec, Inc. Contract: 91000

Lab Code: AQUAI Case No.: 26512 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water) Water Lab Sample ID: 135345

Sample wt/vol: 25 (g/mL) mL Lab File ID: G135345V

Level: (low/med) LOW Date Received: 05/24/91

Date Analyzed: 06/03/91

Column: (pack/cap) CAP Dilution Factor: 1.0

CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L

CAS NO.	COMPOUND		Q
75-71-8	Dichlorodifluoromethane	*	
74-87-3	Chloromethane		
75-01-4	Vinyl Chloride		
74-83-9	Bromomethane		
75-00-3	Chloroethane		
75-69-4	Trichlorofluoromethane		
75-35-4	1,1-Dichloroethene		
75-15-0	Carbon Disulfide		
67-64-1	Acetone		
75-09-2	Methylene Chloride		
156-60-5	trans-1,2-Dichloroethene		
75-34-3	1,1-Dichloroethane		
590-20-7	2,2-Dichloropropane		
156-59-4	cis-1,2-Dichloroethene		
74-97-5	Bromochloromethane		
67-66-3	Chloroform		
71-55-6	1,1,1-Trichloroethane		
56-23-5	Carbon Tetrachloride		
78-93-3	2-Butanone		
563-58-6	1,1-Dichloropropene		
71-43-2	Benzene		
107-06-2	1,2-Dichloroethane		
79-01-6	Trichloroethene		
78-87-5	1,2-Dichloropropane		
74-95-3	Dibromomethane		
75-27-4	Bromodichloromethane		
10061-01-5	cis-1,3-Dichloropropene		
108-88-3	Toluene		
10061-02-6	trans-1,3-Dichloropropene		
108-10-1	4-Methyl-2-Pentanone		
79-00-5	1,1,2-Trichloroethane		
127-18-4	Tetrachloroethene		

* Unsuccessful purge due to suspected matrix effect.

524.2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CU 1-6

Lab Name: Aquatec, Inc. Contract: 91000

Lab Code: AQUAI Case No.: 26512 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water) Water Lab Sample ID: 135345

Sample wt/vol: 25 (g/mL) mL Lab File ID: G135345V

Level: (low/med) LOW Date Received: 05/24/91

Date Analyzed: 06/03/91

Column: (pack/cap) CAP Dilution Factor: 1.0

CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L

CAS NO.	COMPOUND		Q
142-28-9	1,3-Dichloropropane	*	
124-48-1	Dibromochloromethane		
106-93-4	1,2-Dibromoethane		
591-78-6	2-Hexanone		
108-90-7	Chlorobenzene		
630-20-6	1,1,1,2-Tetrachloroethane		
100-41-4	Ethylbenzene		
1330-20-7	Xylene (total)		
100-42-5	Styrene		
75-25-2	Bromoform		
98-82-8	Isopropylbenzene		
108-86-1	Bromobenzene		
96-18-4	1,2,3-Trichloropropane		
79-34-5	1,1,2,2-Tetrachloroethane		
103-65-1	n-Propylbenzene		
95-49-8	2-Chlorotoluene		
106-43-4	4-Chlorotoluene		
108-67-8	1,3,5-Trimethylbenzene		
98-06-6	tert-Butylbenzene		
95-63-6	1,2,4-Trimethylbenzene		
135-98-8	sec-Butylbenzene		
541-73-1	1,3-Dichlorobenzene		
106-46-7	1,4-Dichlorobenzene		
99-87-6	4-Isopropyltoluene		
95-50-1	1,2-Dichlorobenzene		
104-51-8	n-Butylbenzene		
96-12-8	1,2-Dibromo-3-chloropropane		
120-82-1	1,2,4-Trichlorobenzene		
91-20-3	Naphthalene		
87-68-3	Hexachlorobutadiene		
87-61-6	1,2,3-Trichlorobenzene		

*Unsuccessful purge due to suspected matrix effect.

524.2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CU 1-6RE

Lab Name: Aquatec, Inc. Contract: 91000

Lab Code: AQUAI Case No.: 26512 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water) Water Lab Sample ID: 135345R1

Sample wt/vol: 25 (g/mL) mL Lab File ID: G135345I2V

Level: (low/med) LOW Date Received: 05/24/91

Date Analyzed: 06/06/91

Column: (pack/cap) CAP Dilution Factor: 1.0

CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L

CAS NO.	COMPOUND		Q
75-71-8	Dichlorodifluoromethane	*	
74-87-3	Chloromethane		
75-01-4	Vinyl Chloride		
74-83-9	Bromomethane		
75-00-3	Chloroethane		
75-69-4	Trichlorofluoromethane		
75-35-4	1,1-Dichloroethene		
75-15-0	Carbon Disulfide		
67-64-1	Acetone		
75-09-2	Methylene Chloride		
156-60-5	trans-1,2-Dichloroethene		
75-34-3	1,1-Dichloroethane		
590-20-7	2,2-Dichloropropane		
156-59-4	cis-1,2-Dichloroethene		
74-97-5	Bromochloromethane		
67-66-3	Chloroform		
71-55-6	1,1,1-Trichloroethane		
56-23-5	Carbon Tetrachloride		
78-93-3	2-Butanone		
563-58-6	1,1-Dichloropropene		
71-43-2	Benzene		
107-06-2	1,2-Dichloroethane		
79-01-6	Trichloroethene		
78-87-5	1,2-Dichloropropane		
74-95-3	Dibromomethane		
75-27-4	Bromodichloromethane		
10061-01-5	cis-1,3-Dichloropropene		
108-88-3	Toluene		
10061-02-6	trans-1,3-Dichloropropene		
108-10-1	4-Methyl-2-Pentanone		
79-00-5	1,1,2-Trichloroethane		
127-18-4	Tetrachloroethene		

Unsuccessful purge due to suspected matrix effect.

524.2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CU 1-6RE

Lab Name: Aquatec, Inc. Contract: 91000

Lab Code: AQUAI Case No.: 26512 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water) Water Lab Sample ID: 135345R1

Sample wt/vol: 25 (g/mL) mL Lab File ID: G135345I2V

Level: (low/med) LOW Date Received: 05/24/91

Date Analyzed: 06/06/91

Column: (pack/cap) CAP Dilution Factor: 1.0

CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L

CAS NO.	COMPOUND		Q
142-28-9	1,3-Dichloropropane	*	
124-48-1	Dibromochloromethane		
106-93-4	1,2-Dibromoethane		
591-78-6	2-Hexanone		
108-90-7	Chlorobenzene		
630-20-6	1,1,1,2-Tetrachloroethane		
100-41-4	Ethylbenzene		
1330-20-7	Xylene (total)		
100-42-5	Styrene		
75-25-2	Bromoform		
98-82-8	Isopropylbenzene		
108-86-1	Bromobenzene		
96-18-4	1,2,3-Trichloropropane		
79-34-5	1,1,2,2-Tetrachloroethane		
103-65-1	n-Propylbenzene		
95-49-8	2-Chlorotoluene		
106-43-4	4-Chlorotoluene		
108-67-8	1,3,5-Trimethylbenzene		
98-06-6	tert-Butylbenzene		
95-63-6	1,2,4-Trimethylbenzene		
135-98-8	sec-Butylbenzene		
541-73-1	1,3-Dichlorobenzene		
106-46-7	1,4-Dichlorobenzene		
99-87-6	4-Isopropyltoluene		
95-50-1	1,2-Dichlorobenzene		
104-51-8	n-Butylbenzene		
96-12-8	1,2-Dibromo-3-chloropropane		
120-82-1	1,2,4-Trichlorobenzene		
91-20-3	Naphthalene		
87-68-3	Hexachlorobutadiene		
87-61-6	1,2,3-Trichlorobenzene		

* Unsuccessful purge due to suspected matrix effect.

524.2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CU 7-10

Lab Name: Aquatec, Inc. Contract: 91000

Lab Code: AQUAI Case No.: 26512 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water) Water Lab Sample ID: 135346

Sample wt/vol: 25 (g/mL) mL Lab File ID: G135346V

Level: (low/med) LOW Date Received: 05/24/91

Date Analyzed: 06/04/91

Column: (pack/cap) CAP Dilution Factor: 1.0

CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L

CAS NO.	COMPOUND		Q
75-71-8	~~Dichlorodifluoromethane~~	~~0.5~~	~~U~~
74-87-3	~~Chloromethane~~	~~0.5~~	~~U~~
75-01-4	Vinyl Chloride	0.5	U
74-83-9	~~Bromomethane~~	~~0.5~~	~~U~~
75-00-3	Chloroethane	0.5	U
75-69-4	~~Trichlorofluoromethane~~	~~1~~	
75-35-4	1,1-Dichloroethene	0.5	U
75-15-0	~~Carbon Disulfide~~	~~0.5~~	~~U~~
67-64-1	~~Acetone~~	~~5~~	~~U~~
75-09-2	Methylene Chloride	2	~~B~~ U
156-60-5	trans-1,2-Dichloroethene	0.5	U
75-34-3	1,1-Dichloroethane	0.5	U
590-20-7	~~B,2 Dichloropropene~~	~~0.5~~	~~U~~
156-59-4	cis-1,2-Dichloroethene	2	
74-97-5	~~Bromochloromethane~~	~~0.5~~	~~U~~
67-66-3	Chloroform	14	
71-55-6	1,1,1-Trichloroethane	0.5	U
56-23-5	Carbon Tetrachloride	0.5	U
78-93-3	~~2 Butanone~~	~~8~~	
563-58-6	~~1,1 Dichloropropene~~	~~0.5~~	~~U~~
71-43-2	Benzene	0.5	U
107-06-2	1,2-Dichloroethane	0.5	U
79-01-6	Trichloroethene	0.8	
78-87-5	1,2-Dichloropropane	0.5	U
74-95-3	~~Dibromomethane~~	~~0.5~~	~~U~~
75-27-4	Bromodichloromethane	2	
10061-01-5	cis-1,3-Dichloropropene	0.5	U
108-88-3	Toluene	0.6	
10061-02-6	trans-1,3-Dichloropropene	0.5	U
108-10-1	~~4 Methyl 2 Pentanone~~	~~3~~	~~J~~
79-00-5	1,1,2-Trichloroethane	0.5	U
127-18-4	Tetrachloroethene	0.5	U

R Schultz 8/14/91

524.2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CU 7-10

Lab Name: Aquatec, Inc. Contract: 91000

Lab Code: AQUAI Case No.: 26512 SAS No.: _____ SDG No.: CU1-6

atrix: (soil/water) Water Lab Sample ID: 135346

Sample wt/vol: 25 (g/mL) mL Lab File ID: G135346V

evel: (low/med) LOW Date Received: 05/24/91

Date Analyzed: 06/04/91

Column: (pack/cap) CAP Dilution Factor: 1.0

CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L

CAS NO.	COMPOUND		Q
142-28-9	~~1,3-Dichloropropane~~	~~0.5~~	~~U~~
124-48-1	Dibromochloromethane	0.5	U
106-93-4	~~1,2-Dibromoethane~~	~~0.5~~	~~U~~
591-78-6	~~2-Hexanone~~	~~5~~	~~U~~
108-90-7	Chlorobenzene	0.5	U
630-20-6	~~1,1,1,2-Tetrachloroethane~~	~~0.5~~	~~U~~
100-41-4	Ethylbenzene	0.5	U
1330-20-7	Xylene (total)	0.5	U
100-42-5	~~Styrene~~	~~0.5~~	~~U~~
75-25-2	Bromoform	0.5	U
98-82-8	~~Isopropylbenzene~~	~~0.5~~	~~U~~
108-86-1	~~Bromobenzene~~	~~0.5~~	~~U~~
96-18-4	~~1,2,3-Trichloropropane~~	~~0.5~~	~~U~~
79-34-5	1,1,2,2-Tetrachloroethane	0.5	U
103-65-1	~~n-Propylbenzene~~	~~0.5~~	~~U~~
95-49-8	2-Chlorotoluene	0.5	U
106-43-4	4-Chlorotoluene	0.5	U
108-67-8	1,3,5-Trimethylbenzene	0.5	U
98-06-6	tert-Butylbenzene	0.5	U
95-63-6	1,2,4-Trimethylbenzene	0.5	U
135-98-8	sec-Butylbenzene	0.5	U
541-73-1	1,3-Dichlorobenzene	0.5	U
106-46-7	1,4-Dichlorobenzene	0.5	U
99-87-6	4-Isopropyltoluene	0.5	U
95-50-1	1,2-Dichlorobenzene	0.5	U
104-51-8	n-Butylbenzene	0.5	U
96-12-8	1,2-Dibromo-3-chloropropane	0.5	U
120-82-1	1,2,4-Trichlorobenzene	0.5	U
91-20-3	Naphthalene	0.5	U
87-68-3	Hexachlorobutadiene	0.5	U
87-61-6	~~1,2,3-Trichlorobenzene~~	~~0.5~~	~~U~~

D Schulz 8/19/91

524.2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

V140VCU

Lab Name: Aquatec, Inc. Contract: 91000

Lab Code: AQUAI Case No.: 26512 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water) Water Lab Sample ID: 135347

Sample wt/vol: 25 (g/mL) mL Lab File ID: G135347V

Level: (low/med) LOW Date Received: 05/24/91

Date Analyzed: 06/04/91

Column: (pack/cap) CAP Dilution Factor: 1.0

CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L

CAS NO.	COMPOUND		Q
75-71-8	~~Dichlorodifluoromethane~~	~~0.5~~	~~U~~
74-87-3	~~Chloromethane~~	~~1~~	
75-01-4	Vinyl Chloride	32	
74-83-9	~~Bromomethane~~	~~0.5~~	~~U~~
75-00-3	Chloroethane	5	
75-69-4	~~Trichlorofluoromethane~~	~~0.5~~	~~U~~
75-35-4	1,1-Dichloroethene	0.7	
75-15-0	~~Carbon Disulfide~~	~~0.5~~	
67-64-1	~~Acetone~~	~~00~~	
75-09-2	Methylene Chloride	1	~~B~~ U
156-60-5	trans-1,2-Dichloroethene	30	
75-34-3	1,1-Dichloroethane	0.6	
590-20-7	~~2,2 Dichloropropane~~	~~0.5~~	~~U~~
156-59-4	cis-1,2-Dichloroethene	~~120~~	~~E~~ R
74-97-5	~~Bromochloromethane~~	~~0.5~~	~~U~~
67-66-3	Chloroform	1	
71-55-6	1,1,1-Trichloroethane	0.5	U
56-23-5	Carbon Tetrachloride	0.5	U
78-93-3	~~2 Butanone~~	~~1600~~	~~B~~
563-58-6	~~1,1 Dichloropropene~~	~~0.5~~	~~U~~
71-43-2	Benzene	13	
107-06-2	1,2-Dichloroethane	0.5	U
79-01-6	Trichloroethene	11	
78-87-5	1,2-Dichloropropane	0.5	U
74-95-3	~~Dibromomethane~~	~~0.5~~	~~U~~
75-27-4	Bromodichloromethane	0.5	U
10061-01-5	cis-1,3-Dichloropropene	0.5	U
108-88-3	Toluene	0.7	
10061-02-6	trans-1,3-Dichloropropene	0.5	U
108-10-1	~~4 Methyl 2 Pentanone~~	~~5~~	~~U~~
79-00-5	1,1,2-Trichloroethane	0.5	U
127-18-4	Tetrachloroethene	0.7	

L Schultz 8/17/91

FORM I VOA

524.2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

V140VCU

Lab Name: Aquatec, Inc. Contract: 91000

Lab Code: AQUAI Case No.: 26512 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water) Water Lab Sample ID: 135347

Sample wt/vol: 25 (g/mL) mL Lab File ID: G135347V

Level: (low/med) LOW Date Received: 05/24/91

Date Analyzed: 06/04/91

Column: (pack/cap) CAP Dilution Factor: 1.0

CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L

CAS NO.	COMPOUND		Q
142-28-9	~~1,3-Dichloropropane~~	~~0.5~~	~~U~~
124-48-1	Dibromochloromethane	0.5	U
106-93-4	~~1,2-Dibromoethane~~	~~0.5~~	~~U~~
591-78-6	~~2-Hexanone~~	~~5~~	~~U~~
108-90-7	Chlorobenzene	0.5	U
630-20-6	~~1,1,1,2-Tetrachloroethane~~	~~0.5~~	~~U~~
100-41-4	Ethylbenzene	0.5	U
1330-20-7	Xylene (total)	0.5	U
100-42-5	~~Styrene~~	~~0.5~~	~~U~~
75-25-2	Bromoform	0.5	U
98-82-8	~~Isopropylbenzene~~	~~0.5~~	~~U~~
108-86-1	~~Bromobenzene~~	~~0.5~~	~~U~~
96-18-4	~~1,2,3-Trichloropropane~~	~~0.5~~	~~U~~
79-34-5	1,1,2,2-Tetrachloroethane	0.5	U
103-65-1	~~n-Propylbenzene~~	~~0.5~~	~~U~~
95-49-8	2-Chlorotoluene	0.5	U
106-43-4	4-Chlorotoluene	0.5	U
108-67-8	1,3,5-Trimethylbenzene	0.5	U
98-06-6	tert-Butylbenzene	0.5	U
95-63-6	1,2,4-Trimethylbenzene	0.5	U
135-98-8	sec-Butylbenzene	0.5	U
541-73-1	1,3-Dichlorobenzene	0.5	U
106-46-7	1,4-Dichlorobenzene	0.5	U
99-87-6	4-Isopropyltoluene	0.5	U
95-50-1	1,2-Dichlorobenzene	0.5	U
104-51-8	n-Butylbenzene	0.5	U
96-12-8	1,2-Dibromo-3-chloropropane	0.5	U
120-82-1	1,2,4-Trichlorobenzene	0.5	U
91-20-3	Naphthalene	0.5	U
87-68-3	Hexachlorobutadiene	0.5	U
87-61-6	~~1,2,3-Trichlorobenzene~~	~~0.5~~	~~U~~

E. Schutz 8/19/91

524.2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

V140VCUDL

Lab Name: Aquatec, Inc. Contract: 91000

Lab Code: AQUAI Case No.: 26512 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water) Water Lab Sample ID: 135347D1

Sample wt/vol: 25 (g/mL) mL Lab File ID: G135347DV

Level: (low/med) LOW Date Received: 05/24/91

Date Analyzed: 06/06/91

Column: (pack/cap) CAP Dilution Factor: 4.0

CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L

CAS NO.	COMPOUND		Q
75-71-8	~~Dichlorodifluoromethane~~	~~3~~	~~U~~
74-87-3	~~Chloromethane~~	~~3~~	~~U~~
75-01-4	Vinyl Chloride	46	~~D~~ J
74-83-9	~~Bromomethane~~	~~3~~	~~U~~
75-00-3	Chloroethane	4	~~D~~ J
75-69-4	~~Trichlorofluoromethane~~	~~3~~	~~U~~
75-35-4	1,1-Dichloroethene	2	J~~D~~
75-15-0	~~Carbon Disulfide~~	~~2~~	~~U~~
67-64-1	~~Acetone~~	~~85~~	~~D~~
75-09-2	Methylene Chloride	1	~~D~~ J
156-60-5	trans-1,2-Dichloroethene	32	~~D~~ J
75-34-3	1,1-Dichloroethane	2	U J
590-20-7	~~2,2-Dichloropropane~~	~~2~~	~~U~~
156-59-4	cis-1,2-Dichloroethene	140	~~D~~E J
74-97-5	~~Bromochloromethane~~	~~3~~	~~U~~
67-66-3	Chloroform	1	J~~D~~
71-55-6	1,1,1-Trichloroethane	2	U J
56-23-5	Carbon Tetrachloride	2	U J
78-93-3	~~2-Butanone~~	~~1600~~	~~DE~~
563-58-6	~~1,1-Dichloropropene~~	~~2~~	~~U~~
71-43-2	Benzene	14	~~D~~ J
107-06-2	1,2-Dichloroethane	2	U J
79-01-6	Trichloroethene	13	~~D~~ J
78-87-5	1,2-Dichloropropane	2	U J
74-95-3	~~Dibromomethane~~	~~3~~	~~U~~
75-27-4	Bromodichloromethane	2	U J
10061-01-5	cis-1,3-Dichloropropene	2	U J
108-88-3	Toluene	0.7	J~~D~~
10061-02-6	trans-1,3-Dichloropropene	2	U J
108-10-1	~~4-Methyl-2-Pentanone~~	~~20~~	~~U~~
79-00-5	1,1,2-Trichloroethane	2	U J
127-18-4	Tetrachloroethene	0.8	J~~D~~

C. Schulte 8/19/91

FORM I VOA

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524.2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

V140VCUDL

Lab Name: Aquatec, Inc. Contract: 91000

ab Code: AQUAI Case No.: 26512 SAS No.: _____ SDG No.: CU1-6

Matrix: (soil/water) Water Lab Sample ID: 135347D1

Sample wt/vol: 25 (g/mL) mL Lab File ID: G135347DV

evel: (low/med) LOW Date Received: 05/24/91

Date Analyzed: 06/06/91

olumn: (pack/cap) CAP Dilution Factor: 4.0

CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L

CAS NO.	COMPOUND		Q
142-28-9	~~1,3-Dichloropropane~~	~~2~~	~~U~~
124-48-1	Dibromochloromethane	2	UJ
106-93-4	~~1,2-Dibromoethane~~	~~2~~	~~U~~
591-78-6	~~2-Hexanone~~	~~20~~	~~U~~
108-90-7	Chlorobenzene	2	UJ
630-20-6	~~1,1,1,2-Tetrachloroethane~~	~~2~~	~~U~~
100-41-4	Ethylbenzene	2	UJ
1330-20-7	Xylene (total)	2	UJ
100-42-5	~~Styrene~~	~~2~~	~~U~~
75-25-2	Bromoform	2	UJ
98-82-8	~~Isopropylbenzene~~	~~2~~	~~U~~
108-86-1	~~Bromobenzene~~	~~2~~	~~U~~
96-18-4	~~1,2,3-Trichloropropane~~	~~2~~	~~U~~
79-34-5	1,1,2,2-Tetrachloroethane	2	UJ
103-65-1	~~n-Propylbenzene~~	~~2~~	~~U~~
95-49-8	2-Chlorotoluene	2	U
106-43-4	4-Chlorotoluene	2	U
108-67-8	1,3,5-Trimethylbenzene	2	U
98-06-6	tert-Butylbenzene	2	U
95-63-6	1,2,4-Trimethylbenzene	2	U
135-98-8	sec-Butylbenzene	2	U
541-73-1	1,3-Dichlorobenzene	2	U
106-46-7	1,4-Dichlorobenzene	2	U
99-87-6	4-Isopropyltoluene	2	U
95-50-1	1,2-Dichlorobenzene	2	U
104-51-8	n-Butylbenzene	2	U
96-12-8	1,2-Dibromo-3-chloropropane	2	U
120-82-1	1,2,4-Trichlorobenzene	2	U
91-20-3	Naphthalene	2	U
87-68-3	Hexachlorobutadiene	2	U
87-61-6	~~1,2,3-Trichlorobenzene~~	~~2~~	~~U~~

d Acute 8/19/91

FORM I VOA-2

TRILLIUM INC

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

TREATMENT SYSTEM SAMPLING

INORGANIC ANALYSES DATA

Samples Collected 5/21/91 - 5/27/91

Chemical Analyses Performed By

PACE, Incorporated

August 20, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

All samples in this data package were analyzed for only iron. All results were considered valid.

Validation of inorganic laboratory data is conducted in conformance with Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses (2/89) and associated checklist. These guidelines and checklist are intended to evaluate data on a technical basis rather than a contract compliance basis for chemical analyses conducted under the USEPA's Contract Laboratory Program (CLP) and assumes that the data package is presented in accordance with the CLP requirements. In addition, the data package is assumed to represent the best efforts of the laboratory and has already been subjected to adequate and sufficient quality review prior to submission for validation.

Results of analyses are reported by the laboratory as either qualified or unqualified. Unqualified results mean that the reported values may be used without reservations. Qualified results indicate a nonroutine (with respect to CLP procedures) situation occurred during the course of analysis. Various qualifier codes associated with the numerical results are used by the laboratory to denote specific information regarding the analytical results. During the process of validation, laboratory qualified and unqualified data are verified against supporting documentation. Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified results still mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: Analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Inorganic Data Validation

for

Environmental Project Control, Inc.

Samples Collected 5/21-27/91

Case Narrative

This group contained seven water samples. All of the samples were analyzed for only iron.

Samples validated in this report are noted below:

Client ID	Lab ID	Date of Collection
S2-22	3784	5/21/91
S2-23	3839	5/22/91
S2-24	3883	5/23/91
S2-25	3897	5/24/91
S2-26	3909	5/25/91
S2-27	3921	5/26/91
S2-28	3933	5/27/91

The Form I's indicate that all of the samples were received on 5/22/91. However, the chains of custody indicate that samples were collected through 5/27/91.

The areas reviewed during validation are listed below.

CLP Inorganics Data Validation

I. Holding Times

II. Calibration

III. Blanks

IV. ICP Interference Check Sample

V. Matrix Spike Sample Analysis

VI. Duplicate Sample Analysis

VII. Laboratory Control Sample Analysis

VIII. Furnace Atomic Absorption Analysis

IX. ICP Serial Dilution Analysis

X. Detection Limits

XI. Sample Result Verification

XII. Overall Assessment

TRILLIUM INC

Data Validation

I. Holding Times

Analyses were conducted within the acceptable holding time.

II. Calibration

Calibrations were satisfactory.

III. Blanks

Blank results were satisfactory.

IV. ICP Interference Check Sample

ICS results were satisfactory.

V. Matrix Spike Sample Analysis

Matrix spike analyses were conducted on S2-22. Results were satisfactory.

VI. Duplicate Sample Analysis

Duplicate analyses were conducted on S2-23. Results were satisfactory.

VII. Laboratory Control Sample Analysis

LCS results were satisfactory.

VIII. Furnace Atomic Absorption Analysis

No furnace analyses were conducted.

IX. ICP Serial Dilution Analysis

Serial dilution results were satisfactory.

X. Detection Limits

The IDL was less than the CRDL.

XI. Sample Result Verification

Results were calculated correctly.

XII. Overall Assessment

All results were considered valid.

DATA SUMMARY FORM: INORGANICS

Site Name: Wells G & H

WATER SAMPLES
(ug/L)

Case # 810522 501 Sampling Date(s) 5/21 – 27/91

	Sample No	3784	3839	3883	3897	3909	3921	3933			
	Dilution Factor	1	1	1	1	1	1	1			
	Location	S2-22	S2-23	S2-24	S2-25	S2-26	S2-27	S2-28			
	Lab ID										
CRDL											
200	Aluminum	N/R	N/R	N/R	N/R	N/R	N/R	N/R			
60	Antimony	N/R	N/R	N/R	N/R	N/R	N/R	N/R			
10	*Arsenic	N/R	N/R	N/R	N/R	N/R	N/R	N/R			
200	Barium	N/R	N/R	N/R	N/R	N/R	N/R	N/R			
5	Beryllium	N/R	N/R	N/R	N/R	N/R	N/R	N/R			
5	*Cadmium	N/R	N/R	N/R	N/R	N/R	N/R	N/R			
5000	Calcium	N/R	N/R	N/R	N/R	N/R	N/R	N/R			
10	*Chromium	N/R	N/R	N/R	N/R	N/R	N/R	N/R			
50	Cobalt	N/R	N/R	N/R	N/R	N/R	N/R	N/R			
25	Copper	N/R	N/R	N/R	N/R	N/R	N/R	N/R			
100	Iron	3110	2280	2140	6830	15400	2980	2300			
3	*Lead	N/R	N/R	N/R	N/R	N/R	N/R	N/R			
5000	Magnesium	N/R	N/R	N/R	N/R	N/R	N/R	N/R			
15	Manganese	N/R	N/R	N/R	N/R	N/R	N/R	N/R			
0 2	Mercury	N/R	N/R	N/R	N/R	N/R	N/R	N/R			
40	*Nickel	N/R	N/R	N/R	N/R	N/R	N/R	N/R			
5000	Potassium	N/R	N/R	N/R	N/R	N/R	N/R	N/R			
5	Selenium	N/R	N/R	N/R	N/R	N/R	N/R	N/R			
10	Silver	N/R	N/R	N/R	N/R	N/R	N/R	N/R			
5000	Sodium	N/R	N/R	N/R	N/R	N/R	N/R	N/R			
10	Thallium	N/R	N/R	N/R	N/R	N/R	N/R	N/R			
50	Vanadium	N/R	N/R	N/R	N/R	N/R	N/R	N/R			
20	Zinc	N/R	N/R	N/R	N/R	N/R	N/R	N/R			
10	*Cyanide	N/R	N/R	N/R	N/R	N/R	N/R	N/R			

*Action Level Exists

N/R = Not Required

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

S2-22
00022

.b Name: PACE_INCORPORATED_____ Contract: EPC_____

.b Code: _____ Case No.: _____ SAS No.: _____ SDG No.: S2-22_

atrix (soil/water): WATER Lab Sample ID: 3784.6____

vel (low/med): LOW__ Date Received: 05/22/91

Solids: _____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_		_		NR
7440-36-0	Antimony_		_		NR
7440-38-2	Arsenic__		_		NR
7440-39-3	Barium___		_		NR
7440-41-7	Beryllium		_		NR
7440-43-9	Cadmium__		_		NR
7440-70-2	Calcium__		_		NR
7440-47-3	Chromium_		_		NR
7440-48-4	Cobalt___		_		NR
7440-50-8	Copper___		_		NR
7439-89-6	Iron_____	3110_	_		P_
7439-92-1	Lead_____		_		NR
7439-95-4	Magnesium		_		NR
7439-96-5	Manganese		_		NR
7439-97-6	Mercury__		_		NR
7440-02-0	Nickel___		_		NR
7440-09-7	Potassium		_		NR
7782-49-2	Selenium_		_		NR
7440-22-4	Silver___		_		NR
7440-23-5	Sodium___		_		NR
7440-28-0	Thallium_		_		NR
7440-62-2	Vanadium_		_		NR
7440-66-6	Zinc_____		_		NR
_____	Cyanide__		_		NR

olor Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

olor After: COLORLESS Clarity After: CLEAR_ Artifacts: ___

ments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

S2-23

b Name: PACE_INCORPORATED_____ Contract: EPC_____

-b Code: _____ Case No.: _____ SAS No.: _____ SDG No.: S2-22_

00023

atrix (soil/water): WATER Lab Sample ID: 3839.7____

vel (low/med): LOW__ Date Received: 05/22/91

Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_				NR
7440-36-0	Antimony_				NR
7440-38-2	Arsenic__				NR
7440-39-3	Barium___				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium__				NR
7440-70-2	Calcium__				NR
7440-47-3	Chromium_				NR
7440-48-4	Cobalt___				NR
7440-50-8	Copper___				NR
7439-89-6	Iron_____	2280			P
7439-92-1	Lead_____				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury__				NR
7440-02-0	Nickel___				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium_				NR
7440-22-4	Silver___				NR
7440-23-5	Sodium___				NR
7440-28-0	Thallium_				NR
7440-62-2	Vanadium_				NR
7440-66-6	Zinc_____				NR
	Cyanide__				NR

lor Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

or After: COLORLESS Clarity After: CLEAR_ Artifacts: ___

ments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

S2-24

b Name: PACE_INCORPORATED_____ Contract: EPC_____

b Code: _____ Case No.: _____ SAS No.: _____ SDG No.: ~~S2-22~~ 00024

atrix (soil/water): WATER Lab Sample ID: 3883.4____

vel (low/med): LOW__ Date Received: 05/22/91

Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_				NR
7440-36-0	Antimony_				NR
7440-38-2	Arsenic__				NR
7440-39-3	Barium___				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium__				NR
7440-70-2	Calcium__				NR
7440-47-3	Chromium_				NR
7440-48-4	Cobalt___				NR
7440-50-8	Copper___				NR
7439-89-6	Iron_____	2140			P_
7439-92-1	Lead_____				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury__				NR
7440-02-0	Nickel___				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium_				NR
7440-22-4	Silver___				NR
7440-23-5	Sodium___				NR
7440-28-0	Thallium_				NR
7440-62-2	Vanadium_				NR
7440-66-6	Zinc_____				NR
	Cyanide__				NR

lor Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

or After: COLORLESS Clarity After: CLEAR_ Artifacts: ___

ments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

S2-25

ab Name: PACE_INCORPORATED_____ Contract: EPC_____

ab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: S2-22_ 00025

matrix (soil/water): WATER Lab Sample ID: 3897.4____

evel (low/med): LOW__ Date Received: 05/22/91

% Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_				NR
7440-36-0	Antimony_				NR
7440-38-2	Arsenic__				NR
7440-39-3	Barium___				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium__				NR
7440-70-2	Calcium__				NR
7440-47-3	Chromium_				NR
7440-48-4	Cobalt___				NR
7440-50-8	Copper___				NR
7439-89-6	Iron_____	6830_			P_
7439-92-1	Lead_____				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury__				NR
7440-02-0	Nickel___				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium_				NR
7440-22-4	Silver___				NR
7440-23-5	Sodium___				NR
7440-28-0	Thallium_				NR
7440-62-2	Vanadium_				NR
7440-66-6	Zinc_____				NR
_____	Cyanide__				NR

olor Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

or After: COLORLESS Clarity After: CLEAR_ Artifacts: ___

ments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

S2-26

ab Name: PACE_INCORPORATED_____ Contract: EPC_____

ab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: 00026

Matrix (soil/water): WATER Lab Sample ID: 3909.1____

evel (low/med): LOW__ Date Received: 05/22/91

% Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_				NR
7440-36-0	Antimony_				NR
7440-38-2	Arsenic__				NR
7440-39-3	Barium___				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium__				NR
7440-70-2	Calcium__				NR
7440-47-3	Chromium_				NR
7440-48-4	Cobalt___				NR
7440-50-8	Copper___				NR
7439-89-6	Iron_____	15400_			P_
7439-92-1	Lead_____				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury__				NR
7440-02-0	Nickel___				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium_				NR
7440-22-4	Silver___				NR
7440-23-5	Sodium___				NR
7440-28-0	Thallium_				NR
7440-62-2	Vanadium_				NR
7440-66-6	Zinc_____				NR
_____	Cyanide__				NR

olor Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

.or After: COLORLESS Clarity After: CLEAR_ Artifacts: ___

ments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

S2-27

ab Name: PACE_INCORPORATED_____ Contract: EPC_____

ab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: ~~S2-22~~ 00027

matrix (soil/water): WATER Lab Sample ID: 3921.0____

evel (low/med): LOW__ Date Received: 05/22/91

% Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_				NR
7440-36-0	Antimony_				NR
7440-38-2	Arsenic__				NR
7440-39-3	Barium___				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium__				NR
7440-70-2	Calcium__				NR
7440-47-3	Chromium_				NR
7440-48-4	Cobalt___				NR
7440-50-8	Copper___				NR
7439-89-6	Iron____	2980			P
7439-92-1	Lead____				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury__				NR
7440-02-0	Nickel___				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium_				NR
7440-22-4	Silver___				NR
7440-23-5	Sodium___				NR
7440-28-0	Thallium_				NR
7440-62-2	Vanadium_				NR
7440-66-6	Zinc____				NR
_____	Cyanide__				NR

olor Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

.or After: COLORLESS Clarity After: CLEAR_ Artifacts: ___

mments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

S2-28

Lab Name: PACE_INCORPORATED_____ Contract: EPC_____

ab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: S2-22_ 00028

Matrix (soil/water): WATER Lab Sample ID: 3933.4____

_evel (low/med): LOW__ Date Received: 05/22/91

Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_				NR
7440-36-0	Antimony_				NR
7440-38-2	Arsenic__				NR
7440-39-3	Barium___				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium__				NR
7440-70-2	Calcium__				NR
7440-47-3	Chromium_				NR
7440-48-4	Cobalt___				NR
7440-50-8	Copper___				NR
7439-89-6	Iron_____	2300_			P_
7439-92-1	Lead_____				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury__				NR
7440-02-0	Nickel___				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium_				NR
7440-22-4	Silver___				NR
7440-23-5	Sodium___				NR
7440-28-0	Thallium_				NR
7440-62-2	Vanadium_				NR
7440-66-6	Zinc_____				NR
_____	Cyanide__				NR

olor Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

or After: COLORLESS Clarity After: CLEAR_ Artifacts: ___

ents:

TRILLIUM INC

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

TREATMENT SYSTEM SAMPLING

VOLATILES ANALYSES DATA

Samples Collected 5/22/91

Chemical Analyses Performed By

PACE, Incorporated

August 16, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

Tetrachloroethene was the only compound detected above the detection limits in the samples. No tentatively identified compounds (TICs) were detected.

As noted on the chain of custody, samples were 10°C when received in the laboratory. Temperatures outside the 4°C ±2°C range may adversely affect the volatile compounds.

Validation of organic data is conducted in conformance with Environmental Protection Agency Functional Guidelines for Evaluating Organics Analyses, February 1, 1988.

Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified (valid) results mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Case Narrative

Six treatment system samples were collected and submitted for analysis to PACE, Inc. on May 22, 1991. The laboratory was requested to perform volatile organics (VOA) target compound list (TCL) analyses. S1-25 was used for the field duplicate, matrix spike, and matrix spike duplicate.

The samples included in this Sample Delivery Group (SDG) are:

Client ID	Lab ID	Date of Collection
S1-25	3834	05/22/91
S1-25DUP	3835	05/22/91
S1-25TB	3836	05/22/91
S2-23	3839	05/22/91
S3-23	3840	05/22/91
S4-23	3841	05/22/91

Volatiles

The requirements to be checked in validation are listed below.

I. Holding Times

II. GC/MS Tuning

III. Calibration

A. Initial

B. Continuing

IV. Blanks

V. Surrogate Recovery

VI. Matrix Spike/Matrix Spike Duplicate

VII. Field Duplicates

VIII. Internal Standards Performance

IX. TCL Compound Identification

X. Compound Quantitation and Reported Detection Limits

XI. Tentatively Identified Compounds

XII. System Performance

XIII. Overall Assessment

I. Holding Times

All samples were analyzed within the 14-day holding time for preserved samples.

II. GC/MS Tuning

GC/MS tuning and mass calibrations were within criteria.

III. Calibration

Areas were manually integrated for one or more compounds in each of the standards in this data package. No evaluation of these manual integrations can be performed as no hardcopy documentation is provided. The validation has been completed on the assumption that the manual integrations done and reported by the laboratory were valid and correct. No positive data were affected.

A. Initial

Initial calibration criteria were met.

B. Continuing

Continuing calibration criteria not met are summarized below.

Date	Time	Compound	%D
5/30	10:23	2-Butanone	28.3 (25)
		4-Methyl-2-pentanone	35.5 (25)
		2-Hexanone	35.7 (25)
		1,1,2,2-Tetrachloroethane	27.1 (25)
5/31	10:01	Chloromethane	29.7 (25)

() Acceptance criteria

The data were not affected.

IV. Blanks

All blanks were acceptable with the exception of S1-25TB. Acetone was detected at 15 ppb. The data were not affected.

V. Surrogate Recovery

All surrogate recoveries were within acceptance criteria.

VI. Matrix Spike/Matrix Spike Duplicate

All matrix spike (MS) and matrix spike duplicate (MSD) recoveries were within acceptance criteria with the exception of 1,1-dichloroethene which recovered at 49% and 50% (criteria 61-145). The data were not affected.

VII. Field Duplicates

Tetrachloroethene was detected in the sample at 3700 ppb, the field duplicate at 3600 ppb, in the MS at 3500 ppb, and in the MSD at 3600 ppb (RSD 2.8) and trichloroethene was detected in the sample at 87 ppb and in the field duplicate at 87 ppb. The data are acceptable.

VIII. Internal Standards Performance

Internal standards areas and retention times were acceptable.

IX. TCL Compound Identification

Target compounds were properly identified.

X. Compound Quantitation and Reported Detection Limits

Detection limits were acceptable with regard to the supporting data.

XI. Tentatively Identified Compounds

No TICs were detected.

XII. System Performance

System performance was acceptable.

XIII. Overall Assessment of Data for a Case

Because of elevated sample temperatures, data should be used with caution.

1A

VOL ILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S1-25
00022

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3834.6

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2789

Level: (low/med) LOW Date Received: 5/23/91

% Moisture: not dec.100. Date Analyzed: 5/30/91

Column: (pack/cap) PACK Dilution Factor: 20.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	200.	U
74-83-9	Bromomethane	200.	U
75-01-4	Vinyl Chloride	200.	U
75-00-3	Chloroethane	200.	U
75-09-2	Methylene Chloride	100.	U
67-64-1	Acetone	200.	U
75-15-0	Carbon Disulfide	100.	U
75-35-4	1,1-Dichloroethene	100.	U
75-34-3	1,1-Dichloroethane	100.	U
540-59-0	1,2-Dichloroethene (total)	100.	U
67-66-3	Chloroform	100.	U
107-06-2	1,2-Dichloroethane	100.	U
78-93-3	2-Butanone	200.	U
71-55-6	1,1,1-Trichloroethane	100.	U
56-23-5	Carbon Tetrachloride	100.	U
108-05-4	Vinyl Acetate	200.	U
75-27-4	Bromodichloromethane	100.	U
78-87-5	1,2-Dichloropropane	100.	U
10061-01-5	cis-1,3-Dichloropropene	100.	U
79-01-6	Trichloroethene	87.	J
124-48-1	Dibromochloromethane	100.	U
79-00-5	1,1,2-Trichloroethane	100.	U
71-43-2	Benzene	100.	U
10061-02-6	Trans-1,3-Dichloropropene	100.	U
75-25-2	Bromoform	100.	U
108-10-1	4-Methyl-2-Pentanone	200.	U
591-78-6	2-Hexanone	200.	U
127-18-4	Tetrachloroethene	3700.	
79-34-5	1,1,2,2-Tetrachloroethane	100.	U
108-88-3	Toluene	100.	U
108-90-7	Chlorobenzene	100.	U
100-41-4	Ethylbenzene	100.	U
100-42-5	Styrene	100.	U
1330-20-7	Xylene (total)	100.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
T TATIVELY IDENTIFIED COMPOUNDS

31-25
00023

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3834.6

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2789

Level: (low/med) LOW Date Received: 5/23/91

% Moisture: not dec.100. Date Analyzed: 5/30/91

Column: (packl/cap) PACK Dilution Factor: 20.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

00029

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3835.4

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2792

Level: (low/med) LOW Date Received: 5/23/91

% Moisture: not dec.100. Date Analyzed: 5/30/91

Column: (pack/cap) PACK Dilution Factor: 20.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	200.	U
74-83-9	Bromomethane	200.	U
75-01-4	Vinyl Chloride	200.	U
75-00-3	Chloroethane	200.	U
75-09-2	Methylene Chloride	100.	U
67-64-1	Acetone	200.	U
75-15-0	Carbon Disulfide	100.	U
75-35-4	1,1-Dichloroethene	100.	U
75-34-3	1,1-Dichloroethane	100.	U
540-59-0	1,2-Dichloroethene (total)	100.	U
67-66-3	Chloroform	100.	U
107-06-2	1,2-Dichloroethane	100.	U
78-93-3	2-Butanone	200.	U
71-55-6	1,1,1-Trichloroethane	100.	U
56-23-5	Carbon Tetrachloride	100.	U
108-05-4	Vinyl Acetate	200.	U
75-27-4	Bromodichloromethane	100.	U
78-87-5	1,2-Dichloropropane	100.	U
10061-01-5	cis-1,3-Dichloropropene	100.	U
79-01-6	Trichloroethene	87.	J
124-48-1	Dibromochloromethane	100.	U
79-00-5	1,1,2-Trichloroethane	100.	U
71-43-2	Benzene	100.	U
10061-02-6	Trans-1,3-Dichloropropene	100.	U
75-25-2	Bromoform	100.	U
108-10-1	4-Methyl-2-Pentanone	200.	U
591-78-6	2-Hexanone	200.	U
127-18-4	Tetrachloroethene	3600.	
79-34-5	1,1,2,2-Tetrachloroethane	100.	U
108-88-3	Toluene	100.	U
108-90-7	Chlorobenzene	100.	U
100-41-4	Ethylbenzene	100.	U
100-42-5	Styrene	100.	U
1330-20-7	Xylene (total)	100.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

31-25DUP

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00030

Matrix: (soil/water) WATER Lab Sample ID: 3835.4

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2792

Level: (low/med) LOW Date Received: 5/23/91

% Moisture: not dec.100. Date Analyzed: 5/30/91

Column: (pack/cap) PACK Dilution Factor: 20.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S1-25TB

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No. 00036

Matrix: (soil/water) WATER Lab Sample ID: 3836.2

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2793

Level: (low/med) LOW Date Received: 5/23/91

% Moisture: not dec.100. Date Analyzed: 5/30/91

Column: (pack/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	5.	U
67-64-1	Acetone	15.	
75-15-0	Carbon Disulfide	5.	U
75-35-4	1,1-Dichloroethene	5.	U
75-34-3	1,1-Dichloroethane	5.	U
540-59-0	1,2-Dichloroethene (total)	5.	U
67-66-3	Chloroform	5.	U
107-06-2	1,2-Dichloroethane	5.	U
78-93-3	2-Butanone	10.	U
71-55-6	1,1,1-Trichloroethane	5.	U
56-23-5	Carbon Tetrachloride	5.	U
108-05-4	Vinyl Acetate	10.	U
75-27-4	Bromodichloromethane	5.	U
78-87-5	1,2-Dichloropropane	5.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U
79-01-6	Trichloroethene	5.	U
124-48-1	Dibromochloromethane	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U
71-43-2	Benzene	5.	U
10061-02-6	Trans-1,3-Dichloropropene	5.	U
75-25-2	Bromoform	5.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	5.	U
79-34-5	1,1,2,2-Tetrachloroethane	5.	U
108-88-3	Toluene	5.	U
108-90-7	Chlorobenzene	5.	U
100-41-4	Ethylbenzene	5.	U
100-42-5	Styrene	5.	U
1330-20-7	Xylene (total)	5.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

31-25TB

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3836.2 00037

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2793

Level: (low/med) LOW Date Received: 5/23/91

% Moisture: not dec.100. Date Analyzed: 5/30/91

Column: (pack/cap) PACK Dilution Factor: 1.00

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S2-23

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00042

Matrix: (soil/water) WATER Lab Sample ID: 3839.7

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2801

Level: (low/med) LOW Date Received: 5/23/91

% Moisture: not dec.100. Date Analyzed: 5/31/91

Column: (packed/cap) PACK Dilution Factor: 2.50

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
74-87-3	Chloromethane	25.	U
74-83-9	Bromomethane	25.	U
75-01-4	Vinyl Chloride	25.	U
75-00-3	Chloroethane	25.	U
75-09-2	Methylene Chloride	12.	U
67-64-1	Acetone	25.	U
75-15-0	Carbon Disulfide	12.	U
75-35-4	1,1-Dichloroethene	12.	U
75-34-3	1,1-Dichloroethane	12.	U
540-59-0	1,2-Dichloroethene (total)	17.	
67-66-3	Chloroform	12.	U
107-06-2	1,2-Dichloroethane	12.	U
78-93-3	2-Butanone	25.	U
71-55-6	1,1,1-Trichloroethane	12.	J
56-23-5	Carbon Tetrachloride	12.	U
108-05-4	Vinyl Acetate	25.	U
75-27-4	Bromodichloromethane	12.	U
78-87-5	1,2-Dichloropropane	12.	U
10061-01-5	cis-1,3-Dichloropropene	12.	U
79-01-6	Trichloroethene	21.	
124-48-1	Dibromochloromethane	12.	U
79-00-5	1,1,2-Trichloroethane	12.	U
71-43-2	Benzene	12.	U
10061-02-6	Trans-1,3-Dichloropropene	12.	U
75-25-2	Bromoform	12.	U
108-10-1	4-Methyl-2-Pentanone	25.	U
591-78-6	2-Hexanone	25.	U
127-18-4	Tetrachloroethene	540.	E
79-34-5	1,1,2,2-Tetrachloroethane	12.	U
108-88-3	Toluene	12.	U
108-90-7	Chlorobenzene	12.	U
100-41-4	Ethylbenzene	12.	U
100-42-5	Styrene	12.	U
1330-20-7	Xylene (total)	12.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S2-23

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00043

Matrix: (soil/water) WATER Lab Sample ID: 3839.7

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2801

Level: (low/med) LOW Date Received: 5/23/91

% Moisture: not dec.100. Date Analyzed: 5/31/91

Column: (pack/cap) PACK Dilution Factor: 2.50

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S3-23

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00051

Matrix: (soil/water) WATER Lab Sample ID: 3840.0

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2818

Level: (low/med) LOW Date Received: 5/23/91

% Moisture: not dec.100. Date Analyzed: 5/31/91

Column: (pack/cap) PACK Dilution Factor: 12.50

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	120.	U
74-83-9	Bromomethane	120.	U
75-01-4	Vinyl Chloride	120.	U
75-00-3	Chloroethane	120.	U
75-09-2	Methylene Chloride	62.	U
67-64-1	Acetone	120.	U
75-15-0	Carbon Disulfide	62.	U
75-35-4	1,1-Dichloroethene	62.	U
75-34-3	1,1-Dichloroethane	62.	U
540-59-0	1,2-Dichloroethene (total)	62.	U
67-66-3	Chloroform	62.	U
107-06-2	1,2-Dichloroethane	62.	U
78-93-3	2-Butanone	120.	U
71-55-6	1,1,1-Trichloroethane	38.	J
56-23-5	Carbon Tetrachloride	62.	U
108-05-4	Vinyl Acetate	120.	U
75-27-4	Bromodichloromethane	62.	U
78-87-5	1,2-Dichloropropane	62.	U
10061-01-5	cis-1,3-Dichloropropene	62.	U
79-01-6	Trichloroethene	59.	J
124-48-1	Dibromochloromethane	62.	U
79-00-5	1,1,2-Trichloroethane	62.	U
71-43-2	Benzene	62.	U
10061-02-6	Trans-1,3-Dichloropropene	62.	U
75-25-2	Bromoform	62.	U
108-10-1	4-Methyl-2-Pentanone	120.	U
591-78-6	2-Hexanone	120.	U
127-18-4	Tetrachloroethene	1600.	
79-34-5	1,1,2,2-Tetrachloroethane	62.	U
108-88-3	Toluene	62.	U
108-90-7	Chlorobenzene	62.	U
100-41-4	Ethylbenzene	62.	U
100-42-5	Styrene	62.	U
1330-20-7	Xylene (total)	62.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

33-23

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

00052

Matrix: (soil/water) WATER Lab Sample ID: 3840.0

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2818

Level: (low/med) LOW Date Received: 5/23/91

% Moisture: not dec.100. Date Analyzed: 5/31/91

Column: (pack/cap) PACK Dilution Factor: 12.50

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S4-23

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No. 00059

Matrix: (soil/water) WATER Lab Sample ID: 3841.9

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2804

Level: (low/med) LOW Date Received: 5/23/91

% Moisture: not dec.100. Date Analyzed: 5/31/91

Column: (pack/cap) PACK Dilution Factor: 10.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
74-87-3	Chloromethane	100.	U
74-83-9	Bromomethane	100.	U
75-01-4	Vinyl Chloride	100.	U
75-00-3	Chloroethane	100.	U
75-09-2	Methylene Chloride	50.	U
67-64-1	Acetone	100.	U
75-15-0	Carbon Disulfide	50.	U
75-35-4	1,1-Dichloroethene	50.	U
75-34-3	1,1-Dichloroethane	50.	U
540-59-0	1,2-Dichloroethene (total)	50.	U
67-66-3	Chloroform	50.	U
107-06-2	1,2-Dichloroethane	50.	U
78-93-3	2-Butanone	100.	U
71-55-6	1,1,1-Trichloroethane	50.	U
56-23-5	Carbon Tetrachloride	50.	U
108-05-4	Vinyl Acetate	100.	U
75-27-4	Bromodichloromethane	50.	U
78-87-5	1,2-Dichloropropane	50.	U
10061-01-5	cis-1,3-Dichloropropene	50.	U
79-01-6	Trichloroethene	58.	
124-48-1	Dibromochloromethane	50.	U
79-00-5	1,1,2-Trichloroethane	50.	U
71-43-2	Benzene	50.	U
10061-02-6	Trans-1,3-Dichloropropene	50.	U
75-25-2	Bromoform	50.	U
108-10-1	4-Methyl-2-Pentanone	100.	U
591-78-6	2-Hexanone	100.	U
127-18-4	Tetrachloroethene	2000.	E
79-34-5	1,1,2,2-Tetrachloroethane	50.	U
108-88-3	Toluene	50.	U
108-90-7	Chlorobenzene	50.	U
100-41-4	Ethylbenzene	50.	U
100-42-5	Styrene	50.	U
1330-20-7	Xylene (total)	50.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S4-23

Lab Name: PACE Contract: -

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3841.9 00060

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2804

Level: (low/med) LOW Date Received: 5/23/91

% Moisture: not dec.100. Date Analyzed: 5/31/91

Column: (pack/cap) PACK Dilution Factor: 10.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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TRILLIUM INC

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

TREATMENT SYSTEM SAMPLING

VOLATILES ANALYSES DATA

METHOD 524.2 ANALYSES

Samples Collected 5/22/91

Chemical Analyses Performed By

PACE, Incorporated

August 20, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

Foaming occurred during the analyses of all samples except the trip blank and the field blank.

Data quality for other samples in this sample delivery group was good. Methylene chloride results in two samples were corrected to "ND" because the results reported were below the MDL determined by the PQL study for this project.

Cooler temperature upon receipt of samples by the laboratory was 10°C. Temperatures outside the range of 4°C ±2°C may adversely affect the volatile compounds.

Validation of organic data is conducted in conformance with Environmental Protection Agency (EPA) Functional Guidelines for Evaluating Organics Analyses, February 1, 1988, with modifications by EPA Region I, November 1, 1988.

Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified (valid) results mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Case Narrative

Five treatment system samples were collected and submitted to PACE, Inc. on May 22, 1991. The laboratory was requested to perform volatile organics analyses (VOA) using Method 524.2. The analyte list for this method was amended pursuant to the QA/QC Plan for this project.

The samples included in this Sample Delivery Group (SDG) are:

Client ID	Lab ID	Date of Collection
S1-25FB	3837	05/22/91
S5-20	3842	05/22/91
S6-25	3843	05/22/91
S6-25DUP	3844	05/22/91
S6-25TB	3845	05/22/91

Volatiles

The requirements to be checked in validation are listed below.

I. Holding Times

II. GC/MS Tuning

III. Calibration

A. Initial

B. Continuing

IV. Blanks

V. Surrogate Recovery

VI. Matrix Spike/Matrix Spike Duplicate

VII. Field Duplicates

VIII. Internal Standards Performance

IX. TCL Compound Identification

X. Compound Quantitation and Reported Detection Limits

XI. Tentatively Identified Compounds

XII. System Performance

XIII. Overall Assessment

I. Holding Times

All samples were received preserved and analyzed within the 14-day holding time for preserved samples.

II. GC/MS Tuning

GC/MS tuning and mass calibrations were within criteria.

III. Calibration

Areas were manually integrated for one or more compounds in each of the standards in this data package. No evaluation of these manual integrations can be performed, as no hard copy documentation was provided. Such documentation has been requested from the laboratory. The validation has been completed on the assumption that the manual integrations done and reported by the laboratory were valid and correct. No sample data appear to be affected.

A. Initial

Initial calibration criteria were met on 5/23/91.

B. Continuing

Continuing calibration criteria were met on 5/31/91 and 6/2/91. Continuing calibration criteria were met on 6/1/91 with the exception of the % difference for 1,2-dichloroethane (actual 27.92; criteria 25) and 1,1,2,2-tetrachloroethane (actual 26.35; criteria 25). Data were not affected.

IV. Blanks

The trip blank, field blank, and method blanks were clean.

V. Surrogate Recovery

Surrogate recoveries were within acceptance criteria.

VI. Matrix Spike/Matrix Spike Duplicate

A matrix spike (MS) and matrix spike duplicate (MSD) were performed on Sample S6-25. Data were within acceptance criteria.

VII. Field Duplicates

Samples S6-25 and S6-25DUP were submitted as duplicate samples. No compounds were detected in either sample.

VIII. Internal Standards Performance

Internal standards areas and retention times were acceptable.

IX. TCL Compound Identification

Carbon tetrachloride was reported in Sample S5-20 at 0.46 ppb. This compound was incorrectly reported by the laboratory on the Form I; the compound was chloroform. However, the concentration reported was below the PQL study-determined MDL for this project. The reported result for carbon tetrachloride was rejected; the result for chloroform remained "ND."

All other TCL compound identifications were acceptable.

X. Compound Quantitation and Reported Detection Limits

The laboratory performed a practical quantitation limit (PQL) study for the Method 524.2 analyses for this project on October 15, 1990. Method detection limits (MDLs) determined through that PQL study should have been used for reporting purposes for these treatment system samples. MDLs determined through the PQL study were as follows:

Compound	MDL (ug/L)
Vinyl Chloride	0.48
Chloroethane	0.49
Methylene Chloride	4.41
1,1-Dichloroethene	0.67
1,1-Dichloroethane	0.54
trans-1,2-Dichloroethene	0.50
Chloroform	0.53
1,2-Dichloroethane	0.52
1,1,1-Trichloroethane	0.44
Carbon Tetrachloride	0.43
Bromodichloromethane	0.38
1,2-Dichloropropane	0.45
cis-1,3-Dichloropropene	0.33
Trichloroethene	0.42
Dibromochloromethane	0.33
1,1,2-Trichloroethane	0.43

Compound	MDL (ug/L)
Benzene	0.58
trans-1,3-Dichloropropene	0.07
Bromoform	0.49
Tetrachloroethene	0.51
1,1,2,2-Tetrachloroethane	0.44
Toluene	0.45
Chlorobenzene	0.44
Ethylbenzene	0.51
m-Xylene	0.48
o-, p-Xylene	0.93
1,2-Dichloroethane-d4	0.50
Toluene-d8	0.45
Bromofluorobenzene	0.36

Methylene chloride was reported in Samples S5-20 and S6-25 at concentrations below the MDL determined by the PQL study for this project. Methylene chloride concentrations in these two samples were corrected to be "ND."

The result reported for 1,1,1-trichloroethane in Sample S5-20 (33 ug/L) was beyond the calibration range of the instrument (25 ug/L). This result was qualified as estimated.

All other results and detection limits were acceptable with regard to the supporting data.

XI. Tentatively Identified Compounds

No TICs were reported for this sample delivery group.

XII. System Performance

System performance was acceptable.

XIII. Overall Assessment of Data for a Case

Methylene chloride was corrected to be "ND" in Samples S5-20 and S6-25.

The result for carbon tetrachloride in Sample S5-20 was rejected due to incorrect reporting by the laboratory. The result for 1,1,1-trichloroethane in Sample S5-20 was qualified as estimated.

UNIFIRST/ENSR PACE Project Number: 810523500

PACE Sample Number:			95 0038370
Date Collected:			05/22/91
Date Received:			05/23/91
Parameter	Units	MDL	S1-25 FB
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810523500

PACE Sample Number:			95 0038427
Date Collected:			05/22/91
Date Received:			05/23/91
Parameter	Units	MDL	S5-20
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~ND~~ ~~2.7~~ ND CEJ 1/7/91
1,1-Dichloroethene	ug/L	0.5	~~ND~~ 1.9
1,1-Dichloroethane	ug/L	0.5	~~ND~~ 4.4
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	~~ND~~ 33 J
Carbon tetrachloride	ug/L	0.5	~~ND~~ ~~46 EJ~~ R
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810523500

PACE Sample Number:			95 0038435
Date Collected:			05/22/91
Date Received:			05/23/91
Parameter	Units	MDL	S6-25
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.3~~ ND EKJ 7/7/91
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810523500

PACE Sample Number:			95 0038443
Date Collected:			05/22/91
Date Received:			05/23/91
Parameter	Units	MDL	S6-25 Dup
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810523500

PACE Sample Number:			95 0038451
Date Collected:			05/22/91
Date Received:			05/23/91
Parameter	Units	MDL	S6-25 TB
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

TRILLIUM INC

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

TREATMENT SYSTEM SAMPLING

VOLATILES ANALYSES DATA

Samples Collected 5/23/91

Chemical Analyses Performed By

PACE, Incorporated

August 16, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

Acetone was the only target compound list (TCL) compound detected above the detection limit. No tentatively identified compounds (TICs) were detected.

Validation of organic data is conducted in conformance with Environmental Protection Agency Functional Guidelines for Evaluating Organics Analyses, February 1, 1988.

Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified (valid) results mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either sample quantitation limit or sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Case Narrative

One sludge sample was collected and submitted to PACE, Inc. on May 23, 1991. The laboratory was requested to perform volatile organics (VOA) target compound list (TCL) analyses.

The sample included in this Sample Delivery Group (SDG) is:

Client ID	Lab ID	Date of Collection
Sludge	3890	05/23/91

Volatiles

The requirements to be checked in validation are listed below.

I. Holding Times

II. GC/MS Tuning

III. Calibration

A. Initial

B. Continuing

IV. Blanks

V. Surrogate Recovery

VI. Matrix Spike/Matrix Spike Duplicate

VII. Field Duplicates

VIII. Internal Standards Performance

IX. TCL Compound Identification

X. Compound Quantitation and Reported Detection Limits

XI. Tentatively Identified Compounds

XII. System Performance

XIII. Overall Assessment

I. Holding Times

The sample was analyzed within the 14 day holding time for soil samples.

II. GC/MS Tuning

GC/MS tuning and mass calibrations were within criteria.

III. Calibration

Areas were manually integrated for one or more compounds in each of the standards in this data package. No evaluation of these manual integrations can be performed as no hardcopy documentation is provided. The validation has been completed on the assumption that the manual integrations done and reported by the laboratory were valid and correct. No positive data were affected.

A. Initial

Initial calibration criteria were met.

B. Continuing

Continuing calibration criteria were met with the exception of the % difference for 2-butanone (52), chloromethane (26.6) acetone (46.6), vinyl acetate (41.4), 4-methyl-2-pentanone (45.2), 2-hexanone (44.4), and 1,1,2,2-tetrachloroethane (37.4). Detection limits for 2-butanone were qualified as estimated. Acetone results were estimated. The remaining data were not affected.

IV. Blanks

No target compounds were detected in the method blank.

V. Surrogate Recovery

All surrogate recoveries were within acceptance criteria.

VI. Matrix Spike/Matrix Spike Duplicate

No matrix spike or duplicate matrix spike were performed on the sample. The data should be used with caution.

VII. Field Duplicates

No field duplicate was collected.

VIII. Internal Standards Performance

Internal standards areas and retention times were acceptable.

IX. TCL Compound Identification

Target compounds were properly identified.

X. Compound Quantitation and Reported Detection Limits

Detection limits were acceptable with regard to the supporting data.

XI. Tentatively Identified Compounds

No TICs were detected.

XII. System Performance

System performance was acceptable.

XIII. Overall Assessment of Data for a Case

All positive results and detection limits were acceptable except as noted in Sections I and III. Although surrogates and internal standard recoveries were acceptable, the data should be used with caution since no matrix spikes, matrix spike duplicates, or Field quality control samples were analyzed.

1A

VOLA..LE ORGANICS ANALYSIS DATA SHEET

00016

'A SAMPLE NO.

SLUDGECU

.ab Name: PACE Contract:

'ab Code: PACE Case No.: EPC SAS No.: SDG No.:

.atrix: (soil/water) WATER Lab Sample ID: 3890.7

'ample wt/vol: 5. (g/mL) ML Lab File ID: J2898

Level: (low/med) LOW Date Received: 5/24/91

Moisture: not dec.100. Date Analyzed: 6/ 6/91

Column: (pack/cap) PACK Dilution Factor: 1.00

pm 7/17/91

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	5.	U
67-64-1	Acetone	25.	J
75-15-0	Carbon Disulfide	5.	U
75-35-4	1,1-Dichloroethene	5.	U
75-34-3	1,1-Dichloroethane	5.	U
540-59-0	1,2-Dichloroethene (total)	3.	J
67-66-3	Chloroform	5.	U
107-06-2	1,2-Dichloroethane	5.	U
78-93-3	2-Butanone	10.	UJ
71-55-6	1,1,1-Trichloroethane	5.	U
56-23-5	Carbon Tetrachloride	5.	U
108-05-4	Vinyl Acetate	10.	U
75-27-4	Bromodichloromethane	5.	U
78-87-5	1,2-Dichloropropane	5.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U
79-01-6	Trichloroethene	5.	U
124-48-1	Dibromochloromethane	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U
71-43-2	Benzene	5.	U
10061-02-6	Trans-1,3-Dichloropropene	5.	U
75-25-2	Bromoform	5.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	5.	U
79-34-5	1,1,2,2-Tetrachloroethane	5.	U
108-88-3	Toluene	5.	U
108-90-7	Chlorobenzene	5.	U
100-41-4	Ethylbenzene	5.	U
100-42-5	Styrene	5.	U
1330-20-7	Xylene (total)	5.	U

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

SLUDCECU

Lab Name: PACE Contract: 00017

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3890.7

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2898

Level: (low/med) LOW Date Received: 5/24/91

% Moisture: not dec.100. Date Analyzed: 6/ 6/91

Column: (pack/cap) PACK Dilution Factor: 1.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
2.				
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30.				

TRILLIUM INC

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

TREATMENT SYSTEM SAMPLING

VOLATILES ANALYSES DATA

Samples Collected 5/23/91

Chemical Analyses Performed By

PACE, Incorporated

August 20, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

Data quality for this sample delivery group was good. Detection liimts for 2-butanone were rejected in all samples.

Cooler temperature upon receipt of samples by the laboratory was 8°C. Cooler temperatures outside the 4°C ±2°C range may adversely affect the volatile compounds.

Validation of organic data is conducted in conformance with Environmental Protection Agency (EPA) Functional Guidelines for Evaluating Organics Analyses, February 1, 1988, with modifications by EPA Region I, November 1, 1988.

Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified (valid) results mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Case Narrative

Eight samples (including matrix spike and matrix spike duplicate) were collected and submitted to PACE, Inc. on May 23, 1991. The laboratory was requested to perform volatile organics (VOA) target compound list (TCL) analyses.

The samples included in this Sample Delivery Group (SDG) are:

Client ID	Lab ID	Date of Collection
S1-26	3878	05/23/91
S1-26DUP	3879	05/23/91
S1-26TB	3880	05/23/91
S2-24	3883	05/23/91
S3-24	3884	05/23/91
S4-24	3885	05/23/91\

The case narrative for this data package stated that Samples S1-26 and S1-26DUP foamed during the analysis. Although results for these two samples met all QC criteria, the results should be used with caution.

Volatiles

The requirements to be checked in validation are listed below.

I. Holding Times

II. GC/MS Tuning

III. Calibration

A. Initial

B. Continuing

IV. Blanks

V. Surrogate Recovery

VI. Matrix Spike/Matrix Spike Duplicate

VII. Field Duplicates

VIII. Internal Standards Performance

IX. TCL Compound Identification

X. Compound Quantitation and Reported Detection Limits

XI. Tentatively Identified Compounds

XII. System Performance

XIII. Overall Assessment

I. Holding Times

All samples were received and analyzed within the 14-day holding time for preserved samples.

II. GC/MS Tuning

GC/MS tuning and mass calibrations were within criteria.

III. Calibration

Manual areas were integrated for one or more compounds in each of the standards in this data package. No evaluation of these manual integrations can be performed, as no hard copy documentation is provided. The validation has been completed on the assumption that the manual integrations done and reported by the laboratory were valid and correct. No data appear to be affected.

A. Initial

Initial calibration criteria were met on 5/28/91 (Instrument J).

Initial calibration criteria were met on 5/28/91 (Instrument G) with the exception of the RRF for 2-butanone (actual 0.077; criteria 0.1). Detection limits for 2-butanone were rejected in Samples S1-26TB, S2-24, S3-24, S4-24, and S1-26DUP.

B. Continuing

Continuing calibration criteria were met on 6/3/91 Instrument J) with the exception of the RF for 2-butanone (actual 0.097; criteria 0.1) and the % difference for chloromethane (actual 46.2; criteria 25), 2-butanone (actual 40.7; criteria 25), vinyl acetate (actual 27.0; criteria 25), 4-methyl-2-pentanone (actual 38.4; criteria 25), 2-hexanone (actual 43.4; criteria 25), and 1,1,2,2-tetrachloroethane (actual 31.6; criteria 25). Detection limits for 2-butanone were rejected in Samples S1-26, S1-26MS, and S1-26MSD. Other data were not affected.

Continuing calibration criteria were met on 5/30/91 (Instrument G) with the exception of the RF for 2-butanone (actual 0.078; criteria 0.1) and the % difference for acetone (actual 41.0; criteria 25). Data were not affected.

Continuing calibration criteria were met on 5/31/91 (Instrument G) with the exception of the % difference for

bromomethane (actual 40.6; criteria 25) and 2-butanone (actual 32.0; criteria 25). Data were not affected.

IV. Blanks

Acetone was reported in Method Blanks VBLK01, VBLK02, and S1-26TB. The results for acetone in Samples S1-26TB and S1-26MSD were qualified as less than the reported value.

V. Surrogate Recovery

Surrogate recoveries were within acceptance criteria.

VI. Matrix Spike/Matrix Spike Duplicate

The matrix spike (MS) and matrix spike duplicate (MSD) were performed on Sample S1-26. The percent recoveries for 1,1-dichloroethene in the MS and the MSD were below QC criteria. The percent recovery for trichloroethene in the MSD was below QC criteria. Relative percent differences were slightly above criteria for benzene and toluene. No positive results for 1,1-dichloroethene, benzene or toluene were reported in field samples, so data were not affected. Results for trichloroethene in Samples S1-26 and S1-26DUP were qualified as estimated.

Results for 1,1,2-trichloroethane were reported in the MS and MSD but not in the field sample or the duplicate. Although no spectra were provided for these compounds, it appeared that this compound was misidentified. The retention time provided for 1,1,2-trichloroethane on the quant report did not match that of 1,1,2-trichloroethane in the calibration check standard. The retention times in the MS and MSD did closely match that of trichloroethene. There were probably overlapping peaks in the sample spectra. This would explain why percent recoveries for trichloroethene in the MS and MSD were either below QC criteria or in the lower range of QC acceptance criteria. Results for 1,1,2-trichloroethane were rejected in the MS and MSD.

VII. Field Duplicates

Compounds and concentrations (in ug/L) reported in Samples S1-26 and S1-26DUP were as follows:

Compound	S1-26	S1-26DUP
Trichloroethene	97	83
Tetrachloroethene	3700	3900

Results for the above compounds were within QC criteria. The compound 1,1,1-trichloroethane was reported at 41 ug/L in Sample S1-26DUP but was not reported in Sample S1-26. This compound was rejected in the duplicate.

VIII. Internal Standards Performance

Internal standards areas and retention times were acceptable.

IX. TCL Compound Identification

TCL compound identifications were acceptable, with the exception of 1,1,2-trichloroethane in the MS and MSD.

X. Compound Quantitation and Reported Detection Limits

Results and detection limits were acceptable with regard to the supporting data.

XI. Tentatively Identified Compounds

No TICs were reported for this SDG.

XII. System Performance

System performance requires attention. Manual integrations should be addressed. Compound identifications should be verified for accuracy.

XIII. Overall Assessment of Data for a Case

Data quality for this sample delivery group was good. Detection limits for 2-butanone were rejected in all samples.

1,1,1-Trichloroethene was rejected in S1-26DUP.

1,1,2-Trichloroethane results wee rejected in S1-26MS and S1-26MSD.

Acetone results were qualified as less than the reported value in S1-26TB and S1-26MSD.

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S1-00024

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3878.8

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2850

Level: (low/med) LOW Date Received: 5/24/91

% Moisture: not dec. 100. Date Analyzed: 6/ 3/91

Column: (pack/cap) PACK Dilution Factor: 20.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	200.	U
74-83-9	Bromomethane	200.	U
75-01-4	Vinyl Chloride	200.	U
75-00-3	Chloroethane	200.	U
75-09-2	Methylene Chloride	100.	U
67-64-1	Acetone	200.	U
75-15-0	Carbon Disulfide	100.	U
75-35-4	1,1-Dichloroethene	100.	U
75-34-3	1,1-Dichloroethane	100.	U
540-59-0	1,2-Dichloroethene (total)	100.	U
67-66-3	Chloroform	100.	U
107-06-2	1,2-Dichloroethane	100.	U
78-93-3	2-Butanone	~~200.~~	~~U~~ J2
71-55-6	1,1,1-Trichloroethane	100.	U
56-23-5	Carbon Tetrachloride	100.	U
108-05-4	Vinyl Acetate	200.	U
75-27-4	Bromodichloromethane	100.	U
78-87-5	1,2-Dichloropropane	100.	U
10061-01-5	cis-1,3-Dichloropropene	100.	U
79-01-6	Trichloroethene	97.	J
124-48-1	Dibromochloromethane	100.	U
79-00-5	1,1,2-Trichloroethane	100.	U
71-43-2	Benzene	100.	U
10061-02-6	Trans-1,3-Dichloropropene	100.	U
75-25-2	Bromoform	100.	U
108-10-1	4-Methyl-2-Pentanone	200.	U
591-78-6	2-Hexanone	200.	U
127-18-4	Tetrachloroethene	3700.	
79-34-5	1,1,2,2-Tetrachloroethane	100.	U
108-88-3	Toluene	100.	U
108-90-7	Chlorobenzene	100.	U
100-41-4	Ethylbenzene	100.	U
100-42-5	Styrene	100.	U
1330-20-7	Xylene (total)	100.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S1-26

00025

Lab Name: PACE Contract:

ab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3878.8

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2850

evel: (low/med) LOW Date Received: 5/24/91

% Moisture: not dec. 100. Date Analyzed: 6/ 3/91

olumn: (pacl/cap) PACK Dilution Factor: 20.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

61-GSDUP
00031

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3879.6

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3251

Level: (low/med) LOW Date Received: 5/24/91

% Moisture: not dec. 100. Date Analyzed: 5/31/91

Column: (pack/cap) PACK Dilution Factor: 20.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	200.	U
74-83-9	Bromomethane	200.	U
75-01-4	Vinyl Chloride	200.	U
75-00-3	Chloroethane	200.	U
75-09-2	Methylene Chloride	100.	U
67-64-1	Acetone	200.	U
75-15-0	Carbon Disulfide	100.	U
75-35-4	1,1-Dichloroethene	100.	U
75-34-3	1,1-Dichloroethane	100.	U
540-59-0	1,2-Dichloroethene (total)	100.	U
67-66-3	Chloroform	100.	U
107-06-2	1,2-Dichloroethane	100.	U
78-93-3	2-Butanone	~~200.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	~~11.~~	J R
56-23-5	Carbon Tetrachloride	100.	U
108-05-4	Vinyl Acetate	200.	U
75-27-4	Bromodichloromethane	100.	U
78-87-5	1,2-Dichloropropane	100.	U
10061-01-5	cis-1,3-Dichloropropene	100.	U
79-01-6	Trichloroethene	83.	J
124-48-1	Dibromochloromethane	100.	U
79-00-5	1,1,2-Trichloroethane	100.	U
71-43-2	Benzene	100.	U
10061-02-6	Trans-1,3-Dichloropropene	100.	U
75-25-2	Bromoform	100.	U
108-10-1	4-Methyl-2-Pentanone	200.	U
591-78-6	2-Hexanone	200.	U
127-18-4	Tetrachloroethene	3900.	
79-34-5	1,1,2,2-Tetrachloroethane	100.	U
108-88-3	Toluene	100.	U
108-90-7	Chlorobenzene	100.	U
100-41-4	Ethylbenzene	100.	U
100-42-5	Styrene	100.	U
1330-20-7	Xylene(total)	100.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S1-26DUP

00032

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3879.6

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3251

Level: (low/med) LOW Date Received: 5/24/91

% Moisture: not dec. 100. Date Analyzed: 5/31/91

Column: (pack/cap) PACK Dilution Factor: 20.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S1-26TB 00039

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3880.0

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3236

Level: (low/med) LOW Date Received: 5/24/91

% Moisture: not dec. 100. Date Analyzed: 5/30/91

Column: (pack/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	5.	U
67-64-1	Acetone	10.	~~B~~ U
75-15-0	Carbon Disulfide	5.	U
75-35-4	1,1-Dichloroethene	5.	U
75-34-3	1,1-Dichloroethane	5.	U
540-59-0	1,2-Dichloroethene (total)	5.	U
67-66-3	Chloroform	5.	U
107-06-2	1,2-Dichloroethane	5.	U
78-93-3	2-Butanone	~~10.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	5.	U
56-23-5	Carbon Tetrachloride	5.	U
108-05-4	Vinyl Acetate	10.	U
75-27-4	Bromodichloromethane	5.	U
78-87-5	1,2-Dichloropropane	5.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U
79-01-6	Trichloroethene	5.	U
124-48-1	Dibromochloromethane	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U
71-43-2	Benzene	5.	U
10061-02-6	Trans-1,3-Dichloropropene	5.	U
75-25-2	Bromoform	5.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	5.	U
79-34-5	1,1,2,2-Tetrachloroethane	5.	U
108-88-3	Toluene	5.	U
108-90-7	Chlorobenzene	5.	U
100-41-4	Ethylbenzene	5.	U
100-42-5	Styrene	5.	U
1330-20-7	Xylene(total)	5.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S1-26TB

00040

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3880.0

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3236

Level: (low/med) LOW Date Received: 5/24/91

% Moisture: not dec. 100. Date Analyzed: 5/30/91

Column: (pack/cap) PACK Dilution Factor: 1.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

00045

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3883.4

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3237

Level: (low/med) LOW Date Received: 5/24/91

% Moisture: not dec. 100. Date Analyzed: 5/30/91

Column: (pack/cap) PACK Dilution Factor: 5.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
74-87-3	Chloromethane	50.	U
74-83-9	Bromomethane	50.	U
75-01-4	Vinyl Chloride	50.	U
75-00-3	Chloroethane	50.	U
75-09-2	Methylene Chloride	25.	U
67-64-1	Acetone	50.	U
75-15-0	Carbon Disulfide	25.	U
75-35-4	1,1-Dichloroethene	25.	U
75-34-3	1,1-Dichloroethane	25.	U
540-59-0	1,2-Dichloroethene (total)	25.	J
67-66-3	Chloroform	25.	U
107-06-2	1,2-Dichloroethane	25.	U
78-93-3	2-Butanone	~~50.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	20.	J
56-23-5	Carbon Tetrachloride	25.	U
108-05-4	Vinyl Acetate	50.	U
75-27-4	Bromodichloromethane	25.	U
78-87-5	1,2-Dichloropropane	25.	U
10061-01-5	cis-1,3-Dichloropropene	25.	U
79-01-6	Trichloroethene	33.	
124-48-1	Dibromochloromethane	25.	U
79-00-5	1,1,2-Trichloroethane	25.	U
71-43-2	Benzene	25.	U
10061-02-6	Trans-1,3-Dichloropropene	25.	U
75-25-2	Bromoform	25.	U
108-10-1	4-Methyl-2-Pentanone	50.	U
591-78-6	2-Hexanone	50.	U
127-18-4	Tetrachloroethene	920.	
79-34-5	1,1,2,2-Tetrachloroethane	25.	U
108-88-3	Toluene	25.	U
108-90-7	Chlorobenzene	25.	U
100-41-4	Ethylbenzene	25.	U
100-42-5	Styrene	25.	U
1330-20-7	Xylene(total)	25.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S2-24

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00046

Matrix: (soil/water) WATER Lab Sample ID: 3883.4

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3237

Level: (low/med) LOW Date Received: 5/24/91

% Moisture: not dec. 100. Date Analyzed: 5/30/91

Column: (pack/cap) PACK Dilution Factor: 5.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S3-24

00054

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3884.2

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3245

Level: (low/med) LOW Date Received: 5/24/91

% Moisture: not dec. 100. Date Analyzed: 5/31/91

Column: (pack/cap) PACK Dilution Factor: 5.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
74-87-3	Chloromethane	50.	U
74-83-9	Bromomethane	50.	U
75-01-4	Vinyl Chloride	50.	U
75-00-3	Chloroethane	50.	U
75-09-2	Methylene Chloride	25.	U
67-64-1	Acetone	50.	U
75-15-0	Carbon Disulfide	25.	U
75-35-4	1,1-Dichloroethene	25.	U
75-34-3	1,1-Dichloroethane	25.	U
540-59-0	1,2-Dichloroethene (total)	25.	U
67-66-3	Chloroform	25.	U
107-06-2	1,2-Dichloroethane	25.	U
78-93-3	2-Butanone	~~50.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	25.	U
56-23-5	Carbon Tetrachloride	25.	U
108-05-4	Vinyl Acetate	50.	U
75-27-4	Bromodichloromethane	25.	U
78-87-5	1,2-Dichloropropane	25.	U
10061-01-5	cis-1,3-Dichloropropene	25.	U
79-01-6	Trichloroethene	15.	J
124-48-1	Dibromochloromethane	25.	U
79-00-5	1,1,2-Trichloroethane	25.	U
71-43-2	Benzene	25.	U
10061-02-6	Trans-1,3-Dichloropropene	25.	U
75-25-2	Bromoform	25.	U
108-10-1	4-Methyl-2-Pentanone	50.	U
591-78-6	2-Hexanone	50.	U
127-18-4	Tetrachloroethene	400.	
79-34-5	1,1,2,2-Tetrachloroethane	25.	U
108-88-3	Toluene	25.	U
108-90-7	Chlorobenzene	25.	U
100-41-4	Ethylbenzene	25.	U
100-42-5	Styrene	25.	U
1330-20-7	Xylene(total)	25.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S3-24

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00059

Matrix: (soil/water) WATER Lab Sample ID: 3884.2

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3245

Level: (low/med) LOW Date Received: 5/24/91

% Moisture: not dec. 100. Date Analyzed: 5/31/91

Column: (pack/cap) PACK Dilution Factor: 5.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
2.				
3.				
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S4-24
00061

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3885.0

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3239

Level: (low/med) LOW Date Received: 5/24/91

% Moisture: not dec. 100. Date Analyzed: 5/30/91

Column: (pack/cap) PACK Dilution Factor: 10.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
74-87-3	Chloromethane	100.	U
74-83-9	Bromomethane	100.	U
75-01-4	Vinyl Chloride	100.	U
75-00-3	Chloroethane	100.	U
75-09-2	Methylene Chloride	50.	U
67-64-1	Acetone	100.	U
75-15-0	Carbon Disulfide	50.	U
75-35-4	1,1-Dichloroethene	50.	U
75-34-3	1,1-Dichloroethane	50.	U
540-59-0	1,2-Dichloroethene (total)	50.	U
67-66-3	Chloroform	50.	U
107-06-2	1,2-Dichloroethane	50.	U
78-93-3	2-Butanone	~~100.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	30.	J
56-23-5	Carbon Tetrachloride	50.	U
108-05-4	Vinyl Acetate	100.	U
75-27-4	Bromodichloromethane	50.	U
78-87-5	1,2-Dichloropropane	50.	U
10061-01-5	cis-1,3-Dichloropropene	50.	U
79-01-6	Trichloroethene	50.	J
124-48-1	Dibromochloromethane	50.	U
79-00-5	1,1,2-Trichloroethane	50.	U
71-43-2	Benzene	50.	U
10061-02-6	Trans-1,3-Dichloropropene	50.	U
75-25-2	Bromoform	50.	U
108-10-1	4-Methyl-2-Pentanone	100.	U
591-78-6	2-Hexanone	100.	U
127-18-4	Tetrachloroethene	1700.	
79-34-5	1,1,2,2-Tetrachloroethane	50.	U
108-88-3	Toluene	50.	U
108-90-7	Chlorobenzene	50.	U
100-41-4	Ethylbenzene	50.	U
100-42-5	Styrene	50.	U
1330-20-7	Xylene(total)	50.	U

TRILLIUM INC

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

TREATMENT SYSTEM SAMPLING

VOLATILES ANALYSES DATA

METHOD 524.2 ANALYSES

Samples Collected 5/23/91

Chemical Analyses Performed By

PACE, Incorporated

August 20, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

EXECUTIVE SUMMARY

Foaming occurred during the analyses of all samples except the trip blank and the field blank.

Data quality for other samples in this sample delivery group was satisfactory. Methylene chloride results in three samples were corrected to "ND" because the results reported were below the MDL determined by the PQL study for this project.

Cooler temperature upon receipt of samples by the laboratory was 8°C. Temperatures outside the range of 4°C ±2°C may adversely affect the volatile compounds.

Validation of organic data is conducted in conformance with Environmental Protection Agency (EPA) Functional Guidelines for Evaluating Organics Analyses, February 1, 1988, with modifications by EPA Region I, November 1, 1988.

Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified (valid) results mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Case Narrative

Five treatment system samples were collected and submitted to PACE, Inc. on May 23, 1991. The laboratory was requested to perform volatile organics analyses (VOA) using Method 524.2. The analyte list for this method was amended pursuant to the QA/QC Plan for this project.

The samples included in this Sample Delivery Group (SDG) are:

Client ID	Lab ID	Date of Collection
S1-26FB	3881	05/23/91
S5-21	3886	05/23/91
S6-26	3887	05/23/91
S6-26DUP	3888	05/23/91
S6-26TB	3889	05/23/91

TRILLIUM INC

Volatiles

The requirements to be checked in validation are listed below.

I. Holding Times

II. GC/MS Tuning

III. Calibration

A. Initial

B. Continuing

IV. Blanks

V. Surrogate Recovery

VI. Matrix Spike/Matrix Spike Duplicate

VII. Field Duplicates

VIII. Internal Standards Performance

IX. TCL Compound Identification

X. Compound Quantitation and Reported Detection Limits

XI. Tentatively Identified Compounds

XII. System Performance

XIII. Overall Assessment

I. Holding Times

All samples were received preserved and analyzed within the 14-day holding time for preserved samples.

II. GC/MS Tuning

GC/MS tuning and mass calibrations were within criteria.

III. Calibration

Areas were manually integrated for one or more compounds in each of the standards in this data package. No evaluation of these manual integrations can be performed, as no hard copy documentation was provided. Such documentation has been requested from the laboratory. The validation has been completed on the assumption that the manual integrations done and reported by the laboratory were valid and correct. No sample data appear to be affected.

A. Initial

Initial calibration criteria were met on 5/23/91.

B. Continuing

Continuing calibration criteria were met on 6/2/91. Continuing calibration criteria were met on 6/5/91 with the exception of the % difference for 1,1,2,2-tetrachloroethane (actual 30.58; criteria 25). Data were not affected.

IV. Blanks

The trip blank, field blank, and method blanks were clean.

V. Surrogate Recovery

Surrogate recoveries were above QC criteria for Samples S6-26 and S6-26MS. The laboratory reanalyzed these samples. The matrix spike was within QC criteria on the reanalysis; Sample S6-26 was above QC criteria for 1,2-dichloroethane-d4. Since no compounds were detected in Sample S6-26, data were not qualified.

All other surrogate recoveries were within acceptance criteria.

VI. Matrix Spike/Matrix Spike Duplicate

A matrix spike (MS) and matrix spike duplicate (MSD) were performed on Sample S6-26. Recoveries for trichloroethene were above QC criteria in the MS and MSD. The relative percent difference was above QC criteria for trichloroethene. No positive sample results were affected.

As mentioned in Section V, the laboratory had to reanalyze the MS because surrogate recovery criteria were not met. Although criteria were met in the reanalysis of the MS, the laboratory chose to report results from the original analysis, which did not meet criteria. No positive sample data were affected in either analysis; however, it was inappropriate to use the original analysis for reporting.

VII. Field Duplicates

Samples S6-26 and S6-26DUP were submitted as duplicate samples. No compounds were detected in either sample.

VIII. Internal Standards Performance

Internal standards areas and retention times were acceptable.

IX. TCL Compound Identification

TCL compound identifications were acceptable.

X. Compound Quantitation and Reported Detection Limits

The laboratory performed a practical quantitation limit (PQL) study for the Method 524.2 analyses for this project on October 15, 1990. Method detection limits (MDLs) determined through that PQL study should have been used for reporting purposes for these treatment system samples. MDLs determined through the PQL study were as follows:

Compound	MDL (ug/L)
Vinyl Chloride	0.48
Chloroethane	0.49
Methylene Chloride	4.41
1,1-Dichloroethene	0.67
1,1-Dichloroethane	0.54
trans-1,2-Dichloroethene	0.50

Compound	MDL (ug/L)
Chloroform	0.53
1,2-Dichloroethane	0.52
1,1,1-Trichloroethane	0.44
Carbon Tetrachloride	0.43
Bromodichloromethane	0.38
1,2-Dichloropropane	0.45
cis-1,3-Dichloropropene	0.33
Trichloroethene	0.42
Dibromochloromethane	0.33
1,1,2-Trichloroethane	0.43
Benzene	0.58
trans-1,3-Dichloropropene	0.07
Bromoform	0.49
Tetrachloroethene	0.51
1,1,2,2-Tetrachloroethane	0.44
Toluene	0.45
Chlorobenzene	0.44
Ethylbenzene	0.51
m-Xylene	0.48
o-, p-Xylene	0.93
1,2-Dichloroethane-d4	0.50
Toluene-d8	0.45
Bromofluorobenzene	0.36

Methylene chloride was reported in Samples S5-21, S6-26, and S6-26 DUP at concentrations below the MDL determined by the PQL study for this project. Methylene chloride concentrations in these two samples were corrected to be "ND."

The result reported for 1,1,1-trichloroethane in Sample S5-21 (33 ug/L) was beyond the calibration range of the instrument (25 ug/L). This result was qualified as estimated.

The compound 1,1-dichloroethane was reported in Sample S5-21 at 0.35 ug/L. This result was below the PQL study-determined MDL and was corrected to "ND."

All other results and detection limits were acceptable with regard to the supporting data.

XI. Tentatively Identified Compounds

No TICs were reported for this sample delivery group.

XII. System Performance

System performance was acceptable.

XIII. Overall Assessment of Data for a Case

Methylene chloride was corrected to be "ND" in Samples S5-21, S6-26, and S6-26DUP.

The result for 1,1-dichloroethane in Sample S5-21 was corrected to "ND." The result for 1,1,1-trichloroethane in Sample S5-21 was qualified as estimated.

UNIFIRST/ENSR PACE Project Number: 810524501

PACE Sample Number:			95 0038818
Date Collected:			05/23/91
Date Received:			05/24/91
Parameter	Units	MDL	S1-26 FB
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810524501

PACE Sample Number:			95 0038869
Date Collected:			05/23/91
Date Received:			05/24/91
Parameter	Units	MDL	S5-21
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.5~~ ND EKJ 7/7/91
1,1-Dichloroethene	ug/L	0.5	1.8
1,1-Dichloroethane	ug/L	0.5	~~35 (J)~~ ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	33 J EKJ 7/7/91
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.
(J) Less than the MDL

UNIFIRST/ENSR PACE Project Number: 810524501

PACE Sample Number:			95 0038877
Date Collected:			05/23/91
Date Received:			05/24/91
Parameter	Units	MDL	S6-26
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.5~~ ND EKD 7/7/91
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810524501

PACE Sample Number:			95 0038885
Date Collected:			05/23/91
Date Received:			05/24/91
Parameter	Units	MDL	S6-26 Dup
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.4~~ ND 7/7/91
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810524501

PACE Sample Number:			95 0038893
Date Collected:			05/23/91
Date Received:			05/24/91
Parameter	Units	MDL	S6-26 TB
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

TREATMENT SYSTEM SAMPLING

INORGANIC ANALYSES DATA

Samples Collected 5/23/91

Chemical Analyses Performed By

PACE, Incorporated

August 20, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

Metals analytical data presented for this sample delivery group were fair. Since no field blank was provided, the unqualified positive sample data should be used with caution.

Validation of inorganic laboratory data is conducted in conformance with Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses (2/89) and associated checklist. These guidelines and checklist are intended to evaluate data on a technical basis rather than a contract compliance basis for chemical analyses conducted under the USEPA's Contract Laboratory Program (CLP) and assumes that the data package is presented in accordance with the CLP requirements. In addition, the data package is assumed to represent the best efforts of the laboratory and has already been subjected to adequate and sufficient quality review prior to submission for validation.

Results of analyses are reported by the laboratory as either qualified or unqualified. Unqualified results mean that the reported values may be used without reservations. Qualified results indicate a nonroutine (with respect to CLP procedures) situation occurred during the course of analysis. Various qualifier codes associated with the numerical results are used by the laboratory to denote specific information regarding the analytical results. During the process of validation, laboratory qualified and unqualified data are verified against supporting documentation. Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified results still mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: Analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Inorganic Data Validation

for

Environmental Project Control, Inc.

Sample Collected 5/23/91

Case Narrative

This delivery group contained one sludge sample to be analyzed for total metals. No field blank was provided.

Samples validated in this report are noted below:

Client ID	Lab ID	Date of Collection
Sludge	3890	5/23/91

The areas reviewed during validation are listed below.

TRILLIUM INC

CLP Inorganics Data Validation

I. Holding Times

II. Calibration

III. Blanks

IV. ICP Interference Check Sample

V. Matrix Spike Sample Analysis

VI. Duplicate Sample Analysis

VII. Laboratory Control Sample Analysis

VIII. Furnace Atomic Absorption Analysis

IX. ICP Serial Dilution Analysis

X. Detection Limits

XI. Sample Result Verification

XII. Other QC

XIII. Overall Assessment

TRILLIUM INC

Data Validation

I. Holding Times

All metals analyses were conducted within acceptable holding times.

II. Calibration

Calibrations for metals were satisfactory.

One of the standards analyzed to establish the calibration curve for AA must be at the CRDL. The CRDL for antimony is 60 ppb, and the highest standard analyzed was 45 ppb. Since antimony was not detected above 40 ppb in any sample (including the matrix spike), data quality was not affected.

A standard at twice the CRDL was analyzed for ICP analytes. All analytes met the acceptance criteria with the exception of silver which was not recovered. The SOW states that "if the 2xCRDL standard for ICP is not within $\pm$ 20% of the true value, results near the CRDL are questionable. Estimate (J) positive results less than 3xCRDL and (UJ) non-detected results." Positive results for cadmium were qualified as estimated.

III. Blanks

No preparation or calibration blanks were above the CRDLs or less than the negative CRDLs.

The preparation blank contained copper (-1.0) below its negative IDL.

No field blank was provided for analysis.

The IDL for silver was raised to 5.5 U because of the negative blank values reported.

IV. ICP Interference Check Sample

Interference check sample results were satisfactory.

V. Matrix Spike Sample Analysis

Matrix spike analyses were satisfactory except for manganese (150% recovery). Positive results for manganese were qualified as estimated (J).

VI. Duplicate Sample Analysis

Duplicate analyses for were satisfactory.

VII. Laboratory Control Sample Analyses

Laboratory control sample results were satisfactory.

VIII. Furnace Atomic Absorption Analysis

Duplicate injections were performed and agreed within ±20%.

IX. ICP Serial Dilution Analysis

Serial dilutions were conducted and results met the validation criteria.

X. Detection Limits

Instrument detection limits (IDLs) should be less than the contract required detection limits (CRDLs). The IDL reported for mercury is equal to its CRDL. Mercury was not detected in any of the samples, so no data were qualified.

XI. Sample Result Verification

Sample results were acceptable as reported.

XII. Other QC

Not a requirement of the project.

XIII. Overall Assessment

A standard at twice the CRDL was analyzed for ICP analytes. All analytes met the acceptance criteria with the exception of silver which was not recovered. The SOW states that "if the 2xCRDL standard for ICP is not within ± 20% of the true value, results near the CRDL are questionable. Estimate (J) positive results less than 3xCRDL and (UJ) non-detected results." Positive results for cadmium were qualified as estimated.

The preparation blank contained copper (-1.0) below its negative IDL.

The IDL for silver was raised to 5.5 U because of the negative blank values reported.

TRILLIUM INC

Matrix spike analyses were satisfactory except for manganese (150% recovery). Positive results for manganese were qualified as estimated (J).

The data in this data package are acceptable with the modifications noted above,however, since no field blank was provided, the end user should use this data with caution.

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

00010

EPA SAMPLE NO.

SLUDGE

ab Name: PACE_INCORPORATED_____ Contract: EPC_____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

atrix (soil/water): SOIL_ Lab Sample ID: 3890/7

evel (low/med): LOW__ Date Received: 05/24/91

% Solids: _36.4

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	10700_	_		P_
7440-36-0	Antimony_	0.66_	B		F_
7440-38-2	Arsenic__	44.4_	_		F_
7440-39-3	Barium___	125_	_		P_
7440-41-7	Beryllium	11.5_	_		P_
7440-43-9	Cadmium__	4.4_	_	J	P_
7440-70-2	Calcium__	7750_	_		P_
7440-47-3	Chromium_	107_	_		P_
7440-48-4	Cobalt___	14.3_	B		P_
7440-50-8	Copper___	211_	_		P_
7439-89-6	Iron____	87400_	_		P_
7439-92-1	Lead____	34.6_	_		F_
7439-95-4	Magnesium	4540_	_		P_
7439-96-5	Manganese	890_	_	N	P_ J
7439-97-6	Mercury__	0.27_	U		CV
7440-02-0	Nickel___	44.5_	_		P_
7440-09-7	Potassium	1700_	B		P_
7782-49-2	Selenium_	0.27_	U		F_
7440-22-4	Silver___	7.7_	_		P_
7440-23-5	Sodium___	403_	B		P_
7440-28-0	Thallium_	0.38_	U	W	F_
7440-62-2	Vanadium_	41.2_	_		P_
7440-66-6	Zinc____	462_	_		P_
_____	Cyanide__	_____	_		NR
_____	_____	_____	_		__

olor Before: BROWN____ Clarity Before: _____ Texture: COARSE

.or After: COLORLESS Clarity After: _____ Artifacts: ___

uments:

AS_WAS_ANALYZED_AT_A_1/4_DILUTION.

PB_WAS_ANALYZED_AT_A_1/5_DILUTION.

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

TREATMENT SYSTEM SAMPLING

VOLATILES ANALYSES DATA

Samples Collected 5/24/91

Chemical Analyses Performed By

PACE, Incorporated

August 20, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

Data quality for this sample delivery group was good.

Cooler temperature upon receipt of samples by the laboratory was 6°C.

Validation of organic data is conducted in conformance with Environmental Protection Agency (EPA) Functional Guidelines for Evaluating Organics Analyses, February 1, 1988, with modifications by EPA Region I, November 1, 1988.

Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified (valid) results mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Case Narrative

Eight samples (including matrix spike and matrix spike duplicate) were collected and submitted to PACE, Inc. on May 24, 1991. The laboratory was requested to perform volatile organics (VOA) target compound list (TCL) analyses.

The samples included in this Sample Delivery Group (SDG) are:

Client ID	Lab ID	Date of Collection
S1-27	3892	05/24/91
S1-27DUP	3893	05/24/91
S1-27TB	3894	05/24/91
S2-25	3897	05/24/91
S3-25	3898	05/24/91
S4-25	3899	05/24/91

TRILLIUM INC

Volatiles

The requirements to be checked in validation are listed below.

I. Holding Times

II. GC/MS Tuning

III. Calibration

A. Initial

B. Continuing

IV. Blanks

V. Surrogate Recovery

VI. Matrix Spike/Matrix Spike Duplicate

VII. Field Duplicates

VIII. Internal Standards Performance

IX. TCL Compound Identification

X. Compound Quantitation and Reported Detection Limits

XI. Tentatively Identified Compounds

XII. System Performance

XIII. Overall Assessment

TRILLIUM INC

I. Holding Times

All samples were received preserved and analyzed within the 14-day holding time for preserved samples.

II. GC/MS Tuning

GC/MS tuning and mass calibrations were within criteria.

III. Calibration

Manual areas were integrated for one or more compounds in each of the standards in this data package. No evaluation of these manual integrations can be performed, as no hard copy documentation is provided. The validation has been completed on the assumption that the manual integrations done and reported by the laboratory were valid and correct. No data appear to be affected.

A. Initial

Initial calibration criteria were met on 5/28/91.

B. Continuing

Continuing calibration criteria were met on 5/30/91.

Continuing calibration criteria were met on 5/31/91 with the exception of the % difference for chloromethane (actual 29.7; criteria 25). Data were not affected.

Continuing calibration criteria were met on 6/3/91 Instrument J) with the exception of the RF for 2-butanone (actual 0.097; criteria 0.1) and the % difference for chloromethane (actual 46.2; criteria 25), 2-butanone (actual 40.7; criteria 25), vinyl acetate (actual 27.0; criteria 25), 4-methyl-2-pentanone (actual 38.4; criteria 25), 2-hexanone (actual 43.4; criteria 25), and 1,1,2,2-tetrachloroethane (actual 31.6; criteria 25). Detection limits for 2-butanone were rejected in Samples S1-27, S1-27MS, and S1-27MSD. Other data were not affected.

IV. Blanks

Acetone was reported in Method Blank VBLK03 and S1-27TB. The result for acetone in Sample S1-27TB was qualified as less than the reported value.

V. Surrogate Recovery

Surrogate recoveries were within acceptance criteria.

VI. Matrix Spike/Matrix Spike Duplicate

The matrix spike (MS) and matrix spike duplicate (MSD) were performed on Sample S1-27. The percent recoveries for 1,1-dichloroethene in the MS and the MSD were below QC criteria. The percent recovery for trichloroethene in the MS was below QC criteria. No positive results for 1,1-dichloroethene were reported in field samples, so data were not affected. Results for trichloroethene in Samples S1-27 and S1-27DUP were qualified as estimated.

Results for methylene chloride were reported in the MS, MSD, and Sample S1-27, but not in Sample S1-27DUP. This compound was rejected as laboratory contamination in the MS, MSD, and S1-27.

Results for 1,1,2-trichloroethane were reported in the MS but not in the field sample, MSD, or the duplicate. Although no spectra were provided for this compound, it appeared that this compound was misidentified. The retention time provided for 1,1,2-trichloroethane on the quant report did not match that of 1,1,2-trichloroethane in the calibration check standard. The retention time in the MS did closely match that of trichloroethene. There were probably overlapping peaks in the sample spectra. This would explain why percent recoveries for trichloroethene in the MS and MSD were either below QC criteria or in the lower range of QC acceptance criteria. Results for 1,1,2-trichloroethane were rejected in the MS.

VII. Field Duplicates

Compounds and concentrations (in ug/L) reported in Samples S1-27 and S1-27DUP were as follows:

Compound	S1-27	S1-27DUP
Trichloroethene	92	76
Tetrachloroethene	3600	3100

Results for the above compounds were within QC criteria.

VIII. Internal Standards Performance

Internal standards areas and retention times were acceptable.

IX. TCL Compound Identification

TCL compound identifications were acceptable with the exception of 1,1,2-trichloroethane in S1-27MS.

X. Compound Quantitation and Reported Detection Limits

The result for tetrachloroethene in the MS was slightly beyond the calibration range of the instrument. This result was within accuracy and precision criteria and was accepted.

The result for tetrachloroethene in Sample S2-25 was beyond the calibration range of the instrument. This result was qualified as estimated.

All other results and detection limits were acceptable with regard to the supporting data.

XI. Tentatively Identified Compounds

No TICs were reported for this SDG.

XII. System Performance

System performance requires attention. Manual integrations should be addressed. Compound identifications should be reviewed for accuracy.

XIII. Overall Assessment of Data for a Case

Data quality for this sample delivery group was good. Detection limits for 2-butanone were rejected in Samples S1-27, S1-27MS, and S1-27MSD.

Tetrachloroethene in Sample S2-25 was estimated due to the reported value exceeding the calibration range of the instrument.

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S1-27

00022

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3892.3

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2853

Level: (low/med) LOW Date Received: 5/25/91

% Moisture: not dec.100. Date Analyzed: 6/ 3/91

Column: (pack/cap) PACK Dilution Factor: 20.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	200.	U
74-83-9	Bromomethane	200.	U
75-01-4	Vinyl Chloride	200.	U
75-00-3	Chloroethane	200.	U
75-09-2	Methylene Chloride	~~77.~~	~~J~~ R
67-64-1	Acetone	200.	U
75-15-0	Carbon Disulfide	100.	U
75-35-4	1,1-Dichloroethene	100.	U
75-34-3	1,1-Dichloroethane	100.	U
540-59-0	1,2-Dichloroethene (total)	100.	U
67-66-3	Chloroform	100.	U
107-06-2	1,2-Dichloroethane	100.	U
78-93-3	2-Butanone	~~200.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	100.	U
56-23-5	Carbon Tetrachloride	100.	U
108-05-4	Vinyl Acetate	200.	U
75-27-4	Bromodichloromethane	100.	U
78-87-5	1,2-Dichloropropane	100.	U
10061-01-5	cis-1,3-Dichloropropene	100.	U
79-01-6	Trichloroethene	92.	J
124-48-1	Dibromochloromethane	100.	U
79-00-5	1,1,2-Trichloroethane	100.	U
71-43-2	Benzene	100.	U
10061-02-6	Trans-1,3-Dichloropropene	100.	U
75-25-2	Bromoform	100.	U
108-10-1	4-Methyl-2-Pentanone	200.	U
591-78-6	2-Hexanone	200.	U
127-18-4	Tetrachloroethene	3600.	
79-34-5	1,1,2,2-Tetrachloroethane	100.	U
108-88-3	Toluene	100.	U
108-90-7	Chlorobenzene	100.	U
100-41-4	Ethylbenzene	100.	U
100-42-5	Styrene	100.	U
1330-20-7	Xylene (total)	100.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S1-27

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00023

Matrix: (soil/water) WATER Lab Sample ID: 3892.3

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2853

Level: (low/med) LOW Date Received: 5/25/91

% Moisture: not dec.100. Date Analyzed: 6/ 3/91

Column: (pack/cap) PACK Dilution Factor: 20.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S1-27DUP

00030

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3893.1

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2815

Level: (low/med) LOW Date Received: 5/25/91

% Moisture: not dec.100. Date Analyzed: 5/31/91

Column: (pack/cap) PACK Dilution Factor: 20.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	200.	U
74-83-9	Bromomethane	200.	U
75-01-4	Vinyl Chloride	200.	U
75-00-3	Chloroethane	200.	U
75-09-2	Methylene Chloride	100.	U
67-64-1	Acetone	200.	U
75-15-0	Carbon Disulfide	100.	U
75-35-4	1,1-Dichloroethene	100.	U
75-34-3	1,1-Dichloroethane	100.	U
540-59-0	1,2-Dichloroethene (total)	100.	U
67-66-3	Chloroform	100.	U
107-06-2	1,2-Dichloroethane	100.	U
78-93-3	2-Butanone	200.	U
71-55-6	1,1,1-Trichloroethane	100.	U
56-23-5	Carbon Tetrachloride	100.	U
108-05-4	Vinyl Acetate	200.	U
75-27-4	Bromodichloromethane	100.	U
78-87-5	1,2-Dichloropropane	100.	U
10061-01-5	cis-1,3-Dichloropropene	100.	U
79-01-6	Trichloroethene	76.	J
124-48-1	Dibromochloromethane	100.	U
79-00-5	1,1,2-Trichloroethane	100.	U
71-43-2	Benzene	100.	U
10061-02-6	Trans-1,3-Dichloropropene	100.	U
75-25-2	Bromoform	100.	U
108-10-1	4-Methyl-2-Pentanone	200.	U
591-78-6	2-Hexanone	200.	U
127-18-4	Tetrachloroethene	3100.	
79-34-5	1,1,2,2-Tetrachloroethane	100.	U
108-88-3	Toluene	100.	U
108-90-7	Chlorobenzene	100.	U
100-41-4	Ethylbenzene	100.	U
100-42-5	Styrene	100.	U
1330-20-7	Xylene (total)	100.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S1-27DUP

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00031

Matrix: (soil/water) WATER Lab Sample ID: 3893.1

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2815

Level: (low/med) LOW Date Received: 5/25/91

% Moisture: not dec.100. Date Analyzed: 5/31/91

Column: (pack/cap) PACK Dilution Factor: 20.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S1-27TB

00037

ab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

atrix: (soil/water) WATER Lab Sample ID: 3894.0

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2809

Level: (low/med) LOW Date Received: 5/25/91

Moisture: not dec.100. Date Analyzed: 5/31/91

Column: (pack/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	5.	U
67-64-1	Acetone	8.	JU
75-15-0	Carbon Disulfide	5.	U
75-35-4	1,1-Dichloroethene	5.	U
75-34-3	1,1-Dichloroethane	5.	U
540-59-0	1,2-Dichloroethene (total)	5.	U
67-66-3	Chloroform	5.	U
107-06-2	1,2-Dichloroethane	5.	U
78-93-3	2-Butanone	10.	U
71-55-6	1,1,1-Trichloroethane	5.	U
56-23-5	Carbon Tetrachloride	5.	U
108-05-4	Vinyl Acetate	10.	U
75-27-4	Bromodichloromethane	5.	U
78-87-5	1,2-Dichloropropane	5.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U
79-01-6	Trichloroethene	5.	U
124-48-1	Dibromochloromethane	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U
71-43-2	Benzene	5.	U
10061-02-6	Trans-1,3-Dichloropropene	5.	U
75-25-2	Bromoform	5.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	5.	U
79-34-5	1,1,2,2-Tetrachloroethane	5.	U
108-88-3	Toluene	5.	U
108-90-7	Chlorobenzene	5.	U
100-41-4	Ethylbenzene	5.	U
100-42-5	Styrene	5.	U
1330-20-7	Xylene (total)	5.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S1-27TB

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00038

Matrix: (soil/water) WATER Lab Sample ID: 3894.0

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2809

Level: (low/med) LOW Date Received: 5/25/91

% Moisture: not dec.100. Date Analyzed: 5/31/91

Column: (pack/cap) PACK Dilution Factor: 1.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S2-25

00043

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3897.4

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2810

Level: (low/med) LOW Date Received: 5/25/91

% Moisture: not dec.100. Date Analyzed: 5/31/91

Column: (packed/cap) PACK Dilution Factor: 2.50

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
74-87-3	Chloromethane	25.	U
74-83-9	Bromomethane	25.	U
75-01-4	Vinyl Chloride	25.	U
75-00-3	Chloroethane	25.	U
75-09-2	Methylene Chloride	12.	U
67-64-1	Acetone	25.	U
75-15-0	Carbon Disulfide	12.	U
75-35-4	1,1-Dichloroethene	12.	U
75-34-3	1,1-Dichloroethane	12.	U
540-59-0	1,2-Dichloroethene (total)	21.	
67-66-3	Chloroform	12.	U
107-06-2	1,2-Dichloroethane	12.	U
78-93-3	2-Butanone	25.	U
71-55-6	1,1,1-Trichloroethane	16.	
56-23-5	Carbon Tetrachloride	12.	U
108-05-4	Vinyl Acetate	25.	U
75-27-4	Bromodichloromethane	12.	U
78-87-5	1,2-Dichloropropane	12.	U
10061-01-5	cis-1,3-Dichloropropene	12.	U
79-01-6	Trichloroethene	27.	
124-48-1	Dibromochloromethane	12.	U
79-00-5	1,1,2-Trichloroethane	12.	U
71-43-2	Benzene	12.	U
10061-02-6	Trans-1,3-Dichloropropene	12.	U
75-25-2	Bromoform	12.	U
108-10-1	4-Methyl-2-Pentanone	25.	U
591-78-6	2-Hexanone	25.	U
127-18-4	Tetrachloroethene	690.	~~E~~ J
79-34-5	1,1,2,2-Tetrachloroethane	12.	U
108-88-3	Toluene	12.	U
108-90-7	Chlorobenzene	12.	U
100-41-4	Ethylbenzene	12.	U
100-42-5	Styrene	12.	U
1330-20-7	Xylene (total)	12.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S2-25

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00044

Matrix: (soil/water) WATER Lab Sample ID: 3897.4

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2810

Level: (low/med) LOW Date Received: 5/25/91

% Moisture: not dec.100. Date Analyzed: 5/31/91

Column: (packl/cap) PACK Dilution Factor: 2.50

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S3-25

00052

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3898.2

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2816

Level: (low/med) LOW Date Received: 5/25/91

% Moisture: not dec.100. Date Analyzed: 5/31/91

Column: (pack/cap) PACK Dilution Factor: 12.50

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
74-87-3	Chloromethane	120.	U
74-83-9	Bromomethane	120.	U
75-01-4	Vinyl Chloride	120.	U
75-00-3	Chloroethane	120.	U
75-09-2	Methylene Chloride	62.	U
67-64-1	Acetone	120.	U
75-15-0	Carbon Disulfide	62.	U
75-35-4	1,1-Dichloroethene	62.	U
75-34-3	1,1-Dichloroethane	62.	U
540-59-0	1,2-Dichloroethene (total)	62.	U
67-66-3	Chloroform	62.	U
107-06-2	1,2-Dichloroethane	62.	U
78-93-3	2-Butanone	120.	U
71-55-6	1,1,1-Trichloroethane	46.	J
56-23-5	Carbon Tetrachloride	62.	U
108-05-4	Vinyl Acetate	120.	U
75-27-4	Bromodichloromethane	62.	U
78-87-5	1,2-Dichloropropane	62.	U
10061-01-5	cis-1,3-Dichloropropene	62.	U
79-01-6	Trichloroethene	81.	
124-48-1	Dibromochloromethane	62.	U
79-00-5	1,1,2-Trichloroethane	62.	U
71-43-2	Benzene	62.	U
10061-02-6	Trans-1,3-Dichloropropene	62.	U
75-25-2	Bromoform	62.	U
108-10-1	4-Methyl-2-Pentanone	120.	U
591-78-6	2-Hexanone	120.	U
127-18-4	Tetrachloroethene	2000.	
79-34-5	1,1,2,2-Tetrachloroethane	62.	U
108-88-3	Toluene	62.	U
108-90-7	Chlorobenzene	62.	U
100-41-4	Ethylbenzene	62.	U
100-42-5	Styrene	62.	U
1330-20-7	Xylene (total)	62.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S3-25

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No. 00053

Matrix: (soil/water) WATER Lab Sample ID: 3898.2

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2816

Level: (low/med) LOW Date Received: 5/25/91

% Moisture: not dec.100. Date Analyzed: 5/31/91

Column: (pack/cap) PACK Dilution Factor: 12.50

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S4-25
00060

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3899.0

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2817

Level: (low/med) LOW Date Received: 5/25/91

% Moisture: not dec.100. Date Analyzed: 5/31/91

Column: (pack/cap) PACK Dilution Factor: 10.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	100.	U
74-83-9	Bromomethane	100.	U
75-01-4	Vinyl Chloride	100.	U
75-00-3	Chloroethane	100.	U
75-09-2	Methylene Chloride	50.	U
67-64-1	Acetone	100.	U
75-15-0	Carbon Disulfide	50.	U
75-35-4	1,1-Dichloroethene	50.	U
75-34-3	1,1-Dichloroethane	50.	U
540-59-0	1,2-Dichloroethene (total)	50.	U
67-66-3	Chloroform	50.	U
107-06-2	1,2-Dichloroethane	50.	U
78-93-3	2-Butanone	100.	U
71-55-6	1,1,1-Trichloroethane	29.	J
56-23-5	Carbon Tetrachloride	50.	U
108-05-4	Vinyl Acetate	100.	U
75-27-4	Bromodichloromethane	50.	U
78-87-5	1,2-Dichloropropane	50.	U
10061-01-5	cis-1,3-Dichloropropene	50.	U
79-01-6	Trichloroethene	52.	
124-48-1	Dibromochloromethane	50.	U
79-00-5	1,1,2-Trichloroethane	50.	U
71-43-2	Benzene	50.	U
10061-02-6	Trans-1,3-Dichloropropene	50.	U
75-25-2	Bromoform	50.	U
108-10-1	4-Methyl-2-Pentanone	100.	U
591-78-6	2-Hexanone	100.	U
127-18-4	Tetrachloroethene	1700.	
79-34-5	1,1,2,2-Tetrachloroethane	50.	U
108-88-3	Toluene	50.	U
108-90-7	Chlorobenzene	50.	U
100-41-4	Ethylbenzene	50.	U
100-42-5	Styrene	50.	U
1330-20-7	Xylene (total)	50.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S4-25

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00061

Matrix: (soil/water) WATER Lab Sample ID: 3899.0

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2817

Level: (low/med) LOW Date Received: 5/25/91

% Moisture: not dec.100. Date Analyzed: 5/31/91

Column: (pack/cap) PACK Dilution Factor: 10.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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TRILLIUM INC

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

TREATMENT SYSTEM SAMPLING

VOLATILES ANALYSES DATA

METHOD 524.2 ANALYSES

Samples Collected 5/24/91

Chemical Analyses Performed By

PACE, Incorporated

August 20, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

Data quality for samples in this sample delivery group was good.

Cooler temperature upon receipt of samples by the laboratory was 6°C.

Validation of organic data is conducted in conformance with Environmental Protection Agency (EPA) Functional Guidelines for Evaluating Organics Analyses, February 1, 1988, with modifications by EPA Region I, November 1, 1988.

Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified (valid) results mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Case Narrative

Five treatment system samples were collected and submitted to PACE, Inc. on May 24, 1991. The laboratory was requested to perform volatile organics analyses (VOA) using Method 524.2. The analyte list for this method was amended pursuant to the QA/QC Plan for this project.

The samples included in this Sample Delivery Group (SDG) are:

Client ID	Lab ID	Date of Collection
S1-27FB	3895	05/24/91
S5-22	3900	05/24/91
S6-27	3901	05/24/91
S6-27DUP	3902	05/24/91
S6-27TB	3903	05/24/91

Volatiles

The requirements to be checked in validation are listed below.

I. Holding Times

II. GC/MS Tuning

III. Calibration

A. Initial

B. Continuing

IV. Blanks

V. Surrogate Recovery

VI. Matrix Spike/Matrix Spike Duplicate

VII. Field Duplicates

VIII. Internal Standards Performance

IX. TCL Compound Identification

X. Compound Quantitation and Reported Detection Limits

XI. Tentatively Identified Compounds

XII. System Performance

XIII. Overall Assessment

I. Holding Times

All samples were received preserved analyzed within the 14-day holding time for preserved samples.

II. GC/MS Tuning

GC/MS tuning and mass calibrations were within criteria.

III. Calibration

Areas were manually integrated for one or more compounds in each of the standards in this data package. No evaluation of these manual integrations can be performed, as no hard copy documentation was provided. Such documentation has been requested from the laboratory. The validation has been completed on the assumption that the manual integrations done and reported by the laboratory were valid and correct. No sample data appear to be affected.

A. Initial

Initial calibration criteria were met on 5/23/91.

B. Continuing

Continuing calibration criteria were met on 6/2/91. Continuing calibration criteria were met on 6/5/91 with the exception of the % difference for 1,1,2,2-tetrachloroethane (actual 30.58; criteria 25). Data were not affected.

IV. Blanks

The trip blank, field blank, and method blanks were clean.

V. Surrogate Recovery

Surrogate recoveries were within acceptance criteria.

VI. Matrix Spike/Matrix Spike Duplicate

A matrix spike (MS) and matrix spike duplicate (MSD) were performed on Sample S6-27. Recoveries for 1,1-dichloroethene were above QC criteria in the MS and MSD. The relative percent difference was above QC criteria for benzene. No positive sample results were affected.

VII. Field Duplicates

Samples S6-27 and S6-27DUP were submitted as duplicate samples. No compounds were detected in either sample.

VIII. Internal Standards Performance

Internal standards areas and retention times were acceptable.

IX. TCL Compound Identification

TCL compound identifications were acceptable.

X. Compound Quantitation and Reported Detection Limits

The laboratory performed a practical quantitation limit (PQL) study for the Method 524.2 analyses for this project on October 15, 1990. Method detection limits (MDLs) determined through that PQL study should have been used for reporting purposes for these treatment system samples. MDLs determined through the PQL study were as follows:

Compound	MDL (ug/L)
Vinyl Chloride	0.48
Chloroethane	0.49
Methylene Chloride	4.41
1,1-Dichloroethene	0.67
1,1-Dichloroethane	0.54
trans-1,2-Dichloroethene	0.50
Chloroform	0.53
1,2-Dichloroethane	0.52
1,1,1-Trichloroethane	0.44
Carbon Tetrachloride	0.43
Bromodichloromethane	0.38
1,2-Dichloropropane	0.45
cis-1,3-Dichloropropene	0.33
Trichloroethene	0.42
Dibromochloromethane	0.33
1,1,2-Trichloroethane	0.43
Benzene	0.58
trans-1,3-Dichloropropene	0.07
Bromoform	0.49
Tetrachloroethene	0.51
1,1,2,2-Tetrachloroethane	0.44
Toluene	0.45
Chlorobenzene	0.44

Compound	MDL (ug/L)
Ethylbenzene	0.51
m-Xylene	0.48
o-, p-Xylene	0.93
1,2-Dichloroethane-d4	0.50
Toluene-d8	0.45
Bromofluorobenzene	0.36

Methylene chloride was reported in Sample S5-22 at a concentration below the MDL determined by the PQL study for this project. The methylene chloride concentration in this sample was corrected to be "ND."

The result reported for 1,1,1-trichloroethane in Sample S5-22 (31 ug/L) was beyond the calibration range of the instrument (25 ug/L). This result was qualified as estimated.

All other results and detection limits were acceptable with regard to the supporting data.

XI. Tentatively Identified Compounds

No TICs were reported for this sample delivery group.

XII. System Performance

System performance was acceptable.

XIII. Overall Assessment of Data for a Case

Methylene chloride was corrected to be "ND" in Sample S5-22. The result for 1,1,1-trichloroethane in Sample S5-22 was qualified as estiamted.

PACE Sample Number:			95 0038958
Date Collected:			05/24/91
Date Received:			05/25/91
Parameter	Units	MDL	S1-27 FB

ORGANIC ANALYSIS

VOLATILE ORGANICS BY 524.2 MODIFIED

Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

00029

PACE Sample Number:			95 0039008
Date Collected:			05/24/91
Date Received:			05/25/91
Parameter	Units	MDL	S5-22
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.2~~ ND EKJ 7/7/91
1,1-Dichloroethene	ug/L	0.5	1.5
1,1-Dichloroethane	ug/L	0.5	1.7
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND EKJ 7/7/91
1,1,1-Trichloroethane	ug/L	0.5	~~30.8~~ 21 J MJ 6/27/91
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

PACE Sample Number:			95 0039016
Date Collected:			05/24/91
Date Received:			05/25/91
Parameter	Units	MDL	S6-27
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

PACE Sample Number:			95 0039024
Date Collected:			05/24/91
Date Received:			05/25/91
Parameter	Units	MDL	S6-27 Dup
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

PACE Sample Number:			95 0039032
Date Collected:			05/24/91
Date Received:			05/25/91
Parameter	Units	MDL	S6-27 TB
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

TRILLIUM INC

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

TREATMENT SYSTEM SAMPLING

VOLATILES ANALYSES DATA

Samples Collected 5/25/91

Chemical Analyses Performed By

PACE, Incorporated

August 20, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

Data quality for this sample delivery group was fair.

Cooler temperature upon receipt of samples by the laboratory was 4°C.

Validation of organic data is conducted in conformance with Environmental Protection Agency (EPA) Functional Guidelines for Evaluating Organics Analyses, February 1, 1988, with modifications by EPA Region I, November 1, 1988.

Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified (valid) results mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Case Narrative

Eight samples (including matrix spike and matrix spike duplicate) were collected and submitted to PACE, Inc. on May 25, 1991. The laboratory was requested to perform volatile organics (VOA) target compound list (TCL) analyses.

The samples included in this Sample Delivery Group (SDG) are:

Client ID	Lab ID	Date of Collection
S1-28	3904	05/25/91
S1-28DUP	3905	05/25/91
S1-28TB	3906	05/25/91
S2-26	3909	05/25/91
S3-26	3910	05/25/91
S4-26	3911	05/25/91

The case narrative reported that foaming occurred during the analysis of Samples S1-28, S1-28DUP, S2-26, S3A-26, and S4-26.

Volatiles

The requirements to be checked in validation are listed below.

I. Holding Times

II. GC/MS Tuning

III. Calibration

A. Initial

B. Continuing

IV. Blanks

V. Surrogate Recovery

VI. Matrix Spike/Matrix Spike Duplicate

VII. Field Duplicates

VIII. Internal Standards Performance

IX. TCL Compound Identification

X. Compound Quantitation and Reported Detection Limits

XI. Tentatively Identified Compounds

XII. System Performance

XIII. Overall Assessment

I. Holding Times

All samples were received preserved and analyzed within the 14-day holding time for preserved samples.

II. GC/MS Tuning

GC/MS tuning and mass calibrations were within criteria.

III. Calibration

Manual areas were integrated for one or more compounds in each of the standards in this data package. No evaluation of these manual integrations can be performed, as no hard copy documentation is provided. The validation has been completed on the assumption that the manual integrations done and reported by the laboratory were valid and correct. No data appear to be affected.

A. Initial

Initial calibration criteria were met on 5/28/91 (Instrument J).

Initial calibration criteria were met on 5/28/91 (Instrument G) with the exception of the RRF for 2-butanone (actual 0.077; criteria 0.1). Detection limits for 2-butanone were rejected in Samples S1-28, S1-28MS, S1-28MSD, S2-26, S3A-26, and S4-26.

B. Continuing

Continuing calibration criteria were met on 5/31/91 (Instrument G) with the exception of the % difference for 2-butanone (actual 32.0; criteria 25). Data were not affected.

Continuing calibration criteria were met on 6/3/91 Instrument J) with the exception of the RF for 2-butanone (actual 0.097; criteria 0.1) and the % difference for chloromethane (actual 46.2; criteria 25), 2-butanone (actual 40.7; criteria 25), vinyl acetate (actual 27.0; criteria 25), 4-methyl-2-pentanone (actual 38.4; criteria 25), 2-hexanone (actual 43.4; criteria 25), and 1,1,2,2-tetrachloroethane (actual 31.6; criteria 25). Detection limits for 2-butanone were rejected in Samples S1-28TB and S1-28DUP. Other data were not affected.

IV. Blanks

Acetone was reported in Method Blank VBLK01 and S1-28TB. The results for acetone in Sample S1-28TB, S1-28DUP, and S1-28MSD were qualified as less than the reported values.

V. Surrogate Recovery

Percent recoveries for 1,2-dichloroethane-d4 were slightly above acceptance criteria for Samples S1-28MS and S1-28MSD. Data were not affected.

All other surrogate recoveries were within acceptance criteria.

VI. Matrix Spike/Matrix Spike Duplicate

The matrix spike (MS) and matrix spike duplicate (MSD) were performed on Sample S1-28. The percent recoveries for trichloroethene in the MS and the MSD were below QC criteria. The percent recovery for 1,1-dichloroethene in the MSD was below QC criteria. No positive results for 1,1-dichloroethene were reported in field samples, so data were not affected. Results for trichloroethene in Samples S1-28 and S1-28DUP were qualified as estimated.

VII. Field Duplicates

Compounds and concentrations (in ug/L) reported in Samples S1-28 and S1-28DUP were as follows:

Compound	S1-28	S1-28DUP
Methylene Chloride		91
1,1,1-Trichloroethane		52
Trichloroethene	74	110
Tetrachloroethene	3000	3800

Results for the tetrachloroethene were within QC criteria. Results for trichloroethene were above QC criteria; these results were previously qualified as estimated. Because methylene chloride and 1,1,1-trichloroethene were reported only in the duplicate, those results were rejected.

VIII. Internal Standards Performance

Internal standards areas and retention times were acceptable.

IX. TCL Compound Identification

TCL compound identifications were acceptable.

X. Compound Quantitation and Reported Detection Limits

Results and detection limits were acceptable with regard to the supporting data.

XI. Tentatively Identified Compounds

No TICs were reported for this SDG.

XII. System Performance

System performance requires attention. Manual integrations need to be addressed. Repsonse factor criteria should be monitored.

XIII. Overall Assessment of Data for a Case

Data quality for this sample delivery group was fair. The foaming of samples during analyses reported by the laboratory may have been responsible for surrogate recoveries being outside criteria for the MS and MSD and for poor duplicate precision. Detection limits for 2-butanone were rejected in all samples.

0000022

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: DG No.:

Matrix: (Soil/Water) WATER Lab Sample ID: [illegible]

Sample wt/vol: 5. (g/mL) ML Lab File ID: [illegible]

Level: (Low/med) LOW Date Received: [illegible]

Moisture: not dec.100. Date Analyzed: [illegible]

Column: [illegible] PACE Dilution Factor: [illegible]

CAS NO.	COMPOUND	CONCENTRATION/UNITS: (ug/L or ug/kg)	
74-87-3	Chloromethane	200.	U
74-83-9	Bromomethane	200.	U
75-01-4	Vinyl Chloride	[illegible]	U
75-00-3	Chloroethane	[illegible]	
75-09-2	Methylene Chloride	100.	U
67-64-1	Acetone	[illegible]	
75-15-0	Carbon Disulfide	100.	U
75-35-4	1,1-Dichloroethene	[illegible]	
75-34-3	1,1-Dichloroethane	100.	U
540-59-0	1,2-Dichloroethene (total)	100.	U
67-66-3	Chloroform	100.	U
107-06-2	1,2-Dichloroethane	100.	U
78-93-3	2-Butanone	~~200.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	100.	U
56-23-5	Carbon Tetrachloride	100.	U
108-05-4	Vinyl Acetate	200.	U
75-27-4	Bromodichloromethane	100.	U
78-87-5	1,2-Dichloropropane	100.	U
10061-01-5	cis-1,3-Dichloropropene	100.	U
79-01-6	Trichloroethene	74.	J
124-48-1	Dibromochloromethane	100.	U
79-00-5	1,1,2-Trichloroethane	100.	U
71-43-2	Benzene	100.	U
10061-02-6	Trans-1,3-Dichloropropene	100.	U
75-25-2	Bromoform	100.	U
108-10-1	4-Methyl-2-Pentanone	200.	U
591-78-6	2-Hexanone	200.	U
127-18-4	Tetrachloroethene	3000.	
79-34-5	1,1,2,2-Tetrachloroethane	100.	U
108-88-3	Toluene	100.	U
108-90-7	Chlorobenzene	100.	U
100-41-4	Ethylbenzene	100.	U
100-42-5	Styrene	100.	U
1330-20-7	Xylene (total)	100.	U

TENTATIVELY IDENTIFIED COMPOUNDS

0000073

Lab Name: [illegible] Contract:

Lab Code: [illegible] Case No.: [illegible] SAS No.: [illegible]

Matrix: (soil/water) WATER Lab Sam. ID: [illegible]

Sample wt/vol: 5. (g/mL) ML Lab File: [illegible]

Level: (low/med) LOW Date Received: [illegible]

% Moisture: not dec.100. Date Analyzed: [illegible]

Column: [illegible] Dilution Factor: [illegible]

CONCENTRATION UNITS.
(ug/L or ug/kg) [illegible]

Number TICs found: [illegible]

SAS NUMBER	COMPOUND NAME	RT	EST. CONC.	[illegible]
1.				
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4.				
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6.				
7.				
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30.				

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
5122DUP

Lab Name: PACE Contract: 0000029

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3205.1

Sample wt/vol: 5. (g/mL) ML Lab File ID: J1258

Level: (low/med) LOW Date Received: [illegible]

% Moisture: not dec.100. Date Analyzed: [illegible]

Column: (pack/cap) PACK Dilution Factor: [illegible]

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
74-87-3	Chloromethane	200.	U
74-83-9	Bromomethane	200.	U
75-01-4	Vinyl Chloride	200.	U
75-00-3	Chloroethane	200.	U
75-09-2	Methylene Chloride	~~[illegible]~~	~~[illegible]~~ R
67-64-1	Acetone	30.	~~BJ~~ U
75-15-0	Carbon Disulfide	100.	U
75-35-4	1,1-Dichloroethene	[illegible]	U
75-34-3	1,1-Dichloroethane	[illegible]	U
540-59-0	1,2-Dichloroethene (total)	100.	U
67-66-3	Chloroform	100.	U
107-06-2	1,2-Dichloroethane	100.	U
78-93-3	2-Butanone	~~200.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	~~52.~~	~~J~~ R
56-23-5	Carbon Tetrachloride	100.	U
108-05-4	Vinyl Acetate	200.	U
75-27-4	Bromodichloromethane	100.	U
78-87-5	1,2-Dichloropropane	100.	U
10061-01-5	cis-1,3-Dichloropropene	100.	U
79-01-6	Trichloroethene	110.	J
124-48-1	Dibromochloromethane	100.	U
79-00-5	1,1,2-Trichloroethane	100.	U
71-43-2	Benzene	[illegible]	U
10061-02-6	Trans-1,3-Dichloropropene	100.	U
75-25-2	Bromoform	100.	U
108-10-1	4-Methyl-2-Pentanone	[illegible]	U
591-78-6	2-Hexanone	200.	U
127-18-4	Tetrachloroethene	2000.	
79-34-5	1,1,2,2-Tetrachloroethane	100.	U
108-88-3	Toluene	100.	U
108-90-7	Chlorobenzene	100.	U
100-41-4	Ethylbenzene	100.	U
100-42-5	Styrene	100.	U
1330-20-7	Xylene (total)	100.	U

TENTATIVELY IDENTIFIED COMPOUNDS

01-13DUP

Lab Name: PACE Contract: 000003

Lab Code: PACE Case No.: IPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: [illegible]

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2050

Level: (low/med) LOW Date Received: 3/25/01

% Moisture: not dec.100. Date Analyzed: 3/ 0/01

Col n: (pack/cap) PACK Dilution Factor: 20.00

CONCENTRATION UNITS:
(ug/L or ug/kg) UG/L

Number TICs found. 0

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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VOLATILE ORGANICS ANALYSIS DATA SHEET

51-28TB

31-ZOTB

Lab Name: PACE Contract: 0000039

Lab Code: PACE Case No.: EPC SAS No.: SDG No..

(water) WATER Lab Sample ID: 3903.7

Sample wt/vol: 5. (g/mL) ML Lab File ID: 32049

Level: (low/med) LOW Date Received: 5/25/91

% Moisture: not dec.100. Date Analyzed: 6/ 3 91

Column: (pack/cap) PACK Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	5.	U
67-64-1	Acetone	5.	~~B~~ U
75-15-0	Carbon Disulfide	5.	U
75-35-4	1,1-Dichloroethene	5.	U
75-34-3	1,1-Dichloroethane	5.	U
540-59-0	1,2-Dichloroethene (total)	5.	U
67-66-3	Chloroform	5.	U
107-06-2	1,2-Dichloroethane	5.	U
78-93-3	2-Butanone	~~10.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	5.	U
56-23-5	Carbon Tetrachloride	5.	U
108-05-4	Vinyl Acetate	10.	U
75-27-4	Bromodichloromethane	5.	U
78-87-5	1,2-Dichloropropane	5.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U
79-01-6	Trichloroethene	5.	U
124-48-1	Dibromochloromethane	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U
71-43-2	Benzene	5.	U
10061-02-6	Trans-1,3-Dichloropropene	5.	U
75-25-2	Bromoform	5.	U
108-10-1	4-Methyl-2-Pentanone		
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	5.	U
79-34-5	1,1,2,2-Tetrachloroethane	5.	U
108-88-3	Toluene	5.	U
108-90-7	Chlorobenzene	5.	U
100-41-4	Ethylbenzene	5.	U
100-42-5	Styrene	5.	U
1330-20-7	Xylene (total)	5.	U

[illegible] ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

[illegible]

Lab Name: PACE Contract: 0000040

Lab Code: [illegible] Case No.: EPC SAS No.: SDG No.:

Matrix: soil/water WATER Lab Sample ID: [illegible]

Sample wt/vol: 5. (g/mL) ML Lab File ID: [illegible]

Level: low/med LOW Date Received: [illegible]

% Moisture: not dec.100. Date Analyzed: [illegible]

Column: (pack/cap) PACK Dilution Factor: 1.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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VOLATILE ORGANICS ANALYSIS DATA SHEET 0000045 52-26

Lab Name: [illegible] Contract: _____

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: [illegible]

Matrix: (soil/water) WATER Lab Sample ID: [illegible]

Sample wt/vol: 5 (g/ml) ML Lab File ID: [illegible]

Level: (low/med) LOW Date Received: [illegible]

% Moisture: not dec. 100. Date Analyzed: [illegible]

Column: pac (cap/pac) PACK Dilution Factor: [illegible]

CAS NO.	COMPOUND	CONCENTRATION UNITS: ug/L or ug/kg (ug/L)	Q
74-87-3	Chloromethane	[illegible]	U
74-83-9	Bromomethane	50.	U
75-01-4	Vinyl Chloride	50.	U
75-00-3	Chloroethane	50.	U
75-09-2	Methylene Chloride	25.	U
67-64-1	Acetone	50.	U
75-15-0	Carbon Disulfide	25.	U
75-35-4	1,1-Dichloroethene	25.	U
75-34-3	1,1-Dichloroethane	25.	U
540-59-0	1,2-Dichloroethene (total)	22.	J
67-66-3	Chloroform	25.	U
107-06-2	1,2-Dichloroethane	25.	U
78-93-3	2-Butanone	~~50.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	25.	U
56-23-5	Carbon Tetrachloride	25.	U
108-05-4	Vinyl Acetate	50.	U
75-27-4	Bromodichloromethane	25.	U
78-87-5	1,2-Dichloropropane	25.	U
10061-01-5	cis-1,3-Dichloropropene	25.	U
79-01-6	Trichloroethene	26.	
124-48-1	Dibromochloromethane	25.	U
79-00-5	1,1,2-Trichloroethane	25.	U
71-43-2	Benzene	25.	U
10061-02-6	trans-1,3-Dichloropropene	25.	U
75-25-2	Bromoform	25.	U
108-10-1	4-Methyl-2-Pentanone	50.	U
591-78-6	2-Hexanone	50.	U
127-18-4	Tetrachloroethene	740.	
79-34-5	1,1,2,2-Tetrachloroethane	25.	U
108-88-3	Toluene	25.	U
108-90-7	Chlorobenzene	25.	U
100-41-4	Ethylbenzene	25.	U
100-42-5	Styrene	25.	U
1330-20-7	Xylene (total)	25.	U

VOLATILE ORGANIC [illegible]
TENTATIVELY IDENTIFIED COMPOUNDS

52-26

0000046

Lab Name: [illegible] Contract:

Lab Code: PACE Case No.: RPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: [illegible]

Sample wt/vol: 5. (g/mL) ML Lab File ID: [illegible]

Level: (low/med) LOW Date Received: [illegible]

% Moisture: not dec.100. Date Analyzed: [illegible]

Column: (pack/cap) PACK Dilution Factor: 5.0

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
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1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S3A-26

0000053

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 0911.5

Sample wt/vol: 5. (g/mL) ML Lab File ID: 00115

Level: (low/med) LOW Date Received: 7/22/91

% Moisture: not dec.100. Date Analyzed: 7/31/91

Column: (packed/cap) PACK Dilution Factor: 12.5

CAS NO.	COMPOUND	CONCENTRATION UNITS: ug/L or ug/kg (ug/L or ug/kg) UG/L	Q
74-87-3	Chloromethane	120.	U
74-83-9	Bromomethane	120.	U
75-01-4	Vinyl Chloride	120.	U
75-00-3	Chloroethane	120.	U
75-09-2	Methylene Chloride	62.	U
67-64-1	Acetone	120.	U
75-15-0	Carbon Disulfide	62.	U
75-35-4	1,1-Dichloroethene	62.	U
75-34-3	1,1-Dichloroethane	62.	U
540-59-0	1,2-Dichloroethene (total)	62.	U
67-66-3	Chloroform	62.	U
107-06-2	1,2-Dichloroethane	62.	U
78-93-3	2-Butanone	~~120.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	62.	U
56-23-5	Carbon Tetrachloride	62.	U
108-05-4	Vinyl Acetate	120.	U
75-27-4	Bromodichloromethane	62.	U
78-87-5	1,2-Dichloropropane	62.	U
10061-01-5	cis-1,3-Dichloropropene	62.	U
79-01-6	Trichloroethene	63.	
124-48-1	Dibromochloromethane	62.	U
79-00-5	1,1,2-Trichloroethane	62.	U
71-43-2	Benzene	62.	U
10061-02-6	Trans-1,3-Dichloropropene	62.	U
75-25-2	Bromoform	62	U
108-10-1	4-Methyl-2-Pentanone	120.	U
591-78-6	2-Hexanone	120.	U
127-18-4	Tetrachloroethene	930.	
79-34-5	1,1,2,2-Tetrachloroethane	62.	U
108-88-3	Toluene	62.	U
108-90-7	Chlorobenzene	62.	U
100-41-4	Ethylbenzene	62.	U
100-42-5	Styrene	62.	U
1330-20-7	Xylene(total)	62.	U

[illegible] ORGANICS [illegible] DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

53A-26

[illegible]

Lab Name: PACE Contract:

[illegible]: PACE Case No.: [illegible] SAS No.: 0000054 [illegible]

Matrix: (soil/water) WATER Lab Sample ID: [illegible]

Sample wt/vol: 5. g/ml ML Lab File ID: [illegible]

Level: (low/med) LOW Date Received: [illegible]

% Moisture: [illegible] dec.100. Date Analyzed: [illegible]

Column: (pack/cap) PACK Dilution Factor: [illegible]

Number TIC found: 0

CONCENTRATION UNITS:
(ug/L or ug/kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
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[illegible] ORGANIC [illegible] DATA SHEET

24-26

0000000

[illegible] Name: [illegible] Contract:

Lab Code: [illegible] Case No.: [illegible] SAS No.: [illegible] SDG No.:

[illegible] (soil/water) WATER Lab Sample ID: [illegible]

Sample wt vol. [illegible] Lab File ID: [illegible]

[illegible] (low/med) LOW Date Received: [illegible]

[illegible] Moisture: not dec.100. Date Analyzed: [illegible]

[illegible] (cap) RACK Dilution Factor: [illegible]

CONCENTRATION UNITS.

CAS NO.	COMPOUND	ug/L [illegible]	[illegible]
74-87-3	Chloromethane	[illegible]	U
74-83-9	Bromomethane	[illegible]	U
75-01-4	Vinyl Chloride	100.	U
75-00-3	Chloroethane	[illegible]	U
75-09-2	Methylene Chloride	50.	U
67-64-1	Acetone	100.	U
75-15-0	Carbon Disulfide	50.	U
75-35-4	1,1-Dichloroethene	50.	U
75-34-3	1,1-Dichloroethane	50.	U
540-59-0	1,2-Dichloroethene (total)	50.	U
67-66-3	Chloroform	50.	U
107-06-2	1,2-Dichloroethane	50.	U
78-93-3	2-Butanone	~~[illegible]~~	~~[illegible]~~ R
71-55-6	1,1,1-Trichloroethane	15.	J
56-23-5	Carbon Tetrachloride	50.	U
108-05-4	Vinyl Acetate	[illegible]	U
75-27-4	Bromodichloromethane	50.	U
78-87-5	1,2-Dichloropropane	50.	U
10061-01-5	cis-1,3-Dichloropropene	50.	U
79-01-6	Trichloroethene	12.	J
124-48-1	Dibromochloromethane	50.	U
79-00-5	1,1,2-Trichloroethane	50.	U
71-43-2	Benzene	50.	U
10061-02-6	Trans-1,3-Dichloropropene	50.	U
75-25-2	Bromoform	50.	U
108-10-1	4-Methyl-2-Pentanone	100.	U
591-78-6	2-Hexanone	100.	U
127-18-4	Tetrachloroethene	1100.	
79-34-5	1,1,2,2-Tetrachloroethane	50.	U
108-88-3	Toluene	50.	U
108-90-7	Chlorobenzene	50.	U
100-41-4	Ethylbenzene	50.	U
100-42-5	Styrene	50.	U
1330-20-7	Xylene(total)	50.	U

TENTATIVELY IDENTIFIED COMPOUNDS

34-26

0000061

Lab Name: [illegible]

Lab Code: [illegible] Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: [illegible]

Sample wt/vol: 5. (g/mL) ML Lab File ID: [illegible]

Level: (low/med) LOW Date Received: [illegible]

% Moisture: not dec.100. Date Analyzed: [illegible]

Column: (pack/cap) PACK Dilution Factor: [illegible]

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
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TRILLIUM INC

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

TREATMENT SYSTEM SAMPLING

VOLATILES ANALYSES DATA

METHOD 524.2 ANALYSES

Samples Collected 5/25/91

Chemical Analyses Performed By

PACE, Incorporated

August 20, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

Data quality for the samples in this sample delivery group was good.

All samples except the field blank and the trip blank foamed during analyses.

Cooler temperatures upon receipt of samples by the laboratory were 4°C to 5°C.

Validation of organic data is conducted in conformance with Environmental Protection Agency (EPA) Functional Guidelines for Evaluating Organics Analyses, February 1, 1988, with modifications by EPA Region I, November 1, 1988.

Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified (valid) results mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Case Narrative

Five treatment system samples were collected and submitted to PACE, Inc. on May 25, 1991. The laboratory was requested to perform volatile organics analyses (VOA) using Method 524.2. The analyte list for this method was amended pursuant to the QA/QC Plan for this project.

The samples included in this Sample Delivery Group (SDG) are:

Client ID	Lab ID	Date of Collection
S1-28FB	3907	05/25/91
S5-23	3912	05/25/91
S6-28	3913	05/25/91
S6-28DUP	3914	05/25/91
S6-28TB	3915	05/25/91

Volatiles

The requirements to be checked in validation are listed below.

I. Holding Times

II. GC/MS Tuning

III. Calibration

A. Initial

B. Continuing

IV. Blanks

V. Surrogate Recovery

VI. Matrix Spike/Matrix Spike Duplicate

VII. Field Duplicates

VIII. Internal Standards Performance

IX. TCL Compound Identification

X. Compound Quantitation and Reported Detection Limits

XI. Tentatively Identified Compounds

XII. System Performance

XIII. Overall Assessment

I. Holding Times

All samples were received preserved and analyzed within the 14-day holding time for preserved samples.

II. GC/MS Tuning

GC/MS tuning and mass calibrations were within criteria.

III. Calibration

Areas were manually integrated for one or more compounds in each of the standards in this data package. No evaluation of these manual integrations can be performed, as no hard copy documentation was provided. Such documentation has been requested from the laboratory. The validation has been completed on the assumption that the manual integrations done and reported by the laboratory were valid and correct. No sample data appear to be affected.

A. Initial

Initial calibration criteria were met on 5/23/91.

B. Continuing

Continuing calibration criteria were met on 6/6/91. Continuing calibration criteria were met on 6/5/91 with the exception of the % difference for 1,1,2,2-tetrachloroethane (actual 30.58; criteria 25). Data were not affected.

IV. Blanks

The trip blank, field blank, and method blanks were clean.

V. Surrogate Recovery

Surrogate recoveries were within acceptance criteria.

VI. Matrix Spike/Matrix Spike Duplicate

A matrix spike (MS) and matrix spike duplicate (MSD) were performed on Sample S6-28. Recoveries for 1,1-dichloroethene were below QC criteria in the MS and MSD. Recoveries for benzene and toluene were below QC criteria in the MS. No positive sample results were affected.

VII. Field Duplicates

Samples S6-28 and S6-28DUP were submitted as duplicate samples. No compounds were detected in either sample.

VIII. Internal Standards Performance

Internal standards areas and retention times were acceptable.

IX. TCL Compound Identification

TCL compound identifications were acceptable.

X. Compound Quantitation and Reported Detection Limits

The laboratory performed a practical quantitation limit (PQL) study for the Method 524.2 analyses for this project on October 15, 1990. Method detection limits (MDLs) determined through that PQL study should have been used for reporting purposes for these treatment system samples. MDLs determined through the PQL study were as follows:

Compound	MDL (ug/L)
Vinyl Chloride	0.48
Chloroethane	0.49
Methylene Chloride	4.41
1,1-Dichloroethene	0.67
1,1-Dichloroethane	0.54
trans-1,2-Dichloroethene	0.50
Chloroform	0.53
1,2-Dichloroethane	0.52
1,1,1-Trichloroethane	0.44
Carbon Tetrachloride	0.43
Bromodichloromethane	0.38
1,2-Dichloropropane	0.45
cis-1,3-Dichloropropene	0.33
Trichloroethene	0.42
Dibromochloromethane	0.33
1,1,2-Trichloroethane	0.43
Benzene	0.58
trans-1,3-Dichloropropene	0.07
Bromoform	0.49
Tetrachloroethene	0.51
1,1,2,2-Tetrachloroethane	0.44
Toluene	0.45
Chlorobenzene	0.44

Compound	MDL (ug/L)
Ethylbenzene	0.51
m-Xylene	0.48
o-, p-Xylene	0.93
1,2-Dichloroethane-d4	0.50
Toluene-d8	0.45
Bromofluorobenzene	0.36

Methylene chloride was reported in Samples S5-23, S6-28, and S6-28DUP at concentrations below the MDL determined by the PQL study for this project. The methylene chloride concentrations in these samples were corrected to be "ND."

The result reported for 1,1,1-trichloroethane in Sample S5-23 (29 ug/L) was beyond the calibration range of the instrument (25 ug/L). This result met precision and accuracy criteria.

All other results and detection limits were acceptable with regard to the supporting data.

XI. Tentatively Identified Compounds

No TICs were reported for this sample delivery group.

XII. System Performance

System performance was acceptable.

XIII. Overall Assessment of Data for a Case

Methylene chloride was corrected to be "ND" in Samples S5-23, S6-28, and S6-28DUP.

All other results were acceptable as reported.

UNIFIRS/ENSR PACE Project Number: 810525501

PACE Sample Number:			95 0039075
Date Collected:			05/25/91
Date Received:			05/25/91
Parameter	Units	MDL	S1-28 FB
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRS/ENSR PACE Project Number: 810525501

PACE Sample Number:			95 0039121
Date Collected:			05/25/91
Date Received:			05/25/91
Parameter	Units	MDL	S5-23
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~2.6~~ ND EEA 7/7/91
1,1-Dichloroethene	ug/L	0.5	1.7
1,1-Dichloroethane	ug/L	0.5	2.0
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	29
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRS/ENSR PACE Project Number: 810525501

PACE Sample Number:			95 0039130
Date Collected:			05/25/91
Date Received:			05/25/91
Parameter	Units	MDL	S6-28
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~3.0~~ ND ELA 7/7/91
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRS/ENSR PACE Project Number: 810525501

PACE Sample Number:			95 0039148
Date Collected:			05/25/91
Date Received:			05/25/91
Parameter	Units	MDL	S6-28 Dup
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.3~~ ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRS/ENSR PACE Project Number: 810525501

PACE Sample Number:			95 0039156
Date Collected:			05/25/91
Date Received:			05/25/91
Parameter	Units	MDL	S6-28 TB
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0 5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

AREAL SAMPLING

INORGANIC ANALYSIS DATA

Samples Collected 2/25/91 and 2/26/91

Chemical Analyses Performed By

PACE, Incorporated

August 20, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

Metals analytical data presented for this sample delivery group were fair. Much of the data in this package were qualified as estimated. In addition, several positive sample results were rejected due to field blank contamination. All unqualified positive sample data may be used without reservation.

A general review of total metals results compared to the dissolved metals results indicates that a major amount of oxidation could be occurring during the sample filtering portion of the work. In many cases, iron and manganese values found in the total metals analysis of a groundwater approach the 100 mg/L level. The corresponding iron and manganese values for the filtered (dissolved) sample are not detected or in the low ug/L range. Either the groundwater being sampled is extremely turbid (particulates), or the iron and manganese react with air (O_2) to become insoluble oxides and are filtered out of the sample. The chain of custody documents do not indicate turbid samples; therefore, it is reasonable to conclude that the dissolved results for metals are questionable due to sample handling in the field.

Validation of inorganic laboratory data is conducted in conformance with Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses (2/89) and the associated checklist. These guidelines and checklist are intended to evaluate data on a technical basis rather than a contract compliance basis for chemical analyses conducted under the USEPA's Contract Laboratory Program (CLP) and assumes that the data package is presented in accordance with the CLP requirements. In addition, the data package is assumed to represent the best efforts of the laboratory and has already been subjected to adequate and sufficient quality review prior to submission for validation.

Results of analyses are reported by the laboratory as either qualified or unqualified. Unqualified results mean that the reported values may be used without reservations. Qualified results indicate a nonroutine (with respect to CLP procedures) situation occurred during the course of analysis. Various qualifier codes associated with the numerical results are used by the laboratory to denote specific information regarding the analytical results. During the process of validation, laboratory qualified and unqualified data are verified against supporting documentation. Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified

results still mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: Analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Inorganic Data Validation

for

Environmental Project Control, Inc.

Samples Collected 2/25/91 and 2/26/91

Case Narrative

This group contained eleven water samples including one field blank. All of the samples were analyzed for total and dissolved metals and cyanide. All of the samples were also analyzed for total alkalinity, chloride, soluble fluoride, nitrite/nitrate, total phosphorus, dissolved silica, total dissolved solids, sulfate, and total organic carbon.

Samples validated in this report are noted below:

Client ID	Lab ID		Date of Collection
	Metals	Wet Chemistry	
AS64D	1444	1455	2/25/91
AS21	1445	1456	2/25/91
AUC73	1446	1457	2/25/91
ARS65D	1447	1458	2/25/91
FBAS64D	1448	1459	2/25/91
FDAUC232	1449	1460	2/26/91
MSAUC232	1450	1461	2/26/91
AS63S	1451	1462	2/26/91
AS63D	1452	1463	2/26/91
AUC232	1453	1464	2/26/91
AUC235	1454	1465	2/26/91

Laboratory identification numbers did not distinguish between the total and dissolved results on the Form I's. Dissolved results were indicated on the Form I's with a note under "Comments."

The areas reviewed during validation are listed below.

TRILLIUM INC

CLP Inorganics Data Validation

I. Holding Times

II. Calibration

III. Blanks

IV. ICP Interference Check Sample

V. Matrix Spike Sample Analysis

VI. Duplicate Sample Analysis

VII. Laboratory Control Sample Analysis

VIII. Furnace Atomic Absorption Analysis

IX. ICP Serial Dilution Analysis

X. Detection Limits

XI. Sample Result Verification

XII. Other QC

XIII. Overall Assessment

Wet Chemistry Data Validation

I. Holding Times

II. Calibration

III. Blanks

IV. Matrix Spike Sample Analysis

V. Duplicate Sample Analysis

VI. Sample Result Verification

VII. Other QC

VIII. Overall Assessment

TRILLIUM INC

Data Validation

I. Holding Times

All metals analyses were conducted within acceptable holding times.

All wet chemistry analyses were conducted within acceptable holding times.

II. Calibration

Calibrations for metals were satisfactory.

One of the standards analyzed to establish the calibration curve for AA must be at the CRDL. The CRDL for selenium is 60 ppb, and the highest standard analyzed was 45 ppb. Since selenium was not detected above 10 ppb in any sample, data quality was not affected.

A standard at twice the CRDL was analyzed for ICP analytes. Several analytes had high percent recoveries. Results less than three times the CRDL were qualified as follows:

Metal	Sample No.	Qualified Result
Be	AS21	14.0 J
	ARS65D	3.0 J
	AS63S	10.0 J
	AS63D	14.0 J
Co	AS21	37.0 J
	ARS65D	8.0 J
	AS63S	65.0 J
	AS63D	41.0 J
Mn	AS64D	17.0 J
	AS64D(DIS)	6.0 J
	AS21(DIS)	5.0 J
	AUC73(DIS)	40.0 J
	ARS65D(DIS)	6.0 J
	FBAS64D	6.0 J
	AS63S(DIS)	3.0 J
	AS63D(DIS)	42.0 J
Ni	AS21	78.0 J
	ARS65D	19.0 J
	AS63S	72.0 J
	AS63D	43.0 J

Metal	Sample No.	Qualified Result
V	AS21	108 J
	ARS65D	22.0 J
	AS63S	120 J
	AS63D	81.0 J
Zn	AS63S(DIS)	43.0 J
	AS63D(DIS)	40.0 J
	AUC232	53.0 J
	AUC232(DIS)	53.0 J
	AUC235(DIS)	53.0 J
	AS64D	30.0 J
	AS64D(DIS)	28.0 J
	AS21(DIS)	38.0 J
	AUC73	26.0 J
	AUC73(DIS)	35.0 J
	ARS65D(DIS)	30.0 J
	FBAS64D	32.0 J
	FBAS64D(DIS)	29.0 J

The correlation coefficient for the calibration curve for sulfate was 0.9906. All positive sulfate results were qualified as estimated.

III. Blanks

No preparation or calibration blanks were above the CRDLs or less than the negative CRDLs. The field blanks contained iron and zinc above their CRDLs.

The preparation blanks contained copper (9.0 ppb), iron (31.0 ppb), silver (8.0 ppb), and zinc (8.0 ppb) above their respective IDLs and zinc (-13.0 ppb) below its negative IDL.

Continuing Calibration blanks for copper (7.0 ppb), iron (94.0 ppb) and zinc (5.0 ppb) were greater than the IDLs. Continuing calibration blanks for antimony (-2.8 ppb) and selenium (-3.0 ppb) were less than the negative IDLs.

The field blank for total metals contained antimony (0.5 ppb), calcium (1050 ppb), iron (271 ppb), lead (0.6 ppb), manganese (6.0 ppb), and zinc (32.0 ppb). The field blank for dissolved metals contained iron (85.0 ppb) and zinc (29.0 ppb).

Values at or below the action level (five times the highest blank value) were qualified with a "U" at the reported value, as listed below:

Metal	Sample	Qualified Result
Sb	ARS65D	0.60 U
	AS63S	1.3 U
	AUC232	1.2 U
Cu	AS64D	11.0 U
	ARS65D	26.0 U
	AS63D(DIS)	8.0 U
Cu	AUC232(DIS)	9.0 U
	AUC235	8.0 U
Fe	AS64D	773 U
	AS64D(DIS)	101 U
	AS21(DIS)	59.0 U
	AUC73	500 U
	AUC73(DIS)	91.0 U
	ARS65D(DIS)	109 U
	AUC232(DIS)	126 U
	AUC235(DIS)	100 U
Pb	AUC232	0.80 U
Mn	AS64D	17.0 U
Ag	AS64D	8.0 U
	ARS65D	11.0 U
Zn	AS64D	30.0 U
	AS64D(DIS)	28.0 U
	AS21(DIS)	38.0 U
	AUC73	26.0 U
	AUC73(DIS)	35.0 U
	ARS65D	95.0 U
	ARS65D(DIS)	30.0 U
	AS63S(DIS)	43.0 U
	AS63D(DIS)	40.0 U
	AUC232	53.0 U
	AUC232(DIS)	53.0 U
	AUC235	22.0 U
	AUC235(DIS)	53.0 U

Because of the negative blank values reported for antimony and selenium, detection limits were raised for these analytes. Positive data were qualified as follows:

Metal	Sample	Qualified Result
Sb	AUC235(DIS)	3.5 U

The method blank results for total organic carbon were slightly above the method detection limit. Data quality was not affected.

Alkalinity and total organic carbon results were reported for the field blank for wet chemistry analyses. Values at or below the action level (five times the highest blank value) were qualified as less than the reported value, as listed below:

Parameter	Sample	Qualified Result
Alkalinity	FBAS64D	2 U
Total Organic Carbon	AS64D	0.92 U
	AS21	2.14 U
	AUC73	1.05 U
	ARS64D	1.64 U
	FBAS64D	0.67 U
	AS63S	1.88 U
	AS63D	1.24 U
	AUC235	3.21 U

IV. ICP Interference Check Sample

Interference check sample results were satisfactory.

V. Matrix Spike Sample Analysis

Matrix spike analyses for dissolved metals were satisfactory except for arsenic which had a recovery of 41.2% and thallium which had a recovery of 67.6%. Positive results and detection limits for dissolved arsenic data were qualified as estimated (J). Thallium was not detected in any sample; therefore, the detection limit for dissolved thallium is qualified as estimated (UJ).

Matrix spike analyses for total metals were satisfactory except for aluminum, arsenic, iron, lead, selenium, thallium, and zinc. Data for total metals were qualified as follows:

Metal	Sample	Qualified Result
Al	AS64D	428 J
	AS21	50100 J
	AUC73	267 J
	ARS65D	8130 J
	AS63S	51600 J
	AS63D	50800 J
	AUC232	699 J

Metal	Sample	Qualified Result
As	AS21	12.0 J
	AUC73	1.5 J
	ARS65D	1.4 J
	AS63S	9.6 J
	AS63D	3.9 J
Fe	AS64D	773 J
	AS21	85800 J
	AUC73	500 J
	ARS65D	22900 J
	AS63S	63400 J
	AS63D	84100 J
	AUC232	2040 J
	AUC235	1440 J
Pb	AS21	83.0 J
	ARS65D	12.6 J
	FBAS64D	0.6 J
	AS63S	62.0 J
	AS63D	32.7 J
	AUC232	0.8 J
Se	AUC232	7.1 J
Zn	AS21	339 J
	ARS65D	95.0 J
	AS63S	203 J
	AS63D	298 J

Detection limits for selenium were rejected in samples analyzed for total metals. Non-detects for the metals listed above and thallium were estimated.

VI. Duplicate Sample Analysis

Duplicate analyses for dissolved metals were satisfactory. Duplicate analyses for total metals were satisfactory except for iron, manganese, zinc, and cyanide. Positive total metals results for the above elements were qualified as estimated.

Duplicate analyses for wet chemistry paramters were satisfactory except for chloride, nitrite/nitrate, sulfate and total organic carbon. Positive results for the above analytes were qualified as estimated.

VII. Laboratory Control Sample Analyses

Laboratory control sample results were satisfactory.

VIII. Furnace Atomic Absorption Analysis

Duplicate injections were performed for all samples and agreed within ±20%.

The method of standard additions was conducted for the following samples:

Metal	Sample
As	AS21
Pb	ARS65D
	AS63S
	AS63D
Se	AUC232
	AUC232(DIS)

Results were satisfactory.

IX. ICP Serial Dilution Analysis

Serial dilutions were conducted on Samples AUC232 and AUC232(DIS). Results for iron in Sample AUC232 were above 10%, and positive total iron results were qualified as estimated (J). Results for calcium and magnesium in Sample AUC232(DIS) were above 10%, and positive dissolved calcium and dissolved magnesium results were qualified as estimated (J).

X. Detection Limits

Instrument detection limits (IDLs) should be less than the contract required detection limits (CRDLs). The IDL reported for mercury is equal to its CRDL. Mercury was not detected in any of the samples, so no data were qualified.

XI. Sample Result Verification

Form I's have been modified to reflect the following corrections:

Sample ID	Element	Reported Result	Correct Result
AS63D	Pb	32.7	32.8
AUC232(DIS)	Se		11.8 S*

*S is a qualifier used by the laboratory to indicate that the method of standard additions was used.

Note that Form I's are not provided for FDAUC232 and MSAUC232, as these are QC samples. Results of these analyses are discussed in Sections VI and V, respectively, of this report.

XII. Other QC

Samples were analyzed for total and dissolved metals. In some instances, the dissolved result was higher than the total result by more than experimental error. These data were qualified for both total and dissolved metals as indicated below:

Sample	Analyte	Total	Dissolved	Action
AS64D	Na	26800	32400	J

XIII. Overall Assessment

Where "EPA Sample No." is requested on Forms 1, 5, 6 and 9, the client-specified sample identification should be entered rather than the laboratory sample identification. This makes it easier to correlate the data with the chain of custody forms.

A standard at twice the CRDL was analyzed for ICP analytes. Several analytes had high percent recoveries. Results less than three times the CRDL for beryllium, cobalt, manganese, nickel, vanadium, and zinc were qualified as estimated.

The correlation coefficient for the calibration curve for sulfate was 0.9906. All positive sulfate results were qualified as estimated.

The preparation blanks contained copper (9.0 ppb), iron (31.0 ppb), silver (8.0 ppb), and zinc (8.0 ppb) above their respective IDLs and zinc (-13.0 ppb) below its negative IDL.

Continuing calibration blanks for copper (7.0 ppb), iron (94.0 ppb) and zinc (5.0 ppb) were greater than the IDLs. Continuing calibration blanks for antimony (-2.8 ppb) and selenium (-3.0 ppb) were less than the negative IDLs.

The field blank for total metals contained antimony (0.5 ppb), calcium (1050 ppb), iron (271 ppb), lead (0.6 ppb), manganese (6.0 ppb), and zinc (32.0 ppb). The field blank for dissolved metals contained iron (85.0 ppb) and zinc (29.0 ppb).

Values at or below the action level (five times the highest blank value) were qualified as less than the reported value.

Because of the negative blank values reported for antimony and selenium, detection limits were raised for these analytes.

Alkalinity and total organic carbon results were reported for the field blank for wet chemistry analyses. Values at or below the action level (five times the highest blank value) were qualified with a "U" at the reported value.

Matrix spike analyses for dissolved metals were satisfactory except for arsenic which had a recovery of 41.2% and thallium which had a recovery of 67.6%. Positive results for dissolved arsenic data were qualified as estimated (J). Thallium was not detected in any sample; therefore, the detection limit for dissolved thallium is qualified as estimated (UJ).

Matrix spike analyses for total metals were satisfactory except for aluminum, arsenic, iron, lead, selenium, thallium, and zinc. Positive results for total metals for aluminum, arsenic, iron, lead, selenium, thallium, and zinc were qualified as estimated.

Duplicate analyses for total metals were satisfactory except for iron, manganese, zinc, and cyanide. Positive total metals results for the above elements were qualified as estimated.

Serial dilutions were conducted on Samples AUC232 and AUC232(DIS). Results for iron in Sample AUC232 were above 10%, and positive total iron results were qualified as estimated (J). Results for calcium and magnesium in Sample AUC232(DIS) were above 10%, and positive dissolved calcium and dissolved magnesium results were qualified as estimated (J).

Form I's have been modified to reflect the following corrections:

Sample ID	Element	Reported Result	Correct Result
AS63S	Se	2.0 U	0.5 U
AS63D	Pb	32.7	32.8
	Se	2.0 U	0.5 U
AUC232(DIS)	Se		11.8 S

Samples were analyzed for total and dissolved metals. In some instances, the dissolved result was higher than the total result by more than experimental error. These data were qualified for both total and dissolved metals as indicated below:

Sample	Analyte	Total	Dissolved	Action
AS64D	Na	26800	32400	J

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.
AS64D

1444

ab Name: PACE_INCORPORATED_____ Contract: EPC_____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No 00036

atrix (soil/water): WATER Lab Sample ID: 1444_____

evel (low/med): LOW__ Date Received: 02/27/91

% Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	428		J N	P
7440-36-0	Antimony	0.50	U		F
7440-38-2	Arsenic	1.0	U	J N	F
7440-39-3	Barium	31.3	U		P
7440-41-7	Beryllium	1.4	U	J	P
7440-43-9	Cadmium	3.3	U		P
7440-70-2	Calcium	75600			P
7440-47-3	Chromium	9.4	U		P
7440-48-4	Cobalt	7.9	U	J	P
7440-50-8	Copper	11.0	B	U	P
7439-89-6	Iron	773		EN* U	P
7439-92-1	Lead	0.60	U	J N	F
7439-95-4	Magnesium	9010			P
7439-96-5	Manganese	17.0		U *	P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	10.6	U	J	P
7440-09-7	Potassium	2290	B		P
7782-49-2	Selenium	~~0.50~~	~~U~~	N R	F
7440-22-4	Silver	8.0	B	U	P
7440-23-5	Sodium	26800		J *	P
7440-28-0	Thallium	0.60	U	J WN	F
7440-62-2	Vanadium	7.7	U	J	P
7440-66-6	Zinc	30.0		U N*	P
	Cyanide	10	U	*	AS

olor Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

lor After: COLORLESS Clarity After: CLEAR_ Artifacts: ___

omments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.
A564D (D15)

1444

ab Name: PACE_INCORPORATED_____ Contract: EPC_____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No 00027

atrix (soil/water): WATER Lab Sample ID: 1444_____

evel (low/med): LOW__ Date Received: 02/27/91

% Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	95.6_	U		P_
7440-36-0	Antimony_	0.50_	U		F_
7440-38-2	Arsenic__	1.0_	U	J N	F_
7440-39-3	Barium___	31.3_	U		P_
7440-41-7	Beryllium	1.4_	U	J	P_
7440-43-9	Cadmium__	3.3_	U		P_
7440-70-2	Calcium__	78400_		J E	P_
7440-47-3	Chromium_	9.4_	U		P_
7440-48-4	Cobalt___	7.9_	U	J	P_
7440-50-8	Copper___	5.8_	U		P_
7439-89-6	Iron_____	101_		UL	P_
7439-92-1	Lead____	0.60_	U		F_
7439-95-4	Magnesium	9350_		J E	P_
7439-96-5	Manganese	6.0_	B	J	P_
7439-97-6	Mercury__	0.20_	U		CV
7440-02-0	Nickel___	10.6_	U	J	P_
7440-09-7	Potassium	2450_	B		P_
7782-49-2	Selenium_	0.50_	U		F_
7440-22-4	Silver___	6.8_	U		P_
7440-23-5	Sodium___	32400_		J E*	P_
7440-28-0	Thallium_	0.60_	U	J N	F_
7440-62-2	Vanadium_	7.7_	U	J	P_
7440-66-6	Zinc_____	28.0_		UL	P_
_____	Cyanide__	_____			NR
_____	_____	_____			

olor Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

lor After: COLORLESS Clarity After: CLEAR_ Artifacts: ___

omments:
THIS_SAMPLE_WAS_ANALYZED_AS_A_DISSOLVED_METAL._____

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO. A521

1445

00028

ıb Name: PACE_INCORPORATED_____ Contract: EPC_____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: 006___

ıatrix (soil/water): WATER Lab Sample ID: 1445_____

ɜvel (low/med): LOW__ Date Received: 02/27/91

% Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	50100_	_	J N	P_
7440-36-0	Antimony_	0.50_	U		F_
7440-38-2	Arsenic__	12.0_	_	J SN	F_
7440-39-3	Barium___	209_	_		P_
7440-41-7	Beryllium	14.0_	_	J	P_
7440-43-9	Cadmium__	4.0_	B		P_
7440-70-2	Calcium__	51900_	_		P_
7440-47-3	Chromium_	93.0_	_		P_
7440-48-4	Cobalt___	37.0_	B	J	P_
7440-50-8	Copper___	95.0_	_		P_
7439-89-6	Iron____	85800_	_	J EN*	P_
7439-92-1	Lead____	83.0_	_	J N	F_
7439-95-4	Magnesium	18600_	_		P_
7439-96-5	Manganese	2640_	_	J *	P_
7439-97-6	Mercury__	0.20_	U		CV
7440-02-0	Nickel___	78.0_	_	J	P_
7440-09-7	Potassium	11600_	_		P_
7782-49-2	Selenium_	0.50_	U	N R	F_
7440-22-4	Silver___	6.8_	U		P_
7440-23-5	Sodium___	76700_	_	*	P_
7440-28-0	Thallium_	0.60_	U	J WN	F_
7440-62-2	Vanadium_	108_	_	J	P_
7440-66-6	Zinc____	339_	_	J N*	P_
_____	Cyanide__	10_	U	*	AS

ɔolor Before: TAN_____ Clarity Before: CLOUDY Texture: _____

ɔ lor After: LT_YELLOW Clarity After: CLEAR_ Artifacts: ___

ɔ mments:

PB_WAS_ANALYZED_AT_A_1/10_DILUTION.

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

A521(DIS)

1445

00029

ab Name: PACE_INCORPORATED_____ Contract: EPC_____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: 006___

atrix (soil/water): WATER Lab Sample ID: 1445_____

evel (low/med): LOW__ Date Received: 02/27/91

% Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	95.6_	U		P_
7440-36-0	Antimony_	0.50_	U		F_
7440-38-2	Arsenic__	1.0_	U	J WN	F_
7440-39-3	Barium___	31.3_	U		P_
7440-41-7	Beryllium	1.4_	U	J	P_
7440-43-9	Cadmium__	3.3_	U		P_
7440-70-2	Calcium__	34500_		J E	P_
7440-47-3	Chromium_	9.4_	U		P_
7440-48-4	Cobalt___	7.9_	U	J	P_
7440-50-8	Copper___	5.8_	U		P_
7439-89-6	Iron____	59.0_	B	u	P_
7439-92-1	Lead____	0.60_	U		F_
7439-95-4	Magnesium	6060_		J E	P_
7439-96-5	Manganese	5.0_	B	J	P_
7439-97-6	Mercury__	0.20_	U		CV
7440-02-0	Nickel___	10.6_	U	J	P_
7440-09-7	Potassium	3570_	B		P_
7782-49-2	Selenium_	0.50_	U		F_
7440-22-4	Silver___	6.8_	U		P_
7440-23-5	Sodium___	74300_		E*	P_
7440-28-0	Thallium_	0.60_	U	J N	F_
7440-62-2	Vanadium_	7.7_	U	J	P_
7440-66-6	Zinc____	38.0_		u	P_
_____	Cyanide__	_____			NR
_____	_____	_____			

olor Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

lor After: COLORLESS Clarity After: CLEAR_ Artifacts: ___

omments:

THIS_SAMPLE_WAS_ANALYZED_AS_A_DISSOLVED_METAL.

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.
AUC73

1446

00030

Lab Name: PACE_INCORPORATED_____ Contract: EPC_____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: 006___

Matrix (soil/water): WATER Lab Sample ID: 1446_____

Level (low/med): LOW__ Date Received: 02/27/91

% Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	267_	_	J ~~N~~	P_
7440-36-0	Antimony_	0.50_	U		F_
7440-38-2	Arsenic__	1.5_	~~B~~	J ~~N~~	F_
7440-39-3	Barium___	31.3_	U		P_
7440-41-7	Beryllium	1.4_	U	J	P_
7440-43-9	Cadmium__	3.3_	U		P_
7440-70-2	Calcium__	106000_	_		P_
7440-47-3	Chromium_	9.4_	U		P_
7440-48-4	Cobalt___	7.9_	U	J	P_
7440-50-8	Copper___	5.8_	U		P_
7439-89-6	Iron_____	500_	_	~~EN*~~ U	P_
7439-92-1	Lead_____	0.60_	U	J ~~N~~	F_
7439-95-4	Magnesium	8950_	_		P_
7439-96-5	Manganese	51.0_	_	J ~~*~~	P_
7439-97-6	Mercury__	0.20_	U		CV
7440-02-0	Nickel___	10.6_	U	J	P_
7440-09-7	Potassium	1120_	U		P_
7782-49-2	Selenium_	~~0.50~~_	~~U~~	~~N~~ R	F_
7440-22-4	Silver___	6.8_	U		P_
7440-23-5	Sodium___	18200_	_	~~*~~	P_
7440-28-0	Thallium_	0.60_	U	J ~~WN~~	F_
7440-62-2	Vanadium_	7.7_	U	J	P_
7440-66-6	Zinc_____	26.0_	_	U ~~N*~~	P_
_____	Cyanide__	10_	U	~~*~~	AS
_____	_____	_____	_	_____	__

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: ___

Comments:

FORM I - IN 7/87

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.
AU073(DIS)

1446

00031

ab Name: PACE_INCORPORATED_____ Contract: EPC_____

ab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: 006___

matrix (soil/water): WATER Lab Sample ID: 1446_____

evel (low/med): LOW__ Date Received: 02/27/91

% Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	95.6_	U		P_
7440-36-0	Antimony_	0.50_	U		F_
7440-38-2	Arsenic__	1.1_	~~B~~	J WN	F_
7440-39-3	Barium___	31.3_	U		P_
7440-41-7	Beryllium	1.4_	U	J	P_
7440-43-9	Cadmium__	3.3_	U		P_
7440-70-2	Calcium__	100000_		J ~~E~~	P_
7440-47-3	Chromium_	9.4_	U		P_
7440-48-4	Cobalt___	7.9_	U	J	P_
7440-50-8	Copper___	5.8_	U		P_
7439-89-6	Iron_____	91.0_	~~B~~	U	P_
7439-92-1	Lead_____	2.2_	~~B~~		F_
7439-95-4	Magnesium	8680_		J ~~E~~	P_
7439-96-5	Manganese	40.0_		J	P_
7439-97-6	Mercury__	0.20_	U		CV
7440-02-0	Nickel___	10.6_	U	J	P_
7440-09-7	Potassium	1120_	U		P_
7782-49-2	Selenium_	0.50_	U		F_
7440-22-4	Silver___	6.8_	U		P_
7440-23-5	Sodium___	17100_		~~E*~~	P_
7440-28-0	Thallium_	0.60_	U	J WN	F_
7440-62-2	Vanadium_	7.7_	U	J	P_
7440-66-6	Zinc_____	35.0_		U	P_
_____	Cyanide__	_____			NR
_____	_____	_____			

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

olor After: COLORLESS Clarity After: CLEAR_ Artifacts: ___

omments:
THIS_SAMPLE_WAS_ANALYZED_AS_A_DISSOLVED_METAL.

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.
ARS65D

1447

00032

ab Name: PACE_INCORPORATED_____ Contract: EPC_____

ab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: 006___

Matrix (soil/water): WATER Lab Sample ID: 1447_____

evel (low/med): LOW__ Date Received: 02/27/91

% Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	8130		J ~~N~~	P
7440-36-0	Antimony	0.60	~~B~~	U	F
7440-38-2	Arsenic	1.4	~~B~~	J ~~N~~	F
7440-39-3	Barium	36.0	~~B~~		P
7440-41-7	Beryllium	3.0	~~B~~	J	P
7440-43-9	Cadmium	3.3	U		P
7440-70-2	Calcium	83000			P
7440-47-3	Chromium	31.0			P
7440-48-4	Cobalt	8.0	~~B~~	J	P
7440-50-8	Copper	26.0		U	P
7439-89-6	Iron	22900		~~EN*~~ J	P
7439-92-1	Lead	12.6		J ~~SN~~	F
7439-95-4	Magnesium	11200			P
7439-96-5	Manganese	371		J ~~*~~	P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	19.0	~~B~~	J	P
7440-09-7	Potassium	16200			P
7782-49-2	Selenium	~~0.50~~	~~U~~	~~WN~~ R	F
7440-22-4	Silver	11.0		U	P
7440-23-5	Sodium	33200		~~*~~	P
7440-28-0	Thallium	0.60	U	J ~~WN~~	F
7440-62-2	Vanadium	22.0	~~B~~	J	P
7440-66-6	Zinc	95.0		U ~~N*~~	P
	Cyanide	10	U	~~*~~	AS

Color Before: WHITE____ Clarity Before: CLOUDY Texture: _____

olor After: LT_YELLOW Clarity After: CLEAR_ Artifacts: ___

omments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.
AR565D (D15)

1447

ıb Name: PACE_INCORPORATED_____ Contract: EPC_____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: 00033 006

ı.ıtrix (soil/water): WATER Lab Sample ID: 1447_____

ɜvel (low/med): LOW__ Date Received: 02/27/91

% Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	95.6_	U		P_
7440-36-0	Antimony_	0.50_	U		F_
7440-38-2	Arsenic__	1.9_	~~B~~	J ~~WN~~	F_
7440-39-3	Barium___	31.3_	U		P_
7440-41-7	Beryllium	1.4_	U	J	P_
7440-43-9	Cadmium__	3.3_	U		P_
7440-70-2	Calcium__	69500_		J ~~E~~	P_
7440-47-3	Chromium_	9.4_	U		P_
7440-48-4	Cobalt___	7.9_	U	J	P_
7440-50-8	Copper___	5.8_	U		P_
7439-89-6	Iron____	109_		U	P_
7439-92-1	Lead____	0.60_	U		F_
7439-95-4	Magnesium	8550_		J ~~E~~	P_
7439-96-5	Manganese	6.0_	~~B~~	J	P_
7439-97-6	Mercury__	0.20_	U		CV
7440-02-0	Nickel___	10.6_	U	J	P_
7440-09-7	Potassium	8780_			P_
7782-49-2	Selenium_	0.50_	U		F_
7440-22-4	Silver___	6.8_	U		P_
7440-23-5	Sodium___	29900_		~~E*~~	P_
7440-28-0	Thallium_	0.60_	U	J ~~N~~	F_
7440-62-2	Vanadium_	7.7_	U	J	P_
7440-66-6	Zinc____	30.0_		U	P_
_____	Cyanide__				NR

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

(ɔlor After: COLORLESS Clarity After: CLEAR_ Artifacts: ___

Comments:
THIS_SAMPLE_WAS_ANALYZED_AS_A_DISSOLVED_METAL._____

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.
FBAS04D

1448

00034

Lab Name: PACE_INCORPORATED_____ Contract: EPC_____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: 006___

Matrix (soil/water): WATER Lab Sample ID: 1448_____

Level (low/med): LOW__ Date Received: 02/27/91

% Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	95.6_	U	J ~~N~~	P_
7440-36-0	Antimony_	0.50_	~~B~~		F_
7440-38-2	Arsenic__	1.0_	U	J ~~N~~	F_
7440-39-3	Barium___	31.3_	U		P_
7440-41-7	Beryllium	1.4_	U	J	P_
7440-43-9	Cadmium__	3.3_	U		P_
7440-70-2	Calcium__	1050_	~~B~~		P_
7440-47-3	Chromium_	9.4_	U		P_
7440-48-4	Cobalt___	7.9_	U	J	P_
7440-50-8	Copper___	5.8_	U		P_
7439-89-6	Iron_____	271_		~~EN*~~ J	P_
7439-92-1	Lead_____	0.60_	~~B~~	~~N~~	F_
7439-95-4	Magnesium	204_	U		P_
7439-96-5	Manganese	6.0_	~~B~~	~~*~~	P_
7439-97-6	Mercury__	0.20_	U		CV
7440-02-0	Nickel___	10.6_	U	J	P_
7440-09-7	Potassium	1120_	U		P_
7782-49-2	Selenium_	~~0.50~~_	~~U~~	~~N~~ R	F_
7440-22-4	Silver___	6.8_	U		P_
7440-23-5	Sodium___	780_	U	~~*~~	P_
7440-28-0	Thallium_	0.60_	U	J ~~N~~	F_
7440-62-2	Vanadium_	7.7_	U	J	P_
7440-66-6	Zinc_____	32.0_		~~N*~~	P_
_____	Cyanide__	10_	U	~~*~~	AS

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: ___

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.
FBA34D(DIS)
1448

b Name: PACE_INCORPORATED_____ Contract: EPC_____

b Code: _____ Case No.: _____ SAS No.: _____ SDG No.: 006___
00035

atrix (soil/water): WATER Lab Sample ID: 1448_____

vel (low/med): LOW__ Date Received: 02/27/91

Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	95.6_	U		P_
7440-36-0	Antimony_	0.50_	U		F_
7440-38-2	Arsenic__	1.0_	U	J N	F_
7440-39-3	Barium___	31.3_	U		P_
7440-41-7	Beryllium	1.4_	U	J	P_
7440-43-9	Cadmium__	3.3_	U		P_
7440-70-2	Calcium__	565_	U	E	P_
7440-47-3	Chromium_	9.4_	U		P_
7440-48-4	Cobalt___	7.9_	U		P_
7440-50-8	Copper___	5.8_	U		P_
7439-89-6	Iron____	85.0_	B		P_
7439-92-1	Lead____	0.60_	U		F_
7439-95-4	Magnesium	204_	U	E	P_
7439-96-5	Manganese	3.0_	U	J	P_
7439-97-6	Mercury__	0.20_	U		CV
7440-02-0	Nickel___	10.6_	U	J	P_
7440-09-7	Potassium	1120_	U		P_
7782-49-2	Selenium_	0.50_	U		F_
7440-22-4	Silver___	6.8_	U		P_
7440-23-5	Sodium___	780_	U	E*	P_
7440-28-0	Thallium_	0.60_	U	J N	F_
7440-62-2	Vanadium_	7.7_	U	J	P_
7440-66-6	Zinc____	29.0_	_		P_
_____	Cyanide__	_____	_		NR
_____	_____	_____	_		_

olor Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

olor After: COLORLESS Clarity After: CLEAR_ Artifacts: ___

nments:
THIS_SAMPLE_WAS_ANALYZED_AS_A_DISSOLVED_METAL._____

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.
A5635

1451

ab Name: PACE_INCORPORATED_____ Contract: EPC_____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: 00036 006___

atrix (soil/water): WATER Lab Sample ID: 1451_____

evel (low/med): LOW__ Date Received: 02/27/91

% Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	51600		J N	P
7440-36-0	Antimony	1.3	B	UL W	F
7440-38-2	Arsenic	9.6	B	J N	F
7440-39-3	Barium	281			P
7440-41-7	Beryllium	10		J	P
7440-43-9	Cadmium	3.3	U		P
7440-70-2	Calcium	59400			P
7440-47-3	Chromium	100			P
7440-48-4	Cobalt	65.0		J	P
7440-50-8	Copper	131			P
7439-89-6	Iron	63400		J EN*	P
7439-92-1	Lead	62.0		J SN	F
7439-95-4	Magnesium	24000			P
7439-96-5	Manganese	1800		J *	P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	72.0		J	P
7440-09-7	Potassium	13300			P
7782-49-2	Selenium	2.0	U	N R	F
7440-22-4	Silver	6.8	U		P
7440-23-5	Sodium	57700		*	P
7440-28-0	Thallium	0.60	U	J WN	F
7440-62-2	Vanadium	120		J	P
7440-66-6	Zinc	203		J N*	P
	Cyanide	10	U	*	AS

olor Before: TAN_____ Clarity Before: CLOUDY Texture: _____

lor After: LT_YELLOW Clarity After: CLEAR_ Artifacts: ___

omments:
PB_AND_SE_WERE_ANALZYED_AT_A_1/4_DILUTION.

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.
A5635 (D15)

1451

ab Name: PACE_INCORPORATED_____ Contract: EPC_____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: 00037

atrix (soil/water): WATER Lab Sample ID: 1451_____

evel (low/med): LOW__ Date Received: 02/27/91

% Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	95.6_	U		P_
7440-36-0	Antimony_	0.50_	U		F_
7440-38-2	Arsenic__	1.0_	U	J WN	F_
7440-39-3	Barium___	31.3_	U		P_
7440-41-7	Beryllium	1.4_	U	J	P_
7440-43-9	Cadmium__	3.3_	U		P_
7440-70-2	Calcium__	43900_		J E	P_
7440-47-3	Chromium_	9.4_	U		P_
7440-48-4	Cobalt___	7.9_	U	J	P_
7440-50-8	Copper___	5.8_	U		P_
7439-89-6	Iron____	30.7_	U		P_
7439-92-1	Lead____	0.60_	U		F_
7439-95-4	Magnesium	8350_		J E	P_
7439-96-5	Manganese	3.0_	B	J	P_
7439-97-6	Mercury__	0.20_	U		CV
7440-02-0	Nickel___	10.6_	U	J	P_
7440-09-7	Potassium	4020_	B		P_
7782-49-2	Selenium_	0.50_	U		F_
7440-22-4	Silver___	6.8_	U		P_
7440-23-5	Sodium___	50900_		E*	P_
7440-28-0	Thallium_	0.60_	U	J N	F_
7440-62-2	Vanadium_	7.7_	U	J	P_
7440-66-6	Zinc____	43.0_		U	P_
_____	Cyanide__	_____			NR
_____	_____	_____			

olor Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

or After: COLORLESS Clarity After: CLEAR_ Artifacts: ___

omments:
THIS_SAMPLE_WAS_ANALYZED_AS_A_DISSOLVED_METAL.

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

AS63D

1452

b Name: PACE_INCORPORATED_____ Contract: EPC_____

b Code: _____ Case No.: _____ SAS No.: _____ SDG No.: 006 00038

atrix (soil/water): WATER Lab Sample ID: 1452_____

vel (low/med): LOW__ Date Received: 02/27/91

Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	50800_	_	J ~~N~~	P_
7440-36-0	Antimony_	0.50_	U		F_
7440-38-2	Arsenic__	3.9_	~~B~~	J ~~N~~	F_
7440-39-3	Barium___	268_	_		P_
7440-41-7	Beryllium	14.0_	_	J	P_
7440-43-9	Cadmium__	3.3_	U		P_
7440-70-2	Calcium__	60500_	_		P_
7440-47-3	Chromium_	38.0_	_		P_
7440-48-4	Cobalt___	41.0_	~~B~~	J	P_
7440-50-8	Copper___	142_	_		P_
7439-89-6	Iron____	84100_	_	J ~~EN*~~	P_
7439-92-1	Lead____	32.8 ~~32.7~~_	_	J ~~SN~~	F_
7439-95-4	Magnesium	21700_	_		P_
7439-96-5	Manganese	1780_	_	J ~~*~~	P_
7439-97-6	Mercury__	0.20_	U		CV
7440-02-0	Nickel___	43.0_	_	J	P_
7440-09-7	Potassium	18100_	_		P_
7782-49-2	Selenium_	~~2.0~~_	~~U~~	~~N~~ R	F_
7440-22-4	Silver___	6.8_	U		P_
7440-23-5	Sodium___	55000_	_	~~*~~	P_
7440-28-0	Thallium_	0.60_	U	J ~~WN~~	F_
7440-62-2	Vanadium_	81.0_	_	J	P_
7440-66-6	Zinc____	298_	_	J ~~N*~~	P_
	Cyanide__	10_	U	~~*~~	AS

lor Before: WHITE____ Clarity Before: CLOUDY Texture: _____

lor After: LT_YELLOW Clarity After: CLEAR_ Artifacts: ___

ments:
PB_WAS_ANALYZED_AT_A_1/2_DILUTION.
SE_WAS_ANALYZED_AT_A_1/4_DILUTION.

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.
A563D(DIS)

1452

Lab Name: PACE_INCORPORATED_____ Contract: EPC_____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: 00039

Matrix (soil/water): WATER Lab Sample ID: 1452_____

Level (low/med): LOW__ Date Received: 02/27/91

% Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	489			P
7440-36-0	Antimony_	0.50	U		F
7440-38-2	Arsenic__	1.0	U	J WN	F
7440-39-3	Barium___	31.3	U		P
7440-41-7	Beryllium	1.4	U	J	P
7440-43-9	Cadmium__	3.3	U		P
7440-70-2	Calcium__	42200		J E	P
7440-47-3	Chromium_	9.4	U		P
7440-48-4	Cobalt___	7.9	U	J	P
7440-50-8	Copper___	8.0	B	U	P
7439-89-6	Iron_____	798			P
7439-92-1	Lead_____	0.60	U		F
7439-95-4	Magnesium	7240		J E	P
7439-96-5	Manganese	42.0		J	P
7439-97-6	Mercury__	0.20	U		CV
7440-02-0	Nickel___	10.6	U	J	P
7440-09-7	Potassium	4050	B		P
7782-49-2	Selenium_	0.50	U		F
7440-22-4	Silver___	6.8	U		P
7440-23-5	Sodium___	40900		E*	P
7440-28-0	Thallium_	0.60	U	J N	F
7440-62-2	Vanadium_	7.7	U	J	P
7440-66-6	Zinc_____	40.0		U	P
_____	Cyanide__				NR
_____	_____	_____			

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: ___

Comments:
THIS_SAMPLE_WAS_ANALYZED_AS_A_DISSOLVED_METAL.

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.
AUC232
1453

ab Name: PACE_INCORPORATED_____ Contract: EPC_____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: 006 00040

atrix (soil/water): WATER Lab Sample ID: 1453_____

evel (low/med): LOW__ Date Received: 02/27/91

% Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	699		J N	P
7440-36-0	Antimony_	1.2	B	U W	F
7440-38-2	Arsenic__	1.0	U	J WN	F
7440-39-3	Barium___	35.0	B		P
7440-41-7	Beryllium	1.4	U	J	P
7440-43-9	Cadmium__	3.3	U		P
7440-70-2	Calcium__	103000			P
7440-47-3	Chromium_	9.4	U		P
7440-48-4	Cobalt___	7.9	U	J	P
7440-50-8	Copper___	5.8	U		P
7439-89-6	Iron_____	2040		J EN*	P
7439-92-1	Lead_____	0.80	B	U WN	F
7439-95-4	Magnesium	16200			P
7439-96-5	Manganese	116		J *	P
7439-97-6	Mercury__	0.20	U		CV
7440-02-0	Nickel___	10.6	U	J	P
7440-09-7	Potassium	4120	B		P
7782-49-2	Selenium_	7.1		J SN	F
7440-22-4	Silver___	6.8	U		P
7440-23-5	Sodium___	279000		*	P
7440-28-0	Thallium_	0.60	U	J WN	F
7440-62-2	Vanadium_	7.7	U	J	P
7440-66-6	Zinc_____	53.0		U N*	P
_____	Cyanide__	17.2		J *	AS

olor Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

c or After: COLORLESS Clarity After: CLEAR_ Artifacts: ___

omments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.
AWC232(DIS)

1453

ıb Name: PACE_INCORPORATED_____ Contract: EPC_____

ıab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: 00041

trix (soil/water): WATER Lab Sample ID: 1453_____

-vel (low/med): LOW__ Date Received: 02/27/91

; Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	95.6_	U		P_
7440-36-0	Antimony_	0.50_	U		F_
7440-38-2	Arsenic__	1.0_	U	J WN	F_
7440-39-3	Barium___	31.3_	U		P_
7440-41-7	Beryllium	1.4_	U	J	P_
7440-43-9	Cadmium__	3.3_	U		P_
7440-70-2	Calcium__	92000_		J E	P_
7440-47-3	Chromium_	9.4_	U		P_
7440-48-4	Cobalt___	7.9_	U	J	P_
7440-50-8	Copper___	9.0_	B	U	P_
7439-89-6	Iron____	126_		U	P_
7439-92-1	Lead____	0.60_	U	W	F_
7439-95-4	Magnesium	14300_		J E	P_
7439-96-5	Manganese	79.0_			P_
7439-97-6	Mercury__	0.20_	U		CV
7440-02-0	Nickel___	10.6_	U	J	P_
7440-09-7	Potassium	4390_	B		P_
7782-49-2	Selenium_	11.8		S	NR
7440-22-4	Silver___	6.8_	U		P_
7440-23-5	Sodium___	274000_		E*	P_
7440-28-0	Thallium_	0.60_	U	J WN	F_
7440-62-2	Vanadium_	7.7_	U	J	P_
7440-66-6	Zinc____	53.0_		U	P_
_____	Cyanide__				NR

ɔlor Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

ɔ or After: COLORLESS Clarity After: CLEAR_ Artifacts: ___

ɔmments:
THIS_SAMPLE_WAS_ANALYZED_AS_A_DISSOLVED_METAL.

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

AUC235

1454

ab Name: PACE_INCORPORATED_____ Contract: EPC_____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: 00042 006___

atrix (soil/water): WATER Lab Sample ID: 1454_____

evel (low/med): LOW__ Date Received: 02/27/91

% Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	95.6_	U	J N	P_
7440-36-0	Antimony_	0.50_	U		F_
7440-38-2	Arsenic__	1.0_	U	J N	F_
7440-39-3	Barium___	56.0_	B		P_
7440-41-7	Beryllium	1.4_	U	J	P_
7440-43-9	Cadmium__	3.3_	U		P_
7440-70-2	Calcium__	98900_			P_
7440-47-3	Chromium_	9.4_	U		P_
7440-48-4	Cobalt___	7.9_	U	J	P_
7440-50-8	Copper___	8.0_	B	U	P_
7439-89-6	Iron____	1440_		J EN*	P_
7439-92-1	Lead____	0.60_	U	J N	F_
7439-95-4	Magnesium	15200_			P_
7439-96-5	Manganese	102_		J *	P_
7439-97-6	Mercury__	0.20_	U		CV
7440-02-0	Nickel___	10.6_	U	J	P_
7440-09-7	Potassium	3240_	B		P_
7782-49-2	Selenium_	0.50_	U	N R	F_
7440-22-4	Silver___	6.8_	U		P_
7440-23-5	Sodium___	168000_		*	P_
7440-28-0	Thallium_	0.60_	U	J WN	F_
7440-62-2	Vanadium_	7.7_	U	J	P_
7440-66-6	Zinc____	22.0_		U N*	P_
_____	Cyanide__	10_	U	*	AS
_____	_____	_____			

olor Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

lor After: COLORLESS Clarity After: CLEAR_ Artifacts: ___

omments:

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.
AUC235(DIS)

1454

00043

ab Name: PACE_INCORPORATED_____ Contract: EPC_____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: 006___

atrix (soil/water): WATER Lab Sample ID: 1454_____

evel (low/med): LOW__ Date Received: 02/27/91

% Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_	95.6_	U		P_
7440-36-0	Antimony_	~~0.90~~_	~~B~~	3.5UL	F_
7440-38-2	Arsenic__	1.0_	U	J WN	F_
7440-39-3	Barium___	59.0_	~~B~~		P_
7440-41-7	Beryllium	1.4_	U	J	P_
7440-43-9	Cadmium__	3.3_	U		P_
7440-70-2	Calcium__	99000_		J ~~E~~	P_
7440-47-3	Chromium_	9.4_	U		P_
7440-48-4	Cobalt___	7.9_	U	J	P_
7440-50-8	Copper___	5.8_	U		P_
7439-89-6	Iron____	100_		UL	P_
7439-92-1	Lead____	0.60_	~~B~~	J ~~W~~	F_
7439-95-4	Magnesium	14800_		J ~~E~~	P_
7439-96-5	Manganese	94.0_			P_
7439-97-6	Mercury__	0.20_	U		CV
7440-02-0	Nickel___	10.6_	U	J	P_
7440-09-7	Potassium	3140_	~~B~~		P_
7782-49-2	Selenium_	0.50_	U		F_
7440-22-4	Silver___	6.8_	U		P_
7440-23-5	Sodium___	172000_		~~E*~~	P_
7440-28-0	Thallium_	0.60_	U	J WN	F_
7440-62-2	Vanadium_	7.7_	U	J	P_
7440-66-6	Zinc____	53.0_		UL	P_
	Cyanide__				NR

olor Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

(.or After: COLORLESS Clarity After: CLEAR_ Artifacts: ___

omments:
THIS_SAMPLE_WAS_ANALYZED_AS_A_DISSOLVED_METAL.

pace INCORPORATED
THE ASSURANCE OF QUALITY

REPORT OF LABORATORY ANALYSIS

ENVIRONMENTAL PROJECT CONTROL, INC.
Two Grafton Common
Post Office Box 536
Grafton, MA 01519

March 29, 1991
PACE Project Number: 810227504

00026

Attn: Ms. Dusty Rhoades

Wells G & H (Inorg)

PACE Sample Number:			95 0014552	95 0014560	95 0014579
Date Collected:			02/25/91	02/25/91	02/25/91
Date Received:			02/27/91	02/27/91	02/27/91
Parameter	Units	MDL	AS 64D	AS 21	AUC 73
INORGANIC ANALYSIS					
INDIVIDUAL PARAMETERS					
Alkalinity, Total	mg/L	1	88	46	48
Chloride	mg/L	10	166 J	222 J	302 J
Fluoride, Soluble	mg/L	0.1	ND	ND	.75
Nitrogen, Nitrate plus Nitrite	mg/L	0.2	4.0 J	3.6 J	3.4 J
Phosphorus, Total	mg/L	0.3	0.3	3.8	ND
Silica, dissolved	mg/L	0.2	14.7	12.8	12
Solids, Total Dissolved	mg/L	1	536	470	626
Sulfate	mg/L	10	39.5 J	23.7 J	16.8 J
Total Organic Carbon	mg/L	0.10	0.92 u	2.14 u	1.05 u

MDL Method Detection Limit
ND Not detected at or above the MDL.

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REPORT OF LABORATORY ANALYSIS

Ms. Dusty Rhoades
Page 2

March 29, 1991
PACE Project Number: 810227504

00027

Wells G & H (Inorg)

PACE Sample Number:			95 0014587	95 0014595	95 0014609
Date Collected:			02/25/91	02/25/91	02/25/91
Date Received:			02/27/91	02/27/91	02/27/91
Parameter	Units	MDL	ARS 65D	FB AS 64D	FD AS 232
INORGANIC ANALYSIS					
INDIVIDUAL PARAMETERS					
Alkalinity, Total	mg/L	1	72	2 u	121
Chloride	mg/L	1	-	ND	-
Chloride	mg/L	10	185 J	-	563 J
Fluoride, Soluble	mg/L	0.1	ND	ND	.155
Nitrogen, Nitrate plus Nitrite	mg/L	0.02	1.9 J	ND	-
Nitrogen, Nitrate plus Nitrite	mg/L	0.2	-	-	6.1 J
Phosphorus, Total	mg/L	0.3	0.9	ND	ND
Silica, dissolved	mg/L	0.2	11.6	ND	10.6
Solids, Total Dissolved	mg/L	1	528	36	1500
Sulfate	mg/L	10	31.7 J	ND	-
Sulfate	mg/L	50	-	-	343 J
Total Organic Carbon	mg/L	0.10	1.64 u	0.67 u	16.8 J

MDL Method Detection Limit
ND Not detected at or above the MDL.

Robinson Lane RD 6
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REPORT OF LABORATORY ANALYSIS

Ms. Dusty Rhoades
Page 3

March 29, 1991
PACE Project Number: 810227504

00028

Wells G & H (Inorg)

PACE Sample Number:			95 0014617	95 0014625	95 0014633
Date Collected:			02/25/91	02/25/91	02/25/91
Date Received:			02/27/91	02/27/91	02/27/91
Parameter	Units	MDL	MS AS 232	AS 63S	AS 63D
INORGANIC ANALYSIS					
INDIVIDUAL PARAMETERS					
Alkalinity, Total	mg/L	1	221	39	45
Chloride	mg/L	10	859 J	154 J	121 J
Fluoride, Soluble	mg/L	0.1	.89	ND	ND
Nitrogen, Nitrate plus Nitrite	mg/L	0.1	-	3.9 J	3.2 J
Nitrogen, Nitrate plus Nitrite	mg/L	0.2	15.4 J	-	-
Phosphorus, Total	mg/L	0.3	2.46	1.7	3.1
Silica, dissolved	mg/L	0.2	20.6	12.6	13.1
Solids, Total Dissolved	mg/L	1	1560	490	468
Sulfate	mg/L	10	-	22.3 J	26.5 J
Sulfate	mg/L	100	727 J	-	-
Total Organic Carbon	mg/L	0.10	33.8 J	1.88 u	1.24 u

MDL Method Detection Limit
ND Not detected at or above the MDL.

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THE ASSURANCE OF QUALITY

REPORT OF LABORATORY ANALYSIS

Ms. Dusty Rhoades
Page 4

March 29, 1991
PACE Project Number: 81022750

00029

Wells G & H (Inorg)

PACE Sample Number:			95 0014641	95 0014650
Date Collected:			02/25/91	02/25/91
Date Received:			02/27/91	02/27/91
Parameter	Units	MDL	AUC 232	AUC 235
INORGANIC ANALYSIS				
INDIVIDUAL PARAMETERS				
Alkalinity, Total	mg/L	1	118	113
Chloride	mg/L	10	450 J	459 J
Fluoride, Soluble	mg/L	0.1	.135	ND
Nitrogen, Nitrate plus Nitrite	mg/L	0.1	4.2 J	3.0 J
Phosphorus, Total	mg/L	0.3	ND	ND
Silica, dissolved	mg/L	0.2	10.8	12
Solids, Total Dissolved	mg/L	1	1350	1140
Sulfate	mg/L	10	-	25.4 J
Sulfate	mg/L	50	229 J	-
Total Organic Carbon	mg/L	0.10	13.2 J	3.21 u

MDL Method Detection Limit
ND Not detected at or above the MDL.

The data contained in this report were obtained using EPA or other approved methodologies. All analyses were performed by me or under my supervision.

Andrea F. Hyslop
Andrea F. Hyslop
Manager, Inorganic Chemistry

Robinson Lane RD 6
Wappingers Falls NY 12590
TEL. 914 227 2811
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TRILLIUM INC

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

TREATMENT SYSTEM SAMPLING

VOLATILES ANALYSES DATA

Samples Collected 5/26/91

Chemical Analyses Performed By

PACE, Incorporated

August 20, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

Data quality for this sample delivery group was good.

Cooler temperature upon receipt of samples by the laboratory was 5°C.

Validation of organic data is conducted in conformance with Environmental Protection Agency (EPA) Functional Guidelines for Evaluating Organics Analyses, February 1, 1988, with modifications by EPA Region I, November 1, 1988.

Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified (valid) results mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Case Narrative

Eight samples (including matrix spike and matrix spike duplicate) were collected and submitted to PACE, Inc. on May 26, 1991. The laboratory was requested to perform volatile organics (VOA) target compound list (TCL) analyses.

The samples included in this Sample Delivery Group (SDG) are:

Client ID	Lab ID	Date of Collection
S1-29	3916	05/26/91
S1-29DUP	3917	05/26/91
S1-29TB	3918	05/26/91
S2-27	3921	05/26/91
S3A-27	3922	05/26/91
S4-27	3923	05/26/91

The laboratory has misidentified Sample S3A-27 as "S2A-27" throughout the data package.

Volatiles

The requirements to be checked in validation are listed below.

I. Holding Times

II. GC/MS Tuning

III. Calibration

A. Initial

B. Continuing

IV. Blanks

V. Surrogate Recovery

VI. Matrix Spike/Matrix Spike Duplicate

VII. Field Duplicates

VIII. Internal Standards Performance

IX. TCL Compound Identification

X. Compound Quantitation and Reported Detection Limits

XI. Tentatively Identified Compounds

XII. System Performance

XIII. Overall Assessment

I. Holding Times

All samples were received preserved and analyzed within the 14-day holding time for preserved samples.

II. GC/MS Tuning

GC/MS tuning and mass calibrations were within criteria.

III. Calibration

Manual areas were integrated for one or more compounds in each of the standards in this data package. No evaluation of these manual integrations can be performed, as no hard copy documentation is provided. The validation has been completed on the assumption that the manual integrations done and reported by the laboratory were valid and correct. No data appear to be affected.

A. Initial

Initial calibration criteria were met on 5/28/91 (Instrument J).

Initial calibration criteria were met on 5/28/91 (Instrument G) with the exception of the RRF for 2-butanone (actual 0.077; criteria 0.1). Detection limits for 2-butanone were rejected in Samples S1-29, S1-29MS, S1-29MSD, and S3A-27.

B. Continuing

Continuing calibration criteria were met on 5/31/91 (Instrument J) with the exception of the % difference for chloromethane (actual 29.7; criteria 25). Data were not affected.

Continuing calibration criteria were met on 6/3/91 Instrument G) with the exception of the RF for 2-butanone (actual 0.029; criteria 0.1) and the % difference for 2-butanone (actual 61.8; criteria 25) and 4-methyl-2-pentanone (actual 29.0; criteria 25). Data were not affected.

Continuing calibration criteria were met on 6/4/91 (Instrument G) with the exception of the RF for 2-butanone (actual 0.081; criteria 0.1). Data were not affected.

IV. Blanks

The trip blank and method blanks were clean.

V. Surrogate Recovery

Surrogate recoveries were within acceptance criteria.

VI. Matrix Spike/Matrix Spike Duplicate

The matrix spike (MS) and matrix spike duplicate (MSD) were performed on Sample S1-29. The percent recovery for 1,1-dichloroethene in the MSD was below QC criteria. No positive results for 1,1-dichloroethene were reported in field samples, so data were not affected.

Results for acetone were reported in the MS and MSD, but not in Sample S1-29 or Sample S1-29DUP. This compound was rejected as laboratory contamination in the MS and MSD. Sample S3A-27 was analyzed immediately after the MSD. Acetone results for S3A-27 were also rejected due to laboratory contamination.

Results for 1,1,1-trichloroethane were reported in Samples S1-29 and S1-29DUP but not in the MS or MSD. This compound was rejected in Samples S1-29 and S1-29DUP.

VII. Field Duplicates

Compounds and concentrations (in ug/L) reported in Samples S1-29 and S1-29DUP were as follows:

Compound	S1-29	S1-29DUP
Trichloroethene	99	86
Tetrachloroethene	3900	2900

Results for the above compounds were within QC criteria.

VIII. Internal Standards Performance

Internal standards areas and retention times were acceptable.

IX. TCL Compound Identification

TCL compound identifications were acceptable.

X. Compound Quantitation and Reported Detection Limits

Results and detection limits were acceptable with regard to the supporting data.

XI. Tentatively Identified Compounds

No TICs were reported for this SDG.

XII. System Performance

System performance requires attention. Manual integrations need to be addressed.

Sample identifications should be verified for accuracy on all data.

Response factor criteria should be monitored for all compound.

XIII. Overall Assessment of Data for a Case

Data quality for this sample delivery group was good. Detection limits for 2-butanone were rejected in Samples S1-29, S1-29MS, S1-29MSD, and S3A-27.

1,1,1-Trichloroethene was rejected in Samples S1-29 and S1-29DUP due to failure to confirm in the MS and MSD analyses of S1-29.

Acetone results were rejected in S1-20MS, S1-20MSD and S3A-27.

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S1-29

00024

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3916.4

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3275

Level: (low/med) LOW Date Received: 5/26/91

% Moisture: not dec. 100. Date Analyzed: 6/ 3/91

Column: (pack/cap) PACK Dilution Factor: 20.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
74-87-3	Chloromethane	200.	U
74-83-9	Bromomethane	200.	U
75-01-4	Vinyl Chloride	200.	U
75-00-3	Chloroethane	200.	U
75-09-2	Methylene Chloride	100.	U
67-64-1	Acetone	200.	U
75-15-0	Carbon Disulfide	100.	U
75-35-4	1,1-Dichloroethene	100.	U
75-34-3	1,1-Dichloroethane	100.	U
540-59-0	1,2-Dichloroethene (total)	100.	U
67-66-3	Chloroform	100.	U
107-06-2	1,2-Dichloroethane	100.	U
78-93-3	2-Butanone	~~200.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	~~42.~~	J R
56-23-5	Carbon Tetrachloride	100.	U
108-05-4	Vinyl Acetate	200.	U
75-27-4	Bromodichloromethane	100.	U
78-87-5	1,2-Dichloropropane	100.	U
10061-01-5	cis-1,3-Dichloropropene	100.	U
79-01-6	Trichloroethene	99.	J
124-48-1	Dibromochloromethane	100.	U
79-00-5	1,1,2-Trichloroethane	100.	U
71-43-2	Benzene	100.	U
10061-02-6	Trans-1,3-Dichloropropene	100.	U
75-25-2	Bromoform	100.	U
108-10-1	4-Methyl-2-Pentanone	200.	U
591-78-6	2-Hexanone	200.	U
127-18-4	Tetrachloroethene	3900.	
79-34-5	1,1,2,2-Tetrachloroethane	100.	U
108-88-3	Toluene	100.	U
108-90-7	Chlorobenzene	100.	U
100-41-4	Ethylbenzene	100.	U
100-42-5	Styrene	100.	U
1330-20-7	Xylene(total)	100.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S1-29

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No. 00025

Matrix: (soil/water) WATER Lab Sample ID: 3916.4

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3275

Level: (low/med) LOW Date Received: 5/26/91

% Moisture: not dec. 100. Date Analyzed: 6/ 3/91

Column: (pack/cap) PACK Dilution Factor: 20.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S1-29DUP
00032

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3917.0

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2819

Level: (low/med) LOW Date Received: 5/26/91

% Moisture: not dec. 100. Date Analyzed: 5/31/91

Column: (packed/cap) PACK Dilution Factor: 20.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
74-87-3	Chloromethane	200.	U
74-83-9	Bromomethane	200.	U
75-01-4	Vinyl Chloride	200.	U
75-00-3	Chloroethane	200.	U
75-09-2	Methylene Chloride	100.	U
67-64-1	Acetone	200.	U
75-15-0	Carbon Disulfide	100.	U
75-35-4	1,1-Dichloroethene	100.	U
75-34-3	1,1-Dichloroethane	100.	U
540-59-0	1,2-Dichloroethene (total)	100.	U
67-66-3	Chloroform	100.	U
107-06-2	1,2-Dichloroethane	100.	U
78-93-3	2-Butanone	200.	U
71-55-6	1,1,1-Trichloroethane	~~43.~~	~~J~~ R
56-23-5	Carbon Tetrachloride	100.	U
108-05-4	Vinyl Acetate	200.	U
75-27-4	Bromodichloromethane	100.	U
78-87-5	1,2-Dichloropropane	100.	U
10061-01-5	cis-1,3-Dichloropropene	100.	U
79-01-6	Trichloroethene	86.	J
124-48-1	Dibromochloromethane	100.	U
79-00-5	1,1,2-Trichloroethane	100.	U
71-43-2	Benzene	100.	U
10061-02-6	Trans-1,3-Dichloropropene	100.	U
75-25-2	Bromoform	100.	U
108-10-1	4-Methyl-2-Pentanone	200.	U
591-78-6	2-Hexanone	200.	U
127-18-4	Tetrachloroethene	2900.	
79-34-5	1,1,2,2-Tetrachloroethane	100.	U
108-88-3	Toluene	100.	U
108-90-7	Chlorobenzene	100.	U
100-41-4	Ethylbenzene	100.	U
100-42-5	Styrene	100.	U
1330-20-7	Xylene (total)	100.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S1-29DUP

00033

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3917.0

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2819

Level: (low/med) LOW Date Received: 5/26/91

% Moisture: not dec. 100. Date Analyzed: 5/31/91

Column: (pack/cap) PACK Dilution Factor: 20.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S1-29TB
00040

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3918.0

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2822

Level: (low/med) LOW Date Received: 5/26/91

% Moisture: not dec. 100. Date Analyzed: 5/31/91

Column: (packed/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	5.	U
67-64-1	Acetone	10.	U
75-15-0	Carbon Disulfide	5.	U
75-35-4	1,1-Dichloroethene	5.	U
75-34-3	1,1-Dichloroethane	5.	U
540-59-0	1,2-Dichloroethene (total)	5.	U
67-66-3	Chloroform	5.	U
107-06-2	1,2-Dichloroethane	5.	U
78-93-3	2-Butanone	10.	U
71-55-6	1,1,1-Trichloroethane	5.	U
56-23-5	Carbon Tetrachloride	5.	U
108-05-4	Vinyl Acetate	10.	U
75-27-4	Bromodichloromethane	5.	U
78-87-5	1,2-Dichloropropane	5.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U
79-01-6	Trichloroethene	5.	U
124-48-1	Dibromochloromethane	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U
71-43-2	Benzene	5.	U
10061-02-6	Trans-1,3-Dichloropropene	5.	U
75-25-2	Bromoform	5.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	5.	U
79-34-5	1,1,2,2-Tetrachloroethane	5.	U
108-88-3	Toluene	5.	U
108-90-7	Chlorobenzene	5.	U
100-41-4	Ethylbenzene	5.	U
100-42-5	Styrene	5.	U
1330-20-7	Xylene (total)	5.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S1-29TB

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00041

Matrix: (soil/water) WATER Lab Sample ID: 3918.0

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2822

Level: (low/med) LOW Date Received: 5/26/91

% Moisture: not dec. 100. Date Analyzed: 5/31/91

Column: (pack/cap) PACK Dilution Factor: 1.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
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6.					
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S2-27
00045

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3921.0

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2823

Level: (low/med) LOW Date Received: 5/26/91

% Moisture: not dec. 100. Date Analyzed: 5/31/91

Column: (pack/cap) PACK Dilution Factor: 5.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
74-87-3	Chloromethane	50.	U
74-83-9	Bromomethane	50.	U
75-01-4	Vinyl Chloride	50.	U
75-00-3	Chloroethane	50.	U
75-09-2	Methylene Chloride	25.	U
67-64-1	Acetone	50.	U
75-15-0	Carbon Disulfide	25.	U
75-35-4	1,1-Dichloroethene	25.	U
75-34-3	1,1-Dichloroethane	25.	U
540-59-0	1,2-Dichloroethene (total)	21.	J
67-66-3	Chloroform	25.	U
107-06-2	1,2-Dichloroethane	25.	U
78-93-3	2-Butanone	50.	U
71-55-6	1,1,1-Trichloroethane	17.	J
56-23-5	Carbon Tetrachloride	25.	U
108-05-4	Vinyl Acetate	50.	U
75-27-4	Bromodichloromethane	25.	U
78-87-5	1,2-Dichloropropane	25.	U
10061-01-5	cis-1,3-Dichloropropene	25.	U
79-01-6	Trichloroethene	25.	J
124-48-1	Dibromochloromethane	25.	U
79-00-5	1,1,2-Trichloroethane	25.	U
71-43-2	Benzene	25.	U
10061-02-6	Trans-1,3-Dichloropropene	25.	U
75-25-2	Bromoform	25.	U
108-10-1	4-Methyl-2-Pentanone	50.	U
591-78-6	2-Hexanone	50.	U
127-18-4	Tetrachloroethene	660.	
79-34-5	1,1,2,2-Tetrachloroethane	25.	U
108-88-3	Toluene	25.	U
108-90-7	Chlorobenzene	25.	U
100-41-4	Ethylbenzene	25.	U
100-42-5	Styrene	25.	U
1330-20-7	Xylene (total)	25.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S2-27

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00046

Matrix: (soil/water) WATER Lab Sample ID: 3921.0

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2823

Level: (low/med) LOW Date Received: 5/26/91

% Moisture: not dec. 100. Date Analyzed: 5/31/91

Column: (pack/cap) PACK Dilution Factor: 5.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
3 SZA-27
00054

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3922.9

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 63289

Level: (low/med) LOW Date Received: 5/26/91

% Moisture: not dec. 100. Date Analyzed: 6/ 4/91

Column: (pack/cap) PACK Dilution Factor: 5.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
74-87-3	Chloromethane	50.	U
74-83-9	Bromomethane	50.	U
75-01-4	Vinyl Chloride	50.	U
75-00-3	Chloroethane	50.	U
75-09-2	Methylene Chloride	25.	U
67-64-1	Acetone	~~88.~~	R
75-15-0	Carbon Disulfide	25.	U
75-35-4	1,1-Dichloroethene	25.	U
75-34-3	1,1-Dichloroethane	25.	U
540-59-0	1,2-Dichloroethene (total)	25.	U
67-66-3	Chloroform	25.	U
107-06-2	1,2-Dichloroethane	25.	U
78-93-3	2-Butanone	~~50.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	27.	
56-23-5	Carbon Tetrachloride	25.	U
108-05-4	Vinyl Acetate	50.	U
75-27-4	Bromodichloromethane	25.	U
78-87-5	1,2-Dichloropropane	25.	U
10061-01-5	cis-1,3-Dichloropropene	25.	U
79-01-6	Trichloroethene	47.	
124-48-1	Dibromochloromethane	25.	U
79-00-5	1,1,2-Trichloroethane	25.	U
71-43-2	Benzene	25.	U
10061-02-6	Trans-1,3-Dichloropropene	25.	U
75-25-2	Bromoform	25.	U
108-10-1	4-Methyl-2-Pentanone	50.	U
591-78-6	2-Hexanone	50.	U
127-18-4	Tetrachloroethene	710.	
79-34-5	1,1,2,2-Tetrachloroethane	25.	U
108-88-3	Toluene	25.	U
108-90-7	Chlorobenzene	25.	U
100-41-4	Ethylbenzene	25.	U
100-42-5	Styrene	25.	U
1330-20-7	Xylene(total)	25.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

3 ZKB 1/4/91
SZA-27

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00055

Matrix: (soil/water) WATER Lab Sample ID: 3922.9

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3289

Level: (low/med) LOW Date Received: 5/26/91

% Moisture: not dec. 100. Date Analyzed: 6/ 4/91

Column: (pack/cap) PACK Dilution Factor: 5.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S4-27

00063

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3923.7

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2824

Level: (low/med) LOW Date Received: 5/26/91

% Moisture: not dec. 100. Date Analyzed: 5/31/91

Column: (pack/cap) PACK Dilution Factor: 10.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	100.	U
74-83-9	Bromomethane	100.	U
75-01-4	Vinyl Chloride	100.	U
75-00-3	Chloroethane	100.	U
75-09-2	Methylene Chloride	50.	U
67-64-1	Acetone	100.	U
75-15-0	Carbon Disulfide	50.	U
75-35-4	1,1-Dichloroethene	50.	U
75-34-3	1,1-Dichloroethane	50.	U
540-59-0	1,2-Dichloroethene (total)	50.	U
67-66-3	Chloroform	50.	U
107-06-2	1,2-Dichloroethane	50.	U
78-93-3	2-Butanone	100.	U
71-55-6	1,1,1-Trichloroethane	31.	J
56-23-5	Carbon Tetrachloride	50.	U
108-05-4	Vinyl Acetate	100.	U
75-27-4	Bromodichloromethane	50.	U
78-87-5	1,2-Dichloropropane	50.	U
10061-01-5	cis-1,3-Dichloropropene	50.	U
79-01-6	Trichloroethene	56.	
124-48-1	Dibromochloromethane	50.	U
79-00-5	1,1,2-Trichloroethane	50.	U
71-43-2	Benzene	50.	U
10061-02-6	Trans-1,3-Dichloropropene	50.	U
75-25-2	Bromoform	50.	U
108-10-1	4-Methyl-2-Pentanone	100.	U
591-78-6	2-Hexanone	100.	U
127-18-4	Tetrachloroethene	1800.	
79-34-5	1,1,2,2-Tetrachloroethane	50.	U
108-88-3	Toluene	50.	U
108-90-7	Chlorobenzene	50.	U
100-41-4	Ethylbenzene	50.	U
100-42-5	Styrene	50.	U
1330-20-7	Xylene (total)	50.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S4-27

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

00064

Matrix: (soil/water) WATER Lab Sample ID: 3923.7

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2824

Level: (low/med) LOW Date Received: 5/26/91

% Moisture: not dec. 100. Date Analyzed: 5/31/91

Column: (pack/cap) PACK Dilution Factor: 10.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
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3.					
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TRILLIUM INC

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

TREATMENT SYSTEM SAMPLING

VOLATILES ANALYSES DATA

METHOD 524.2 ANALYSES

Samples Collected 5/26/91

Chemical Analyses Performed By

PACE, Incorporated

August 20, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

Data quality for the samples in this sample delivery group was good.

Cooler temperature upon receipt of samples by the laboratory was 5°C.

Validation of organic data is conducted in conformance with Environmental Protection Agency (EPA) Functional Guidelines for Evaluating Organics Analyses, February 1, 1988, with modifications by EPA Region I, November 1, 1988.

Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified (valid) results mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Case Narrative

Five treatment system samples were collected and submitted to PACE, Inc. on May 26, 1991. The laboratory was requested to perform volatile organics analyses (VOA) using Method 524.2. The analyte list for this method was amended pursuant to the QA/QC Plan for this project.

The samples included in this Sample Delivery Group (SDG) are:

Client ID	Lab ID	Date of Collection
S1-29FB	3919	05/26/91
S5-24	3924	05/26/91
S6-29	3925	05/26/91
S6-29DUP	3926	05/26/91
S6-29TB	3927	05/26/91

Volatiles

The requirements to be checked in validation are listed below.

I. Holding Times

II. GC/MS Tuning

III. Calibration

A. Initial

B. Continuing

IV. Blanks

V. Surrogate Recovery

VI. Matrix Spike/Matrix Spike Duplicate

VII. Field Duplicates

VIII. Internal Standards Performance

IX. TCL Compound Identification

X. Compound Quantitation and Reported Detection Limits

XI. Tentatively Identified Compounds

XII. System Performance

XIII. Overall Assessment

I. Holding Times

All samples were analyzed within the 14-day holding time for preserved samples.

II. GC/MS Tuning

GC/MS tuning and mass calibrations were within criteria.

III. Calibration

Areas were manually integrated for one or more compounds in each of the standards in this data package. No evaluation of these manual integrations can be performed, as no hard copy documentation was provided. Such documentation has been requested from the laboratory. The validation has been completed on the assumption that the manual integrations done and reported by the laboratory were valid and correct. No sample data appear to be affected.

A. Initial

Initial calibration criteria were met on 5/23/91.

B. Continuing

Continuing calibration criteria were met on 6/6/91.

IV. Blanks

The trip blank, field blank, and method blanks were clean.

V. Surrogate Recovery

Surrogate recoveries were within acceptance criteria.

VI. Matrix Spike/Matrix Spike Duplicate

A matrix spike (MS) and matrix spike duplicate (MSD) were performed on Sample S6-29. Data were within acceptance criteria.

VII. Field Duplicates

Samples S6-29 and S6-29DUP were submitted as duplicate samples. No compounds were detected in either sample.

VIII. Internal Standards Performance

The retention time for bromochloromethane was slightly above QC criteria in Sample S6-29. No positive sample data were affected.

All other internal standards areas and retention times were acceptable.

IX. TCL Compound Identification

TCL compound identifications were acceptable.

X. Compound Quantitation and Reported Detection Limits

The laboratory performed a practical quantitation limit (PQL) study for the Method 524.2 analyses for this project on October 15, 1990. Method detection limits (MDLs) determined through that PQL study should have been used for reporting purposes for these treatment system samples. MDLs determined through the PQL study were as follows:

Compound	MDL (ug/L)
Vinyl Chloride	0.48
Chloroethane	0.49
Methylene Chloride	4.41
1,1-Dichloroethene	0.67
1,1-Dichloroethane	0.54
trans-1,2-Dichloroethene	0.50
Chloroform	0.53
1,2-Dichloroethane	0.52
1,1,1-Trichloroethane	0.44
Carbon Tetrachloride	0.43
Bromodichloromethane	0.38
1,2-Dichloropropane	0.45
cis-1,3-Dichloropropene	0.33
Trichloroethene	0.42
Dibromochloromethane	0.33
1,1,2-Trichloroethane	0.43
Benzene	0.58
trans-1,3-Dichloropropene	0.07
Bromoform	0.49
Tetrachloroethene	0.51
1,1,2,2-Tetrachloroethane	0.44
Toluene	0.45
Chlorobenzene	0.44

Compound	MDL (ug/L)
Ethylbenzene	0.51
m-Xylene	0.48
o-, p-Xylene	0.93
1,2-Dichloroethane-d4	0.50
Toluene-d8	0.45
Bromofluorobenzene	0.36

Methylene chloride was reported in Samples S5-24, S6-29, and S6-29DUP at concentrations below the MDL determined by the PQL study for this project. The methylene chloride concentrations in these samples were corrected to be "ND."

The result reported for 1,1,1-trichloroethane in Sample S5-24 (28.8 ug/L) was beyond the calibration range of the instrument (25 ug/L). This result met precision and accuracy criteria.

All other results and detection limits were acceptable with regard to the supporting data.

XI. Tentatively Identified Compounds

No TICs were reported for this sample delivery group.

XII. System Performance

System performance was acceptable.

XIII. Overall Assessment of Data for a Case

Methylene chloride was corrected to be "ND" in Samples S5-24, S6-29, and S6-29DUP.

All other results were acceptable as reported.

UNIFIRST/ENSR

PACE Project Number: 810526500

PACE Sample Number:			95 0039199
Date Collected:			05/26/91
Date Received:			05/26/91
Parameter	Units	MDL	S1-29 FB
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR

PACE Project Number: 810526500

PACE Sample Number:			95 0039245
Date Collected:			05/26/91
Date Received:			05/26/91
Parameter	Units	MDL	S5-24
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.1~~ ND EKS 7/7/91
1,1-Dichloroethene	ug/L	0.5	1.7
1,1-Dichloroethane	ug/L	0.5	2.1
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	28.8
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR

PACE Project Number: 810526500

PACE Sample Number:			95 0039253
Date Collected:			05/26/91
Date Received:			05/26/91
Parameter	Units	MDL	S6-29
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.3~~ ND CKJ 7/7/91
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR

PACE Project Number: 810526500

PACE Sample Number:			95 0039261
Date Collected:			05/26/91
Date Received:			05/26/91
Parameter	Units	MDL	S6-29 Dup
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.3~~ ND LLD 7/7/91
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR

PACE Project Number: 810526500

PACE Sample Number:			95 0039270
Date Collected:			05/26/91
Date Received:			05/26/91
Parameter	Units	MDL	S6-29 TB
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

TRILLIUM INC

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

TREATMENT SYSTEM SAMPLING

VOLATILES ANALYSES DATA

Samples Collected 5/27/91

Chemical Analyses Performed By

PACE, Incorporated

August 20, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

Data quality for this sample delivery group was good.

Cooler temperature upon receipt of samples by the laboratory was 6°C.

Validation of organic data is conducted in conformance with Environmental Protection Agency (EPA) Functional Guidelines for Evaluating Organics Analyses, February 1, 1988, with modifications by EPA Region I, November 1, 1988.

Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified (valid) results mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Case Narrative

Eight samples (including matrix spike and matrix spike duplicate) were collected and submitted to PACE, Inc. on May 27, 1991. The laboratory was requested to perform volatile organics (VOA) target compound list (TCL) analyses.

The samples included in this Sample Delivery Group (SDG) are:

Client ID	Lab ID	Date of Collection
S1-30	3928	05/27/91
S1-30DUP	3929	05/27/91
S1-30TB	3930	05/27/91
S2-28	3933	05/27/91
S3A-28	3934	05/27/91
S4-28	3935	05/27/91

The laboratory has misidentified Sample S3A-28 as "S2A-28" throughout the data package.

Volatiles

The requirements to be checked in validation are listed below.

I. Holding Times

II. GC/MS Tuning

III. Calibration

A. Initial

B. Continuing

IV. Blanks

V. Surrogate Recovery

VI. Matrix Spike/Matrix Spike Duplicate

VII. Field Duplicates

VIII. Internal Standards Performance

IX. TCL Compound Identification

X. Compound Quantitation and Reported Detection Limits

XI. Tentatively Identified Compounds

XII. System Performance

XIII. Overall Assessment

I. Holding Times

All samples were received preserved and analyzed within the 14-day holding time for preserved samples.

II. GC/MS Tuning

GC/MS tuning and mass calibrations were within criteria.

III. Calibration

Manual areas were integrated for one or more compounds in each of the standards in this data package. No evaluation of these manual integrations can be performed, as no hard copy documentation is provided. The validation has been completed on the assumption that the manual integrations done and reported by the laboratory were valid and correct. No data appear to be affected.

A. Initial

Initial calibration criteria were met on 5/28/91.

B. Continuing

Continuing calibration criteria were met on 6/2/91 with the exception of the % difference for 2-butanone (actual 36.0; criteria 25), trans-1,3-dichloropropene (actual 175.1; criteria 25), 4-methyl-2-pentanone (actual 33.1; criteria 25), 2-hexanone (actual 30.1; criteria 25), and 1,1,2,2-tetrachloroethane (actual 32.9; criteria 25). Detection limits for trans-1,3-dichloropropene were estimated in Samples S2-28, S1-30, S1-30MS, S1-30MSD, and S1-30TB. Other data were not affected.

Continuing calibration criteria were met on 6/3/91 with the exception of the RF for 2-butanone (actual 0.097; criteria 0.1) and the % difference for chloromethane (actual 46.2; criteria 25), 2-butanone (actual 40.7; criteria 25), trans-1,3-dichloropropene (actual 197.5; criteria 25), 4-methyl-2-pentanone (actual 38.4; criteria 25), 2-hexanone (actual 43.4; criteria 25), and 1,1,2,2-tetrachloroethane (actual 31.6; criteria 25). Detection limits for 2-butanone were rejected and detection limits for trans-1,3-dichloropropene were estimated in Samples S1-30DUP, S3A-28, and S4-28. Other data were not affected.

IV. Blanks

Acetone was reported in Method Blank VBLK02 and the trip blank, S1-30TB. Acetone results in the trip blank, the MS, and the MSD were qualified as less than the reported values.

V. Surrogate Recovery

Surrogate recoveries were within acceptance criteria.

VI. Matrix Spike/Matrix Spike Duplicate

The matrix spike (MS) and matrix spike duplicate (MSD) were performed on Sample S1-30. The percent recoveries for 1,1-dichloroethene in the MS and MSD were below QC criteria. The relative percent difference for 1,1-dichloroethene was above QC criteria. No positive results for 1,1-dichloroethene were reported in field samples, so data were not affected.

VII. Field Duplicates

Compounds and concentrations (in ug/L) reported in Samples S1-30 and S1-30DUP were as follows:

Compound	S1-30	S1-30DUP
1,1,1-Trichloroethane	130	51
Trichloroethene	80	110
Tetrachloroethene	2700	4000

None of the above results were within QC criteria, so all of the above results were qualified as estimated.

VIII. Internal Standards Performance

All internal standard areas were below acceptance criteria for Sample S1-30TB. Detection limits for all compounds were estimated for this sample.

All other internal standards areas and retention times were acceptable.

IX. TCL Compound Identification

TCL compound identifications were acceptable.

X. Compound Quantitation and Reported Detection Limits

The result reported for tetrachloroethene in Sample S4-28 was beyond the calibration range of the instrument. This result was within precision and accuracy criteria and was accepted as reported.

Results for the spiking compounds were not reported on the Forms I for the MS or the MSD. The data validator has entered the correct concentrations and corrected copies of the Forms I were included with this data validation report.

All other results and detection limits were acceptable with regard to the supporting data.

XI. Tentatively Identified Compounds

No TICs were reported for this SDG.

XII. System Performance

System performance requires attention. Manual integrations need to be addressed.

Sample identifications should be verified for accuracy on all data.

XIII. Overall Assessment of Data for a Case

Data quality for this sample delivery group was good. Detection limits for 2-butanone were rejected in Samples S1-30DUP, S3A-28, and S4-28. Detection limits for trans-1,3-dichloropropene were estimated in all samples. All positive results in Samples S1-30 and S1-30DUP were qualified as estimates due to failure to meet field duplicate quality control criteria. Detection limits for all TCL compounds were qualified as estimated in the trip blank.

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S1-30

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3928.8

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2839

Level: (low/med) LOW Date Received: 5/27/91

% Moisture: not dec. 100. Date Analyzed: 6/ 3/91

Column: (pack/cap) PACK Dilution Factor: 20.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	200.	U
74-83-9	Bromomethane	200.	U
75-01-4	Vinyl Chloride	200.	U
75-00-3	Chloroethane	200.	U
75-09-2	Methylene Chloride	100.	U
67-64-1	Acetone	200.	U
75-15-0	Carbon Disulfide	100.	U
75-35-4	1,1-Dichloroethene	100.	U
75-34-3	1,1-Dichloroethane	100.	U
540-59-0	1,2-Dichloroethene (total)	100.	U
67-66-3	Chloroform	100.	U
107-06-2	1,2-Dichloroethane	100.	U
78-93-3	2-Butanone	200.	U
71-55-6	1,1,1-Trichloroethane	130.	J
56-23-5	Carbon Tetrachloride	100.	U
108-05-4	Vinyl Acetate	200.	U
75-27-4	Bromodichloromethane	100.	U
78-87-5	1,2-Dichloropropane	100.	U
10061-01-5	cis-1,3-Dichloropropene	100.	U
79-01-6	Trichloroethene	80.	J
124-48-1	Dibromochloromethane	100.	U
79-00-5	1,1,2-Trichloroethane	100.	U
71-43-2	Benzene	100.	U
10061-02-6	Trans-1,3-Dichloropropene	100.	UJ
75-25-2	Bromoform	100.	U
108-10-1	4-Methyl-2-Pentanone	200.	U
591-78-6	2-Hexanone	200.	U
127-18-4	Tetrachloroethene	2700.	J
79-34-5	1,1,2,2-Tetrachloroethane	100.	U
108-88-3	Toluene	100.	U
108-90-7	Chlorobenzene	100.	U
100-41-4	Ethylbenzene	100.	U
100-42-5	Styrene	100.	U
1330-20-7	Xylene (total)	100.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S1-30

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3928.8

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2839

Level: (low/med) LOW Date Received: 5/27/91

% Moisture: not dec. 100. Date Analyzed: 6/ 3/91

Column: (pack/cap) PACK Dilution Factor: 20.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S1-30DUP

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3929.6

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2857

Level: (low/med) LOW Date Received: 5/27/91

% Moisture: not dec. 100. Date Analyzed: 6/ 3/91

Column: (pack/cap) PACK Dilution Factor: 20.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	200.	U
74-83-9	Bromomethane	200.	U
75-01-4	Vinyl Chloride	200.	U
75-00-3	Chloroethane	200.	U
75-09-2	Methylene Chloride	100.	U
67-64-1	Acetone	200.	U
75-15-0	Carbon Disulfide	100.	U
75-35-4	1,1-Dichloroethene	100.	U
75-34-3	1,1-Dichloroethane	100.	U
540-59-0	1,2-Dichloroethene (total)	100.	U
67-66-3	Chloroform	100.	U
107-06-2	1,2-Dichloroethane	100.	U
78-93-3	2-Butanone	~~200.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	51.	J
56-23-5	Carbon Tetrachloride	100.	U
108-05-4	Vinyl Acetate	200.	U
75-27-4	Bromodichloromethane	100.	U
78-87-5	1,2-Dichloropropane	100.	U
10061-01-5	cis-1,3-Dichloropropene	100.	U
79-01-6	Trichloroethene	110.	J
124-48-1	Dibromochloromethane	100.	U
79-00-5	1,1,2-Trichloroethane	100.	U
71-43-2	Benzene	100.	U
10061-02-6	Trans-1,3-Dichloropropene	100.	UJ
75-25-2	Bromoform	100.	U
108-10-1	4-Methyl-2-Pentanone	200.	U
591-78-6	2-Hexanone	200.	U
127-18-4	Tetrachloroethene	4000.	J E
79-34-5	1,1,2,2-Tetrachloroethane	100.	U
108-88-3	Toluene	100.	U
108-90-7	Chlorobenzene	100.	U
100-41-4	Ethylbenzene	100.	U
100-42-5	Styrene	100.	U
1330-20-7	Xylene (total)	100.	U

MM 6/25/91

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S1-30DUP

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00029

Matrix: (soil/water) WATER Lab Sample ID: 3929.6

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2857

Level: (low/med) LOW Date Received: 5/27/91

% Moisture: not dec. 100. Date Analyzed: 6/ 3/91

Column: (pack/cap) PACK Dilution Factor: 20.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S1-30TB

040027

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3930.0

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2842

Level: (low/med) LOW Date Received: 5/27/91

% Moisture: not dec. 100. Date Analyzed: 6/ 3/91

Column: (pack/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10.	UJ
74-83-9	Bromomethane	10.	UJ
75-01-4	Vinyl Chloride	10.	UJ
75-00-3	Chloroethane	10.	UJ
75-09-2	Methylene Chloride	5.	UJ
67-64-1	Acetone	43.	UJ
75-15-0	Carbon Disulfide	5.	UJ
75-35-4	1,1-Dichloroethene	5.	UJ
75-34-3	1,1-Dichloroethane	5.	UJ
540-59-0	1,2-Dichloroethene (total)	5.	UJ
67-66-3	Chloroform	5.	UJ
107-06-2	1,2-Dichloroethane	5.	UJ
78-93-3	2-Butanone	10.	UJ
71-55-6	1,1,1-Trichloroethane	5.	UJ
56-23-5	Carbon Tetrachloride	5.	UJ
108-05-4	Vinyl Acetate	10.	UJ
75-27-4	Bromodichloromethane	5.	UJ
78-87-5	1,2-Dichloropropane	5.	UJ
10061-01-5	cis-1,3-Dichloropropene	5.	UJ
79-01-6	Trichloroethene	5.	UJ
124-48-1	Dibromochloromethane	5.	UJ
79-00-5	1,1,2-Trichloroethane	5.	UJ
71-43-2	Benzene	5.	UJ
10061-02-6	Trans-1,3-Dichloropropene	5.	UJ
75-25-2	Bromoform	5.	UJ
108-10-1	4-Methyl-2-Pentanone	10.	UJ
591-78-6	2-Hexanone	10.	UJ
127-18-4	Tetrachloroethene	5.	UJ
79-34-5	1,1,2,2-Tetrachloroethane	5.	UJ
108-88-3	Toluene	5.	UJ
108-90-7	Chlorobenzene	5.	UJ
100-41-4	Ethylbenzene	5.	UJ
100-42-5	Styrene	5.	UJ
1330-20-7	Xylene (total)	5.	UJ

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S1-30TB

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00038

Matrix: (soil/water) WATER Lab Sample ID: 3930.0

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2842

Level: (low/med) LOW Date Received: 5/27/91

% Moisture: not dec. 100. Date Analyzed: 6/ 3/91

Column: (pack/cap) PACK Dilution Factor: 1.00

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S2-28

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3933.4

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2837

Level: (low/med) LOW Date Received: 5/27/91

% Moisture: not dec. 100. Date Analyzed: 6/ 2/91

Column: (pack/cap) PACK Dilution Factor: 5.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	50.	U
74-83-9	Bromomethane	50.	U
75-01-4	Vinyl Chloride	50.	U
75-00-3	Chloroethane	50.	U
75-09-2	Methylene Chloride	25.	U
67-64-1	Acetone	50.	U
75-15-0	Carbon Disulfide	25.	U
75-35-4	1,1-Dichloroethene	25.	U
75-34-3	1,1-Dichloroethane	25.	U
540-59-0	1,2-Dichloroethene (total)	32.	
67-66-3	Chloroform	25.	U
107-06-2	1,2-Dichloroethane	25.	U
78-93-3	2-Butanone	50.	U
71-55-6	1,1,1-Trichloroethane	25.	
56-23-5	Carbon Tetrachloride	25.	U
108-05-4	Vinyl Acetate	50.	U
75-27-4	Bromodichloromethane	25.	U
78-87-5	1,2-Dichloropropane	25.	U
10061-01-5	cis-1,3-Dichloropropene	25.	U
79-01-6	Trichloroethene	38.	
124-48-1	Dibromochloromethane	25.	U
79-00-5	1,1,2-Trichloroethane	25.	U
71-43-2	Benzene	25.	U
10061-02-6	Trans-1,3-Dichloropropene	25.	U
75-25-2	Bromoform	25.	U
108-10-1	4-Methyl-2-Pentanone	50.	U
591-78-6	2-Hexanone	50.	U
127-18-4	Tetrachloroethene	940.	
79-34-5	1,1,2,2-Tetrachloroethane	25.	U
108-88-3	Toluene	25.	U
108-90-7	Chlorobenzene	25.	U
100-41-4	Ethylbenzene	25.	U
100-42-5	Styrene	25.	U
1330-20-7	Xylene (total)	25.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S2-28

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3933.4

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2837

Level: (low/med) LOW Date Received: 5/27/91

% Moisture: not dec. 100. Date Analyzed: 6/ 2/91

Column: (pack/cap) PACK Dilution Factor: 5.00

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

3 SZA-28

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3934.2

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2858

Level: (low/med) LOW Date Received: 5/27/91

% Moisture: not dec. 100. Date Analyzed: 6/ 3/91

Column: (pack/cap) PACK Dilution Factor: 10.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	100.	U
74-83-9	Bromomethane	100.	U
75-01-4	Vinyl Chloride	100.	U
75-00-3	Chloroethane	100.	U
75-09-2	Methylene Chloride	50.	U
67-64-1	Acetone	100.	U
75-15-0	Carbon Disulfide	50.	U
75-35-4	1,1-Dichloroethene	50.	U
75-34-3	1,1-Dichloroethane	50.	U
540-59-0	1,2-Dichloroethene (total)	38.	J
67-66-3	Chloroform	50.	U
107-06-2	1,2-Dichloroethane	50.	U
78-93-3	2-Butanone	~~100.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	50.	
56-23-5	Carbon Tetrachloride	50.	U
108-05-4	Vinyl Acetate	100.	U
75-27-4	Bromodichloromethane	50.	U
78-87-5	1,2-Dichloropropane	50.	U
10061-01-5	cis-1,3-Dichloropropene	50.	U
79-01-6	Trichloroethene	91.	
124-48-1	Dibromochloromethane	50.	U
79-00-5	1,1,2-Trichloroethane	50.	U
71-43-2	Benzene	50.	U
10061-02-6	Trans-1,3-Dichloropropene	50.	UJ
75-25-2	Bromoform	50.	U
108-10-1	4-Methyl-2-Pentanone	100.	U
591-78-6	2-Hexanone	100.	U
127-18-4	Tetrachloroethene	1500.	
79-34-5	1,1,2,2-Tetrachloroethane	50.	U
108-88-3	Toluene	50.	U
108-90-7	Chlorobenzene	50.	U
100-41-4	Ethylbenzene	50.	U
100-42-5	Styrene	50.	U
1330-20-7	Xylene (total)	50.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

3 SEA-28

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3934.2

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2858

Level: (low/med) LOW Date Received: 5/27/91

% Moisture: not dec. 100. Date Analyzed: 6/ 3/91

Column: (pack/cap) PACK Dilution Factor: 10.00

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S4-28

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3935.0

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2859

Level: (low/med) LOW Date Received: 5/27/91

Moisture: not dec. 100. Date Analyzed: 6/ 3/91

Column: (pack/cap) PACK Dilution Factor: 5.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	50.	U
74-83-9	Bromomethane	50.	U
75-01-4	Vinyl Chloride	50.	U
75-00-3	Chloroethane	50.	U
75-09-2	Methylene Chloride	25.	U
67-64-1	Acetone	50.	U
75-15-0	Carbon Disulfide	25.	U
75-35-4	1,1-Dichloroethene	25.	U
75-34-3	1,1-Dichloroethane	25.	U
540-59-0	1,2-Dichloroethene (total)	14.	J
67-66-3	Chloroform	25.	U
107-06-2	1,2-Dichloroethane	25.	U
78-93-3	2-Butanone	~~50.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	18.	J
56-23-5	Carbon Tetrachloride	25.	U
108-05-4	Vinyl Acetate	50.	U
75-27-4	Bromodichloromethane	25.	U
78-87-5	1,2-Dichloropropane	25.	U
10061-01-5	cis-1,3-Dichloropropene	25.	U
79-01-6	Trichloroethene	33.	
124-48-1	Dibromochloromethane	25.	U
79-00-5	1,1,2-Trichloroethane	25.	U
71-43-2	Benzene	25.	U
10061-02-6	Trans-1,3-Dichloropropene	25.	U
75-25-2	Bromoform	25.	U
108-10-1	4-Methyl-2-Pentanone	50.	U
591-78-6	2-Hexanone	50.	U
127-18-4	Tetrachloroethene	1100.	E
79-34-5	1,1,2,2-Tetrachloroethane	25.	U
108-88-3	Toluene	25.	U
108-90-7	Chlorobenzene	25.	U
100-41-4	Ethylbenzene	25.	U
100-42-5	Styrene	25.	U
1330-20-7	Xylene (total)	25.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S4-28

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3935.0

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2859

Level: (low/med) LOW Date Received: 5/27/91

% Moisture: not dec. 100. Date Analyzed: 6/ 3/91

Column: (packed/cap) PACK Dilution Factor: 5.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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TRILLIUM INC

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

TREATMENT SYSTEM SAMPLING

VOLATILES ANALYSES DATA

METHOD 524.2 ANALYSES

Samples Collected 5/27/91

Chemical Analyses Performed By

PACE, Incorporated

August 20, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

Foaming occurred during the analysis of Sample S5-25, S6-30, and S6-30DUP. The foaming was probably responsible for the poor comparability of results between the matrix spike and matrix spike duplicate.

Data quality for other samples in this sample delivery group was satisfactory.

Cooler temperature upon receipt of samples by the laboratory was 6°C.

Validation of organic data is conducted in conformance with Environmental Protection Agency (EPA) Functional Guidelines for Evaluating Organics Analyses, February 1, 1988, with modifications by EPA Region I, November 1, 1988.

Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified (valid) results mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Case Narrative

Five treatment system samples were collected and submitted to PACE, Inc. on May 27, 1991. The laboratory was requested to perform volatile organics analyses (VOA) using Method 524.2. The analyte list for this method was amended pursuant to the QA/QC Plan for this project.

The samples included in this Sample Delivery Group (SDG) are:

Client ID	Lab ID	Date of Collection
S1-30FB	3931	05/27/91
S5-25	3936	05/27/91
S6-30	3937	05/27/91
S6-30DUP	3938	05/27/91
S6-30TB	3939	05/27/91

Volatiles

The requirements to be checked in validation are listed below.

I. Holding Times

II. GC/MS Tuning

III. Calibration

A. Initial

B. Continuing

IV. Blanks

V. Surrogate Recovery

VI. Matrix Spike/Matrix Spike Duplicate

VII. Field Duplicates

VIII. Internal Standards Performance

IX. TCL Compound Identification

X. Compound Quantitation and Reported Detection Limits

XI. Tentatively Identified Compounds

XII. System Performance

XIII. Overall Assessment

I. Holding Times

All samples were analyzed within the 14-day holding time for preserved samples.

II. GC/MS Tuning

GC/MS tuning and mass calibrations were within criteria.

The Form V for the 6/7/91 (14:23) BFB tune did not match the raw data. Values found in the raw data did meet criteria.

III. Calibration

Areas were manually integrated for one or more compounds in each of the standards in this data package. No evaluation of these manual integrations can be performed, as no hard copy documentation was provided. Such documentation has been requested from the laboratory. The validation has been completed on the assumption that the manual integrations done and reported by the laboratory were valid and correct. No sample data appear to be affected.

A. Initial

Initial calibration criteria were met on 5/23/91. Initial calibration criteria were met on 6/10 with the exception of the % difference for 1,1,2,2-tetrachloroethane (actual 38.24; criteria 30). Data were not affected. Neither trichloroethene nor methylene chloride was included in the 0.2 ppb standard for the 6/10/91 initial calibration. This was inappropriate but did not affect data quality.

B. Continuing

Continuing calibration criteria were met on 6/6/91. Continuing calibration criteria were met on 6/7/91 with the exception of the % difference for vinyl chloride (actual 38.56; criteria 25). Data were not affected.

IV. Blanks

The trip blank, field blank, and method blanks were clean.

V. Surrogate Recovery

Surrogate recoveries were within acceptance criteria.

VI. Matrix Spike/Matrix Spike Duplicate

A matrix spike (MS) and matrix spike duplicate (MSD) were performed on Sample S6-30. Recoveries were within acceptance criteria. However, relative percent differences were above criteria for all five spiking compounds. This probably resulted from the foaming of the sample during analysis. No positive data were affected.

VII. Field Duplicates

Samples S6-30 and S6-30DUP were submitted as duplicate samples. No compounds were detected in either sample.

VIII. Internal Standards Performance

Internal standards areas and retention times were acceptable.

IX. TCL Compound Identification

TCL compound identifications were acceptable.

X. Compound Quantitation and Reported Detection Limits

The laboratory performed a practical quantitation limit (PQL) study for the Method 524.2 analyses for this project on October 15, 1990. Method detection limits (MDLs) determined through that PQL study should have been used for reporting purposes for these treatment system samples. MDLs determined through the PQL study were as follows:

Compound	MDL (ug/L)
Vinyl Chloride	0.48
Chloroethane	0.49
Methylene Chloride	4.41
1,1-Dichloroethene	0.67
1,1-Dichloroethane	0.54
trans-1,2-Dichloroethene	0.50
Chloroform	0.53
1,2-Dichloroethane	0.52
1,1,1-Trichloroethane	0.44
Carbon Tetrachloride	0.43
Bromodichloromethane	0.38
1,2-Dichloropropane	0.45
cis-1,3-Dichloropropene	0.33

Compound	MDL (ug/L)
Trichloroethene	0.42
Dibromochloromethane	0.33
1,1,2-Trichloroethane	0.43
Benzene	0.58
trans-1,3-Dichloropropene	0.07
Bromoform	0.49
Tetrachloroethene	0.51
1,1,2,2-Tetrachloroethane	0.44
Toluene	0.45
Chlorobenzene	0.44
Ethylbenzene	0.51
m-Xylene	0.48
o-, p-Xylene	0.93
1,2-Dichloroethane-d4	0.50
Toluene-d8	0.45
Bromofluorobenzene	0.36

Methylene chloride was reported in Samples S5-25, S6-30, and S6-30DUP at concentrations below the MDL determined by the PQL study for this project. The methylene chloride concentrations in these samples were corrected to be "ND."

The result reported for 1,1,1-trichloroethane in Sample S5-25 (30 ug/L) was beyond the calibration range of the instrument (25 ug/L). This result met precision and accuracy criteria.

All other results and detection limits were acceptable with regard to the supporting data.

XI. Tentatively Identified Compounds

No TICs were reported for this sample delivery group.

XII. System Performance

System performance was acceptable.

XIII. Overall Assessment of Data for a Case

Methylene chloride was corrected to be "ND" in Samples S5-25, S6-30, and S6-30DUP.

All other results were acceptable as reported.

UNIFIRST/ENSR PACE Project Number: 810527500

PACE Sample Number:			95 0039318
Date Collected:			05/27/91
Date Received:			05/27/91
Parameter	Units	MDL	S1-30 FB
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810527500

PACE Sample Number:			95 0039369
Date Collected:			05/27/91
Date Received:			05/27/91
Parameter	Units	MDL	S5-25
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~J.T~~ ND EKA 7/7/91
1,1-Dichloroethene	ug/L	0.5	1.8
1,1-Dichloroethane	ug/L	0.5	2.4
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	30
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810527500

PACE Sample Number:			95 0039377
Date Collected:			05/27/91
Date Received:			05/27/91
Parameter	Units	MDL	S6-30
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.3~~ ND EKS 7/7/91
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810527500

PACE Sample Number:			95 0039385
Date Collected:			05/27/91
Date Received:			05/27/91
Parameter	Units	MDL	S6-30 Dup
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.3~~ ND EKS 7/7/91
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR PACE Project Number: 810527500

PACE Sample Number:			95 0039393
Date Collected:			05/27/91
Date Received:			05/27/91
Parameter	Units	MDL	S6-30 TB
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

TRILLIUM INC

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

AREAL SAMPLING

VOLATILES ANALYSES DATA

Samples Collected 5/28/91

Chemical Analyses Performed By

PACE, Incorporated

August 16, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

No field QC samples, e.g., field duplicate, field blank, trip blank, or volume for matrix spike/matrix spike duplicate, were submitted with this sample delivery. Data quality was fair.

The laboratory reported in its case narrative that foaming occurred during the purging of the analyses of Samples UC141 and UC141RE. Surrogate recoveries were outside acceptance criteria for both samples. Although analyzed at the same dilution factor, the Forms I for these two samples showed little resemblance. Sample UC141 was analyzed three minutes beyond the 12-hour time limit for instrument BFB tuning. For the reasons described above, all reported positive results and detection limits for Sample UC141 were rejected. All detection limits and positive results for Sample UC141RE were qualified as estimated, and the results for the rerun should be used with caution.

Cooler temperature upon receipt of samples by the laboratory was 14°C. Cooler temperatures outside the 4°C ±2°C range may adversely affect the volatile compounds.

Validation of organic data is conducted in conformance with Environmental Protection Agency Functional Guidelines for Evaluating Organics Analyses, February 1, 1988.

Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified (valid) results mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Case Narrative

Five samples were collected and submitted to PACE, Inc. on May 30, 1991. No field QC samples were submitted with this sample delivery group. The laboratory was requested to perform volatile organics (VOA) target compound list (TCL) analyses.

The samples included in this sample delivery group are:

Client ID	Lab ID	Date of Collection
UC18	4108	05/28/91
UC72	4105	05/28/91
UC112	4107	05/28/91
UC141	4106	05/28/91
UC145	4104	05/28/91

Volatiles

The requirements to be checked in validation are listed below.

I. Holding Times

II. GC/MS Tuning

III. Calibration

A. Initial

B. Continuing

IV. Blanks

V. Surrogate Recovery

VI. Matrix Spike/Matrix Spike Duplicate

VII. Field Duplicates

VIII. Internal Standards Performance

IX. TCL Compound Identification

X. Compound Quantitation and Reported Detection Limits

XI. Tentatively Identified Compounds

XII. System Performance

XIII. Overall Assessment

I. Holding Times

All samples were analyzed within the 14-day holding time for preserved samples.

II. GC/MS Tuning

GC/MS tuning and mass calibrations were within criteria.

Sample UC141 was analyzed three minutes beyond the 12-hour time limit for instrument BFB tuning.

III. Calibration

Areas were manually integrated for one or more compounds in each of the standards in this data package. No evaluation of these manual integrations can be performed, as no hard copy documentation is provided. The validation has been completed on the assumption that the manual integrations done and reported by the laboratory were valid and correct. No positive data are affected.

A. Initial

Initial calibration criteria were met on 5/28/91 with the exception of the RRF for 2-butanone (actual 0.077; criteria 0.1). Detection limits for 2-butanone were rejected in all samples.

B. Continuing

Continuing calibration criteria were met on 6/5/91 with the exception of the RF for 2-butanone (actual 0.056; criteria 0.1) and the % difference for bromomethane (actual 48.9; criteria 25), methylene chloride (actual 33.4; criteria 25), vinyl acetate (actual 26.7; criteria 25), 4-methyl-2-pentanone (actual 29.0; criteria 25) and 2-hexanone (actual 26.0; criteria 25). The positive result for methylene chloride in Sample UC112 was qualified as estimated. Other data were not affected.

Continuing calibration criteria were met on 6/10/91 with the exception of the RF for 2-butanone (actual 0.064; criteria 0.1) and the % difference for acetone (actual 44.5; criteria 25), acetone (actual 46.6; criteria 25) and 4-methyl-2-pentanone (actual 30.3; criteria 25). Data were not affected.

Continuing calibration criteria were met on 6/11/91 with the exception of the RF for 2-butanone (actual 0.069; criteria

0.1) and vinyl acetate (actual 0.096; criteria 0.1). Detection limits for vinyl acetate were rejected in Samples UC18, UC72, UC141RE, and UC18RE.

IV. Blanks

Acetone was reported in the Method Blank VBLK01. No sample data were affected. No trip or field blanks were submitted.

Acetone reorted in Sample UC112 mostly likely resulted from laboratory contamination. Since field QC samples were not submitted, no qualification of this result could be made.

V. Surrogate Recovery

Surrogate recoveries for Sample UC141 were above QC criteria. Surrogate recoveries for Sample UC141RE were substantially below QC criteria. Foaming of the samples during analysis may have been responsible for the poor recoveries. All positive results and detection limits were qualified as estimated for Sample UC141RE. All positive results and detection limits were rejected for Sample UC141, as discussed further below.

All other surrogate recoveries were within acceptance criteria.

VI. Matrix Spike/Matrix Spike Duplicate

No matrix spike or matrix spike duplicate was submitted with this sample delivery group.

VII. Field Duplicates

No field duplicate sample was submitted with this sample delivery group. However, because Sample UC141 was reanalyzed by the laboratory, a comparison of sample results was made below.

Compound	UC141	UC141RE
Methylene Chloride	4	
1,1-Dichloroethane	5	
1,2-Dichloroethenes	5	9
1,1,1-Trichloroethane	5	
Trichloroethene	3	
Tetrachloroethene	7	9
Toluene	8	7

Agreement between these two samples was extremely poor. Because Sample UC141 was run outside the 12-hour time limit for BFB tuning, the sample foamed during analysis, and the results above do not agree with the rerun, all positive results and detection limits for Sample UC141 were rejected.

VIII. Internal Standards Performance

Internal standards areas and retention times were acceptable.

IX. TCL Compound Identification

TCL compound identifications were acceptable.

X. Compound Quantitation and Reported Detection Limits

The result reported for tetrachloroethene in Sample UC18 was beyond the calibration range of the instrument. The laboratory reanalyzed this sample at a dilution. The result for tetrachloroethene in Sample UC18 was rejected; the result in the rerun was accepted.

All other results and detection limits were acceptable with regard to the supporting data.

XI. Tentatively Identified Compounds

No TICs were reported for this SDG.

XII. System Performance

System performance was acceptable.

XIII. Overall Assessment of Data for a Case

Data quality for this sample delivery group was fair. Detection limits for 2-butanone were rejected all samples.

No field QC samples were submitted with this sample delivery group.

Positive results and detection limits were rejected for Sample UC141. Positive results and detection limits were qualified as estimated in the rerun, Sample UC141RE.

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

UC18

Lab Name: PACE Contract: 0000020

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4108.8

Sample wt/vol: 5. (g/mL) ML Lab File ID: G3334

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec.100. Date Analyzed: 6/11/91

Column: (pack/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	5.	U
67-64-1	Acetone	10.	U
75-15-0	Carbon Disulfide	5.	U
75-35-4	1,1-Dichloroethene	5.	U
75-34-3	1,1-Dichloroethane	5.	U
540-59-0	1,2-Dichloroethene (total)	5.	U
67-66-3	Chloroform	5.	U
107-06-2	1,2-Dichloroethane	5.	U
78-93-3	2-Butanone	~~10.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	8.	
56-23-5	Carbon Tetrachloride	5.	U
108-05-4	Vinyl Acetate	~~10.~~	~~U~~ R
75-27-4	Bromodichloromethane	5.	U
78-87-5	1,2-Dichloropropane	5.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U
79-01-6	Trichloroethene	3.	J
124-48-1	Dibromochloromethane	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U
71-43-2	Benzene	5.	U
10061-02-6	Trans-1,3-Dichloropropene	5.	U
75-25-2	Bromoform	5.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	~~110.~~	~~E~~ R
79-34-5	1,1,2,2-Tetrachloroethane	5.	U
108-88-3	Toluene	5.	U
108-90-7	Chlorobenzene	5.	U
100-41-4	Ethylbenzene	5.	U
100-42-5	Styrene	5.	U
1330-20-7	Xylene(total)	5.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

0000021

UC18

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4108.8

Sample wt/vol: 5. (g/mL) ML Lab File ID: G3334

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec.100. Date Analyzed: 6/11/91

Column: (pack/cap) PACK Dilution Factor: 1.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

UC18RE

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: 0000028 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4108.8RE

Sample wt/vol: 5. (g/mL) ML Lab File ID: G3339

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec.100. Date Analyzed: 6/12/91

Column: (pack/cap) PACK Dilution Factor: 5.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	50.	U
74-83-9	Bromomethane	50.	U
75-01-4	Vinyl Chloride	50.	U
75-00-3	Chloroethane	50.	U
75-09-2	Methylene Chloride	25.	U
67-64-1	Acetone	50.	U
75-15-0	Carbon Disulfide	25.	U
75-35-4	1,1-Dichloroethene	25.	U
75-34-3	1,1-Dichloroethane	25.	U
540-59-0	1,2-Dichloroethene (total)	25.	U
67-66-3	Chloroform	25.	U
107-06-2	1,2-Dichloroethane	25.	U
78-93-3	2-Butanone	~~50.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	25.	U
56-23-5	Carbon Tetrachloride	25.	U
108-05-4	Vinyl Acetate	~~50.~~	~~U~~ R
75-27-4	Bromodichloromethane	25.	U
78-87-5	1,2-Dichloropropane	25.	U
10061-01-5	cis-1,3-Dichloropropene	25.	U
79-01-6	Trichloroethene	25.	U
124-48-1	Dibromochloromethane	25.	U
79-00-5	1,1,2-Trichloroethane	25.	U
71-43-2	Benzene	25.	U
10061-02-6	Trans-1,3-Dichloropropene	25.	U
75-25-2	Bromoform	25.	U
108-10-1	4-Methyl-2-Pentanone	50.	U
591-78-6	2-Hexanone	50.	U
127-18-4	Tetrachloroethene	530.	
79-34-5	1,1,2,2-Tetrachloroethane	25.	U
108-88-3	Toluene	25.	U
108-90-7	Chlorobenzene	25.	U
100-41-4	Ethylbenzene	25.	U
100-42-5	Styrene	25.	U
1330-20-7	Xylene(total)	25.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

UC18RE

Lab Name: PACE Contract: 0000029

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4108.8RE

Sample wt/vol: 5. (g/mL) ML Lab File ID: G3339

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec.100. Date Analyzed: 6/12/91

Column: (pack/cap) PACK Dilution Factor: 5.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

UC72

Lab Name: PACE Contract: 0000034

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4105.3

Sample wt/vol: 5. (g/mL) ML Lab File ID: G3336

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec.100. Date Analyzed: 6/11/91

Column: (pack/cap) PACK Dilution Factor: 20.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	200.	U
74-83-9	Bromomethane	200.	U
75-01-4	Vinyl Chloride	200.	U
75-00-3	Chloroethane	200.	U
75-09-2	Methylene Chloride	100.	U
67-64-1	Acetone	200.	U
75-15-0	Carbon Disulfide	100.	U
75-35-4	1,1-Dichloroethene	100.	U
75-34-3	1,1-Dichloroethane	100.	U
540-59-0	1,2-Dichloroethene (total)	100.	U
67-66-3	Chloroform	100.	U
107-06-2	1,2-Dichloroethane	100.	U
78-93-3	2-Butanone	~~200.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	100.	U
56-23-5	Carbon Tetrachloride	100.	U
108-05-4	Vinyl Acetate	~~200.~~	~~U~~ R
75-27-4	Bromodichloromethane	100.	U
78-87-5	1,2-Dichloropropane	100.	U
10061-01-5	cis-1,3-Dichloropropene	100.	U
79-01-6	Trichloroethene	100.	U
124-48-1	Dibromochloromethane	100.	U
79-00-5	1,1,2-Trichloroethane	100.	U
71-43-2	Benzene	100.	U
10061-02-6	Trans-1,3-Dichloropropene	100.	U
75-25-2	Bromoform	100.	U
108-10-1	4-Methyl-2-Pentanone	200.	U
591-78-6	2-Hexanone	200.	U
127-18-4	Tetrachloroethene	2900.	
79-34-5	1,1,2,2-Tetrachloroethane	100.	U
108-88-3	Toluene	100.	U
108-90-7	Chlorobenzene	100.	U
100-41-4	Ethylbenzene	100.	U
100-42-5	Styrene	100.	U
1330-20-7	Xylene(total)	100.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

0000035

Lab Name: PACE Contract: UC72

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4105.3

Sample wt/vol: 5. (g/mL) ML Lab File ID: G3336

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec.100. Date Analyzed: 6/11/91

Column: (pack/cap) PACK Dilution Factor: 20.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

UC112

Lab Name: PACE Contract: 0000040

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4107.0

Sample wt/vol: 5. (g/mL) ML Lab File ID: G3310

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec.100. Date Analyzed: 6/ 5/91

Column: (pack/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	10.	J
67-64-1	Acetone	10.	U
75-15-0	Carbon Disulfide	5.	U
75-35-4	1,1-Dichloroethene	5.	U
75-34-3	1,1-Dichloroethane	5.	U
540-59-0	1,2-Dichloroethene (total)	4.	J
67-66-3	Chloroform	5.	U
107-06-2	1,2-Dichloroethane	5.	U
78-93-3	2-Butanone	~~10.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	5.	U
56-23-5	Carbon Tetrachloride	5.	U
108-05-4	Vinyl Acetate	10.	U
75-27-4	Bromodichloromethane	5.	U
78-87-5	1,2-Dichloropropane	5.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U
79-01-6	Trichloroethene	22.	
124-48-1	Dibromochloromethane	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U
71-43-2	Benzene	5.	U
10061-02-6	Trans-1,3-Dichloropropene	5.	U
75-25-2	Bromoform	5.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	130.	
79-34-5	1,1,2,2-Tetrachloroethane	5.	U
108-88-3	Toluene	5.	U
108-90-7	Chlorobenzene	5.	U
100-41-4	Ethylbenzene	5.	U
100-42-5	Styrene	5.	U
1330-20-7	Xylene(total)	5.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

UC112

Lab Name: PACE Contract: 000004

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4107.0

Sample wt/vol: 5. (g/mL) ML Lab File ID: G3310

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec.100. Date Analyzed: 6/ 5/91

Column: (pack/cap) PACK Dilution Factor: 1.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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VOLA..LE ORGANICS ANALYSIS DATA SHEET

'A SAMPLE NO.

UC141

Lab Name: PACE Contract: 0000042

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4106.1

Sample wt/vol: 5. (g/mL) ML Lab File ID: G3329

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec.100. Date Analyzed: 6/10/91

Column: (pack/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	~~10.~~	~~U~~ R
74-83-9	Bromomethane	~~10.~~	~~U~~
75-01-4	Vinyl Chloride	~~10.~~	~~U~~
75-00-3	Chloroethane	~~10.~~	~~U~~
75-09-2	Methylene Chloride	~~4.~~	J
67-64-1	Acetone	~~10.~~	~~U~~
75-15-0	Carbon Disulfide	~~5.~~	~~U~~
75-35-4	1,1-Dichloroethene	~~5.~~	~~U~~
75-34-3	1,1-Dichloroethane	~~5.~~	J
540-59-0	1,2-Dichloroethene (total)	~~15.~~	
67-66-3	Chloroform	~~5.~~	~~U~~
107-06-2	1,2-Dichloroethane	~~5.~~	~~U~~
78-93-3	2-Butanone	~~10.~~	~~U~~
71-55-6	1,1,1-Trichloroethane	~~5.~~	J
56-23-5	Carbon Tetrachloride	~~5.~~	~~U~~
108-05-4	Vinyl Acetate	~~10.~~	~~U~~
75-27-4	Bromodichloromethane	~~5.~~	~~U~~
78-87-5	1,2-Dichloropropane	5.	~~U~~
10061-01-5	cis-1,3-Dichloropropene	5.	~~U~~
79-01-6	Trichloroethene	3.	J
124-48-1	Dibromochloromethane	~~5.~~	~~U~~
79-00-5	1,1,2-Trichloroethane	~~5.~~	~~U~~
71-43-2	Benzene	~~5.~~	~~U~~
10061-02-6	Trans-1,3-Dichloropropene	~~5.~~	~~U~~
75-25-2	Bromoform	~~5.~~	~~U~~
108-10-1	4-Methyl-2-Pentanone	~~10.~~	~~U~~
591-78-6	2-Hexanone	~~10.~~	~~U~~
127-18-4	Tetrachloroethene	7.	
79-34-5	1,1,2,2-Tetrachloroethane	5.	~~U~~
108-88-3	Toluene	8.	
108-90-7	Chlorobenzene	5.	~~U~~
100-41-4	Ethylbenzene	5.	~~U~~
100-42-5	Styrene	5.	~~U~~
1330-20-7	Xylene(total)	~~4.~~	J

1E

VOLA~~LE ORGANICS ANALYSIS DATA SHEET
TE. .ATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

UC141

b Name: PACE Contract: 0000050

.ab Code: PACE Case No.: EPC SAS No.: SDG No.:

' trix: (soil/water) WATER Lab Sample ID: 4106.1

;ample wt/vol: 5. (g/mL) ML Lab File ID: G3329

.vel: (low/med) LOW Date Received: 5/31/91

. Moisture: not dec.100. Date Analyzed: 6/10/91

:olumn: (pack/cap) PACK Dilution Factor: 1.00

..mber TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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VOLATILE ORGANICS ANALYSIS DATA SHEET

?A SAMPLE NO.

0000062

UC141 RE

ab Name: PACE Contract:

ab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4106.1

ample wt/vol: 5. (g/mL) ML Lab File ID: G3337

Level: (low/med) LOW Date Received: 5/31/91

Moisture: not dec.100. Date Analyzed: 6/11/91

Column: (pack/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10.	U J
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	5.	U
67-64-1	Acetone	10.	U
75-15-0	Carbon Disulfide	5.	U
75-35-4	1,1-Dichloroethene	5.	U
75-34-3	1,1-Dichloroethane	5.	U
540-59-0	1,2-Dichloroethene (total)	9.	
67-66-3	Chloroform	5.	U
107-06-2	1,2-Dichloroethane	5.	U
78-93-3	2-Butanone	~~10.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	5.	U J
56-23-5	Carbon Tetrachloride	5.	U J
108-05-4	Vinyl Acetate	~~10.~~	~~U~~ R
75-27-4	Bromodichloromethane	5.	U J
78-87-5	1,2-Dichloropropane	5.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U
79-01-6	Trichloroethene	5.	U
124-48-1	Dibromochloromethane	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U
71-43-2	Benzene	5.	U
10061-02-6	Trans-1,3-Dichloropropene	5.	U
75-25-2	Bromoform	5.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	9.	
79-34-5	1,1,2,2-Tetrachloroethane	5.	U
108-88-3	Toluene	7.	
108-90-7	Chlorobenzene	5.	U
100-41-4	Ethylbenzene	5.	U
100-42-5	Styrene	5.	U
1330-20-7	Xylene(total)	5.	U

1E
VOLA LE ORGANICS ANALYSIS DATA SHEET
TE. ATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

UC141 RE

ab Name: PACE Contract: 0000063

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

atrix: (soil/water) WATER Lab Sample ID: 4106.1

ample wt/vol: 5. (g/mL) ML Lab File ID: G3337

Level: (low/med) LOW Date Received: 5/31/91

Moisture: not dec.100. Date Analyzed: 6/11/91

Column: (pack/cap) PACK Dilution Factor: 1.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

UC145

Lab Name: PACE Contract: 0000070

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4104.5

Sample wt/vol: 5. (g/mL) ML Lab File ID: G3321

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec.100. Date Analyzed: 6/10/91

Column: (pack/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	5.	U
67-64-1	Acetone	10.	U
75-15-0	Carbon Disulfide	5.	U
75-35-4	1,1-Dichloroethene	5.	U
75-34-3	1,1-Dichloroethane	5.	U
540-59-0	1,2-Dichloroethene (total)	5.	U
67-66-3	Chloroform	5.	U
107-06-2	1,2-Dichloroethane	5.	U
78-93-3	2-Butanone	~~10.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	5.	U
56-23-5	Carbon Tetrachloride	5.	U
108-05-4	Vinyl Acetate	10.	U
75-27-4	Bromodichloromethane	5.	U
78-87-5	1,2-Dichloropropane	5.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U
79-01-6	Trichloroethene	5.	
124-48-1	Dibromochloromethane	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U
71-43-2	Benzene	5.	U
10061-02-6	Trans-1,3-Dichloropropene	5.	U
75-25-2	Bromoform	5.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	80.	
79-34-5	1,1,2,2-Tetrachloroethane	5.	U
108-88-3	Toluene	5.	U
108-90-7	Chlorobenzene	5.	U
100-41-4	Ethylbenzene	5.	U
100-42-5	Styrene	5.	U
1330-20-7	Xylene(total)	5.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

UC145

Lab Name: PACE Contract: 0000071

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4104.5

Sample wt/vol: 5. (g/mL) ML Lab File ID: G3321

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec.100. Date Analyzed: 6/10/91

Column: (pack/cap) PACK Dilution Factor: 1.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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TRILLIUM INC

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

TREATMENT SYSTEM SAMPLING

VOLATILES ANALYSES DATA

Samples Collected 5/28/91

Chemical Analyses Performed By

PACE, Incorporated

August 20, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

Data quality for this sample delivery group was good.

Cooler temperature upon receipt of samples by the laboratory was 12°C. Cooler temperatures outside the 4°C ±2°C range may adversely affect the volatile compounds.

Validation of organic data is conducted in conformance with Environmental Protection Agency (EPA) Functional Guidelines for Evaluating Organics Analyses, February 1, 1988, with modifications by EPA Region I, November 1, 1988.

Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified (valid) results mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Case Narrative

Eight samples (including matrix spike and matrix spike duplicate) were collected and submitted to PACE, Inc. on May 28, 1991. The laboratory was requested to perform volatile organics (VOA) target compound list (TCL) analyses.

The samples included in this Sample Delivery Group (SDG) are:

Client ID	Lab ID	Date of Collection
S1-31	3942	05/28/91
S1-31DUP	3943	05/28/91
S1-31TB	3944	05/28/91
S2-29	3947	05/28/91
S3A-29	3948	05/28/91
S4-29	3949	05/28/91

Volatiles

The requirements to be checked in validation are listed below.

I. Holding Times

II. GC/MS Tuning

III. Calibration

A. Initial

B. Continuing

IV. Blanks

V. Surrogate Recovery

VI. Matrix Spike/Matrix Spike Duplicate

VII. Field Duplicates

VIII. Internal Standards Performance

IX. TCL Compound Identification

X. Compound Quantitation and Reported Detection Limits

XI. Tentatively Identified Compounds

XII. System Performance

XIII. Overall Assessment

I. Holding Times

All samples were received preserved and analyzed within the 14-day holding time for preserved samples.

II. GC/MS Tuning

GC/MS tuning and mass calibrations were within criteria.

III. Calibration

Manual areas were integrated for one or more compounds in each of the standards in this data package. No evaluation of these manual integrations can be performed, as no hard copy documentation is provided. The validation has been completed on the assumption that the manual integrations done and reported by the laboratory were valid and correct. No data appear to be affected.

A. Initial

Initial calibration criteria were met on 5/28/91.

B. Continuing

Continuing calibration criteria were met on 6/4/91 with the exception of the % difference for chloromethane (actual 28.1; criteria 25), acetone (actual 28.8; criteria 25), 2-butanone (actual 36.1; criteria 25), vinyl acetate (actual 25.5; criteria 25), 4-methyl-2-pentanone (actual 26.7; criteria 25), and 2-hexanone (actual 30.2; criteria 25). Data were not affected.

Continuing calibration criteria were met on 6/5/91 with the exception of the RF for 2-butanone (actual 0.087; criteria 0.1) and the % difference for acetone (actual 32.4; criteria 25), 2-butanone (actual 47.3; criteria 25), vinyl acetate (actual 32.7; criteria 25), 4-methyl-2-pentanone (actual 36.5; criteria 25), 2-hexanone (actual 37.5; criteria 25), and 1,1,2,2-tetrachloroethane (actual 31.8; criteria 25). The detection limit for 2-butanone was rejected in Sample S2-29. Other data were not affected.

IV. Blanks

Method blanks and the trip blank were clean.

V. Surrogate Recovery

Surrogate recoveries were within acceptance criteria.

VI. Matrix Spike/Matrix Spike Duplicate

The matrix spike (MS) and matrix spike duplicate (MSD) were performed on Sample S1-31. The percent recoveries for 1,1-dichloroethene in the MS and MSD were below QC criteria. No positive results for 1,1-dichloroethene were reported in field samples, so data were not affected.

VII. Field Duplicates

Compounds and concentrations (in ug/L) reported in Samples S1-31 and S1-31DUP were as follows:

Compound	S1-31	S1-31DUP
Acetone		150
Trichloroethene	110	93
Tetrachloroethene	4100	3600

With the exception of acetone, the above results were within QC criteria. Since acetone was reported in only one of the duplicate samples, this value is rejected in the duplicate.

VIII. Internal Standards Performance

Internal standards areas and retention times were acceptable.

IX. TCL Compound Identification

TCL compound identifications were acceptable.

X. Compound Quantitation and Reported Detection Limits

The result reported for tetrachloroethene in Sample S4-29 was beyond the calibration range of the instrument. This result was within precision and accuracy criteria and was accepted as reported.

All other results and detection limits were acceptable with regard to the supporting data.

XI. Tentatively Identified Compounds

No TICs were reported for this SDG.

XII. System Performance

System performance was acceptable, with the exception of manual integrations.

XIII. Overall Assessment of Data for a Case

Data quality for this sample delivery group was good. The detection limit for 2-butanone was rejected in Sample S2-29.

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S1-31

Lab Name: PACE Contract: 90120

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3942.3

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2864

Level: (low/med) LOW Date Received: 5/29/91

Moisture: not dec. 100. Date Analyzed: 6/ 4/91

Column: (pack/cap) PACK Dilution Factor: 20.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
74-87-3	Chloromethane	200.	U
74-83-9	Bromomethane	200.	U
75-01-4	Vinyl Chloride	200.	U
75-00-3	Chloroethane	200.	U
75-09-2	Methylene Chloride	100.	U
67-64-1	Acetone	200.	U
75-15-0	Carbon Disulfide	100.	U
75-35-4	1,1-Dichloroethene	100.	U
75-34-3	1,1-Dichloroethane	100.	U
540-59-0	1,2-Dichloroethene (total)	100.	U
67-66-3	Chloroform	100.	U
107-06-2	1,2-Dichloroethane	100.	U
78-93-3	2-Butanone	200.	U
71-55-6	1,1,1-Trichloroethane	100.	U
56-23-5	Carbon Tetrachloride	100.	U
108-05-4	Vinyl Acetate	200.	U
75-27-4	Bromodichloromethane	100.	U
78-87-5	1,2-Dichloropropane	100.	U
10061-01-5	cis-1,3-Dichloropropene	100.	U
79-01-6	Trichloroethene	110.	
124-48-1	Dibromochloromethane	100.	U
79-00-5	1,1,2-Trichloroethane	100.	U
71-43-2	Benzene	100.	U
10061-02-6	Trans-1,3-Dichloropropene	100.	U
75-25-2	Bromoform	100.	U
108-10-1	4-Methyl-2-Pentanone	200.	U
591-78-6	2-Hexanone	200.	U
127-18-4	Tetrachloroethene	4100.	E
79-34-5	1,1,2,2-Tetrachloroethane	100.	U
108-88-3	Toluene	100.	U
108-90-7	Chlorobenzene	100.	U
100-41-4	Ethylbenzene	100.	U
100-42-5	Styrene	100.	U
1330-20-7	Xylene (total)	100.	U

MM 6/25/91

EPA SAMPLE NO.

S1-31

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: 00021 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3942.3

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2864

Level: (low/med) LOW Date Received: 5/29/91

% Moisture: not dec. 100. Date Analyzed: 6/ 4/91

Column: (pack/cap) PACK Dilution Factor: 20.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S1-31DUP

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00027

Matrix: (soil/water) WATER Lab Sample ID: 3943.1

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2867

Level: (low/med) LOW Date Received: 5/29/91

Moisture: not dec. 100. Date Analyzed: 6/ 4/91

Column: (pack/cap) PACK Dilution Factor: 20.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
74-87-3	Chloromethane	200.	U
74-83-9	Bromomethane	200.	U
75-01-4	Vinyl Chloride	200.	U
75-00-3	Chloroethane	200.	U
75-09-2	Methylene Chloride	100.	U
67-64-1	Acetone	~~150.~~	~~J~~ R
75-15-0	Carbon Disulfide	100.	U
75-35-4	1,1-Dichloroethene	100.	U
75-34-3	1,1-Dichloroethane	100.	U
540-59-0	1,2-Dichloroethene (total)	100.	U
67-66-3	Chloroform	100.	U
107-06-2	1,2-Dichloroethane	100.	U
78-93-3	2-Butanone	200.	U
71-55-6	1,1,1-Trichloroethane	100.	U
56-23-5	Carbon Tetrachloride	100.	U
108-05-4	Vinyl Acetate	200.	U
75-27-4	Bromodichloromethane	100.	U
78-87-5	1,2-Dichloropropane	100.	U
10061-01-5	cis-1,3-Dichloropropene	100.	U
79-01-6	Trichloroethene	93.	J
124-48-1	Dibromochloromethane	100.	U
79-00-5	1,1,2-Trichloroethane	100.	U
71-43-2	Benzene	100.	U
10061-02-6	Trans-1,3-Dichloropropene	100.	U
75-25-2	Bromoform	100.	U
108-10-1	4-Methyl-2-Pentanone	200.	U
591-78-6	2-Hexanone	200.	U
127-18-4	Tetrachloroethene	3600.	
79-34-5	1,1,2,2-Tetrachloroethane	100.	U
108-88-3	Toluene	100.	U
108-90-7	Chlorobenzene	100.	U
100-41-4	Ethylbenzene	100.	U
100-42-5	Styrene	100.	U
1330-20-7	Xylene (total)	100.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S1-31DUP

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00028

Matrix: (soil/water) WATER Lab Sample ID: 3943.1

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2867

Level: (low/med) LOW Date Received: 5/29/91

% Moisture: not dec. 100. Date Analyzed: 6/ 4/91

Column: (pack/cap) PACK Dilution Factor: 20.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S1-31TB

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3944.0

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2868

Level: (low/med) LOW Date Received: 5/29/91

% Moisture: not dec. 100. Date Analyzed: 6/ 4/91

Column: (pack/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	5.	U
67-64-1	Acetone	10.	U
75-15-0	Carbon Disulfide	5.	U
75-35-4	1,1-Dichloroethene	5.	U
75-34-3	1,1-Dichloroethane	5.	U
540-59-0	1,2-Dichloroethene (total)	5.	U
67-66-3	Chloroform	5.	U
107-06-2	1,2-Dichloroethane	5.	U
78-93-3	2-Butanone	10.	U
71-55-6	1,1,1-Trichloroethane	5.	U
56-23-5	Carbon Tetrachloride	5.	U
108-05-4	Vinyl Acetate	10.	U
75-27-4	Bromodichloromethane	5.	U
78-87-5	1,2-Dichloropropane	5.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U
79-01-6	Trichloroethene	5.	U
124-48-1	Dibromochloromethane	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U
71-43-2	Benzene	5.	U
10061-02-6	Trans-1,3-Dichloropropene	5.	U
75-25-2	Bromoform	5.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	5.	U
79-34-5	1,1,2,2-Tetrachloroethane	5.	U
108-88-3	Toluene	5.	U
108-90-7	Chlorobenzene	5.	U
100-41-4	Ethylbenzene	5.	U
100-42-5	Styrene	5.	U
1330-20-7	Xylene (total)	5.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S1-31TB

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3944.0

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2868

Level: (low/med) LOW Date Received: 5/29/91

% Moisture: not dec. 100. Date Analyzed: 6/ 4/91

Column: (pack/cap) PACK Dilution Factor: 1.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S2-29

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3947.4

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2883

Level: (low/med) LOW Date Received: 5/29/91

Moisture: not dec. 100. Date Analyzed: 6/ 5/91

Column: (pack/cap) PACK Dilution Factor: 5.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	50.	U
74-83-9	Bromomethane	50.	U
75-01-4	Vinyl Chloride	50.	U
75-00-3	Chloroethane	50.	U
75-09-2	Methylene Chloride	25.	U
67-64-1	Acetone	49.	J
75-15-0	Carbon Disulfide	25.	U
75-35-4	1,1-Dichloroethene	25.	U
75-34-3	1,1-Dichloroethane	25.	U
540-59-0	1,2-Dichloroethene (total)	28.	
67-66-3	Chloroform	25.	U
107-06-2	1,2-Dichloroethane	25.	U
78-93-3	2-Butanone	~~50.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	24.	J
56-23-5	Carbon Tetrachloride	25.	U
108-05-4	Vinyl Acetate	50.	U
75-27-4	Bromodichloromethane	25.	U
78-87-5	1,2-Dichloropropane	25.	U
10061-01-5	cis-1,3-Dichloropropene	25.	U
79-01-6	Trichloroethene	33.	
124-48-1	Dibromochloromethane	25.	U
79-00-5	1,1,2-Trichloroethane	25.	U
71-43-2	Benzene	25.	U
10061-02-6	Trans-1,3-Dichloropropene	25.	U
75-25-2	Bromoform	25.	U
108-10-1	4-Methyl-2-Pentanone	50.	U
591-78-6	2-Hexanone	50.	U
127-18-4	Tetrachloroethene	780.	
79-34-5	1,1,2,2-Tetrachloroethane	25.	U
108-88-3	Toluene	25.	U
108-90-7	Chlorobenzene	25.	U
100-41-4	Ethylbenzene	25.	U
100-42-5	Styrene	25.	U
1330-20-7	Xylene (total)	25.	U

EPA SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S2-29

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: [illegible] 6

Matrix: (soil/water) WATER Lab Sample ID: 3947.4

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2883

Level: (low/med) LOW Date Received: 5/29/91

% Moisture: not dec. 100. Date Analyzed: 6/ 5/91

Column: (pack/cap) PACK Dilution Factor: 5.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S3A-29

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3948.2

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2870

Level: (low/med) LOW Date Received: 5/29/91

% Moisture: not dec. 100. Date Analyzed: 6/ 4/91

Column: (pack/cap) PACK Dilution Factor: 10.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
74-87-3	Chloromethane	100.	U
74-83-9	Bromomethane	100.	U
75-01-4	Vinyl Chloride	100.	U
75-00-3	Chloroethane	100.	U
75-09-2	Methylene Chloride	50.	U
67-64-1	Acetone	100.	U
75-15-0	Carbon Disulfide	50.	U
75-35-4	1,1-Dichloroethene	50.	U
75-34-3	1,1-Dichloroethane	50.	U
540-59-0	1,2-Dichloroethene (total)	41.	J
67-66-3	Chloroform	50.	U
107-06-2	1,2-Dichloroethane	50.	U
78-93-3	2-Butanone	100.	U
71-55-6	1,1,1-Trichloroethane	53.	
56-23-5	Carbon Tetrachloride	50.	U
108-05-4	Vinyl Acetate	100.	U
75-27-4	Bromodichloromethane	50.	U
78-87-5	1,2-Dichloropropane	50.	U
10061-01-5	cis-1,3-Dichloropropene	50.	U
79-01-6	Trichloroethene	98.	
124-48-1	Dibromochloromethane	50.	U
79-00-5	1,1,2-Trichloroethane	50.	U
71-43-2	Benzene	50.	U
10061-02-6	Trans-1,3-Dichloropropene	50.	U
75-25-2	Bromoform	50.	U
108-10-1	4-Methyl-2-Pentanone	100.	U
591-78-6	2-Hexanone	100.	U
127-18-4	Tetrachloroethene	1600.	
79-34-5	1,1,2,2-Tetrachloroethane	50.	U
108-88-3	Toluene	50.	U
108-90-7	Chlorobenzene	50.	U
100-41-4	Ethylbenzene	50.	U
100-42-5	Styrene	50.	U
1330-20-7	Xylene (total)	50.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S3A-29

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 50

Matrix: (soil/water) WATER Lab Sample ID: 3948.2

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2870

Level: (low/med) LOW Date Received: 5/29/91

% Moisture: not dec. 100. Date Analyzed: 6/ 4/91

Column: (pack/cap) PACK Dilution Factor: 10.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S4-29

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00

Matrix: (soil/water) WATER Lab Sample ID: 3949.0

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2871

Level: (low/med) LOW Date Received: 5/29/91

% Moisture: not dec. 100. Date Analyzed: 6/ 4/91

Column: (packl/cap) PACK Dilution Factor: 10.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
74-87-3	Chloromethane	100.	U
74-83-9	Bromomethane	100.	U
75-01-4	Vinyl Chloride	100.	U
75-00-3	Chloroethane	100.	U
75-09-2	Methylene Chloride	50.	U
67-64-1	Acetone	100.	U
75-15-0	Carbon Disulfide	50.	U
75-35-4	1,1-Dichloroethene	50.	U
75-34-3	1,1-Dichloroethane	50.	U
540-59-0	1,2-Dichloroethene (total)	50.	U
67-66-3	Chloroform	50.	U
107-06-2	1,2-Dichloroethane	50.	U
78-93-3	2-Butanone	100.	U
71-55-6	1,1,1-Trichloroethane	41.	J
56-23-5	Carbon Tetrachloride	50.	U
108-05-4	Vinyl Acetate	100.	U
75-27-4	Bromodichloromethane	50.	U
78-87-5	1,2-Dichloropropane	50.	U
10061-01-5	cis-1,3-Dichloropropene	50.	U
79-01-6	Trichloroethene	77.	
124-48-1	Dibromochloromethane	50.	U
79-00-5	1,1,2-Trichloroethane	50.	U
71-43-2	Benzene	50.	U
10061-02-6	Trans-1,3-Dichloropropene	50.	U
75-25-2	Bromoform	50.	U
108-10-1	4-Methyl-2-Pentanone	100.	U
591-78-6	2-Hexanone	100.	U
127-18-4	Tetrachloroethene	2300.	E
79-34-5	1,1,2,2-Tetrachloroethane	50.	U
108-88-3	Toluene	50.	U
108-90-7	Chlorobenzene	50.	U
100-41-4	Ethylbenzene	50.	U
100-42-5	Styrene	50.	U
1330-20-7	Xylene (total)	50.	U

EPA SAMPLE NO.

S4-29

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 3 1 07

Matrix: (soil/water) WATER Lab Sample ID: 3949.0

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2871

Level: (low/med) LOW Date Received: 5/29/91

% Moisture: not dec. 100. Date Analyzed: 6/ 4/91

Column: (packed/cap) PACK Dilution Factor: 10.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
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TRILLIUM INC

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

TREATMENT SYSTEM SAMPLING

VOLATILES ANALYSES DATA

METHOD 524.2 ANALYSES

Samples Collected 5/28/91

Chemical Analyses Performed By

PACE, Incorporated

August 20, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

Data quality for samples in this sample delivery group was good.

Detection limits were estimated in Sample S6-31TB because internal standard areas were below QC limits.

Cooler temperature upon receipt of samples by the laboratory was 15°C. Temperatures outside the 4°C ±2°C range may adversely affect the volatile compounds.

Validation of organic data is conducted in conformance with Environmental Protection Agency (EPA) Functional Guidelines for Evaluating Organics Analyses, February 1, 1988, with modifications by EPA Region I, November 1, 1988.

Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified (valid) results mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Case Narrative

Five treatment system samples were collected and submitted to PACE, Inc. on May 28, 1991. The laboratory was requested to perform volatile organics analyses (VOA) using Method 524.2. The analyte list for this method was amended pursuant to the QA/QC Plan for this project.

The samples included in this Sample Delivery Group (SDG) are:

Client ID	Lab ID	Date of Collection
S1-31FB	3945	05/28/91
S5-26	3950	05/28/91
S6-31	3951	05/28/91
S6-31DUP	3952	05/28/91
S6-31TB	3953	05/28/91

Sample S6-31TB was incorrectly referred to throughout the data package as S6-31FB.

Volatiles

The requirements to be checked in validation are listed below.

I. Holding Times

II. GC/MS Tuning

III. Calibration

A. Initial

B. Continuing

IV. Blanks

V. Surrogate Recovery

VI. Matrix Spike/Matrix Spike Duplicate

VII. Field Duplicates

VIII. Internal Standards Performance

IX. TCL Compound Identification

X. Compound Quantitation and Reported Detection Limits

XI. Tentatively Identified Compounds

XII. System Performance

XIII. Overall Assessment

I. Holding Times

All samples were analyzed within the 14-day holding time for preserved samples.

II. GC/MS Tuning

GC/MS tuning and mass calibrations were within criteria.

III. Calibration

Areas were manually integrated for one or more compounds in each of the standards in this data package. No evaluation of these manual integrations can be performed, as no hard copy documentation was provided. Such documentation has been requested from the laboratory. The validation has been completed on the assumption that the manual integrations done and reported by the laboratory were valid and correct. No sample data appear to be affected.

A. Initial

Initial calibration criteria were met on 5/23/91. Initial calibration criteria were met on 6/10/91 with the exception of the % difference for 1,1,2,2-tetrachloroethane (actual 38.24; criteria 30). Data were not affected. Neither trichloroethene nor methylene chloride was included in the 0.2 ppb standard for the 6/10/91 initial calibration. This was inappropriate but did not affect data quality. Initial calibration criteria were met on 6/11/91.

B. Continuing

Continuing calibration criteria were met on 6/7/91 with the exception of the % difference for vinyl chloride (actual 38.56; criteria 25). Data were not affected.

IV. Blanks

The trip blank, field blank, and method blanks were clean.

V. Surrogate Recovery

The recovery for toluene-d8 was above QC criteria for Sample S6-31TB. This sample was rerun with acceptable results; however, the rerun was performed more than 12 hours after the preceding BFB tune. No positive results were reported for Sample S6-31TB; detection limits were qualified as estimated.

All other surrogate recoveries were within acceptance criteria.

VI. Matrix Spike/Matrix Spike Duplicate

A matrix spike (MS) and matrix spike duplicate (MSD) were performed on Sample S6-31. Data were within QC criteria.

VII. Field Duplicates

Samples S6-31 and S6-31DUP were submitted as duplicate samples. No compounds were detected in either sample.

VIII. Internal Standards Performance

Internal standard areas were below criteria in Sample S6-31TB for all three internal standards. No positive results were reported for this sample; however, all detection limits were previously estimated.

All other internal standards areas and retention times were acceptable.

IX. TCL Compound Identification

TCL compound identifications were acceptable.

X. Compound Quantitation and Reported Detection Limits

The laboratory performed a practical quantitation limit (PQL) study for the Method 524.2 analyses for this project on October 15, 1990. Method detection limits (MDLs) determined through that PQL study should have been used for reporting purposes for these treatment system samples. MDLs determined through the PQL study were as follows:

Compound	MDL (ug/L)
Vinyl Chloride	0.48
Chloroethane	0.49
Methylene Chloride	4.41
1,1-Dichloroethene	0.67
1,1-Dichloroethane	0.54
trans-1,2-Dichloroethene	0.50
Chloroform	0.53
1,2-Dichloroethane	0.52

Compound	MDL (ug/L)
1,1,1-Trichloroethane	0.44
Carbon Tetrachloride	0.43
Bromodichloromethane	0.38
1,2-Dichloropropane	0.45
cis-1,3-Dichloropropene	0.33
Trichloroethene	0.42
Dibromochloromethane	0.33
1,1,2-Trichloroethane	0.43
Benzene	0.58
trans-1,3-Dichloropropene	0.07
Bromoform	0.49
Tetrachloroethene	0.51
1,1,2,2-Tetrachloroethane	0.44
Toluene	0.45
Chlorobenzene	0.44
Ethylbenzene	0.51
m-Xylene	0.48
o-, p-Xylene	0.93
1,2-Dichloroethane-d4	0.50
Toluene-d8	0.45
Bromofluorobenzene	0.36

Methylene chloride was reported in Samples S6-31 and S6-31DUP at concentrations below the MDL determined by the PQL study for this project. The methylene chloride concentrations in these samples were corrected to be "ND."

The result reported for 1,1,1-trichloroethane in Sample S5-26 (28 ug/L) was beyond the calibration range of the instrument (25 ug/L). This result met precision and accuracy criteria.

All other results and detection limits were acceptable with regard to the supporting data.

XI. Tentatively Identified Compounds

One tentatively identified compound was reported in the trip blank at a retention time of 20.96. No other TICs were reported for this sample delivery group.

XII. System Performance

System performance was acceptable.

XIII. Overall Assessment of Data for a Case

Methylene chloride was corrected to be "ND" in Samples S6-31 and S6-31DUP.

Detection limits were estimated in Sample S6-31TB.

All other results were acceptable as reported.

UNIFIRST/ENSR

Project# 810529.5010 0 0 3 0

PACE Sample Number:			95 0039458
Date Collected:			05/23/91
Date Received:			05/29/91
Parameter	Units	MDL	S1-31 FB
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR

Project# 810529.501

04034

PACE Sample Number:			95 0039504
Date Collected:			05/23/91
Date Received:			05/29/91
Parameter	Units	MDL	S5-26
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	1.5
1,1-Dichloroethane	ug/L	0.5	2.1
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	28
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR

Project# 810529.501

00041

PACE Sample Number:			95 0039512
Date Collected:			05/23/91
Date Received:			05/29/91
Parameter	Units	MDL	S6-31

ORGANIC ANALYSIS

VOLATILE ORGANICS BY 524.2 MODIFIED

Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.2~~ ND EKD 7/7/91
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR

Project# 810529.501

00046

PACE Sample Number:			95 0039520
Date Collected:			05/23/91
Date Received:			05/29/91
Parameter	Units	MDL	S6-31 Dup
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.2~~ ND LKD 7/7/91
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR

Project# 810529.581 00051

PACE Sample Number:			95 0039539
Date Collected:			05/23/91
Date Received:			05/29/91
Parameter	Units	MDL	S6-31 ~~FB~~ TB ECL 7/7/91

ORGANIC ANALYSIS

VOLATILE ORGANICS BY 524.2 MODIFIED

Vinyl chloride	ug/L	0.5	ND KW ECL 7/7/91
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

00052

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

S6-31 TB EB

Lab Name: Pace Inc Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) Water Lab Sample ID: 3953 9

Sample wt/vol: _____ (g/mL) ____ Lab File ID: >F1105

Level: (low/med) _____ Date Received: 5/29/91

% Moisture: not dec. _____ Date Analyzed: 6/10/91

Column: (pack/cap) cap Dilution Factor: _____

Number TICs found: 1 CONCENTRATION UNITS: (ug/L or ug/Kg) _____

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. —	UNKNOWN	20.96	5 ug/L	
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
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17.				
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24.				
25.				
26.				
27.				
28.				
29.				
30.				

TRILLIUM INC

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

TREATMENT SYSTEM SAMPLING

INORGANIC ANALYSES DATA

Samples Collected 5/28/91

Chemical Analyses Performed By

PACE, Incorporated

August 20, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

EXECUTIVE SUMMARY

Metals analytical data presented for this sample delivery group were fair. Much of the data was qualified as estimated. In addition, several positive sample results were rejected due to blank contamination. All unqualified sample data may be used without reservation.

Validation of inorganic laboratory data is conducted in conformance with Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses (2/89) and associated checklist. These guidelines and checklist are intended to evaluate data on a technical basis rather than a contract compliance basis for chemical analyses conducted under the USEPA's Contract Laboratory Program (CLP) and assumes that the data package is presented in accordance with the CLP requirements. In addition, the data package is assumed to represent the best efforts of the laboratory and has already been subjected to adequate and sufficient quality review prior to submission for validation.

Results of analyses are reported by the laboratory as either qualified or unqualified. Unqualified results mean that the reported values may be used without reservations. Qualified results indicate a nonroutine (with respect to CLP procedures) situation occurred during the course of analysis. Various qualifier codes associated with the numerical results are used by the laboratory to denote specific information regarding the analytical results. During the process of validation, laboratory qualified and unqualified data are verified against supporting documentation. Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified results still mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: Analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Inorganic Data Validation

for

Environmental Project Control, Inc.

Samples Collected 4/26/91

Case Narrative

This group contained five treatment system samples including one field blank to be analyzed for metals and cyanide.

Samples validated in this report are noted below:

Client ID	Lab ID	Date of Collection
S1-31	3954	5/28/91
Cyanide	3960	
S1-31FB	3956	5/28/91
Cyanide	3962	
S6-31	3957	5/28/91
Cyanide	3963	
S1A-29 (Iron only)	3958	5/28/91
S2-29 (Iron only)	3959	5/28/91

The areas reviewed during validation are listed below.

TRILLIUM INC

CLP Inorganics Data Validation

I. Holding Times

II. Calibration

III. Blanks

IV. ICP Interference Check Sample

V. Matrix Spike Sample Analysis

VI. Duplicate Sample Analysis

VII. Laboratory Control Sample Analysis

VIII. Furnace Atomic Absorption Analysis

IX. ICP Serial Dilution Analysis

X. Detection Limits

XI. Sample Result Verification

XII. Overall Assessment

Data Validation

I. Holding Times

All metals analyses were conducted within acceptable holding times.

Cyanide analyses were conducted within acceptable holding times.

II. Calibration

Calibrations for metals were satisfactory.

Calibration for cyanide was satisfactory.

One of the standards analyzed to establish the calibration curve for AA must be at the CRDL. The CRDL for antimony is 60 ppb, and the highest standard analyzed was 45 ppb. Since antimony was not detected above 20 ppb in any sample (including the matrix spike), data quality was not affected.

A standard at twice the CRDL was analyzed for ICP analytes. All analytes met the acceptance criteria with the exception of silver which was not recovered. The SOW states that "if the 2xCRDL standard for ICP is not within ± 20% of the true value, results near the CRDL are questionable. Estimate (J) positive results less than 3xCRDL and (UJ) non-detected results." All recoveries were acceptable.

III. Blanks

No preparation or calibration blanks were above the CRDLs or less than the negative CRDLs.

Continuing calibration blank for lead (0.9 ppb) and selenium (1.0 ppb) were greater than the IDLs.

The field blank contained copper (5.0 ppb), iron (277 ppb), lead (0.9 ppb), manganese (2 ppb), silver (14 ppb), sodium (526 ppb), vanadium (7.0 ppb), and zinc (29 ppb).

Values at or below the action level (five times the highest blank value) were qualified with a "U" at the reported value. Copper, iron, lead, manganese, silver, vanadium, and zinc results were affected.

Detection limits were raised for antimony (0.9) and thallium (1.1) because of the negative blank values.

IV. ICP Interference Check Sample

Interference check sample results were satisfactory.

V. Matrix Spike Sample Analysis

Matrix spike analyses were satisfactory except for barium (9.0% recovery), selenium (66% recovery), silver (46% recovery), and thallium (62.8% recovery). Positive results for the above analytes were qualified as estimated (J). Detection limits for selenium, silver, and thallium were qualified as estimated (UJ). Detection limits for barium were qualified as rejected (R).

VI. Duplicate Sample Analysis

Duplicate analyses were satisfactory.

VII. Laboratory Control Sample Analyses

Laboratory control sample results were satisfactory.

VIII. Furnace Atomic Absorption Analysis

Duplicate injections were performed for all samples and agreed within ±20%.

IX. ICP Serial Dilution Analysis

Serial dilutions were conducted on S1-31. All results met the validation criteria of 15%.

X. Detection Limits

Instrument detection limits (IDLs) should be less than the contract required detection limits (CRDLs). The IDL reported for mercury is equal to its CRDL. Mercury was not detected in any of the samples, so no data were qualified.

XI. Sample Result Verification

Sample results were acceptable as qualified.

XII. Other QC

Samples were not analyzed for total and dissolved metals. Therefore, no additional QC was available.

XIII. Overall Assessment

Continuing calibration blank for lead (0.9 ppb) and selenium (1.0 ppb) were greater than the IDLs.

The field blank contained copper (5.0 ppb), iron (277 ppb), lead (0.9 ppb), manganese (2 ppb), silver (14 ppb), sodium (526 ppb), vanadium (7.0 ppb), and zinc (29 ppb).

Values at or below the action level (five times the highest blank value) were qualified with a "U" at the reported value. Copper, iron, lead, manganese, silver, vanadium, and zinc results were affected.

Detection limits were raised for antimony (0.9) and thallium (1.1) because of the negative blank values.

Matrix spike analyses were satisfactory except for barium (9.0% recovery), selenium (66% recovery), silver (46% recovery), and thallium (62.8% recovery). Positive results for the above analytes were qualified as estimated (J). Detection limits for selenium, silver, and thallium were qualified as estimated (UJ). Detection limits for barium were qualified as rejected (R).

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

S1-31

00019

Lab Name: PACE_INCORPORATED_____ Contract: EPC_~~00020~~ 00019

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: S1-31_

Matrix (soil/water): WATER Lab Sample ID: 3954.7____

Level (low/med): LOW__ Date Received: 05/29/91

% Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum_	195_	U		P_	
7440-36-0	Antimony_	~~0.80~~_	U		F_	0.9 U
7440-38-2	Arsenic__	1.0_	U		F_	
7440-39-3	Barium___	17.0_	~~B~~	~~N~~ J	P_	J
7440-41-7	Beryllium	1.1_	U		P_	
7440-43-9	Cadmium__	3.0_	U		P_	
7440-70-2	Calcium__	88400_			P_	
7440-47-3	Chromium_	9.5_	U		P_	
7440-48-4	Cobalt___	6.4_	U		P_	
7440-50-8	Copper___	6.0_	~~B~~		P_	U
7439-89-6	Iron_____	131_			P_	U
7439-92-1	Lead_____	0.90_	~~B~~		F_	U
7439-95-4	Magnesium	10300_			P_	
7439-96-5	Manganese	3.0_	~~B~~		P_	U
7439-97-6	Mercury__	0.20_	U		CV	
7440-02-0	Nickel___	8.6_	U		P_	
7440-09-7	Potassium	2650_	~~B~~		P_	
7782-49-2	Selenium_	0.50_	U	~~WN~~	F_	J
7440-22-4	Silver___	24.0_		~~N~~	P_	UJ
7440-23-5	Sodium___	73000_			P_	
7440-28-0	Thallium_	~~0.70~~_	~~U~~	~~WN~~	F_	1.1 UJ
7440-62-2	Vanadium_	6.0_	~~B~~		P_	U
7440-66-6	Zinc_____	132_			P_	U
_____	Cyanide__				NR	

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: ___

Comments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

S1-31FB

ogc 6/28/91 00020

Lab Name: PACE_INCORPORATED_____ Contract: EPC_____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: S1-31_

Matrix (soil/water): WATER Lab Sample ID: 3956.3____

Level (low/med): LOW__ Date Received: 05/29/91

% Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum_	195_	U		P_	
7440-36-0	Antimony_	~~0.80~~	~~U~~		F_	0.9 U
7440-38-2	Arsenic__	1.0_	U		F_	
7440-39-3	Barium___	12.5_	~~U~~		P_	R
7440-41-7	Beryllium	1.1_	U		P_	
7440-43-9	Cadmium__	3.0_	U		P_	
7440-70-2	Calcium__	448_	U		P_	
7440-47-3	Chromium_	9.5_	U		P_	
7440-48-4	Cobalt___	6.4_	U		P_	
7440-50-8	Copper___	5.0_	B		P_	
7439-89-6	Iron____	277_			P_	
7439-92-1	Lead____	0.90_	~~B~~		F_	U
7439-95-4	Magnesium	509_	U		P_	
7439-96-5	Manganese	2.0_	B		P_	
7439-97-6	Mercury__	0.20_	U		CV	
7440-02-0	Nickel___	8.6_	U		P_	
7440-09-7	Potassium	760_	U		P_	
7782-49-2	Selenium_	0.50_	U		F_	J
7440-22-4	Silver___	14.0_			P_	J
7440-23-5	Sodium___	526_	~~B~~		P_	
7440-28-0	Thallium_	~~0.70~~	~~U~~		F_	1.1 UJ
7440-62-2	Vanadium_	7.0_	~~B~~		P_	
7440-66-6	Zinc____	29.0_			P_	
	Cyanide__				NR	

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: ___

Comments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

S6-31

ab Name: PACE_INCORPORATED_____ Contract: EPC 00021

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: S1-31_

atrix (soil/water): WATER Lab Sample ID: 3957.1____

Level (low/med): LOW__ Date Received: 05/29/91

% Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum_	195_	U		P_	
7440-36-0	Antimony_	~~0.80~~	~~U~~		F_	0.9 U
7440-38-2	Arsenic__	1.0_	U		F_	
7440-39-3	Barium___	16.0_	~~B~~	~~N~~	P_	J
7440-41-7	Beryllium	1.1_	U		P_	
7440-43-9	Cadmium__	3.0_	U		P_	
7440-70-2	Calcium__	89200_			P_	
7440-47-3	Chromium_	9.5_	U		P_	
7440-48-4	Cobalt___	6.4_	U		P_	
7440-50-8	Copper___	5.0_	~~B~~		P_	U
7439-89-6	Iron_____	97.7_	U		P_	
7439-92-1	Lead_____	1.8_	~~B~~		F_	U
7439-95-4	Magnesium	10400_			P_	
7439-96-5	Manganese	3.0_	~~B~~		P_	U
7439-97-6	Mercury__	0.20_	U		CV	
7440-02-0	Nickel___	8.6_	U		P_	
7440-09-7	Potassium	2550_	~~B~~		P_	
7782-49-2	Selenium_	0.50_	U	~~WN~~	F_	J
7440-22-4	Silver___	9.0_	~~B~~	~~N~~	P_	UJ
7440-23-5	Sodium___	75800_			P_	
7440-28-0	Thallium_	~~0.70~~	~~U~~	~~WN~~	F_	1.1 UJ
7440-62-2	Vanadium_	4.2_	U		P_	
7440-66-6	Zinc_____	113_			P_	U
_____	Cyanide__				NR	

olor Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

lor After: COLORLESS Clarity After: CLEAR_ Artifacts: ___

omments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

S1A-29

ab Name: PACE_INCORPORATED_____ Contract: EPC 00022

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: S1-31_

atrix (soil/water): WATER Lab Sample ID: 3958.0____

evel (low/med): LOW__ Date Received: 05/29/91

% Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_				NR
7440-36-0	Antimony_				NR
7440-38-2	Arsenic__				NR
7440-39-3	Barium___				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium__				NR
7440-70-2	Calcium__				NR
7440-47-3	Chromium_				NR
7440-48-4	Cobalt___				NR
7440-50-8	Copper___				NR
7439-89-6	Iron_____	97.7_	U		P_
7439-92-1	Lead_____				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury__				NR
7440-02-0	Nickel___				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium_				NR
7440-22-4	Silver___				NR
7440-23-5	Sodium___				NR
7440-28-0	Thallium_				NR
7440-62-2	Vanadium_				NR
7440-66-6	Zinc_____				NR
	Cyanide__				NR

olor Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

olor After: COLORLESS Clarity After: CLEAR_ Artifacts: ___

omments:

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

S2-29

ıb Name: PACE_INCORPORATED_____ Contract: EPC00023

ab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: S1-31_

trix (soil/water): WATER Lab Sample ID: 3959.8____

vel (low/med): LOW__ Date Received: 05/29/91

Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_				NR
7440-36-0	Antimony_				NR
7440-38-2	Arsenic__				NR
7440-39-3	Barium___				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium__				NR
7440-70-2	Calcium__				NR
7440-47-3	Chromium_				NR
7440-48-4	Cobalt___				NR
7440-50-8	Copper___				NR
7439-89-6	Iron_____	2330_			P_
7439-92-1	Lead_____				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury__				NR
7440-02-0	Nickel___				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium_				NR
7440-22-4	Silver___				NR
7440-23-5	Sodium___				NR
7440-28-0	Thallium_				NR
7440-62-2	Vanadium_				NR
7440-66-6	Zinc_____				NR
_____	Cyanide__				NR

olor Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

or After: COLORLESS Clarity After: CLEAR_ Artifacts: ___

omments:

FORM I - IN 7/87

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

S1-31

ıb Name: PACE_INCORPORATED_____ Contract: EPC 00024

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: S1-31_

ıtrix (soil/water): WATER Lab Sample ID: 3960.1____

'evel (low/med): LOW__ Date Received: 05/29/91

, Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_				NR
7440-36-0	Antimony_				NR
7440-38-2	Arsenic__				NR
7440-39-3	Barium___				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium__				NR
7440-70-2	Calcium__				NR
7440-47-3	Chromium_				NR
7440-48-4	Cobalt___				NR
7440-50-8	Copper___				NR
7439-89-6	Iron____				NR
7439-92-1	Lead____				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury__				NR
7440-02-0	Nickel___				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium_				NR
7440-22-4	Silver___				NR
7440-23-5	Sodium___				NR
7440-28-0	Thallium_				NR
7440-62-2	Vanadium_				NR
7440-66-6	Zinc____				NR
	Cyanide__	10_	U		AS

c_or Before: _____ Clarity Before: _____ Texture: _____

c .or After: _____ Clarity After: _____ Artifacts: ___

omments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

S1-31FB

Lab Name: PACE_INCORPORATED_____ Contract: 88025

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: S1-31_

Matrix (soil/water): WATER Lab Sample ID: 3962.8____

Level (low/med): LOW__ Date Received: 05/29/91

% Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_				NR
7440-36-0	Antimony_				NR
7440-38-2	Arsenic__				NR
7440-39-3	Barium___				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium__				NR
7440-70-2	Calcium__				NR
7440-47-3	Chromium_				NR
7440-48-4	Cobalt___				NR
7440-50-8	Copper___				NR
7439-89-6	Iron____				NR
7439-92-1	Lead____				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury__				NR
7440-02-0	Nickel___				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium_				NR
7440-22-4	Silver___				NR
7440-23-5	Sodium___				NR
7440-28-0	Thallium_				NR
7440-62-2	Vanadium_				NR
7440-66-6	Zinc____				NR
	Cyanide__	10_	U		AS

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: ___

Comments:

_____

_____

_____

_____

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1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

S6-31

b Name: PACE_INCORPORATED_____ Contract: 00026

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: S1-31_

trix (soil/water): WATER Lab Sample ID: 3963.6____

vel (low/med): LOW__ Date Received: 05/29/91

% Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_				NR
7440-36-0	Antimony_				NR
7440-38-2	Arsenic__				NR
7440-39-3	Barium___				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium__				NR
7440-70-2	Calcium__				NR
7440-47-3	Chromium_				NR
7440-48-4	Cobalt___				NR
7440-50-8	Copper___				NR
7439-89-6	Iron_____				NR
7439-92-1	Lead_____				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury__				NR
7440-02-0	Nickel___				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium_				NR
7440-22-4	Silver___				NR
7440-23-5	Sodium___				NR
7440-28-0	Thallium_				NR
7440-62-2	Vanadium_				NR
7440-66-6	Zinc_____				NR
	Cyanide__	10	U		AS

olor Before: _____ Clarity Before: _____ Texture: _____

c or After: _____ Clarity After: _____ Artifacts: ___

omments:

TRILLIUM INC

DATA VALIDATION REPORT

FOR

WELLS G&H PROJECT

TREATMENT SYSTEM SAMPLING

SEMIVOLATILES ANALYSIS DATA
Samples Collected May 28, 1991

Chemical Analyses Performed by:

PACE, Incorporated

August 19, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

All three samples in this Sample Delivery Group (SDG) were re-extracted and re-analyzed well beyond the established holding time due to a problem with the method blank in the original extraction batch. All re-extraction analysis results are estimated (J, UJ).

Results for 4-nitroaniline and 3,3'-dichlorobenzidine were rejected in all original and re-extracted samples; detection limits for 3-nitroaniline were estimated in all original and re-extracted samples. Detection limits for 4-chloroaniline a di-n-butylphthalate were estimated in the re-extracted samples only.

Results reported for diethyl phthalate in the three re-extracted samples were rejected as blank contaminants, and modified to "10 U" for reporting purposes. A positive result reported for N-nitroso-di-n-propylamine in S1-31 FB was rejected as a false positive, and modified to "10 U" for reporting purposes.

Bis(2-ethylhexyl)phthalate was detected in S6-31RE at 150 ug/L and was not detected in the original run of this sample; this phthalate also was not detected in any of the blanks in this SDG, but is a very common laboratory contaminant. Its presence in this sample should be considered suspect.

No tentatively identified compounds were reported in any of the samples in this SDG, but one large early-eluting peak (retention time approximately 6.5 minutes) is clearly visible in Sample S1-31, Sample S1-31RE, and both the MS and MSD pairs. The lab has been requested to provide documentation of this peak to complete the data package.

With the qualifications and modifications described above, there are no reportable TCL compounds and a single potentially reportable TIC in the samples in this SDG. It is recommended that the <u>original</u> analysis results be used in favor of the re-extracted sample data.

Problems identified on the Chain of Custody (COC) records include: (1) 3 COC's are included although only 2 are pertinent to this data package; (2) affiliations are not included with any of the transfer signatures; (3) cold storage of the samples is not documented; (4) separate entries should not be made for MS/MSD samples; and (5) documentation of corrections is inconsistent. In addition, the Case Narrative states that the samples were received at the laboratory on May 20, 1991; it is clear from the COC records that the samples did not arrive until May 21, 1991.

Validation of the data package is conducted in conformance with Environmental Protection Agency (EPA) Functional Guidelines for Evaluating Organics Analyses, February 1, 1988, with modifications by EPA Region I, November 1, 1988.

Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified (valid) results mean that the reported values may be used without reservations. Validator-qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: Analyte may or may not be present.)

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying Form I's copied from the data package to qualify some of the results as appropriate based on the findings of the data review.

TRILLIUM INC

Case Narrative

Five water samples (including separate samples for matrix spike/matrix spike duplicate) were collected on May 28, 1991 and received by Pace, Inc. on May 29, 1991. Analysis of semivolatile organic compounds according to EPA Contract Laboratory Program (CLP) Statement of Work 2/88 was performed.

The following samples are included in this Sample Delivery Group (SDG):

Client ID	Lab ID	Collection Date
S1-31	3964	5/28/91
S1-31 FB	3965	5/28/91
S6-31	3966	5/28/91

Semivolatiles analysis results for these samples were reported by the laboratory under Project Number 810529.501.

Semivolatiles

The areas reviewed during the semivolatiles validation procedure are listed below.

I. Holding Times

II. GC/MS Tuning

III. Calibration

A. Initial

B. Continuing

IV. Blanks

V. Surrogate Recovery

VI. Matrix Spike/Matrix Spike Duplicate

VII. Field Duplicates

VIII. Internal Standards Performance

IX. TCL Compound Identification

X. Compound Quantitation and Reported Detection Limits

XI. Tentatively Identified Compounds

XII. System Performance

XIII. Overall Assessment

I. Holding Times

All samples were extracted and analyzed within the established holding times. Due to an error in the preparation of the method blank with the original extraction batch, all samples were re-extracted almost 3 weeks after collection; this is well outside the 7-day established holding time. All results for the re-extracted sample analyses are estimated, "J" or "UJ".

The COC records do not indicate that the samples were placed in cold storage in the field, at the time of collection. It can be inferred that the samples were placed in coolers from the notations of cooler temperatures made on 5/29/91 on the COC's. Cold storage is a form of preservation and must be documented, or the validator must assume it was not performed. No qualifiers are applied to the results in this case.

II. GC/MS Tuning

GC/MS tuning and mass calibrations were within criteria.

III. Calibration

Manual areas were integrated for one or more compounds in most of the standards in this data package. No evaluation of these manual integrations can be done as no hardcopy documentation is provided. The validation has been completed on the assumption that the manual integrations done and reported by the laboratory were valid and correct. No internal standard (IS) or surrogate peaks were manually integrated; data do not appear to be affected.

A. Initial

All samples in this SDG were analyzed under an initial calibration (IC) performed on 6/19/91. All criteria were met for this calibration with the exception of the Percent Relative Standard Deviation (%RSD) for 4-chloroaniline (37.5), 3-nitroaniline (41.4), and 3,3'-dichlorobenzidine (44.7). No data are affected.

All samples in this SDG were re-analyzed under an IC performed on 6/25/91. Response Factors (RF) for two compounds are below the 0.05 minimum criterion: 4-nitroaniline (0.040) and 3,3'-dichlorobenzidine (0.039). Detection limits for these two analytes are rejected in Samples S1-31RE, S1-31 FBRE, and S6-31RE. In addition, the following %RSD's exceeded the maximum 30% criterion:

Naphthalene (37.4)
4-Chloroaniline (50.9)
Acenaphthylene (37.5)
3-Nitroaniline (51.9)
Diethyl phthalate (46.0)
Fluorene (34.7)
Di-n-butyl phthalate (55.6)

Detection limits for 4-chloroaniline, 3-nitroaniline, and di-n-butyl phthalate are qualified as estimated, "UJ", in Samples S1-31RE, S1-31FBRE, and S6-31RE.

B. Continuing

Samples S1-31, S1-31FB, and S6-31 were also run under a continuing calibration (CC) standard on 6/21/91. All criteria were met in this calibration except the RF's for 4-nitroaniline (0.045) and 3,3'-dichlorobenzidine (0.048), and the %D for 3-nitroaniline (64.2), 2,4-dinitrophenol (43.8), 2,4-dinitrotoluene (26.6), 4-nitroaniline (46.4), and 3,3'-dichlorobenzidine (36.8). Detection limits for 4-nitroaniline and 3,3'-dichlorobenzidine were rejected in Samples S1-31, S1-31 FB and S6-31, and detection limits for 3-nitroaniline were estimated in these three samples.

Samples S1-31RE, S1-31FBRE, and S6-31RE were run immediately after the IC on 6/25/91, with no separate CC standard. This is a valid procedure; no data are affected.

An additional CC standard was run on 6/26/91. RF's were below the 0.05 minimum criterion for 4-nitroaniline (0.049) and for 3-nitroaniline (0.038). In addition, the %D exceeded 25% for the following analytes:

4-chloroaniline (49.8)
Hexachlorocyclopentadiene (35.3)
Acenaphthylene (26.7)
3-Nitroaniline (49.7)
Di-n-butyl phthalate (41.5)
3,3'-dichlorobenzidine (79.3)

Only S1-31MSRE was analyzed under this CC from this SDG. No field sample data are affected.

IV. Blanks

SBLK1 was incorrectly spiked with the base/neutral spike solution instead of the base/neutral surrogate solution at the time of preparation on 5/31/91. Analysis results on 6/21/91, therefore, show no recovery of the base/neutral surrogates and positive results for the following compounds: 1,4-dichlorobenzene; N-

Nitroso-di-n-propylamine; 1,2,4-trichlorobenzene; acenaphthene; 2,4-dinitrotoluene; and pyrene. Di-n-butyl phthalate is also detected in this blank. Compared to the normal spiking levels, recoveries for the base/neutral spike compounds in the blank are very good, ranging from 74-111%. A positive result (1. J) for 4-nitrophenol in this blank is rejected, as this analyte does not appear on the quant report. No di-n-butyl phthalate was detected in any of the samples in this SDG, therefore no data are affected by its presence in this blank. The six spike compounds also were not detected in any of the original sample analyses.

SBLK6 was prepared on 6/24/91 with the re-extractions of the samples in this SDG. Diethyl phthalate was detected at 7 ug/L; no unknown peaks were observed or reported. Reported low levels of diethyl phthalate in S1-31RE, S1-31 FBRE, and S6-31RE are rejected as blank contaminants, and modified to 10 U for reporting purposes.

In the original analysis of the field blank, S1-31FB, N-nitroso-di-n-propylamine is reported as being found at 14. ug/L; a "B" qualifier is also applied. This value is rejected as a false positive because the retention time does not match the associated standard. [Note that the data system often misidentifies the nitrobenzene-d5 peak as N-nitroso-di-n-propylamine. That is the case here as well.] No target or tentatively identified compounds are detected in this analysis of the field blank.

In the re-analyzed field blank, diethyl phthalate is detected at 4 ug/L, and is qualified "BJ" by the laboratory. This result is rejected as a lab blank contaminant, and is modified to 10 U for reporting purposes.

Based on the similarity of the results between the original and re-extracted samples, and the good recoveries for the base/neutral spike compounds as well as the acid surrogates in the original blank, there appears to be no effect on the technical quality of the original data from the incorrectly prepared blank. It is, therefore, recommended that the original sample results be used in favor of the re-extracted results, due to the exceeded holding time in the latter.

V. Surrogate Recovery

All surrogate recoveries were within established acceptance limits, except for the base/neutral surrogates in SBLK5, which were not added at the time of extraction. No data are affected.

VI. Matrix Spike/Matrix Spike Duplicate

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were performed on Sample S1-31 and S1-31RE. All Percent Recovery (%R) and Relative Percent Difference (RPD) values were within established QC criteria except %R for 2,4-dinitrotoluene (actual 98%, limits 24-96%) in S1-31MS and %R for 4-nitrophenol (actual 9%, limits 10-80%) in S1-31REMS. No data are affected.

VII. Field Duplicates

No field duplicate pair was included with this SDG.

VIII. Internal Standards Performance

All internal standard areas and retention times were within the established QC limits for acceptance.

IX. TCL Compound Identification

N-nitroso-di-n-propylamine was incorrectly reported as 14 B in S1-31 FB; no spectrum was provided to confirm this result. The retention time for this "hit" on the quant report is the same as the retention time for nitrobenzene-d5; this is a typical misidentification made by the datasystem. This result is rejected as a false positive, and modified to 10 U for reporting purposes.

All other target compound identifications were reported and documented satisfactorily.

X. Compound Quantitation and Reported Detection Limits

Results and quantitation limits are correctly reported; no dilutions were performed in this SDG.

XI. Tentatively Identified Compounds

No TIC's are reported in the samples in this SDG. One large unidentified peak is, however, visible in Sample S1-31 and its rerun, S1-31RE; the peak is also observed in the MS and MSD runs of this sample. A library search and corrected Form I-TIC has been requested from the laboratory to properly document this peak.

XII. System Performance

No system performance problems were observed in the raw data presented in this data package.

XIII. Overall Assessment

Sample results are usable as reported with the following exceptions:

1. All results for S1-31RE, S1-31 FBRE, and S6-31RE are estimated (J, UJ) due to the missed holding time on re-extraction.

2. Detection limits for 4-nitroaniline and 3,3'-dichlorobenzidine are rejected in Samples S1-31, S1-31 FB, and S6-31 due to low RF's in the continuing calibration standard.

3. Detection limits for 3-nitroaniline are estimated in Samples S1-31, S1-31 FB, and S6-31 due to a high %D in the associated continuing calibration standard.

4. Detection limits for 4-nitroaniline and 3,3'-dichlorobenzidine are rejected in Samples S1-31RE, S1-31 FBRE, and S6-31RE due to low RF's in the associated initial calibration.

5. Detection limits for 4-chloroaniline, 3-nitroaniline, and di-n-butyl phthalate are estimated in Samples S1-31RE, S1-31 FBRE, and S6-31RE due to high %RSD's in the associated initial calibration.

6. Positive results for diethyl phthalate in S1-31RE, S1-31 FBRE, and S6-31RE are modified to none detected at the quantitation limit due to associated blank contamination.

7. The positive result reported for N-nitroso-di-n-propylamine in S1-31 FB is rejected as a false positive, and modified to none detected at the quantitation limit.

It is recommended that the <u>original</u> analysis results be used in favor of the re-extracted sample results, due in large part to the significantly exceeded holding time in the latter.

Incomplete, unclear, or inaccurate Chain of Custody (COC) records can jeopardize the legal value of sample results regardless of the technical quality of the data. The following problems were observed on the COC records included in this data package:

1. More custody records are included than are pertinent to this package; this could cause confusion as to the disposition of the rest of the data requested on the COC's.

2. Transfer signatures are incomplete: the affiliation of the person involved is not included for any of the signatures and the third COC does not contain an "Accepted by" signature.

3. Corrections to the forms are made as "write-overs", and are not initialled or dated (corrections should be made by crossing out the incorrect entry with a single line, writing in the correct entry, and initialling and dating the entry).

4. Cold storage is not documented, except for references to cooler temperatures added to the COC's on 5/29/91.

5. MS/MSD analyses are a laboratory-initiated quality control activity; there should not be separate samples on the COC identified as "MS" and "MSD".

Manually integrated areas should be documented in the data package to allow review of the integration method used.

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

S1-31 023

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3964.4

Sample wt/vol: 1000. (g/mL) ML Lab File ID: D2771

Level: (low/med) LOW Date Received: 5/29/91

Moisture: not dec.100. dec. 0. Date Extracted: 5/31/91

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 6/21/91

PC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-95-2	Phenol	10.	U
111-44-4	bis(2-Chloroethyl)ether	10.	U
95-57-8	2-Chlorophenol	10.	U
541-73-1	1,3-Dichlorobenzene	10.	U
106-46-7	1,4-Dichlorobenzene	10.	U
100-51-6	Benzyl alcohol	10.	U
95-50-1	1,2-Dichlorobenzene	10.	U
95-48-7	2-Methylphenol	10.	U
108-60-1	bis(2-Chloroisopropyl)ether	10.	U
106-44-5	4-Methylphenol	10.	U
621-64-7	N-Nitroso-di-n-propylamine	10.	U
67-72-1	Hexachloroethane	10.	U
98-95-3	Nitrobenzene	10.	U
78-59-1	Isophorone	10.	U
88-75-5	2-Nitrophenol	10.	U
105-67-9	2,4-Dimethylphenol	10.	U
65-85-0	Benzoic acid	50.	U
111-91-1	bis(2-Chloroethoxy)methane	10.	U
120-83-2	2,4-Dichlorophenol	10.	U
120-82-1	1,2,4-Trichlorobenzene	10.	U
91-20-3	Naphthalene	10.	U
106-47-8	4-Chloroaniline	10.	U
87-68-3	Hexachlorobutadiene	10.	U
59-50-7	4-Chloro-3-methylphenol	10.	U
91-57-6	2-Methylnaphthalene	10.	U
77-47-4	Hexachlorocyclopentadiene	10.	U
88-06-2	2,4,6-Trichlorophenol	10.	U
95-95-4	2,4,5-Trichlorophenol	50.	U
91-58-7	2-Chloronaphthalene	10.	U
88-74-4	2-Nitroaniline	50.	U
131-11-3	Dimethylphthalate	10.	U
208-96-8	Acenaphthylene	10.	U
606-20-2	2,6-Dinitrotoluene	10.	U

1C

SEMIVOLA' .E ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S1-31

00024

ab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

atrix: (soil/water) WATER Lab Sample ID: 3964.4

Sample wt/vol: 1000. (g/mL) ML Lab File ID: D2771

evel: (low/med) LOW Date Received: 5/29/91

% Moisture: not dec.100. dec. 0. Date Extracted: 5/31/91

xtraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 6/21/91

PC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
99-09-2	3-Nitroaniline	50.	~~U~~ UJ
83-32-9	Acenaphthene	10.	U
51-28-5	2,4-Dinitrophenol	50.	U
100-02-7	4-Nitrophenol	50.	U
132-64-9	Dibenzofuran	10.	U
121-14-2	2,4-Dinitrotoluene	10.	U
84-66-2	Diethylphthalate	10.	U
7005-72-3	4-Chlorophenyl-phenylether	10.	U
86-73-7	Fluorene	10.	U
100-01-6	4-Nitroaniline	~~50.~~	~~U~~ R
534-52-1	4,6-Dinitro-2-methylphenol	50.	U
86-30-6	N-Nitrosodiphenylamine	10.	U
101-55-3	4-Bromophenyl-phenylether	10.	U
118-74-1	Hexachlorobenzene	10.	U
87-86-5	Pentachlorophenol	50.	U
85-01-8	Phenanthrene	10.	U
120-12-7	Anthracene	10.	U
84-74-2	Di-n-butylphthalate	10.	U
206-44-0	Fluoranthene	10.	U
129-00-0	Pyrene	10.	U
85-68-7	Butylbenzylphthalate	10.	U
91-94-1	3,3'-Dichlorobenzidine	~~20.~~	~~U~~ R
56-55-3	Benzo(a)anthracene	10.	U
218-01-9	Chrysene	10.	U
117-81-7	bis(2-Ethylhexyl)phthalate	10.	U
117-84-0	Di-n-octylphthalate	10.	U
205-99-2	Benzo(b)fluoranthene	10.	U
207-08-9	Benzo(k)fluoranthene	10.	U
50-32-8	Benzo(a)pyrene	10.	U
193-39-5	Indeno(1,2,3-cd)pyrene	10.	U
53-70-3	Dibenzo(a,h)anthracene	10.	U
191-24-2	Benzo(g,h,i)perylene	10.	U

CaEnkson 9/7/91

(1) - Cannot be separated from diphenylamine

1F

SEMIVOLA' .E ORGANICS ANALYSIS DATA SHEET
TEN'ATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

S1-31

ab Name: PACE Contract:

b Code: PACE Case No.: EPC SAS No.: SDG No.: 00025

atrix: (soil/water) WATER Lab Sample ID: 3964.4

Sample wt/vol: 1000. (g/mL) ML Lab File ID: D2771

evel: (low/med) LOW Date Received: 5/29/91

% Moisture: not dec.100. dec. 0. Date Extracted: 5/31/91

traction: (SepF/Cont/Sonc) SEPF Date Analyzed: 6/21/91

PC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

Number TICs found: ~~0~~ 1

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	Unknown (not searched)	~ 6.5		
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4.	CAE 7/7/91			
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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

A SAMPLE NO.

S1-31 RE

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00029

Matrix: (soil/water) WATER Lab Sample ID: 3964.4

Sample wt/vol: 1000. (g/mL) ML Lab File ID: D2799

Level: (low/med) LOW Date Received: 5/29/91

Moisture: not dec.100. dec. 0. Date Extracted: 6/24/91

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 6/25/91

PC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-95-2	Phenol	10.	U J
111-44-4	bis(2-Chloroethyl)ether	10.	U
95-57-8	2-Chlorophenol	10.	U
541-73-1	1,3-Dichlorobenzene	10.	U
106-46-7	1,4-Dichlorobenzene	10.	U
100-51-6	Benzyl alcohol	10.	U
95-50-1	1,2-Dichlorobenzene	10.	U
95-48-7	2-Methylphenol	10.	U
108-60-1	bis(2-Chloroisopropyl)ether	10.	U
106-44-5	4-Methylphenol	10.	U
621-64-7	N-Nitroso-di-n-propylamine	10.	U
67-72-1	Hexachloroethane	10.	U
98-95-3	Nitrobenzene	10.	U
78-59-1	Isophorone	10.	U
88-75-5	2-Nitrophenol	10.	U
105-67-9	2,4-Dimethylphenol	10.	U
65-85-0	Benzoic acid	50.	U
111-91-1	bis(2-Chloroethoxy)methane	10.	U
120-83-2	2,4-Dichlorophenol	10.	U
120-82-1	1,2,4-Trichlorobenzene	10.	U
91-20-3	Naphthalene	10.	U
106-47-8	4-Chloroaniline	10.	U
87-68-3	Hexachlorobutadiene	10.	U
59-50-7	4-Chloro-3-methylphenol	10.	U
91-57-6	2-Methylnaphthalene	10.	U
77-47-4	Hexachlorocyclopentadiene	10.	U
88-06-2	2,4,6-Trichlorophenol	10.	U
95-95-4	2,4,5-Trichlorophenol	50.	U
91-58-7	2-Chloronaphthalene	10.	U
88-74-4	2-Nitroaniline	50.	U
131-11-3	Dimethylphthalate	10.	U
208-96-8	Acenaphthylene	10.	U
606-20-2	2,6-Dinitrotoluene	10.	U

CAEriksen 7/7/91

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S1-31 RE

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00030

Matrix: (soil/water) WATER Lab Sample ID: 3964.4

Sample wt/vol: 1000. (g/mL) ML Lab File ID: D2799

Level: (low/med) LOW Date Received: 5/29/91

% Moisture: not dec.100. dec. 0. Date Extracted: 6/24/91

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 6/25/91

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
99-09-2	3-Nitroaniline	50.	U J
83-32-9	Acenaphthene	10.	U
51-28-5	2,4-Dinitrophenol	50.	U
100-02-7	4-Nitrophenol	50.	U
132-64-9	Dibenzofuran	10.	U
121-14-2	2,4-Dinitrotoluene	10.	U
84-66-2	Diethylphthalate	10. ~~4.~~	~~BJ~~ UJ
7005-72-3	4-Chlorophenyl-phenylether	10.	U J
86-73-7	Fluorene	10.	U J
100-01-6	4-Nitroaniline	~~50.~~	~~U~~ R
534-52-1	4,6-Dinitro-2-methylphenol	50.	U J
86-30-6	N-Nitrosodiphenylamine	10.	U
101-55-3	4-Bromophenyl-phenylether	10.	U
118-74-1	Hexachlorobenzene	10.	U
87-86-5	Pentachlorophenol	50.	U
85-01-8	Phenanthrene	10.	U
120-12-7	Anthracene	10.	U
84-74-2	Di-n-butylphthalate	10.	U
206-44-0	Fluoranthene	10.	U
129-00-0	Pyrene	10.	U
85-68-7	Butylbenzylphthalate	10.	U
91-94-1	3,3'-Dichlorobenzidine	~~20.~~	~~U~~ R
56-55-3	Benzo(a)anthracene	10.	U J
218-01-9	Chrysene	10.	U
117-81-7	bis(2-Ethylhexyl)phthalate	10.	U
117-84-0	Di-n-octylphthalate	10.	U
205-99-2	Benzo(b)fluoranthene	10.	U
207-08-9	Benzo(k)fluoranthene	10.	U
50-32-8	Benzo(a)pyrene	10.	U
193-39-5	Indeno(1,2,3-cd)pyrene	10.	U
53-70-3	Dibenzo(a,h)anthracene	10.	U
191-24-2	Benzo(g,h,i)perylene	10.	U

(1) - Cannot be separated from diphenylamine

CA Erikson 7/7/91

1F

SEMIVOLA' .E ORGANICS ANALYSIS DATA SHEET
TEN.ATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

S1-31 RE

ab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00031

atrix: (soil/water) WATER Lab Sample ID: 3964.4

Sample wt/vol: 1000. (g/mL) ML Lab File ID: D2799

evel: (low/med) LOW Date Received: 5/29/91

% Moisture: not dec.100. dec. 0. Date Extracted: 6/24/91

xtraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 6/25/91

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

Number TICs found: ~~0~~ 1

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		Unknown (not searched)	~6.5		
2.					
3.					
4.		CAE 7/7/91			
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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

S1-31 FB

00026

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3965.2

Sample wt/vol: 1000. (g/mL) ML Lab File ID: D2774

Level: (low/med) LOW Date Received: 5/29/91

Moisture: not dec.100. dec. 0. Date Extracted: 5/31/91

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 6/21/91

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-95-2	Phenol	10.	U
111-44-4	bis(2-Chloroethyl)ether	10.	U
95-57-8	2-Chlorophenol	10.	U
541-73-1	1,3-Dichlorobenzene	10.	U
106-46-7	1,4-Dichlorobenzene	10.	U
100-51-6	Benzyl alcohol	10.	U
95-50-1	1,2-Dichlorobenzene	10.	U
95-48-7	2-Methylphenol	10.	U
108-60-1	bis(2-Chloroisopropyl)ether	10.	U
106-44-5	4-Methylphenol	10.	U
621-64-7	N-Nitroso-di-n-propylamine	10. ~~14.~~ ~~B~~ U	
67-72-1	Hexachloroethane	10.	U
98-95-3	Nitrobenzene	10.	U
78-59-1	Isophorone	10.	U
88-75-5	2-Nitrophenol	10.	U
105-67-9	2,4-Dimethylphenol	10.	U
65-85-0	Benzoic acid	50.	U
111-91-1	bis(2-Chloroethoxy)methane	10.	U
120-83-2	2,4-Dichlorophenol	10.	U
120-82-1	1,2,4-Trichlorobenzene	10.	U
91-20-3	Naphthalene	10.	U
106-47-8	4-Chloroaniline	10.	U
87-68-3	Hexachlorobutadiene	10.	U
59-50-7	4-Chloro-3-methylphenol	10.	U
91-57-6	2-Methylnaphthalene	10.	U
77-47-4	Hexachlorocyclopentadiene	10.	U
88-06-2	2,4,6-Trichlorophenol	10.	U
95-95-4	2,4,5-Trichlorophenol	50.	U
91-58-7	2-Chloronaphthalene	10.	U
88-74-4	2-Nitroaniline	50.	U
131-11-3	Dimethylphthalate	10.	U
208-96-8	Acenaphthylene	10.	U
606-20-2	2,6-Dinitrotoluene	10.	U

CAS 7/2/91

1C

SEMIVOLA' LE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S1-31 FB

ab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00037

atrix: (soil/water) WATER Lab Sample ID: 3965.2

Sample wt/vol: 1000. (g/mL) ML Lab File ID: D2774

evel: (low/med) LOW Date Received: 5/29/91

% Moisture: not dec.100. dec. 0. Date Extracted: 5/31/91

xtraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 6/21/91

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
99-09-2	3-Nitroaniline	50.	~~U~~ UJ
83-32-9	Acenaphthene	10.	U
51-28-5	2,4-Dinitrophenol	50.	U
100-02-7	4-Nitrophenol	50.	U
132-64-9	Dibenzofuran	10.	U
121-14-2	2,4-Dinitrotoluene	10.	U
84-66-2	Diethylphthalate	10.	U
7005-72-3	4-Chlorophenyl-phenylether	10.	U
86-73-7	Fluorene	10.	U
100-01-6	4-Nitroaniline	~~50.~~	~~U~~ R
534-52-1	4,6-Dinitro-2-methylphenol	50.	U
86-30-6	N-Nitrosodiphenylamine	10.	U
101-55-3	4-Bromophenyl-phenylether	10.	U
118-74-1	Hexachlorobenzene	10.	U
87-86-5	Pentachlorophenol	50.	U
85-01-8	Phenanthrene	10.	U
120-12-7	Anthracene	10.	U
84-74-2	Di-n-butylphthalate	10.	U
206-44-0	Fluoranthene	10.	U
129-00-0	Pyrene	10.	U
85-68-7	Butylbenzylphthalate	10.	U
91-94-1	3,3'-Dichlorobenzidine	~~20.~~	~~U~~ R
56-55-3	Benzo(a)anthracene	10.	U
218-01-9	Chrysene	10.	U
117-81-7	bis(2-Ethylhexyl)phthalate	10.	U
117-84-0	Di-n-octylphthalate	10.	U
205-99-2	Benzo(b)fluoranthene	10.	U
207-08-9	Benzo(k)fluoranthene	10.	U
50-32-8	Benzo(a)pyrene	10.	U
193-39-5	Indeno(1,2,3-cd)pyrene	10.	U
53-70-3	Dibenzo(a,h)anthracene	10.	U
191-24-2	Benzo(g,h,i)perylene	10.	U

CA Erikson 7/7/91

(1) - Cannot be separated from diphenylamine

1F

SEMIVOLAT E ORGANICS ANALYSIS DATA SHEET
TEN ATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

S1-31 FB

ab Name: PACE Contract:

ab Code: PACE Case No.: EPC SAS No.: SDG No.: 00038

atrix: (soil/water) WATER Lab Sample ID: 3965.2

Sample wt/vol: 1000. (g/mL) ML Lab File ID: D2774

evel: (low/med) LOW Date Received: 5/29/91

% Moisture: not dec.100. dec. 0. Date Extracted: 5/31/91

xtraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 6/21/91

PC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

S1-31 FBRE

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 90072

Matrix: (soil/water) WATER Lab Sample ID: 3965.2

Sample wt/vol: 1000. (g/mL) ML Lab File ID: D2798

Level: (low/med) LOW Date Received: 5/29/91

Moisture: not dec.100. dec. 0. Date Extracted: 6/24/91

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 6/25/91

PC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-95-2	Phenol	10.	U J
111-44-4	bis(2-Chloroethyl)ether	10.	U
95-57-8	2-Chlorophenol	10.	U
541-73-1	1,3-Dichlorobenzene	10.	U
106-46-7	1,4-Dichlorobenzene	10.	U
100-51-6	Benzyl alcohol	10.	U
95-50-1	1,2-Dichlorobenzene	10.	U
95-48-7	2-Methylphenol	10.	U
108-60-1	bis(2-Chloroisopropyl)ether	10.	U
106-44-5	4-Methylphenol	10.	U
621-64-7	N-Nitroso-di-n-propylamine	10.	U
67-72-1	Hexachloroethane	10.	U
98-95-3	Nitrobenzene	10.	U
78-59-1	Isophorone	10.	U
88-75-5	2-Nitrophenol	10.	U
105-67-9	2,4-Dimethylphenol	10.	U
65-85-0	Benzoic acid	50.	U
111-91-1	bis(2-Chloroethoxy)methane	10.	U
120-83-2	2,4-Dichlorophenol	10.	U
120-82-1	1,2,4-Trichlorobenzene	10.	U
91-20-3	Naphthalene	10.	U
106-47-8	4-Chloroaniline	10.	U
87-68-3	Hexachlorobutadiene	10.	U
59-50-7	4-Chloro-3-methylphenol	10.	U
91-57-6	2-Methylnaphthalene	10.	U
77-47-4	Hexachlorocyclopentadiene	10.	U
88-06-2	2,4,6-Trichlorophenol	10.	U
95-95-4	2,4,5-Trichlorophenol	50.	U
91-58-7	2-Chloronaphthalene	10.	U
88-74-4	2-Nitroaniline	50.	U
131-11-3	Dimethylphthalate	10.	U
208-96-8	Acenaphthylene	10.	U
606-20-2	2,6-Dinitrotoluene	10.	U

CAEriksson 8/9/91

1C

SEMIVOLAT E ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S1-31 FBRE

ab Name: PACE Contract:

b Code: PACE Case No.: EPC SAS No.: SDG No.: 00043

atrix: (soil/water) WATER Lab Sample ID: 3965.2

Sample wt/vol: 1000. (g/mL) ML Lab File ID: D2798

evel: (low/med) LOW Date Received: 5/29/91

% Moisture: not dec.100. dec. 0. Date Extracted: 6/24/91

xtraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 6/25/91

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
99-09-2	3-Nitroaniline	50.	U J
83-32-9	Acenaphthene	10.	U
51-28-5	2,4-Dinitrophenol	50.	U
100-02-7	4-Nitrophenol	50.	U
132-64-9	Dibenzofuran	10.	U
121-14-2	2,4-Dinitrotoluene	10.	U
84-66-2	Diethylphthalate	10. ~~4.~~	~~BJ~~ UJ
7005-72-3	4-Chlorophenyl-phenylether	10.	U J
86-73-7	Fluorene	10.	U J
100-01-6	4-Nitroaniline	~~50.~~	~~U~~ R
534-52-1	4,6-Dinitro-2-methylphenol	50.	U J
86-30-6	N-Nitrosodiphenylamine	10.	U
101-55-3	4-Bromophenyl-phenylether	10.	U
118-74-1	Hexachlorobenzene	10.	U
87-86-5	Pentachlorophenol	50.	U
85-01-8	Phenanthrene	10.	U
120-12-7	Anthracene	10.	U
84-74-2	Di-n-butylphthalate	10.	U
206-44-0	Fluoranthene	10.	U
129-00-0	Pyrene	10.	U
85-68-7	Butylbenzylphthalate	10.	U
91-94-1	3,3'-Dichlorobenzidine	~~20.~~	~~U~~ R
56-55-3	Benzo(a)anthracene	10.	U J
218-01-9	Chrysene	10.	U
117-81-7	bis(2-Ethylhexyl)phthalate	10.	U
117-84-0	Di-n-octylphthalate	10.	U
205-99-2	Benzo(b)fluoranthene	10.	U
207-08-9	Benzo(k)fluoranthene	10.	U
50-32-8	Benzo(a)pyrene	10.	U
193-39-5	Indeno(1,2,3-cd)pyrene	10.	U
53-70-3	Dibenzo(a,h)anthracene	10.	U
191-24-2	Benzo(g,h,i)perylene	10.	U

cabrikson 7/7/91

(1) - Cannot be separated from diphenylamine

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

S1-31 FBRE

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00044

Matrix: (soil/water) WATER Lab Sample ID: 3965.2

Sample wt/vol: 1000. (g/mL) ML Lab File ID: D2798

Level: (low/med) LOW Date Received: 5/29/91

% Moisture: not dec.100. dec. 0. Date Extracted: 6/24/91

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 6/25/91

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

A SAMPLE NO.

S6-31

00049

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3966.0

Sample wt/vol: 1000. (g/mL) ML Lab File ID: D2775

Level: (low/med) LOW Date Received: 5/29/91

Moisture: not dec.100. dec. 0. Date Extracted: 5/31/91

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 6/21/91

PC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-95-2	Phenol	10.	U
111-44-4	bis(2-Chloroethyl)ether	10.	U
95-57-8	2-Chlorophenol	10.	U
541-73-1	1,3-Dichlorobenzene	10.	U
106-46-7	1,4-Dichlorobenzene	10.	U
100-51-6	Benzyl alcohol	10.	U
95-50-1	1,2-Dichlorobenzene	10.	U
95-48-7	2-Methylphenol	10.	U
108-60-1	bis(2-Chloroisopropyl)ether	10.	U
106-44-5	4-Methylphenol	10.	U
621-64-7	N-Nitroso-di-n-propylamine	10.	U
67-72-1	Hexachloroethane	10.	U
98-95-3	Nitrobenzene	10.	U
78-59-1	Isophorone	10.	U
88-75-5	2-Nitrophenol	10.	U
105-67-9	2,4-Dimethylphenol	10.	U
65-85-0	Benzoic acid	50.	U
111-91-1	bis(2-Chloroethoxy)methane	10.	U
120-83-2	2,4-Dichlorophenol	10.	U
120-82-1	1,2,4-Trichlorobenzene	10.	U
91-20-3	Naphthalene	10.	U
106-47-8	4-Chloroaniline	10.	U
87-68-3	Hexachlorobutadiene	10.	U
59-50-7	4-Chloro-3-methylphenol	10.	U
91-57-6	2-Methylnaphthalene	10.	U
77-47-4	Hexachlorocyclopentadiene	10.	U
88-06-2	2,4,6-Trichlorophenol	10.	U
95-95-4	2,4,5-Trichlorophenol	50.	U
91-58-7	2-Chloronaphthalene	10.	U
88-74-4	2-Nitroaniline	50.	U
131-11-3	Dimethylphthalate	10.	U
208-96-8	Acenaphthylene	10.	U
606-20-2	2,6-Dinitrotoluene	10.	U

1C

SEMIVOLA' 'E ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S6-31

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00050

Matrix: (soil/water) WATER Lab Sample ID: 3966.0

Sample wt/vol: 1000. (g/mL) ML Lab File ID: D2775

Level: (low/med) LOW Date Received: 5/29/91

% Moisture: not dec.100. dec. 0. Date Extracted: 5/31/91

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 6/21/91

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
99-09-2	3-Nitroaniline	50.	~~U~~ UJ
83-32-9	Acenaphthene	10.	U
51-28-5	2,4-Dinitrophenol	50.	U
100-02-7	4-Nitrophenol	50.	U
132-64-9	Dibenzofuran	10.	U
121-14-2	2,4-Dinitrotoluene	10.	U
84-66-2	Diethylphthalate	10.	U
7005-72-3	4-Chlorophenyl-phenylether	10.	U
86-73-7	Fluorene	10.	U
100-01-6	4-Nitroaniline	~~50.~~	~~U~~ R
534-52-1	4,6-Dinitro-2-methylphenol	50.	U
86-30-6	N-Nitrosodiphenylamine	10.	U
101-55-3	4-Bromophenyl-phenylether	10.	U
118-74-1	Hexachlorobenzene	10.	U
87-86-5	Pentachlorophenol	50.	U
85-01-8	Phenanthrene	10.	U
120-12-7	Anthracene	10.	U
84-74-2	Di-n-butylphthalate	10.	U
206-44-0	Fluoranthene	10.	U
129-00-0	Pyrene	10.	U
85-68-7	Butylbenzylphthalate	10.	U
91-94-1	3,3'-Dichlorobenzidine	~~20.~~	~~U~~ R
56-55-3	Benzo(a)anthracene	10.	U
218-01-9	Chrysene	10.	U
117-81-7	bis(2-Ethylhexyl)phthalate	10.	U
117-84-0	Di-n-octylphthalate	10.	U
205-99-2	Benzo(b)fluoranthene	10.	U
207-08-9	Benzo(k)fluoranthene	10.	U
50-32-8	Benzo(a)pyrene	10.	U
193-39-5	Indeno(1,2,3-cd)pyrene	10.	U
53-70-3	Dibenzo(a,h)anthracene	10.	U
191-24-2	Benzo(g,h,i)perylene	10.	U

(1) - Cannot be separated from diphenylamine

Robinson 7/7/91

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

S6-31

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00051

Matrix: (soil/water) WATER Lab Sample ID: 3966.0

Sample wt/vol: 1000. (g/mL) ML Lab File ID: D2775

Level: (low/med) LOW Date Received: 5/29/91

% Moisture: not dec.100. dec. 0. Date Extracted: 5/31/91

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 6/21/91

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
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1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

A SAMPLE NO.

S6-31 RE

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00055

Matrix: (soil/water) WATER Lab Sample ID: 3966.0

Sample wt/vol: 1000. (g/mL) ML Lab File ID: D2797

Level: (low/med) LOW Date Received: 5/29/91

Moisture: not dec.100. dec. 0. Date Extracted: 6/24/91

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 6/25/91

PC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-95-2	Phenol	10.	U J
111-44-4	bis(2-Chloroethyl)ether	10.	U
95-57-8	2-Chlorophenol	10.	U
541-73-1	1,3-Dichlorobenzene	10.	U
106-46-7	1,4-Dichlorobenzene	10.	U
100-51-6	Benzyl alcohol	10.	U
95-50-1	1,2-Dichlorobenzene	10.	U
95-48-7	2-Methylphenol	10.	U
108-60-1	bis(2-Chloroisopropyl)ether	10.	U
106-44-5	4-Methylphenol	10.	U
621-64-7	N-Nitroso-di-n-propylamine	10.	U
67-72-1	Hexachloroethane	10.	U
98-95-3	Nitrobenzene	10.	U
78-59-1	Isophorone	10.	U
88-75-5	2-Nitrophenol	10.	U
105-67-9	2,4-Dimethylphenol	10.	U
65-85-0	Benzoic acid	50.	U
111-91-1	bis(2-Chloroethoxy)methane	10.	U
120-83-2	2,4-Dichlorophenol	10.	U
120-82-1	1,2,4-Trichlorobenzene	10.	U
91-20-3	Naphthalene	10.	U
106-47-8	4-Chloroaniline	10.	U
87-68-3	Hexachlorobutadiene	10.	U
59-50-7	4-Chloro-3-methylphenol	10.	U
91-57-6	2-Methylnaphthalene	10.	U
77-47-4	Hexachlorocyclopentadiene	10.	U
88-06-2	2,4,6-Trichlorophenol	10.	U
95-95-4	2,4,5-Trichlorophenol	50.	U
91-58-7	2-Chloronaphthalene	10.	U
88-74-4	2-Nitroaniline	50.	U
131-11-3	Dimethylphthalate	10.	U
208-96-8	Acenaphthylene	10.	U
606-20-2	2,6-Dinitrotoluene	10.	U

CAEriksson 7/9/91

1C

SEMIVOLA' .E ORGANICS ANALYSIS DATA SHEET

FPA SAMPLE NO.

S6-31 RE

ab Name: PACE Contract:

.b Code: PACE Case No.: EPC SAS No.: SDG No.: 00056

atrix: (soil/water) WATER Lab Sample ID: 3966.0

Sample wt/vol: 1000. (g/mL) ML Lab File ID: D2797

evel: (low/med) LOW Date Received: 5/29/91

% Moisture: not dec.100. dec. 0. Date Extracted: 6/24/91

_xtraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 6/25/91

-PC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
99-09-2	3-Nitroaniline	50.	UJ
83-32-9	Acenaphthene	10.	U
51-28-5	2,4-Dinitrophenol	50.	U
100-02-7	4-Nitrophenol	50.	U
132-64-9	Dibenzofuran	10.	U
121-14-2	2,4-Dinitrotoluene	10.	U
84-66-2	Diethylphthalate	10. ~~5.~~	~~BJ~~ UJ
7005-72-3	4-Chlorophenyl-phenylether	10.	UJ
86-73-7	Fluorene	10.	UJ
100-01-6	4-Nitroaniline	~~50.~~	~~U~~ R
534-52-1	4,6-Dinitro-2-methylphenol	50.	UJ
86-30-6	N-Nitrosodiphenylamine	10.	U
101-55-3	4-Bromophenyl-phenylether	10.	U
118-74-1	Hexachlorobenzene	10.	U
87-86-5	Pentachlorophenol	50.	U
85-01-8	Phenanthrene	10.	U
120-12-7	Anthracene	10.	U
84-74-2	Di-n-butylphthalate	10.	U
206-44-0	Fluoranthene	10.	U
129-00-0	Pyrene	10.	U
85-68-7	Butylbenzylphthalate	10.	U
91-94-1	3,3'-Dichlorobenzidine	~~20.~~	~~U~~ R
56-55-3	Benzo(a)anthracene	10.	UJ
218-01-9	Chrysene	10.	UJ
117-81-7	bis(2-Ethylhexyl)phthalate	150.	J
117-84-0	Di-n-octylphthalate	10.	UJ
205-99-2	Benzo(b)fluoranthene	10.	U
207-08-9	Benzo(k)fluoranthene	10.	U
50-32-8	Benzo(a)pyrene	10.	U
193-39-5	Indeno(1,2,3-cd)pyrene	10.	U
53-70-3	Dibenzo(a,h)anthracene	10.	U
191-24-2	Benzo(g,h,i)perylene	10.	U

CAEriksen 7/7/91

(1) - Cannot be separated from diphenylamine

1F

SEMIVOLA' .E ORGANICS ANALYSIS DATA SHEET
TEN.ATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

S6-31 RE

ab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

00057

atrix: (soil/water) WATER Lab Sample ID: 3966.0

Sample wt/vol: 1000. (g/mL) ML Lab File ID: D2797

evel: (low/med) LOW Date Received: 5/29/91

% Moisture: not dec.100. dec. 0. Date Extracted: 6/24/91

xtraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 6/25/91

PC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
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TRILLIUM INC

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

TREATMENT SYSTEM SAMPLING

PESTICIDES/PCBS ANALYSES DATA

Samples Collected 05/28/91

Chemical Analyses Performed By

PACE, Incorporated

August 19, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

No target compound list (TCL) compounds were detected in the pesticide/PCB fraction.

Validation of organic data is conducted in conformance with Environmental Protection Agency Functional Guidelines for Evaluating Organics Analyses, February 1, 1988.

Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified (valid) results mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable. (Note: Analyte may or may not be present.)

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Data Validation for
Environmental Project Control, Inc.

Samples Collected May 28, 1991

Pesticide/PCB Analyses Data

Case Narrative

Three treatment system samples were collected May 28, 1991 and submitted to Pace, Inc. on May 29, 1991. The laboratory was requested to perform pesticide/PCB target compound list (TCL) analyses.

Cooler temperature on receipt at the laboratory was not recorded on the documentation included in the data package. Corrective action is required. Temperatures outside the $4^{o}C \pm 2^{o}C$ range may adversely affect the more volatile compounds.

No TCL compounds were detected in the pesticide/PCB fraction.

The samples included in this Sample Delivery Group (SDG) are:

Lab ID	Client ID	Date of Collection
3964	S1-31	05/28/91
3965	S1-31FB	05/28/91
3966	S6-31	05/28/91

The areas reviewed during validation are listed below.

TRILLIUM INC

ORGANIC DATA VALIDATION PROCEDURE

I. Sample Holding Time

II. Instrument Performance

III. Calibration

IV. Blanks

V. Surrogate Recovery

VI. Matrix Spike/Matrix Spike Duplicate

VII. Field QC Samples

VIII. Internal Standards Performance

IX. TCL Compound Identification

X. Compound Quantitation and Reported Detection Limits

XI. Tentatively Identified Compounds

XII. System Performance

XIII. Overall Assessment of Data for a Case

DATA VALIDATION

I. Sample Holding Times

All samples were extracted and analyzed within holding times.

II. Instrument Performance

DDT retention time was greater than or equal to 12 minutes.

Retention time windows were reported on Form IX for each column used.

Retention times and calibration factors were accurately recorded on Form IX.

DDT/Endrin degradation was less than 20%.

DBC retention time met the 1.5% criteria for wide-bore capillary columns on the DB-5 and DB-608 columns.

III. Calibration

Initial Calibration Linearity Check Inst V63400 06/10-11/91

The DB608 column used for quantitation met the 10% relative standard deviation (%RSD) criteria. The DB5 column used for confirmation failed to meet the %RSD criteria for the following compounds:

aldrin (26%)
endrin (28%)
4,4'-DDT (31%)
DBC (21%)

These compound were not detected and no data have been qualified.

Analytical Run Sequence

All standards were run within 72 hours.

Continuing Calibration

The column used for quantitation met the 15% D criteria.
The column used for confirmation met the 20% D criteria.

IV. Blanks

No TCL compounds were detected in BLKW03.

V. Surrogate Recovery

Surrogate recoveries were acceptable.

VI. Matrix Spike/Matrix Spike Duplicate

Matrix spike recoveries for the following compound was outside the established advisory limits:

gamma-BHC (49%)

Matrix spike duplicate recoveries for the following compound was outside established advisory limits:

gamma-BHC (54%)

This compound was not detected in the unspiked sample and no data have been qualified.

All compounds met RPD criteria.

VII. Field Quality Control Samples

S1-31FB is a field blank. No TCL compounds were detected.

VIII. Internal Standards Performance

Standard performance based on the retention time windows is acceptable.

IX. TCL Compound Identification

No target compounds were detected.

X. Compound Quantitation and Reported Detection Limits

Detection limit quantifications were acceptable with regard to supporting data.

XI. Tentatively Identified Compounds

Not Applicable.

XII. System Performance

System performance was acceptable.

XIII. Overall Assessment of Data for a Case

No TCL compounds were detected.

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

A SAMPLE NO.

S1-31 00019

Lab Name: PACE Contract: EPC

Lab Code: PACE Case No.: SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3964.4

Sample wt/vol: 1000. (g/mL)ML Lab File ID: V66669

Level: (low/med) LOW Date Received: 5/29/91

Moisture: not dec.100. dec. 0. Date Extracted: 6/ 3/91

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 6/10/91

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	Alpha-BHC	.050	U
319-85-7	Beta-BHC	.050	U
319-86-8	Delta-BHC	.050	U
58-89-9	Gamma-BHC	.050	U
76-44-8	Heptachlor	.050	U
309-00-2	Aldrin	.050	U
1024-57-3	Heptachlor Epoxide	.050	U
959-98-8	Endosulfan I	.050	U
60-57-1	Dieldrin	.10	U
72-55-9	4,4'-DDE	.10	U
72-20-8	Endrin	.10	U
33213-65-9	Endosulfan II	.10	U
72-54-8	4,4'-DDD	.10	U
1031-07-8	Endosulfan Sulfate	.10	U
50-29-3	4,4'-DDT	.10	U
72-43-5	Methoxychlor	.50	U
53494-70-5	Endrin Ketone	.10	U
5103-71-9	alpha-Chlordane	.50	U
5103-74-2	gamma-Chlordane	.50	U
8001-35-2	Toxaphene	1.0	U
12674-11-2	Arochlor-1016	.50	U
11104-28-2	Arochlor-1221	.50	U
11141-16-5	Arochlor-1232	.50	U
53469-21-9	Arochlor-1242	.50	U
12672-29-6	Arochlor-1248	.50	U
11097-69-1	Arochlor-1254	1.0	U
11096-82-5	Arochlor-1260	1.0	U

1D
PEST ICIDE ORGANICS ANALYSIS DATA SHEET

PA SAMPLE NO.

S1-31[illegible]0024

Lab Name: PACE Contract: EPC

Lab Code: PACE Case No.: SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 3965.2

Sample wt/vol: 1000. (g/mL)ML Lab File ID: V66673

Level: (low/med) LOW Date Received: 5/29/91

Moisture: not dec.100. dec. 0. Date Extracted: 6/ 3/91

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 6/11/91

PC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	Alpha-BHC	.050	U
319-85-7	Beta-BHC	.050	U
319-86-8	Delta-BHC	.050	U
58-89-9	Gamma-BHC	.050	U
76-44-8	Heptachlor	.050	U
309-00-2	Aldrin	.050	U
1024-57-3	Heptachlor Epoxide	.050	U
959-98-8	Endosulfan I	.050	U
60-57-1	Dieldrin	.10	U
72-55-9	4,4'-DDE	.10	U
72-20-8	Endrin	.10	U
33213-65-9	Endosulfan II	.10	U
72-54-8	4,4'-DDD	.10	U
1031-07-8	Endosulfan Sulfate	.10	U
50-29-3	4,4'-DDT	.10	U
72-43-5	Methoxychlor	.50	U
53494-70-5	Endrin Ketone	.10	U
5103-71-9	alpha-Chlordane	.50	U
5103-74-2	gamma-Chlordane	.50	U
8001-35-2	Toxaphene	1.0	U
12674-11-2	Arochlor-1016	.50	U
11104-28-2	Arochlor-1221	.50	U
11141-16-5	Arochlor-1232	.50	U
53469-21-9	Arochlor-1242	.50	U
12672-29-6	Arochlor-1248	.50	U
11097-69-1	Arochlor-1254	1.0	U
11096-82-5	Arochlor-1260	1.0	U

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

A SAMPLE NO.

S6-31

Lab Name: PACE Contract: EPC

Lab Code: PACE Case No.: SAS No.: SDG No.: 00029

Matrix: (soil/water) WATER Lab Sample ID: 3966.0

Sample wt/vol: 1000. (g/mL)ML Lab File ID: V66674

Level: (low/med) LOW Date Received: 5/29/91

Moisture: not dec.100. dec. 0. Date Extracted: 6/ 3/91

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 6/11/91

PC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	Alpha-BHC	.050	U
319-85-7	Beta-BHC	.050	U
319-86-8	Delta-BHC	.050	U
58-89-9	Gamma-BHC	.050	U
76-44-8	Heptachlor	.050	U
309-00-2	Aldrin	.050	U
1024-57-3	Heptachlor Epoxide	.050	U
959-98-8	Endosulfan I	.050	U
60-57-1	Dieldrin	.10	U
72-55-9	4,4'-DDE	.10	U
72-20-8	Endrin	.10	U
33213-65-9	Endosulfan II	.10	U
72-54-8	4,4'-DDD	.10	U
1031-07-8	Endosulfan Sulfate	.10	U
50-29-3	4,4'-DDT	.10	U
72-43-5	Methoxychlor	.50	U
53494-70-5	Endrin Ketone	.10	U
5103-71-9	alpha-Chlordane	.50	U
5103-74-2	gamma-Chlordane	.50	U
8001-35-2	Toxaphene	1.0	U
12674-11-2	Arochlor-1016	.50	U
11104-28-2	Arochlor-1221	.50	U
11141-16-5	Arochlor-1232	.50	U
53469-21-9	Arochlor-1242	.50	U
12672-29-6	Arochlor-1248	.50	U
11097-69-1	Arochlor-1254	1.0	U
11096-82-5	Arochlor-1260	1.0	U

TRILLIUM INC

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

TREATMENT SYSTEM SAMPLING

VOLATILES ANALYSES DATA

Samples Collected 5/29/91

Chemical Analyses Performed By

PACE, Incorporated

August 20, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

Data quality for this sample delivery group was good.

Cooler temperature upon receipt of samples by the laboratory was 4°C.

Validation of organic data is conducted in conformance with Environmental Protection Agency (EPA) Functional Guidelines for Evaluating Organics Analyses, February 1, 1988, with modifications by EPA Region I, November 1, 1988.

Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified (valid) results mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Case Narrative

Eight samples (including matrix spike and matrix spike duplicate) were collected and submitted to PACE, Inc. on May 29, 1991. The laboratory was requested to perform volatile organics (VOA) target compound list (TCL) analyses.

The samples included in this Sample Delivery Group (SDG) are:

Client ID	Lab ID	Date of Collection
S1-32	4012	05/29/91
S1-32DUP	4013	05/29/91
S1-32TB	4014	05/29/91
S2-30	4017	05/29/91
S3A-30	4018	05/29/91
S4-30	4019	05/29/91

Volatiles

The requirements to be checked in validation are listed below.

I. Holding Times

II. GC/MS Tuning

III. Calibration

A. Initial

B. Continuing

IV. Blanks

V. Surrogate Recovery

VI. Matrix Spike/Matrix Spike Duplicate

VII. Field Duplicates

VIII. Internal Standards Performance

IX. TCL Compound Identification

X. Compound Quantitation and Reported Detection Limits

XI. Tentatively Identified Compounds

XII. System Performance

XIII. Overall Assessment

I. Holding Times

All samples were received preserved and analyzed within the 14-day holding time for preserved samples.

II. GC/MS Tuning

GC/MS tuning and mass calibrations were within criteria.

III. Calibration

Manual areas were integrated for one or more compounds in each of the standards in this data package. No evaluation of these manual integrations can be performed, as no hard copy documentation is provided. The validation has been completed on the assumption that the manual integrations done and reported by the laboratory were valid and correct. No data appear to be affected.

A. Initial

Initial calibration criteria were met on 5/28/91 (Instrument G) with the exception of the RRF for 2-butanone (actual 0.077; criteria 0.1). Detection limits for 2-butanone were rejected in Samples S1-32, S1-32DUP, S1-32TB, S3A-30, S4-30, S1-32MS, and S1-32MSD.

Initial calibration criteria were met on 5/28/91 (Instrument J).

B. Continuing

Continuing calibration criteria were met on 6/4/91 (Instrument G) with the exception of the RF for 2-butanone (actual 0.081; criteria 0.1). Data were not affected.

Continuing calibration criteria were met on 6/6/91 (Instrument J) with the exception of the RF for 2-butanone (actual 0.079; criteria 0.1) and the % difference for chloromethane (actual 26.6; criteria 25), acetone (actual 46.6; criteria 25), 2-butanone (actual 52.0; criteria 25), vinyl acetate (actual 41.4; criteria 25), 4-methyl-2-pentanone (actual 45.2; criteria 25), 2-hexanone (actual 44.4; criteria 25), and 1,1,2,2-tetrachloroethane (actual 37.4; criteria 25). The detection limit for 2-butanone was rejected in Sample S2-30. Other data were not affected.

IV. Blanks

Method blanks and the trip blank were clean.

V. Surrogate Recovery

Surrogate recoveries were within acceptance criteria.

VI. Matrix Spike/Matrix Spike Duplicate

The matrix spike (MS) and matrix spike duplicate (MSD) were performed on Sample S1-32. Results were within QC acceptance criteria.

VII. Field Duplicates

Compounds and concentrations (in ug/L) reported in Samples S1-32 and S1-32DUP were as follows:

Compound	S1-32	S1-32DUP
Trichloroethene	110	110
Tetrachloroethene	4400	3800

Results were within QC criteria.

VIII. Internal Standards Performance

Internal standards areas and retention times were acceptable.

IX. TCL Compound Identification

TCL compound identifications were acceptable.

X. Compound Quantitation and Reported Detection Limits

The results reported for tetrachloroethene in Samples S1-32 and S4-30 were beyond the calibration range of the instrument. These results were within precision and accuracy criteria and were accepted as reported.

All other results and detection limits were acceptable with regard to the supporting data.

XI. Tentatively Identified Compounds

No TICs were reported for this SDG.

XII. System Performance

System performance requires attention. Manual integrations should be addressed.

Calibration response after criteria needs to be monitored by the laboratory.

XIII. Overall Assessment of Data for a Case

Data quality for this sample delivery group was good. The detection limit for 2-butanone was rejected in all samples.

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S1-32

00022

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4012.0

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3290

Level: (low/med) LOW Date Received: 5/30/91

Moisture: not dec. 100. Date Analyzed: 6/ 4/91

Column: (pack/cap) PACK Dilution Factor: 20.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
74-87-3	Chloromethane	200.	U
74-83-9	Bromomethane	200.	U
75-01-4	Vinyl Chloride	200.	U
75-00-3	Chloroethane	200.	U
75-09-2	Methylene Chloride	100.	U
67-64-1	Acetone	200.	U
75-15-0	Carbon Disulfide	100.	U
75-35-4	1,1-Dichloroethene	100.	U
75-34-3	1,1-Dichloroethane	100.	U
540-59-0	1,2-Dichloroethene (total)	100.	U
67-66-3	Chloroform	100.	U
107-06-2	1,2-Dichloroethane	100.	U
78-93-3	2-Butanone	~~200.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	100.	U
56-23-5	Carbon Tetrachloride	100.	U
108-05-4	Vinyl Acetate	200.	U
75-27-4	Bromodichloromethane	100.	U
78-87-5	1,2-Dichloropropane	100.	U
10061-01-5	cis-1,3-Dichloropropene	100.	U
79-01-6	Trichloroethene	110.	
124-48-1	Dibromochloromethane	100.	U
79-00-5	1,1,2-Trichloroethane	100.	U
71-43-2	Benzene	100.	U
10061-02-6	Trans-1,3-Dichloropropene	100.	U
75-25-2	Bromoform	100.	U
108-10-1	4-methyl-2-Pentanone	200.	U
591-78-6	2-Hexanone	200.	U
127-18-4	Tetrachloroethene	4400.	E
79-34-5	1,1,2,2-Tetrachloroethane	100.	U
108-88-3	Toluene	100.	U
108-90-7	Chlorobenzene	100.	U
100-41-4	Ethylbenzene	100.	U
100-42-5	Styrene	100.	U
1330-20-7	Xylene(total)	100.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S1-32

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00023

Matrix: (soil/water) WATER Lab Sample ID: 4012.0

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3290

Level: (low/med) LOW Date Received: 5/30/91

% Moisture: not dec. 100. Date Analyzed: 6/ 4/91

Column: (pack/cap) PACK Dilution Factor: 20.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

91-32DUP

00029

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4013.8

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: 63293

Level: (low/med) LOW Date Received: 5/30/91

% Moisture: not dec. 100. Date Analyzed: 6/ 4/91

Column: (packed/cap) PACK Dilution Factor: 20.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
74-87-3	Chloromethane	200.	U
74-83-9	Bromomethane	200.	U
75-01-4	Vinyl Chloride	200.	U
75-00-3	Chloroethane	200.	U
75-09-2	Methylene Chloride	100.	U
67-64-1	Acetone	200.	U
75-15-0	Carbon Disulfide	100.	U
75-35-4	1,1-Dichloroethene	100.	U
75-34-3	1,1-Dichloroethane	100.	U
540-59-0	1,2-Dichloroethene (total)	100.	U
67-66-3	Chloroform	100.	U
107-06-2	1,2-Dichloroethane	100.	U
78-93-3	2-Butanone	~~200.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	100.	U
56-23-5	Carbon Tetrachloride	100.	U
108-05-4	Vinyl Acetate	200.	U
75-27-4	Bromodichloromethane	100.	U
78-87-5	1,2-Dichloropropane	100.	U
10061-01-5	cis-1,3-Dichloropropene	100.	U
79-01-6	Trichloroethene	110.	
124-48-1	Dibromochloromethane	100.	U
79-00-5	1,1,2-Trichloroethane	100.	U
71-43-2	Benzene	100.	U
10061-02-6	Trans-1,3-Dichloropropene	100.	U
75-25-2	Bromoform	100.	U
108-10-1	4-Methyl-2-Pentanone	200.	U
591-78-6	2-Hexanone	200.	U
127-18-4	Tetrachloroethene	3800.	
79-34-5	1,1,2,2-Tetrachloroethane	100.	U
108-88-3	Toluene	100.	U
108-90-7	Chlorobenzene	100.	U
100-41-4	Ethylbenzene	100.	U
100-42-5	Styrene	100.	U
1330-20-7	Xylene(total)	100.	U

EPA SAMPLE NO.

S1-32DUP

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00030

Matrix: (soil/water) WATER Lab Sample ID: 4013.8

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3293

Level: (low/med) LOW Date Received: 5/30/91

% Moisture: not dec. 100. Date Analyzed: 6/ 4/91

Column: (packed/cap) PACK Dilution Factor: 20.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S1-32TB

00036

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4014.6

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3294

Level: (low/med) LOW Date Received: 5/30/91

% Moisture: not dec. 100. Date Analyzed: 6/ 4/91

Column: (packl/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	5.	U
67-64-1	Acetone	10.	U
75-15-0	Carbon Disulfide	5.	U
75-35-4	1,1-Dichloroethene	5.	U
75-34-3	1,1-Dichloroethane	5.	U
540-59-0	1,2-Dichloroethene (total)	5.	U
67-66-3	Chloroform	5.	U
107-06-2	1,2-Dichloroethane	5.	U
78-93-3	2-Butanone	~~10.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	5.	U
56-23-5	Carbon Tetrachloride	5.	U
108-05-4	Vinyl Acetate	10.	U
75-27-4	Bromodichloromethane	5.	U
78-87-5	1,2-Dichloropropane	5.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U
79-01-6	Trichloroethene	5.	U
124-48-1	Dibromochloromethane	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U
71-43-2	Benzene	5.	U
10061-02-6	Trans-1,3-Dichloropropene	5.	U
75-25-2	Bromoform	5.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	5.	U
79-34-5	1,1,2,2-Tetrachloroethane	5.	U
108-88-3	Toluene	5.	U
108-90-7	Chlorobenzene	5.	U
100-41-4	Ethylbenzene	5.	U
100-42-5	Styrene	5.	U
1330-20-7	Xylene(total)	5.	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

S1-32TB

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00037

Matrix: (soil/water) WATER Lab Sample ID: 4014.6

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3294

Level: (low/med) LOW Date Received: 5/30/91

% Moisture: not dec. 100. Date Analyzed: 6/ 4/91

Column: (pack/cap) PACK Dilution Factor: 1.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S2-30

00041

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4017.0

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2896

Level: (low/med) LOW Date Received: 5/30/91

Moisture: not dec. 100. Date Analyzed: 6/ 6/91

Column: (pack/cap) PACK Dilution Factor: 5.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	50.	U
74-83-9	Bromomethane	50.	U
75-01-4	Vinyl Chloride	50.	U
75-00-3	Chloroethane	50.	U
75-09-2	Methylene Chloride	25.	U
67-64-1	Acetone	50.	U
75-15-0	Carbon Disulfide	25.	U
75-35-4	1,1-Dichloroethene	25.	U
75-34-3	1,1-Dichloroethane	25.	U
540-59-0	1,2-Dichloroethene (total)	25.	U
67-66-3	Chloroform	25.	U
107-06-2	1,2-Dichloroethane	25.	U
78-93-3	2-Butanone	~~50.~~	~~UR~~
71-55-6	1,1,1-Trichloroethane	25.	U
56-23-5	Carbon Tetrachloride	25.	U
108-05-4	Vinyl Acetate	50.	U
75-27-4	Bromodichloromethane	25.	U
78-87-5	1,2-Dichloropropane	25.	U
10061-01-5	cis-1,3-Dichloropropene	25.	U
79-01-6	Trichloroethene	32.	
124-48-1	Dibromochloromethane	25.	U
79-00-5	1,1,2-Trichloroethane	25.	U
71-43-2	Benzene	25.	UJ
10061-02-6	Trans-1,3-Dichloropropene	25.	U
75-25-2	Bromoform	25.	U
108-10-1	4-Methyl-2-Pentanone	50.	U
591-78-6	2-Hexanone	50.	U
127-18-4	Tetrachloroethene	770.	
79-34-5	1,1,2,2-Tetrachloroethane	25.	U
108-88-3	Toluene	25.	UJ
108-90-7	Chlorobenzene	25.	UJ
100-41-4	Ethylbenzene	25.	UJ
100-42-5	Styrene	25.	UJ
1330-20-7	Xylene (total)	25.	UJ

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S2-30

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00042

Matrix: (soil/water) WATER Lab Sample ID: 4017.0

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2896

Level: (low/med) LOW Date Received: 5/30/91

% Moisture: not dec. 100. Date Analyzed: 6/ 6/91

Column: (pack/cap) PACK Dilution Factor: 5.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S3A-30

00048

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4018.9

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3296

Level: (low/med) LOW Date Received: 5/30/91

% Moisture: not dec. 100. Date Analyzed: 6/ 4/91

Column: (pack/cap) PACK Dilution Factor: 10.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	100.	U
74-83-9	Bromomethane	100.	U
75-01-4	Vinyl Chloride	100.	U
75-00-3	Chloroethane	100.	U
75-09-2	Methylene Chloride	50.	U
67-64-1	Acetone	100.	U
75-15-0	Carbon Disulfide	50.	U
75-35-4	1,1-Dichloroethene	50.	U
75-34-3	1,1-Dichloroethane	50.	U
540-59-0	1,2-Dichloroethene (total)	50.	U
67-66-3	Chloroform	50.	U
107-06-2	1,2-Dichloroethane	50.	U
78-93-3	2-Butanone	~~100.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	60.	
56-23-5	Carbon Tetrachloride	50.	U
108-05-4	Vinyl Acetate	100.	U
75-27-4	Bromodichloromethane	50.	U
78-87-5	1,2-Dichloropropane	50.	U
10061-01-5	cis-1,3-Dichloropropene	50.	U
79-01-6	Trichloroethene	110.	
124-48-1	Dibromochloromethane	50.	U
79-00-5	1,1,2-Trichloroethane	50.	U
71-43-2	Benzene	50.	U
10061-02-6	Trans-1,3-Dichloropropene	50.	U
75-25-2	Bromoform	50.	U
108-10-1	4-Methyl-2-Pentanone	100.	U
591-78-6	2-Hexanone	100.	U
127-18-4	Tetrachloroethene	1900.	
79-34-5	1,1,2,2-Tetrachloroethane	50.	U
108-88-3	Toluene	50.	U
108-90-7	Chlorobenzene	50.	U
100-41-4	Ethylbenzene	50.	U
100-42-5	Styrene	50.	U
1330-20-7	Xylene(total)	50.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S3A-30

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00049

Matrix: (soil/water) WATER Lab Sample ID: 4018.9

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3296

Level: (low/med) LOW Date Received: 5/30/91

% Moisture: not dec. 100. Date Analyzed: 6/ 4/91

Column: (pack/cap) PACK Dilution Factor: 10.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S4-30
00056

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4019.7

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3297

Level: (low/med) LOW Date Received: 5/30/91

% Moisture: not dec. 100. Date Analyzed: 6/ 4/91

Column: (pac)/cap) PACK Dilution Factor: 10.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	100.	U
74-83-9	Bromomethane	100.	U
75-01-4	Vinyl Chloride	100.	U
75-00-3	Chloroethane	100.	U
75-09-2	Methylene Chloride	50.	U
67-64-1	Acetone	100.	U
75-15-0	Carbon Disulfide	50.	U
75-35-4	1,1-Dichloroethene	50.	U
75-34-3	1,1-Dichloroethane	50.	U
540-59-0	1,2-Dichloroethene (total)	38.	J
67-66-3	Chloroform	50.	U
107-06-2	1,2-Dichloroethane	50.	U
78-93-3	2-Butanone	~~100.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	44.	J
56-23-5	Carbon Tetrachloride	50.	U
108-05-4	Vinyl Acetate	100.	U
75-27-4	Bromodichloromethane	50.	U
78-87-5	1,2-Dichloropropane	50.	U
10061-01-5	cis-1,3-Dichloropropene	50.	U
79-01-6	Trichloroethene	80.	
124-48-1	Dibromochloromethane	50.	U
79-00-5	1,1,2-Trichloroethane	50.	U
71-43-2	Benzene	50.	U
10061-02-6	Trans-1,3-Dichloropropene	50.	U
75-25-2	Bromoform	50.	U
108-10-1	4-Methyl-2-Pentanone	100.	U
591-78-6	2-Hexanone	100.	U
127-18-4	Tetrachloroethene	2400.	E
79-34-5	1,1,2,2-Tetrachloroethane	50.	U
108-88-3	Toluene	50.	U
108-90-7	Chlorobenzene	50.	U
100-41-4	Ethylbenzene	50.	U
100-42-5	Styrene	50.	U
1330-20-7	Xylene(total)	50.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

S4-30

00057

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4019.7

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3297

Level: (low/med) LOW Date Received: 5/30/91

% Moisture: not dec. 100. Date Analyzed: 6/ 4/91

Column: (pack/cap) PACK Dilution Factor: 10.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
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TRILLIUM INC

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

TREATMENT SYSTEM SAMPLING

VOLATILES ANALYSES DATA

METHOD 524.2 ANALYSES

Samples Collected 5/29/91

Chemical Analyses Performed By

PACE, Incorporated

August 20, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

Data quality for samples in this sample delivery group was good.

Cooler temperature upon receipt of samples by the laboratory was 4°C.

Validation of organic data is conducted in conformance with Environmental Protection Agency (EPA) Functional Guidelines for Evaluating Organics Analyses, February 1, 1988, with modifications by EPA Region I, November 1, 1988.

Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified (valid) results mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Case Narrative

Five treatment system samples were collected and submitted to PACE, Inc. on May 29, 1991. The laboratory was requested to perform volatile organics analyses (VOA) using Method 524.2. The analyte list for this method was amended pursuant to the QA/QC Plan for this project.

The samples included in this Sample Delivery Group (SDG) are:

Client ID	Lab ID	Date of Collection
S1-32FB	4015	05/29/91
S5-27	4020	05/29/91
S6-32	4021	05/29/91
S6-32DUP	4022	05/29/91
S6-32TB	4023	05/29/91

Volatiles

The requirements to be checked in validation are listed below.

I. Holding Times

II. GC/MS Tuning

III. Calibration

A. Initial

B. Continuing

IV. Blanks

V. Surrogate Recovery

VI. Matrix Spike/Matrix Spike Duplicate

VII. Field Duplicates

VIII. Internal Standards Performance

IX. TCL Compound Identification

X. Compound Quantitation and Reported Detection Limits

XI. Tentatively Identified Compounds

XII. System Performance

XIII. Overall Assessment

I. Holding Times

All samples preserved with HCl at the time of collection and were analyzed within the 14-day holding time for preserved samples.

II. GC/MS Tuning

GC/MS tuning and mass calibrations were within criteria.

III. Calibration

Areas were manually integrated for one or more compounds in each of the standards in this data package. No evaluation of these manual integrations can be performed, as no hard copy documentation was provided. Such documentation has been requested from the laboratory. The validation has been completed on the assumption that the manual integrations done and reported by the laboratory were valid and correct. No sample data appear to be affected.

A. Initial

Initial calibration criteria were met on 6/11/91.

B. Continuing

Continuing calibration criteria were met on 6/12/91.

IV. Blanks

The trip blank, field blank, and method blanks were clean.

V. Surrogate Recovery

Surrogate recoveries were within acceptance criteria.

VI. Matrix Spike/Matrix Spike Duplicate

A matrix spike (MS) and matrix spike duplicate (MSD) were performed on Sample S6-32. The relative percent difference for benzene was above QC criteria. Sample data were not affected.

VII. Field Duplicates

Samples S6-32 and S6-32DUP were submitted as duplicate samples. No compounds were detected in either sample.

VIII. Internal Standards Performance

Internal standards areas and retention times were acceptable.

IX. TCL Compound Identification

TCL compound identifications were acceptable.

X. Compound Quantitation and Reported Detection Limits

The laboratory performed a practical quantitation limit (PQL) study for the Method 524.2 analyses for this project on October 15, 1990. Method detection limits (MDLs) determined through that PQL study should have been used for reporting purposes for these treatment system samples. MDLs determined through the PQL study were as follows:

Compound	MDL (ug/L)
Vinyl Chloride	0.48
Chloroethane	0.49
Methylene Chloride	4.41
1,1-Dichloroethene	0.67
1,1-Dichloroethane	0.54
trans-1,2-Dichloroethene	0.50
Chloroform	0.53
1,2-Dichloroethane	0.52
1,1,1-Trichloroethane	0.44
Carbon Tetrachloride	0.43
Bromodichloromethane	0.38
1,2-Dichloropropane	0.45
cis-1,3-Dichloropropene	0.33
Trichloroethene	0.42
Dibromochloromethane	0.33
1,1,2-Trichloroethane	0.43
Benzene	0.58
trans-1,3-Dichloropropene	0.07
Bromoform	0.49
Tetrachloroethene	0.51
1,1,2,2-Tetrachloroethane	0.44
Toluene	0.45
Chlorobenzene	0.44
Ethylbenzene	0.51
m-Xylene	0.48
o-, p-Xylene	0.93
1,2-Dichloroethane-d4	0.50
Toluene-d8	0.45
Bromofluorobenzene	0.36

Methylene chloride was reported in Samples S5-27, S6-32 and S6-32DUP at concentrations below the MDL determined by the PQL study for this project. The methylene chloride concentrations in these samples were corrected to be "ND."

The result reported for 1,1,1-trichloroethane in Sample S5-27 (28 ug/L) was beyond the calibration range of the instrument (25 ug/L). This result met precision and accuracy criteria.

All other results and detection limits were acceptable with regard to the supporting data.

XI. Tentatively Identified Compounds

One tentatively identified compound was reported in the trip blank at a retention time of 20.98. No other TICs were reported for this sample delivery group.

XII. System Performance

System performance was acceptable.

XIII. Overall Assessment of Data for a Case

Methylene chloride was corrected to be "ND" in Samples S5-27, S6-32, and S6-32DUP.

All other results were acceptable as reported.

UNIFIRST/ENSR

PACE Project Number: 810530502

PACE Sample Number:			95 0040154
Date Collected:			05/29/91
Date Received:			05/30/91
Parameter	Units	MDL	S1-32 FB
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR

PACE Project Number: 810530502

PACE Sample Number:			95 0040200
Date Collected:			05/29/91
Date Received:			05/30/91
Parameter	Units	MDL	S5-27
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~9~~ ND KKD 11/7/91
1,1-Dichloroethene	ug/L	0.5	1.6
1,1-Dichloroethane	ug/L	0.5	2.4
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	28
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR

PACE Project Number: 810530502

PACE Sample Number:			95 0040219
Date Collected:			05/29/91
Date Received:			05/30/91
Parameter	Units	MDL	S6-32

ORGANIC ANALYSIS

VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.13~~ ND EKB 7/7/91 ND 6/26/91
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR

PACE Project Number: 810530502

PACE Sample Number:			95 0040227
Date Collected:			05/29/91
Date Received:			05/30/91
Parameter	Units	MDL	S6-32 Dup
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.2~~ ND KCA 7/12/91
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR

PACE Project Number: 810530502

PACE Sample Number:			95 0040235
Date Collected:			05/29/91
Date Received:			05/30/91
Parameter	Units	MDL	S6-32 TB
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
S6-32 TB

Lab Name: Pace Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) water Lab Sample ID: 95004023.5

Sample wt/vol: 25ml (g/mL) ____ Lab File ID: >F1125

Level: (low/med) — Date Received: 5/30/91

% Moisture: not dec. — Date Analyzed: 6/12/91

Column: (pack/cap) cap Dilution Factor: _____

Number TICs found: 1 CONCENTRATION UNITS: (ug/L or ug/Kg) _____

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	—	Unknown	20.98	89 ug/L	
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TRILLIUM INC

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

TREATMENT SYSTEM SAMPLING

INORGANIC ANALYSES DATA

Samples Collected 5/29/91

Chemical Analyses Performed By

PACE, Incorporated

August 20, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

Data presented for this sample delivery group were good. All unqualified sample data may be used without reservation.

Validation of inorganic laboratory data is conducted in conformance with Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses (2/89) and associated checklist. These guidelines and checklist are intended to evaluate data on a technical basis rather than a contract compliance basis for chemical analyses conducted under the USEPA's Contract Laboratory Program (CLP) and assumes that the data package is presented in accordance with the CLP requirements. In addition, the data package is assumed to represent the best efforts of the laboratory and has already been subjected to adequate and sufficient quality review prior to submission for validation.

Results of analyses are reported by the laboratory as either qualified or unqualified. Unqualified results mean that the reported values may be used without reservations. Qualified results indicate a nonroutine (with respect to CLP procedures) situation occurred during the course of analysis. Various qualifier codes associated with the numerical results are used by the laboratory to denote specific information regarding the analytical results. During the process of validation, laboratory qualified and unqualified data are verified against supporting documentation. Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified results still mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: Analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Inorganic Data Validation

for

Environmental Project Control, Inc.

Samples Collected 5/29/91

Case Narrative

This group contained two water samples to be analyzed for iron. No field blank was provided.

Samples validated in this report are noted below:

Client ID	Lab ID	Date of Collection
S2-30	4017	5/29/91
S2-31	4069	5/29/91

The areas reviewed during validation are listed below.

TRILLIUM INC

CLP Inorganics Data Validation

I. Holding Times

II. Calibration

III. Blanks

IV. ICP Interference Check Sample

V. Matrix Spike Sample Analysis

VI. Duplicate Sample Analysis

VII. Laboratory Control Sample Analysis

VIII. Furnace Atomic Absorption Analysis

IX. ICP Serial Dilution Analysis

X. Detection Limits

XI. Sample Result Verification

XII. Overall Assessment

Data Validation

I. Holding Times

Analyses were conducted within acceptable holding times.

II. Calibration

Calibrations were satisfactory.

III. Blanks

No blank contamination was detected. No field blank was provided for analysis. Because of this, there is no wasy to determine if the detected concentrations in the samples are true or attributable to contamination.

IV. ICP Interference Check Sample

Interference check sample results were satisfactory.

V. Matrix Spike Sample Analysis

Matrix spike analyses were satisfactory.

VI. Duplicate Sample Analysis

Duplicate analyses were satisfactory.

VII. Laboratory Control Sample Analyses

Laboratory control sample results were satisfactory.

VIII. Furnace Atomic Absorption Analysis

Not a requirement of this sample delivery group.

IX. ICP Serial Dilution Analysis

Serial dilutions were conducted on S2-30. All results met the validation criteria of 15%.

X. Detection Limits

Instrument detection limits (IDLs) were acceptable.

XI. Sample Result Verification

Sample results were acceptable as reported.

XII. Overall Assessment

The data in this data package are acceptable as reported, however, since no field blank was provided, the end user should use this data with caution.

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

00014

EPA SAMPLE NO.

S2-30

ab Name: PACE_INCORPORATED_____ Contract: EPC_____

ab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix (soil/water): WATER Lab Sample ID: 4017.0____

evel (low/med): LOW__ Date Received: 05/30/91

% Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_				NR
7440-36-0	Antimony_				NR
7440-38-2	Arsenic__				NR
7440-39-3	Barium___				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium__				NR
7440-70-2	Calcium__				NR
7440-47-3	Chromium_				NR
7440-48-4	Cobalt___				NR
7440-50-8	Copper___				NR
7439-89-6	Iron____	2100			P
7439-92-1	Lead____				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury__				NR
7440-02-0	Nickel___				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium_				NR
7440-22-4	Silver___				NR
7440-23-5	Sodium___				NR
7440-28-0	Thallium_				NR
7440-62-2	Vanadium_				NR
7440-66-6	Zinc____				NR
	Cyanide__				NR

olor Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

lor After: COLORLESS Clarity After: CLEAR_ Artifacts: ___

mments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

00015

EPA SAMPLE NO.

S2-31

ab Name: PACE_INCORPORATED_____ Contract: EPC_____

ab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix (soil/water): WATER Lab Sample ID: 4069.3____

evel (low/med): LOW__ Date Received: 05/31/91

% Solids: ____0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum_				NR
7440-36-0	Antimony_				NR
7440-38-2	Arsenic__				NR
7440-39-3	Barium___				NR
7440-41-7	Beryllium				NR
7440-43-9	Cadmium__				NR
7440-70-2	Calcium__				NR
7440-47-3	Chromium_				NR
7440-48-4	Cobalt___				NR
7440-50-8	Copper___				NR
7439-89-6	Iron_____	3460_			P_
7439-92-1	Lead_____				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury__				NR
7440-02-0	Nickel___				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium_				NR
7440-22-4	Silver___				NR
7440-23-5	Sodium___				NR
7440-28-0	Thallium_				NR
7440-62-2	Vanadium_				NR
7440-66-6	Zinc_____				NR
_____	Cyanide__				NR
_____	_____				

olor Before: COLORLESS Clarity Before: CLEAR_ Texture: _____

lor After: COLORLESS Clarity After: CLEAR_ Artifacts: ___

mments:

_____

_____

_____

_____

TRILLIUM INC

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

AREAL SAMPLING

VOLATILES ANALYSES DATA

Samples Collected 5/29/91 and 5/30/91

Chemical Analyses Performed By

PACE, Incorporated

August 16, 1991
Rev. 9/16/91

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

Data quality for this sample delivery group was good.

Cooler temperature upon receipt of samples by the laboratory was 13°C. Cooler temperatures outside the 4°C ±2°C range may adversely affect the volatile compounds.

Validation of organic data is conducted in conformance with Environmental Protection Agency Functional Guidelines for Evaluating Organics Analyses, February 1, 1988.

Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified (valid) results mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Case Narrative

Ten samples (including matrix spike and matrix spike duplicate) were collected and submitted to PACE, Inc. on May 30, 1991. The laboratory was requested to perform volatile organics (VOA) target compound list (TCL) analyses.

The samples included in this sample delivery group are:

Client ID	Lab ID	Date of Collection
FDUG12	4097	05/29/91
G01DB	4101	05/29/91
S81S	4095	05/29/91
TB	4102	05/29/91
UG12	4096	05/29/91
UG16	4100	05/29/91
UC233	4103	05/30/91
S82	4094	05/29/91

Volatiles

The requirements to be checked in validation are listed below.

I. Holding Times

II. GC/MS Tuning

III. Calibration

A. Initial

B. Continuing

IV. Blanks

V. Surrogate Recovery

VI. Matrix Spike/Matrix Spike Duplicate

VII. Field Duplicates

VIII. Internal Standards Performance

IX. TCL Compound Identification

X. Compound Quantitation and Reported Detection Limits

XI. Tentatively Identified Compounds

XII. System Performance

XIII. Overall Assessment

I. Holding Times

All samples were analyzed within the 14-day holding time for preserved samples.

II. GC/MS Tuning

GC/MS tuning and mass calibrations were within criteria.

III. Calibration

Areas were manually integrated for one or more compounds in each of the standards in this data package. No evaluation of these manual integrations can be performed, as no hard copy documentation is provided. The validation has been completed on the assumption that the manual integrations done and reported by the laboratory were valid and correct. No positive data are affected.

A. Initial

Initial calibration criteria were met on 5/28/91 (Instrument G) with the exception of the RRF for 2-butanone (actual 0.077; criteria 0.1). Detection limits for 2-butanone were rejected in Samples UG12MS, UG12MSD, UG16, G01DB, UC233, FDUG12, G01DBDL, S82, and S81S.

Initial calibration criteria were met on 5/29/91 (Instrument J).

B. Continuing

Continuing calibration criteria were met on 6/10/91 (Instrument G) with the exception of the RF for 2-butanone (actual 0.064; criteria 0.1) and the % difference for acetone (actual 44.5; criteria 25) and 4-methyl-2-pentanone (actual 30.3; criteria 25). The positive results for acetone in Samples UG12MS, UG12MSD, and UC233 were qualified as estimated. Other data were not affected.

Continuing calibration criteria were met on 6/11/91 (Instrument G) with the exception of the RF for 2-butanone (actual 0.069; criteria 0.1) and acetone (actual 0.096; criteria 0.1). Detection limits for acetone were rejected in Samples G01DBDL and S81S. The positive result for acetone in Sample FDUG12 was qualified as estimated. Other data were not affected.

Continuing calibration criteria were met on 6/12/91 (Instrument G) with the exception of the RF for 2-butanone

(actual 0.058; criteria 0.1) and vinyl acetate (actual 0.090; criteria 0.1) and the % difference for vinyl acetate (actual 38.4; criteria 25) and 4-methyl-2-pentanone (actual 25.3; criteria 25). The detection limit for 2-butanone were previously rejected; the detection limit for vinyl acetate was rejected in Sample S82. Other data were not affected.

Continuing calibration criteria were met on 6/4/91 (Instrument J) with the exception of the % difference for chloromethane (actual 28.1; criteria 25), acetone (actual 28.8; criteria 25), 2-butanone (actual 36.1; criteria 25), vinyl acetate (actual 25.5; criteria 25), 4-methyl-2-pentanone (actual 26.7; criteria 25), and 2-hexanone (actual 30.2; criteria 25). Data were not affected.

Continuing calibration criteria were met on 6/6/91 (Instrument J) with the exception of the RF for 2-butanone (actual 0.079; criteria 0.1) and the % difference for chloromethane (actual 26.6; criteria 25), acetone (actual 46.6; criteria 25), 2-butanone (actual 52.0; criteria 25), vinyl acetate (actual 41.4; criteria 25), bromoform (actual 25.1; criteria 25), 4-methyl-2-pentanone (actual 45.2; criteria 25), 2-hexanone (actual 44.4; criteria 25), and 1,1,2,2-tetrachloroethane (actual 37.4; criteria 25). The detection limit for 2-butanone was rejected in Sample UG12. The positive result for acetone in Sample UG12 was qualified as estimated.

IV. Blanks

Method blanks and the trip blank were clean.

V. Surrogate Recovery

Surrogate recoveries were within acceptance criteria.

VI. Matrix Spike/Matrix Spike Duplicate

The matrix spike and matrix spike duplicate were performed on Sample UG12. Recoveries for benzene and toluene were above QC criteria in the MS and the MSD. No positive data was reported in field samples for these compounds, so no data were qualified.

VII. Field Duplicates

Compounds and concentrations (in ug/L) reported for Samples UG12 and FDUG12 were as follows:

Compound	UG12	FDUG12
Methylene Chloride		4
Acetone	310	330
1,1-Dichloroethane	5	5
1,2-Dichloroethenes	29	28
Trichloroethene	59	50
Tetrachloroethene	170	140

Because methylene chloride was reported only for the field duplicate, this result was rejected. Other results were within QC criteria.

VIII. Internal Standards Performance

Internal standards areas and retention times were acceptable.

IX. TCL Compound Identification

TCL compound identifications were acceptable.

X. Compound Quantitation and Reported Detection Limits

The result reported for tetrachloroethene in Sample G01DB was beyond the calibration range of the instrument. The laboratory reanalyzed this sample at a dilution. The result for tetrachloroethene in Sample G01DB was rejected; the result in the rerun was accepted.

The result reported for tetrachloroethene in Sample S82 was slightly beyond the calibration range of the instrument. This result met precision and accuracy criteria and was acceptable as reported.

Chloroform results in Samples S81S and UC233 probably resulted from laboratory contamination.

All other results and detection limits were acceptable with regard to the supporting data.

XI. Tentatively Identified Compounds

No TICs were reported for this SDG.

XII. System Performance

System performance was acceptable.

XIII. Overall Assessment of Data for a Case

Data quality for this sample delivery group was good. Detection limits for 2-butanone were rejected all samples except the trip blank. Detection limits for acetone were rejected in Samples G01DBDL and S81S. The detection limit for vinyl acetate was rejected in Sample S82.

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

FDUG12

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4097.9

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3340

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec. 100. 0000027 Date Analyzed: 6/12/91

Column: (pack/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	~~4.~~	~~J~~ R
67-64-1	Acetone	330.	~~E~~ J
75-15-0	Carbon Disulfide	5.	U
75-35-4	1,1-Dichloroethene	5.	U
75-34-3	1,1-Dichloroethane	5.	J
540-59-0	1,2-Dichloroethene (total)	28.	
67-66-3	Chloroform	5.	U
107-06-2	1,2-Dichloroethane	5.	U
78-93-3	2-Butanone	~~10.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	5.	U
56-23-5	Carbon Tetrachloride	5.	U
108-05-4	Vinyl Acetate	10.	U
75-27-4	Bromodichloromethane	5.	U
78-87-5	1,2-Dichloropropane	5.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U
79-01-6	Trichloroethene	50.	
124-48-1	Dibromochloromethane	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U
71-43-2	Benzene	5.	U
10061-02-6	Trans-1,3-Dichloropropene	5.	U
75-25-2	Bromoform	5.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	140.	
79-34-5	1,1,2,2-Tetrachloroethane	5.	U
108-88-3	Toluene	5.	U
108-90-7	Chlorobenzene	5.	U
100-41-4	Ethylbenzene	5.	U
100-42-5	Styrene	5.	U
1330-20-7	Xylene(total)	5.	U

TENTATIVELY IDENTIFIED COMPOUNDS

FDUG12

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4097.9

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3340

Level: (low/med) LOW 0000028 Date Received: 5/31/91

% Moisture: not dec. 100. Date Analyzed: 6/12/91

Column: (pack/cap) PACK Dilution Factor: 1.00

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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VOLATILE ORGANICS ANALYSIS DATA SHEET

G01DB

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4101.0

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3325

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec. 100. 0000038 Date Analyzed: 6/10/91

Column: (pack/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	5.	U
67-64-1	Acetone	10.	U
75-15-0	Carbon Disulfide	5.	U
75-35-4	1,1-Dichloroethene	5.	U
75-34-3	1,1-Dichloroethane	5.	U
540-59-0	1,2-Dichloroethene (total)	10.	
67-66-3	Chloroform	5.	U
107-06-2	1,2-Dichloroethane	5.	U
78-93-3	2-Butanone	~~10.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	12.	
56-23-5	Carbon Tetrachloride	5.	U
108-05-4	Vinyl Acetate	10.	U
75-27-4	Bromodichloromethane	5.	U
78-87-5	1,2-Dichloropropane	5.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U
79-01-6	Trichloroethene	29.	
124-48-1	Dibromochloromethane	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U
71-43-2	Benzene	5.	U
10061-02-6	Trans-1,3-Dichloropropene	5.	U
75-25-2	Bromoform	5.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	~~1000.~~	~~E~~ R
79-34-5	1,1,2,2-Tetrachloroethane	5.	U
108-88-3	Toluene	5.	U
108-90-7	Chlorobenzene	5.	U
100-41-4	Ethylbenzene	5.	U
100-42-5	Styrene	5.	U
1330-20-7	Xylene(total)	5.	U

TENTATIVELY IDENTIFIED COMPOUNDS

G01DB

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4101.0

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3325

Level: (low/med) LOW 0000039 Date Received: 5/31/91

% Moisture: not dec. 100. Date Analyzed: 6/10/91

Column: (pack/cap) PACK Dilution Factor: 1.00

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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VOLATILE ORGANICS ANALYSIS DATA SHEET

G01DBDL

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4101.0DL

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3341

Level: (low/med) LOW 0000047 Date Received: 5/31/91

% Moisture: not dec. 100. Date Analyzed: 6/12/91

Column: (pack/cap) PACK Dilution Factor: 10.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	100.	U
74-83-9	Bromomethane	100.	U
75-01-4	Vinyl Chloride	100.	U
75-00-3	Chloroethane	100.	U
75-09-2	Methylene Chloride	50.	U
67-64-1	Acetone	~~100.~~	~~U~~ R
75-15-0	Carbon Disulfide	50.	U
75-35-4	1,1-Dichloroethene	50.	U
75-34-3	1,1-Dichloroethane	50.	U
540-59-0	1,2-Dichloroethene (total)	50.	U
67-66-3	Chloroform	50.	U
107-06-2	1,2-Dichloroethane	50.	U
78-93-3	2-Butanone	~~100.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	50.	U
56-23-5	Carbon Tetrachloride	50.	U
108-05-4	Vinyl Acetate	100.	U
75-27-4	Bromodichloromethane	50.	U
78-87-5	1,2-Dichloropropane	50.	U
10061-01-5	cis-1,3-Dichloropropene	50.	U
79-01-6	Trichloroethene	50.	U
124-48-1	Dibromochloromethane	50.	U
79-00-5	1,1,2-Trichloroethane	50.	U
71-43-2	Benzene	50.	U
10061-02-6	Trans-1,3-Dichloropropene	50.	U
75-25-2	Bromoform	50.	U
108-10-1	4-Methyl-2-Pentanone	100.	U
591-78-6	2-Hexanone	100.	U
127-18-4	Tetrachloroethene	1000.	
79-34-5	1,1,2,2-Tetrachloroethane	50.	U
108-88-3	Toluene	50.	U
108-90-7	Chlorobenzene	50.	U
100-41-4	Ethylbenzene	50.	U
100-42-5	Styrene	50.	U
1330-20-7	Xylene(total)	50.	U

TENTATIVELY IDENTIFIED COMPOUNDS

G01DBDL

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4101.0DL

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3341

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec. 100. 0000048 Date Analyzed: 6/12/91

Column: (pack/cap) PACK Dilution Factor: 10.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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VOLATILE ORGANICS ANALYSIS DATA SHEET

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Lab Name: PACE Contract: 0000052

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4095.2

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3342

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec. 100. Date Analyzed: 6/12/91

Column: (pack/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	5.	U
67-64-1	Acetone	~~10.~~	~~U~~ R
75-15-0	Carbon Disulfide	5.	U
75-35-4	1,1-Dichloroethene	5.	U
75-34-3	1,1-Dichloroethane	5.	U
540-59-0	1,2-Dichloroethene (total)	5.	U
67-66-3	Chloroform	6.	
107-06-2	1,2-Dichloroethane	5.	U
78-93-3	2-Butanone	~~10.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	4.	J
56-23-5	Carbon Tetrachloride	5.	U
108-05-4	Vinyl Acetate	10.	U
75-27-4	Bromodichloromethane	5.	U
78-87-5	1,2-Dichloropropane	5.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U
79-01-6	Trichloroethene	5.	U
124-48-1	Dibromochloromethane	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U
71-43-2	Benzene	5.	U
10061-02-6	Trans-1,3-Dichloropropene	5.	U
75-25-2	Bromoform	5.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	77.	
79-34-5	1,1,2,2-Tetrachloroethane	5.	U
108-88-3	Toluene	5.	U
108-90-7	Chlorobenzene	5.	U
100-41-4	Ethylbenzene	5.	U
100-42-5	Styrene	5.	U
1330-20-7	Xylene(total)	5.	U

TENTATIVELY IDENTIFIED COMPOUNDS

S81~~0~~5

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: 0000053 SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4095.2

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3342

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec. 100. Date Analyzed: 6/12/91

Column: (pack/cap) PACK Dilution Factor: 1.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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EPA SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: PACE Contract: 0000060 TB

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4102.9

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2872

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec. 100. Date Analyzed: 6/ 4/91

Column: (pack/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	5.	U
67-64-1	Acetone	10.	U
75-15-0	Carbon Disulfide	5.	U
75-35-4	1,1-Dichloroethene	5.	U
75-34-3	1,1-Dichloroethane	5.	U
540-59-0	1,2-Dichloroethene (total)	5.	U
67-66-3	Chloroform	5.	U
107-06-2	1,2-Dichloroethane	5.	U
78-93-3	2-Butanone	10.	U
71-55-6	1,1,1-Trichloroethane	5.	U
56-23-5	Carbon Tetrachloride	5.	U
108-05-4	Vinyl Acetate	10.	U
75-27-4	Bromodichloromethane	5.	U
78-87-5	1,2-Dichloropropane	5.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U
79-01-6	Trichloroethene	5.	U
124-48-1	Dibromochloromethane	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U
71-43-2	Benzene	5.	U
10061-02-6	Trans-1,3-Dichloropropene	5.	U
75-25-2	Bromoform	5.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	5.	U
79-34-5	1,1,2,2-Tetrachloroethane	5.	U
108-88-3	Toluene	5.	U
108-90-7	Chlorobenzene	5.	U
100-41-4	Ethylbenzene	5.	U
100-42-5	Styrene	5.	U
1330-20-7	Xylene (total)	5.	U

TENTATIVELY IDENTIFIED COMPOUNDS

000006 TB

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4102.9

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2872

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec. 100. Date Analyzed: 6/ 4/91

Column: (pack/cap) PACK Dilution Factor: 1.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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VOLATILE ORGANICS ANALYSIS DATA SHEET

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UG12

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4096.0

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2897

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec. 100. Date Analyzed: 6/ 6/91

Column: (pack/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	5.	U
67-64-1	Acetone	310.	EJ
75-15-0	Carbon Disulfide	5.	U
75-35-4	1,1-Dichloroethene	5.	U
75-34-3	1,1-Dichloroethane	5.	J
540-59-0	1,2-Dichloroethene (total)	29.	
67-66-3	Chloroform	5.	U
107-06-2	1,2-Dichloroethane	5.	U
78-93-3	2-Butanone	~~10.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	5.	U
56-23-5	Carbon Tetrachloride	5.	U
108-05-4	Vinyl Acetate	10.	U
75-27-4	Bromodichloromethane	5.	U
78-87-5	1,2-Dichloropropane	5.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U
79-01-6	Trichloroethene	59.	
124-48-1	Dibromochloromethane	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U
71-43-2	Benzene	5.	U
10061-02-6	Trans-1,3-Dichloropropene	5.	U
75-25-2	Bromoform	5.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	170.	
79-34-5	1,1,2,2-Tetrachloroethane	5.	U
108-88-3	Toluene	5.	U
108-90-7	Chlorobenzene	5.	U
100-41-4	Ethylbenzene	5.	U
100-42-5	Styrene	5.	U
1330-20-7	Xylene (total)	5.	U

TENTATIVELY IDENTIFIED COMPOUNDS

UG12

Lab Name: PACE Contract: 0000066

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4096.0

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: J2897

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec. 100. Date Analyzed: 6/ 6/91

Column: (pack/cap) PACK Dilution Factor: 1.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
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VOLATILE ORGANICS ANALYSIS DATA SHEET

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UG16

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4100.2

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3324

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec. 100. Date Analyzed: 6/10/91

Column: (pack/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	5.	U
67-64-1	Acetone	10.	U
75-15-0	Carbon Disulfide	5.	U
75-35-4	1,1-Dichloroethene	5.	U
75-34-3	1,1-Dichloroethane	5.	U
540-59-0	1,2-Dichloroethene (total)	5.	U
67-66-3	Chloroform	5.	U
107-06-2	1,2-Dichloroethane	5.	U
78-93-3	2-Butanone	~~10.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	5.	U
56-23-5	Carbon Tetrachloride	5.	U
108-05-4	Vinyl Acetate	10.	U
75-27-4	Bromodichloromethane	5.	U
78-87-5	1,2-Dichloropropane	5.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U
79-01-6	Trichloroethene	5.	U
124-48-1	Dibromochloromethane	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U
71-43-2	Benzene	5.	U
10061-02-6	Trans-1,3-Dichloropropene	5.	U
75-25-2	Bromoform	5.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	11.	
79-34-5	1,1,2,2-Tetrachloroethane	5.	U
108-88-3	Toluene	5.	U
108-90-7	Chlorobenzene	5.	U
100-41-4	Ethylbenzene	5.	U
100-42-5	Styrene	5.	U
1330-20-7	Xylene(total)	5.	U

TENTATIVELY IDENTIFIED COMPOUNDS

UG16

Lab Name: PACE Contract: 0000076

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4100.2

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3324

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec. 100. Date Analyzed: 6/10/91

Column: (pack/cap) PACK Dilution Factor: 1.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
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VOLATILE ORGANICS ANALYSIS DATA SHEET

0000081 | UC233

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4103.7

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3326

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec. 100. Date Analyzed: 6/10/91

Column: (pack/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	5.	U
67-64-1	Acetone	26.	J
75-15-0	Carbon Disulfide	5.	U
75-35-4	1,1-Dichloroethene	5.	U
75-34-3	1,1-Dichloroethane	5.	U
540-59-0	1,2-Dichloroethene (total)	5.	U
67-66-3	Chloroform	4.	J
107-06-2	1,2-Dichloroethane	5.	U
78-93-3	2-Butanone	~~10.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	5.	U
56-23-5	Carbon Tetrachloride	5.	U
108-05-4	Vinyl Acetate	10.	U
75-27-4	Bromodichloromethane	5.	U
78-87-5	1,2-Dichloropropane	5.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U
79-01-6	Trichloroethene	5.	U
124-48-1	Dibromochloromethane	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U
71-43-2	Benzene	5.	U
10061-02-6	Trans-1,3-Dichloropropene	5.	U
75-25-2	Bromoform	5.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	5.	~~U~~
79-34-5	1,1,2,2-Tetrachloroethane	5.	~~U~~ U
108-88-3	Toluene	5.	U
108-90-7	Chlorobenzene	5.	U
100-41-4	Ethylbenzene	5.	U
100-42-5	Styrene	5.	U
1330-20-7	Xylene(total)	5.	U

CC 6/28/91

TENTATIVELY IDENTIFIED COMPOUNDS

0000082

UC233

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4103.7

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: G3326

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec. 100. Date Analyzed: 6/10/91

Column: (pack/cap) PACK Dilution Factor: 1.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S82

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 0000087B

Matrix: (soil/water) WATER Lab Sample ID: 4094.4

Sample wt/vol: 5. (g/mL) ML Lab File ID: G3346

Level: (low/med) LOW Date Received: 5/31/91

Moisture: not dec.100. Date Analyzed: 6/12/91

Column: (pack/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q	
74-87-3	Chloromethane	10.	U	
74-83-9	Bromomethane	10.	U	
75-01-4	Vinyl Chloride	10.	U	
75-00-3	Chloroethane	10.	U	
75-09-2	Methylene Chloride	5.	U	
67-64-1	Acetone	10.	U	
75-15-0	Carbon Disulfide	5.	U	
75-35-4	1,1-Dichloroethene	5.	U	
75-34-3	1,1-Dichloroethane	5 ~~1.~~	~~J~~U	CM 6/19/91
540-59-0	1,2-Dichloroethene (total)	12.		
67-66-3	Chloroform	5.	U	
107-06-2	1,2-Dichloroethane	5.	U	RKS 9/16/91
78-93-3	2-Butanone	~~10.~~	~~U~~ R	
71-55-6	1,1,1-Trichloroethane	5 ~~1.~~	~~J~~U	CM 6/19/91
56-23-5	Carbon Tetrachloride	5.	U	
108-05-4	Vinyl Acetate	~~10.~~	~~U~~ R	RKS 9/16/91
75-27-4	Bromodichloromethane	5.	U	
78-87-5	1,2-Dichloropropane	5.	U	
10061-01-5	cis-1,3-Dichloropropene	5.	U	
79-01-6	Trichloroethene	26.		
124-48-1	Dibromochloromethane	5.	U	
79-00-5	1,1,2-Trichloroethane	5.	U	
71-43-2	Benzene	5.	U	
10061-02-6	Trans-1,3-Dichloropropene	5.	U	
75-25-2	Bromoform	5.	U	
108-10-1	4-Methyl-2-Pentanone	10.	U	
591-78-6	2-Hexanone	10.	U	
127-18-4	Tetrachloroethene	210.	~~E~~	RKS 9/16/91
79-34-5	1,1,2,2-Tetrachloroethane	5.	U	
108-88-3	Toluene	5.	U	
108-90-7	Chlorobenzene	5.	U	
100-41-4	Ethylbenzene	5.	U	
100-42-5	Styrene	5.	U	
1330-20-7	Xylene(total)	5.	U	

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

S82

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 0000087C

Matrix: (soil/water) WATER Lab Sample ID: 4094.4

Sample wt/vol: 5. (g/mL) ML Lab File ID: G3346

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec.100. Date Analyzed: 6/12/91

Column: (pack/cap) PACK Dilution Factor: 1.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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TRILLIUM INC

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

TREATMENT SYSTEM SAMPLING

VOLATILES ANALYSES DATA

Samples Collected 5/30/91

Chemical Analyses Performed By

PACE, Incorporated

August 20, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

Data quality for this sample delivery group was good.

Cooler temperature upon receipt of samples by the laboratory was 12°C. Cooler temperatures outside the 4°C ±2°C range may adversely affect the volatile compounds.

Validation of organic data is conducted in conformance with Environmental Protection Agency (EPA) Functional Guidelines for Evaluating Organics Analyses, February 1, 1988, with modifications by EPA Region 1, November 1, 1988.

Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified (valid) results mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Case Narrative

Eight samples (including matrix spike and matrix spike duplicate) were collected and submitted to PACE, Inc. on May 30, 1991. The laboratory was requested to perform volatile organics (VOA) target compound list (TCL) analyses.

The samples included in this Sample Delivery Group (SDG) are:

Client ID	Lab ID	Date of Collection
S1-33	4064	05/30/91
S1-33DUP	4065	05/30/91
S1-33TB	4066	05/30/91
S2-31	4069	05/30/91
S3A-31	4070	05/30/91
S4-31	4071	05/30/91

Volatiles

The requirements to be checked in validation are listed below.

I. Holding Times

II. GC/MS Tuning

III. Calibration

A. Initial

B. Continuing

IV. Blanks

V. Surrogate Recovery

VI. Matrix Spike/Matrix Spike Duplicate

VII. Field Duplicates

VIII. Internal Standards Performance

IX. TCL Compound Identification

X. Compound Quantitation and Reported Detection Limits

XI. Tentatively Identified Compounds

XII. System Performance

XIII. Overall Assessment

I. Holding Times

All samples were received preserved and analyzed within the 14-day holding time for preserved samples.

II. GC/MS Tuning

GC/MS tuning and mass calibrations were within criteria.

III. Calibration

Areas were manually integrated for one or more compounds in each of the standards in this data package. No evaluation of these manual integrations can be performed, as no hard copy documentation is provided. The validation has been completed on the assumption that the manual integrations done and reported by the laboratory were valid and correct. No positive data appear to be affected.

A. Initial

Initial calibration criteria were met on 5/28/91.

B. Continuing

Continuing calibration criteria were met on 6/5/91 with the exception of the RF for 2-butanone (actual 0.087; criteria 0.1) and the % difference for acetone (actual 32.4; criteria 25), 2-butanone (actual 47.3; criteria 25), vinyl acetate (actual 32.7; criteria 25), 4-methyl-2-pentanone (actual 36.5; criteria 25), 2-hexanone (actual 37.5; criteria 25), and 1,1,2,2-tetrachloroethane (actual 31.8; criteria 25). Detection limits for 2-butanone were rejected in Samples S1-33, S1-33TB, S3A-31, and S4-31. Other data were not affected.

Continuing calibration criteria were met on 6/6/91 with the exception of the RF for 2-butanone (actual 0.079; criteria 0.1) and the % difference for chloromethane (actual 26.6; criteria 25), acetone (actual 46.6; criteria 25), 2-butanone (actual 52.0; criteria 25), vinyl acetate (actual 41.4; criteria 25), 4-methyl-2-pentanone (actual 45.2; criteria 25), 2-hexanone (actual 44.4; criteria 25), and 1,1,2,2-tetrachloroethane (actual 37.4; criteria 25). Detection limits for 2-butanone was rejected in Samples S2-31, S1-33DUP, S1-33MS, and S1-33MSD. Other data were not affected.

IV. Blanks

Acetone was reported in the trip blank. Although not reported on the Form I, methylene chloride was reported on the quant report for Method Blank VBLK01. Acetone results for Samples S1-33TB, S1-33, and S4-31 and methylene chloride results for Sample S4-31 were qualified as less than the reported values.

V. Surrogate Recovery

Surrogate recoveries were within acceptance criteria.

VI. Matrix Spike/Matrix Spike Duplicate

The matrix spike (MS) and matrix spike duplicate (MSD) were performed on Sample S1-33. Results were within QC acceptance criteria.

VII. Field Duplicates

Compounds and concentrations (in ug/L) reported in Samples S1-32 and S1-32DUP were as follows:

Compound	S1-32	S1-32DUP
Trichloroethene	120	100
Tetrachloroethene	4000	3400

Results were within QC criteria.

VIII. Internal Standards Performance

Internal standards areas and retention times were acceptable.

IX. TCL Compound Identification

TCL compound identifications were acceptable.

X. Compound Quantitation and Reported Detection Limits

The result reported for tetrachloroethene in Sample S4-31 was beyond the calibration range of the instrument. This result was within precision and accuracy criteria and was accepted as reported.

All other results and detection limits were acceptable with regard to the supporting data.

XI. Tentatively Identified Compounds

No TICs were reported for this SDG.

XII. System Performance

System performance requires attention. Manual integrations should be addressed.

Calibration response factors need to be monitored by the laboratory.

XIII. Overall Assessment of Data for a Case

Data quality for this sample delivery group was good. The detection limit for 2-butanone was rejected all samples.

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S1-33

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00020

Matrix: (soil/water) WATER Lab Sample ID: 4064.2

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2877

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec.100. Date Analyzed: 6/ 5/91

Column: (pack/cap) PACK Dilution Factor: 20.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	200.	U
74-83-9	Bromomethane	200.	U
75-01-4	Vinyl Chloride	200.	U
75-00-3	Chloroethane	200.	U
75-09-2	Methylene Chloride	100.	U
67-64-1	Acetone	190.	J U
75-15-0	Carbon Disulfide	100.	U
75-35-4	1,1-Dichloroethene	100.	U
75-34-3	1,1-Dichloroethane	100.	U
540-59-0	1,2-Dichloroethene (total)	100.	U
67-66-3	Chloroform	100.	U
107-06-2	1,2-Dichloroethane	100.	U
78-93-3	2-Butanone	~~200.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	100.	U
56-23-5	Carbon Tetrachloride	100.	U
108-05-4	Vinyl Acetate	200.	U
75-27-4	Bromodichloromethane	100.	U
78-87-5	1,2-Dichloropropane	100.	U
10061-01-5	cis-1,3-Dichloropropene	100.	U
79-01-6	Trichloroethene	120.	
124-48-1	Dibromochloromethane	100.	U
79-00-5	1,1,2-Trichloroethane	100.	U
71-43-2	Benzene	100.	U
10061-02-6	Trans-1,3-Dichloropropene	100.	U
75-25-2	Bromoform	100.	U
108-10-1	4-Methyl-2-Pentanone	200.	U
591-78-6	2-Hexanone	200.	U
127-18-4	Tetrachloroethene	4000.	
79-34-5	1,1,2,2-Tetrachloroethane	100.	U
108-88-3	Toluene	100.	U
108-90-7	Chlorobenzene	100.	U
100-41-4	Ethylbenzene	100.	U
100-42-5	Styrene	100.	U
1330-20-7	Xylene (total)	100.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S1-33

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00021

Matrix: (soil/water) WATER Lab Sample ID: 4064.2

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2877

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec.100. Date Analyzed: 6/ 5/91

Column: (pack/cap) PACK Dilution Factor: 20.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S1-33DUP

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00029

Matrix: (soil/water) WATER Lab Sample ID: 4065.0

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2892

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec.100. Date Analyzed: 6/ 6/91

Column: (pack/cap) PACK Dilution Factor: 20.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
74-87-3	Chloromethane	200.	U
74-83-9	Bromomethane	200.	U
75-01-4	Vinyl Chloride	200.	U
75-00-3	Chloroethane	200.	U
75-09-2	Methylene Chloride	100.	U
67-64-1	Acetone	200.	U
75-15-0	Carbon Disulfide	100.	U
75-35-4	1,1-Dichloroethene	100.	U
75-34-3	1,1-Dichloroethane	100.	U
540-59-0	1,2-Dichloroethene (total)	100.	U
67-66-3	Chloroform	100.	U
107-06-2	1,2-Dichloroethane	100.	U
78-93-3	2-Butanone	~~200.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	100.	U
56-23-5	Carbon Tetrachloride	100.	U
108-05-4	Vinyl Acetate	200.	U
75-27-4	Bromodichloromethane	100.	U
78-87-5	1,2-Dichloropropane	100.	U
10061-01-5	cis-1,3-Dichloropropene	100.	U
79-01-6	Trichloroethene	100.	
124-48-1	Dibromochloromethane	100.	U
79-00-5	1,1,2-Trichloroethane	100.	U
71-43-2	Benzene	100.	U
10061-02-6	Trans-1,3-Dichloropropene	100.	U
75-25-2	Bromoform	100.	U
108-10-1	4-Methyl-2-Pentanone	200.	U
591-78-6	2-Hexanone	200.	U
127-18-4	Tetrachloroethene	3400.	
79-34-5	1,1,2,2-Tetrachloroethane	100.	U
108-88-3	Toluene	100.	U
108-90-7	Chlorobenzene	100.	U
100-41-4	Ethylbenzene	100.	U
100-42-5	Styrene	100.	U
1330-20-7	Xylene (total)	100.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S1-33DUP

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00030

Matrix: (soil/water) WATER Lab Sample ID: 4065.0

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2892

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec.100. Date Analyzed: 6/ 6/91

Column: (pack/cap) PACK Dilution Factor: 20.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S1-33TB

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00036

Matrix: (soil/water) WATER Lab Sample ID: 4066.9

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2880

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec.100. Date Analyzed: 6/ 5/91

Column: (pack/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	5.	U
67-64-1	Acetone	10.	~~U~~
75-15-0	Carbon Disulfide	5.	U
75-35-4	1,1-Dichloroethene	5.	U
75-34-3	1,1-Dichloroethane	5.	U
540-59-0	1,2-Dichloroethene (total)	5.	U
67-66-3	Chloroform	5.	U
107-06-2	1,2-Dichloroethane	5.	U
78-93-3	2-Butanone	~~10.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	5.	U
56-23-5	Carbon Tetrachloride	5.	U
108-05-4	Vinyl Acetate	10.	U
75-27-4	Bromodichloromethane	5.	U
78-87-5	1,2-Dichloropropane	5.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U
79-01-6	Trichloroethene	5.	U
124-48-1	Dibromochloromethane	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U
71-43-2	Benzene	5.	U
10061-02-6	Trans-1,3-Dichloropropene	5.	U
75-25-2	Bromoform	5.	U
108-10-1	4-Methyl-2-Pentanone	10.	U
591-78-6	2-Hexanone	10.	U
127-18-4	Tetrachloroethene	5.	U
79-34-5	1,1,2,2-Tetrachloroethane	5.	U
108-88-3	Toluene	5.	U
108-90-7	Chlorobenzene	5.	U
100-41-4	Ethylbenzene	5.	U
100-42-5	Styrene	5.	U
1330-20-7	Xylene (total)	5.	U

cm 6/24/91

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S1-33TB

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00037

Matrix: (soil/water) WATER Lab Sample ID: 4066.9

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2880

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec.100. Date Analyzed: 6/ 5/91

Column: (pack/cap) PACK Dilution Factor: 1.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S2-31

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00042

Matrix: (soil/water) WATER Lab Sample ID: 4069.3

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2891

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec.100. Date Analyzed: 6/ 6/91

Column: (pack/cap) PACK Dilution Factor: 5.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	50.	U
74-83-9	Bromomethane	50.	U
75-01-4	Vinyl Chloride	50.	U
75-00-3	Chloroethane	50.	U
75-09-2	Methylene Chloride	25.	U
67-64-1	Acetone	50.	U
75-15-0	Carbon Disulfide	25.	U
75-35-4	1,1-Dichloroethene	25.	U
75-34-3	1,1-Dichloroethane	25.	U
540-59-0	1,2-Dichloroethene (total)	35.	
67-66-3	Chloroform	25.	U
107-06-2	1,2-Dichloroethane	25.	U
78-93-3	2-Butanone	~~50.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	26.	
56-23-5	Carbon Tetrachloride	25.	U
108-05-4	Vinyl Acetate	50.	U
75-27-4	Bromodichloromethane	25.	U
78-87-5	1,2-Dichloropropane	25.	U
10061-01-5	cis-1,3-Dichloropropene	25.	U
79-01-6	Trichloroethene	38.	
124-48-1	Dibromochloromethane	25.	U
79-00-5	1,1,2-Trichloroethane	25.	U
71-43-2	Benzene	25.	U
10061-02-6	Trans-1,3-Dichloropropene	25.	U
75-25-2	Bromoform	25.	U
108-10-1	4-Methyl-2-Pentanone	50.	U
591-78-6	2-Hexanone	50.	U
127-18-4	Tetrachloroethene	910.	
79-34-5	1,1,2,2-Tetrachloroethane	25.	U
108-88-3	Toluene	25.	U
108-90-7	Chlorobenzene	25.	U
100-41-4	Ethylbenzene	25.	U
100-42-5	Styrene	25.	U
1330-20-7	Xylene (total)	25.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S2-31

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00043

Matrix: (soil/water) WATER Lab Sample ID: 4069.3

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2891

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec.100. Date Analyzed: 6/ 6/91

Column: (pack/cap) PACK Dilution Factor: 5.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
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1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S3A-31

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No. 00051

Matrix: (soil/water) WATER Lab Sample ID: 4070.7

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2882

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec.100. Date Analyzed: 6/ 5/91

Column: (pack/cap) PACK Dilution Factor: 10.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	100.	U
74-83-9	Bromomethane	100.	U
75-01-4	Vinyl Chloride	100.	U
75-00-3	Chloroethane	100.	U
75-09-2	Methylene Chloride	50.	U
67-64-1	Acetone	100.	U
75-15-0	Carbon Disulfide	50.	U
75-35-4	1,1-Dichloroethene	50.	U
75-34-3	1,1-Dichloroethane	50.	U
540-59-0	1,2-Dichloroethene (total)	41.	J
67-66-3	Chloroform	50.	U
107-06-2	1,2-Dichloroethane	50.	U
78-93-3	2-Butanone	~~100.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	55.	
56-23-5	Carbon Tetrachloride	50.	U
108-05-4	Vinyl Acetate	100.	U
75-27-4	Bromodichloromethane	50.	U
78-87-5	1,2-Dichloropropane	50.	U
10061-01-5	cis-1,3-Dichloropropene	50.	U
79-01-6	Trichloroethene	100.	
124-48-1	Dibromochloromethane	50.	U
79-00-5	1,1,2-Trichloroethane	50.	U
71-43-2	Benzene	50.	U
10061-02-6	Trans-1,3-Dichloropropene	50.	U
75-25-2	Bromoform	50.	U
108-10-1	4-Methyl-2-Pentanone	100.	U
591-78-6	2-Hexanone	100.	U
127-18-4	Tetrachloroethene	1600.	
79-34-5	1,1,2,2-Tetrachloroethane	50.	U
108-88-3	Toluene	50.	U
108-90-7	Chlorobenzene	50.	U
100-41-4	Ethylbenzene	50.	U
100-42-5	Styrene	50.	U
1330-20-7	Xylene (total)	50.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S3A-31

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00052

Matrix: (soil/water) WATER Lab Sample ID: 4070.7

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2882

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec.100. Date Analyzed: 6/ 5/91

Column: (pack/cap) PACK Dilution Factor: 10.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

S4-31

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) WATER Lab Sample ID: 4071.5

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2884

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec.100. Date Analyzed: 6/ 5/91

Column: (pack/cap) PACK Dilution Factor: 10.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	100.	U
74-83-9	Bromomethane	100.	U
75-01-4	Vinyl Chloride	100.	U
75-00-3	Chloroethane	100.	U
75-09-2	Methylene Chloride	26.	JU
67-64-1	Acetone	94.	JU
75-15-0	Carbon Disulfide	50.	U
75-35-4	1,1-Dichloroethene	50.	U
75-34-3	1,1-Dichloroethane	50.	U
540-59-0	1,2-Dichloroethene (total)	50.	U
67-66-3	Chloroform	50.	U
107-06-2	1,2-Dichloroethane	50.	U
78-93-3	2-Butanone	~~100.~~	U R
71-55-6	1,1,1-Trichloroethane	50.	U
56-23-5	Carbon Tetrachloride	50.	U
108-05-4	Vinyl Acetate	100.	U
75-27-4	Bromodichloromethane	50.	U
78-87-5	1,2-Dichloropropane	50.	U
10061-01-5	cis-1,3-Dichloropropene	50.	U
79-01-6	Trichloroethene	75.	
124-48-1	Dibromochloromethane	50.	U
79-00-5	1,1,2-Trichloroethane	50.	U
71-43-2	Benzene	50.	U
10061-02-6	Trans-1,3-Dichloropropene	50.	U
75-25-2	Bromoform	50.	U
108-10-1	4-Methyl-2-Pentanone	100.	U
591-78-6	2-Hexanone	100.	U
127-18-4	Tetrachloroethene	2200.	E
79-34-5	1,1,2,2-Tetrachloroethane	50.	U
108-88-3	Toluene	50.	U
108-90-7	Chlorobenzene	50.	U
100-41-4	Ethylbenzene	50.	U
100-42-5	Styrene	50.	U
1330-20-7	Xylene (total)	50.	U

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

S4-31

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.: 00061

Matrix: (soil/water) WATER Lab Sample ID: 4071.5

Sample wt/vol: 5. (g/mL) ML Lab File ID: J2884

Level: (low/med) LOW Date Received: 5/31/91

% Moisture: not dec.100. Date Analyzed: 6/ 5/91

Column: (pack/cap) PACK Dilution Factor: 10.00

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
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TRILLIUM INC

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

TREATMENT SYSTEMS

VOLATILES ANALYSES DATA

METHOD 524.2 ANALYSES

Samples Collected 5/30/91

Chemical Analyses Performed By

PACE, Incorporated

August 19, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

Data quality for samples in this sample delivery group was good.

Cooler temperature upon receipt of samples by the laboratory was 12°C. Temperatures outside the 4°C ±2°C range may adversely affect the volatile compounds.

Validation of organic data is conducted in conformance with Environmental Protection Agency Functional Guidelines for Evaluating Organics Analyses, February 1, 1988.

Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified (valid) results mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Case Narrative

Five samples were collected and submitted to PACE, Inc. on May 30, 1991. The laboratory was requested to perform volatile organics analyses (VOA) using Method 524.2. The analyte list for this method was amended pursuant to the QA/QC Plan for this project.

The samples included in this Sample Delivery Group (SDG) are:

Client ID	Lab ID	Date of Collection
S1-33FB	4067	05/30/91
S5-28	4072	05/30/91
S6-33	4073	05/30/91
S6-33DUP	4074	05/30/91
S6-33TB	4075	05/30/91

TRILLIUM INC

Volatiles

The requirements to be checked in validation are listed below.

I. Holding Times

II. GC/MS Tuning

III. Calibration

A. Initial

B. Continuing

IV. Blanks

V. Surrogate Recovery

VI. Matrix Spike/Matrix Spike Duplicate

VII. Field Duplicates

VIII. Internal Standards Performance

IX. TCL Compound Identification

X. Compound Quantitation and Reported Detection Limits

XI. Tentatively Identified Compounds

XII. System Performance

XIII. Overall Assessment

I. Holding Times

All samples were analyzed within the 14-day holding time for preserved samples.

II. GC/MS Tuning

GC/MS tuning and mass calibrations were within criteria.

III. Calibration

Areas were manually integrated for one or more compounds in each of the standards in this data package. No evaluation of these manual integrations can be performed, as no hard copy documentation was provided. Such documentation has been requested from the laboratory. The validation has been completed on the assumption that the manual integrations done and reported by the laboratory were valid and correct. No positive sample data were affected.

A. Initial

Initial calibration criteria were met on 6/11/91.

B. Continuing

Continuing calibration criteria were met on 6/12/91.

IV. Blanks

The trip blank, field blank, and method blanks were clean.

V. Surrogate Recovery

The surrogate recovery for toluene-d8 in Sample S1-33FB was below QC criteria. This was the second analysis for Sample S1-33FB; surrogates were inadvertently left out on the first analysis. Insufficient sample volume remained for a third analysis. Detection limits for Sample S1-33FB were qualified as estimated.

All other surrogate recoveries were within acceptance criteria.

VI. Matrix Spike/Matrix Spike Duplicate

A matrix spike (MS) and matrix spike duplicate (MSD) were performed on Sample S6-33. Percent recoveries for benzene, 1,1-dichloroethene, and toluene were below QC criteria in the MS. The relative percent difference for trichloroethene was above QC criteria. Sample data were not affected.

VII. Field Duplicates

Samples S6-33 and S6-33DUP were submitted as duplicate samples. No compounds were detected in either sample.

VIII. Internal Standards Performance

Internal standards areas and retention times were acceptable.

IX. TCL Compound Identification

TCL compound identifications were acceptable.

X. Compound Quantitation and Reported Detection Limits

The laboratory performed a practical quantitation limit (PQL) study for the Method 524.2 analyses for this project on October 15, 1990. Method detection limits (MDLs) determined through that PQL study should have been used for reporting purposes for these treatment system samples. MDLs determined through the PQL study were as follows:

Compound	MDL (ug/L)
Vinyl Chloride	0.48
Chloroethane	0.49
Methylene Chloride	4.41
1,1-Dichloroethene	0.67
1,1-Dichloroethane	0.54
trans-1,2-Dichloroethene	0.50
Chloroform	0.53
1,2-Dichloroethane	0.52
1,1,1-Trichloroethane	0.44
Carbon Tetrachloride	0.43
Bromodichloromethane	0.38
1,2-Dichloropropane	0.45
cis-1,3-Dichloropropene	0.33
Trichloroethene	0.42

Compound	MDL (ug/L)
Dibromochloromethane	0.33
1,1,2-Trichloroethane	0.43
Benzene	0.58
trans-1,3-Dichloropropene	0.07
Bromoform	0.49
Tetrachloroethene	0.51
1,1,2,2-Tetrachloroethane	0.44
Toluene	0.45
Chlorobenzene	0.44
Ethylbenzene	0.51
m-Xylene	0.48
o-, p-Xylene	0.93
1,2-Dichloroethane-d4	0.50
Toluene-d8	0.45
Bromofluorobenzene	0.36

Methylene chloride was reported in Samples S5-28, S6-33 and S6-33DUP at concentrations below the MDL determined by the PQL study for this project. The methylene chloride concentrations in these samples were corrected to be "ND."

The result reported for 1,1,1-trichloroethane in Sample S5-28 (26 ug/L) was slightly beyond the calibration range of the instrument (25 ug/L). This result met precision and accuracy criteria.

For Sample S5-28, 1,1-dichloroethane should have been reported at 2.6 ug/L, not 2.5 ug/L.

Concentrations for spiking compounds in the MS were incorrectly quantified using the average response factor from the initial calibration instead of the response factor from the continuing calibration. Results discussed in Section VI above take into consideration the correct concentrations calculated by the data validator. Data quality was not affected by the incorrect quantitation of spiking compounds.

All other results and detection limits were acceptable with regard to the supporting data.

XI. Tentatively Identified Compounds

One tentatively identified compound was reported in the trip blank at a retention time of 5.34. This TIC was rejected. No other TICs were reported for this sample delivery group.

XII. System Performance

System performance was acceptable.

XIII. Overall Assessment of Data for a Case

Methylene chloride was corrected to be "ND" in Samples S5-28, S6-33, and S6-33DUP. The result for 1,1-dichloroethane in Sample S5-28 was corrected to 2.6 ug/L.

All other results were acceptable as reported.

UNIFIRST/ENSR

PACE Project Number: 810531507 00022

PACE Sample Number:			95 0040677
Date Collected:			05/30/91
Date Received:			05/31/91
Parameter	Units	MDL	S1-33 FB
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

ECL 7/8/91

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR

PACE Project Number: 810531507 00026

PACE Sample Number:			95 0040723
Date Collected:			05/30/91
Date Received:			05/31/91
Parameter	Units	MDL	S5-28
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~87~~ ND EKS 7/8/91
1,1-Dichloroethene	ug/L	0.5	1.5
1,1-Dichloroethane	ug/L	0.5	~~2.5~~ 2.6
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	26
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR

PACE Project Number: 810531507

00034

PACE Sample Number:			95 0040731
Date Collected:			05/30/91
Date Received:			05/31/91
Parameter	Units	MDL	S6-33
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	~~1.7~~ ND KKD 7/8/91
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR

PACE Project Number: 810531507

PACE Sample Number:			95 0040740 00039
Date Collected:			05/30/91
Date Received:			05/31/91
Parameter	Units	MDL	S6-33 Dup
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

L TNDEKS 7/2/91

MDL Method Detection Limit
ND Not detected at or above the MDL.

UNIFIRST/ENSR

PACE Project Number: 810531507

00044

PACE Sample Number:			95 0040758
Date Collected:			05/30/91
Date Received:			05/31/91
Parameter	Units	MDL	S6-33 TB
ORGANIC ANALYSIS			
VOLATILE ORGANICS BY 524.2 MODIFIED			
Vinyl chloride	ug/L	0.5	ND
Chloroethane	ug/L	0.5	ND
Methylene chloride	ug/L	0.5	ND
1,1-Dichloroethene	ug/L	0.5	ND
1,1-Dichloroethane	ug/L	0.5	ND
trans-1,2-Dichloroethene	ug/L	0.5	ND
cis-1,2-Dichloroethene	ug/L	0.5	ND
Chloroform	ug/L	0.5	ND
1,2-Dichloroethane	ug/L	0.5	ND
1,1,1-Trichloroethane	ug/L	0.5	ND
Carbon tetrachloride	ug/L	0.5	ND
Bromodichloromethane	ug/L	0.5	ND
1,2-Dichloropropane	ug/L	0.5	ND
cis-1,3-Dichloropropene	ug/L	0.5	ND
Trichloroethene	ug/L	0.5	ND
Dibromochloromethane	ug/L	0.5	ND
1,1,2-Trichloroethane	ug/L	0.5	ND
Benzene	ug/L	0.5	ND
trans-1,3-Dichloropropene	ug/L	0.5	ND
Bromoform	ug/L	0.5	ND
Tetrachloroethene	ug/L	0.5	ND
1,1,2,2-Tetrachloroethane	ug/L	0.5	ND
Toluene	ug/L	0.5	ND
Chlorobenzene	ug/L	0.5	ND
Ethyl benzene	ug/L	0.5	ND
Xylene, total	ug/L	0.5	ND

MDL Method Detection Limit
ND Not detected at or above the MDL.

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
00045
S6-33TB

Lab Name: Pace Inc Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) _____ Lab Sample ID: _____

Sample wt/vol: _____ (g/mL) ____ Lab File ID: _____

Level: (low/med) _____ Date Received: _____

% Moisture: not dec. _____ dec. _____ Date Extracted: _____

Extraction: (SepF/Cont/Sonc) _____ Date Analyzed: _____

GPC Cleanup: (Y/N) ___ pH: ____ Dilution Factor: _____

Number TICs found: 1

CONCENTRATION UNITS:
(ug/L or ug/Kg) _____

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. —	Unknown	5.34	19 ug/L	R
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7/8/91

DATA VALIDATION REPORT

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.

WELLS G&H PROJECT

SOIL SAMPLING

VOLATILES ANALYSES DATA

Samples Collected June 7, 1991

Chemical Analyses Performed By

PACE, Incorporated

August 23, 1991

By:

Trillium, Inc.
7A Grace's Drive
Coatesville, PA 19320
(215) 383-7233

TRILLIUM INC

EXECUTIVE SUMMARY

No field QC samples, e.g., field duplicate, field blank, trip blank, were submitted with this sample delivery group. Several compounds were rejected due to calibrations outside criteria, incorrect compound identification, and results which exceeded the calibration range of the instrument.

All positive results and detection limits (except those rejected) were qualified as estimated in Sample BS-3.

Cooler temperature upon receipt of samples by the laboratory was 6°C.

Validation of organic data is conducted in conformance with Environmental Protection Agency (EPA) Functional Guidelines for Evaluating Organics Analyses, February 1, 1988, with modifications by EPA Region I, November 1, 1988.

Based on the supporting documentation, qualifier codes may be added, deleted, or modified by the data validator. Final results are either qualified or unqualified. Unqualified (valid) results mean that the reported values may be used without reservations. Validator qualified results are annotated with the following codes in accordance with the Functional Guidelines:

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable (Note: analyte may or may not be present).

UJ - The material was analyzed for, but was not detected. The associated value, which is either the sample quantitation limit or the sample detection limit, is an estimate and may be inaccurate or imprecise.

These codes are used on the accompanying data summary sheets to qualify some of the results.

TRILLIUM INC

Case Narrative

Two soil samples were collected by the Johnson Co. and submitted to PACE, Inc. on June 7, 1991. No field QC samples were submitted with this sample delivery group. The laboratory was requested to perform volatile organics (VOA) target compound list (TCL) analyses.

The samples included in this sample delivery group are:

Client ID	Lab ID	Date of Collection
GC-3	4226	06/07/91
BS-3	4229	06/07/91

TRILLIUM INC

Volatiles

The requirements to be checked in validation are listed below.

I. Holding Times

II. GC/MS Tuning

III. Calibration

A. Initial

B. Continuing

IV. Blanks

V. Surrogate Recovery

VI. Matrix Spike/Matrix Spike Duplicate

VII. Field Duplicates

VIII. Internal Standards Performance

IX. TCL Compound Identification

X. Compound Quantitation and Reported Detection Limits

XI. Tentatively Identified Compounds

XII. System Performance

XIII. Overall Assessment

TRILLIUM INC

I. Holding Times

All samples were analyzed within the 14-day holding time for soil samples.

II. GC/MS Tuning

GC/MS tuning and mass calibrations were within criteria.

III. Calibration

Areas were manually integrated for one or more compounds in each of the standards in this data package. No evaluation of these manual integrations can be performed, as no hard copy documentation is provided. The validation has been completed on the assumption that the manual integrations done and reported by the laboratory were valid and correct. No sample data appear to be affected.

A. Initial

Initial calibration criteria were met on 6/15/91 (Instrument J) with the exception of the RRF for 2-butanone (actual 0.050; criteria 0.1) and vinyl acetate (0.055). Detection limits for 2-butanone and vinyl acetate were rejected in Samples CG-3 and BS-3.

Initial calibration criteria were met on 6/19/91 (Instrument G) with the exception of the RRF for 2-butanone (0.084) and vinyl acetate (0.020) and the % relative standard deviation for acetone (actual 36.3; criteria 30). Detection limits for 2-butanone and vinyl acetate were rejected in Samples CG-3RE and BS-3RE.

B. Continuing

Continuing calibration criteria were met on 6/17/91 (Instrument J) with the exception of the RF for 2-butanone (actual 0.048) and vinyl acetate (0.054). Data were previously qualified.

Continuing calibration criteria were met on 6/20/91 (Instrument G) with the exception of the RF for vinyl acetate (0.017) and the % difference for 2-butanone (actual 27.7; criteria 25) and bromoform (27.0). Vinyl acetate data were previously qualified; other data were not affected.

IV. Blanks

Acetone was reported in the Method Blank VBLK01. The result for acetone in Sample CG-3 was qualified as less than the reported value.

No trip or field blanks were submitted.

V. Surrogate Recovery

Surrogate recoveries for toluene-d8 and bromofluorobenzene were outside QC criteria in Sample BS-3. All positive results and detection limits were qualified as estimated for Sample BS-3. All positive results and detection limits were rejected for Sample UC141, as discussed further below.

All other surrogate recoveries were within acceptance criteria.

VI. Matrix Spike/Matrix Spike Duplicate

Matrix spike/matrix spike duplicate analyses were performed on Sample BS-3. Data met QC criteria.

VII. Field Duplicates

No field duplicate sample was submitted with this sample delivery group.

VIII. Internal Standards Performance

Internal standard area counts were below QC criteria for Sample BS-3. All positive results and detection limits for this sample were previously qualified as estimated.

All other internal standards areas and retention times were acceptable.

IX. TCL Compound Identification

The laboratory reported results for 1,2-dichloroethane and carbon tetrachloride in Sample BS-3. The mass spectra provided for these two compounds were those of 1,1,1-trichloroethane. Results for 1,2-dichloroethane and carbon tetrachloride in Sample BS-3 were rejected.

All other TCL compound identifications were acceptable.

X. Compound Quantitation and Reported Detection Limits

The result reported for tetrachloroethene in Sample CG-3 was beyond the calibration range of the instrument. The laboratory reanalyzed this sample at a dilution. The result for tetrachloroethene in Sample CG-3 was rejected; the result in the rerun was acceptable as reported.

The results reported for acetone, 1,1,1-trichloroethane, and tetrachloroethene in Sample BS-3 were beyond the calibration range of the instrument. The laboratory reanalyzed this sample at a dilution. The result for 1,1,1-trichloroethane was qualified as estimated in Sample BS-3. Acetone was rejected from Sample BS-3 because the result was not duplicated by the reanalysis. Acetone most likely resulted from laboratory contamination. The result for tetrachloroethene in Sample BS-3 was rejected; the result in the rerun was acceptable as reported.

All other results and detection limits were acceptable with regard to the supporting data.

XI. Tentatively Identified Compounds

No TICs were reported for this SDG.

XII. System Performance

System performance requires attention. The laboratory should pay more attention to compound identifications.

XI. Overall Assessment of Data for a Case

Detection limits for 2-butanone and vinyl acetate were rejected all samples. Several other results were rejected because of incorrect compound identification or results outside the calibration range of the instrument. All results (except those rejected) for Sample BS-3 were qualified as estimated because surrogate recoveries and internal standard area counts were outside QC criteria.

Since no field QC samples were submitted with this sample delivery group, data should be used with caution.

1A
VOLA LE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BS-3

ab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

000041

atrix: (soil/water) SOIL Lab Sample ID: 4229.7

Sample wt/vol: 5. (g/mL) G Lab File ID: J2943

evel: (low/med) LOW Date Received: 6/ 7/91

% Moisture: not dec. 87. Date Analyzed: 6/17/91

olumn: (pack/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	76.	UJ
74-83-9	Bromomethane	76.	UJ
75-01-4	Vinyl Chloride	38.	J
75-00-3	Chloroethane	76.	UJ
75-09-2	Methylene Chloride	46.	J
67-64-1	Acetone	2900.	~~B~~ E
75-15-0	Carbon Disulfide	38.	UJ
75-35-4	1,1-Dichloroethene	41.	J
75-34-3	1,1-Dichloroethane	200.	
540-59-0	1,2-Dichloroethene (total)	200.	
67-66-3	Chloroform	520.	
107-06-2	1,2-Dichloroethane	~~74.~~	R
78-93-3	2-Butanone	~~76.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	2500.	~~E~~ J
56-23-5	Carbon Tetrachloride	~~400.~~	R
108-05-4	Vinyl Acetate	~~76.~~	~~U~~ R
75-27-4	Bromodichloromethane	38.	UJ
78-87-5	1,2-Dichloropropane	38.	U
10061-01-5	cis-1,3-Dichloropropene	38.	U
79-01-6	Trichloroethene	720.	
124-48-1	Dibromochloromethane	38.	U
79-00-5	1,1,2-Trichloroethane	38.	U
71-43-2	Benzene	38.	U
10061-02-6	trans-1,3-Dichloropropene	38.	U
75-25-2	Bromoform	38.	U
108-10-1	4-Methyl-2-Pentanone	76.	U
591-78-6	2-Hexanone	76.	U
127-18-4	Tetrachloroethene	~~38000.~~	~~E~~ R
79-34-5	1,1,2,2-Tetrachloroethane	38.	UJ
108-88-3	Toluene	38.	U
108-90-7	Chlorobenzene	38.	U
100-41-4	Ethylbenzene	38.	U
100-42-5	Styrene	38.	U
1330-20-7	Xylene (total)	38.	U

E. Johnson 8/23/91

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TF 'ATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BS-3

ab Name: PACE Contract:

ab Code: PACE Case No.: EPC SAS No.: SDG No.:

000042

trix: (soil/water) SOIL Lab Sample ID: 4229.7

ample wt/vol: 5. (g/mL) G Lab File ID: J2943

vel: (low/med) LOW Date Received: 6/ 7/91

Moisture: not dec. 87. Date Analyzed: 6/17/91

lumn: (pack/cap) PACK Dilution Factor: 1.00

umber TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CG-3

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) SOIL Lab Sample ID: 4226.3 000021

Sample wt/vol: 5. (g/mL) G Lab File ID: J2942

Level: (low/med) LOW Date Received: 6/ 7/91

Moisture: not dec. 77. Date Analyzed: 6/17/91

Column: (pack/cap) PACK Dilution Factor: 1.00

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	44.	U
74-83-9	Bromomethane	44.	U
75-01-4	Vinyl Chloride	44.	U
75-00-3	Chloroethane	44.	U
75-09-2	Methylene Chloride	7.	J
67-64-1	Acetone	180.	~~B~~ U
75-15-0	Carbon Disulfide	22.	U
75-35-4	1,1-Dichloroethene	11.	J
75-34-3	1,1-Dichloroethane	19.	J
540-59-0	1,2-Dichloroethene (total)	13.	J
67-66-3	Chloroform	22.	U
107-06-2	1,2-Dichloroethane	22.	U
78-93-3	2-Butanone	~~44.~~	~~U~~ R
71-55-6	1,1,1-Trichloroethane	49.	
56-23-5	Carbon Tetrachloride	22.	U
108-05-4	Vinyl Acetate	~~44.~~	~~U~~ R
75-27-4	Bromodichloromethane	22.	U
78-87-5	1,2-Dichloropropane	22.	U
10061-01-5	cis-1,3-Dichloropropene	22.	U
79-01-6	Trichloroethene	78.	
124-48-1	Dibromochloromethane	22.	U
79-00-5	1,1,2-Trichloroethane	22.	U
71-43-2	Benzene	22.	U
10061-02-6	trans-1,3-Dichloropropene	22.	U
75-25-2	Bromoform	22.	U
108-10-1	4-Methyl-2-Pentanone	44.	U
591-78-6	2-Hexanone	44.	U
127-18-4	Tetrachloroethene	~~5700.~~	~~E~~ R
79-34-5	1,1,2,2-Tetrachloroethane	22.	U
108-88-3	Toluene	12.	J
108-90-7	Chlorobenzene	22.	U
100-41-4	Ethylbenzene	22.	U
100-42-5	Styrene	22.	U
1330-20-7	Xylene (total)	22.	U

L. Schultz 8/23/91

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

CG-3

Lab Name: PACE Contract:

Lab Code: PACE Case No.: EPC SAS No.: SDG No.:

Matrix: (soil/water) SOIL Lab Sample ID: 4226.3 000022

Sample wt/vol: 5. (g/mL) G Lab File ID: J2942

Level: (low/med) LOW Date Received: 6/ 7/91

% Moisture: not dec. 77. Date Analyzed: 6/17/91

Column: (pack/cap) PACK Dilution Factor: 1.00

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO. CG-3 RE RKS 8/23/91

000035

Lab Name: PACE			Contract:		
Lab Code: PACE		Case no.: EPC	SAS No.:		SDG No:
Matrix:(soil/water)	SOIL			Lab Sample ID:	4226.2
Sample wt/vol:	5	(g/mL)		Lab File ID:	>G3417
Level: (low/med)	MED			Date Received:	06/07/91
% Moisture:not dec.	77.1			Date Analyzed:	06/20/91
Column:(pack/cap)	PACK			Dilution Factor:	125

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/l or ug/kg): UG/KG	Q
74-87-3	Chloromethane	5500 ~~5200~~	U
74-83-9	Bromomethane	5500 ~~5200~~	U
75-01-4	Vinyl Chloride	5500 ~~5200~~	U
75-00-3	Chloroethane	5500 ~~5200~~	U
75-09-2	Methylene Chloride	2700	U
67-64-1	Acetone	5500 ~~5200~~	U
75-15-0	Carbon Disulfide	2700	U
75-35-4	1,1-Dichloroethene	2700	U
75-34-3	1,1-Dichloroethane	2700	U
540-59-0	1,2-Dichloroethene(total)	2700	U
67-66-3	Chloroform	2700	U
107-06-2	1,2-Dichloroethane	2700	U
78-93-3	2-Butanone	~~5200~~ ~~U~~	R
71-55-6	1,1,1-Trichloroethane	2700	U
56-23-5	Carbon Tetrachloride	2700	U
108-05-4	Vinyl Acetate	~~5200~~ ~~U~~	R
75-27-4	Bromodichloromethane	2700	U
78-87-5	1,2-Dichloropropane	2700	U
10061-01-5	cis-1,3-Dichloropropene	2700	U
79-01-6	Trichloroethene	2700	U
124-48-1	Dibromochloromethane	2700	U
79-00-5	1,1,2-Trichloroethane	2700	U
71-43-2	Benzene	2700	U
10061-02-6	Trans-1,3-Dichloropropene	2700	U
75-25-2	Bromoform	2700	U
108-10-1	4-Methyl-2-Pentanone	5500 ~~5200~~	U
591-78-6	2-Hexanone	5500 ~~5200~~	U
127-18-4	Tetrachloroethene	5500 ~~5700~~	
79-34-5	1,1,2,2-Tetrachloroethane	2700	U
108-88-3	Toluene	2700	U
108-90-7	Chlorobenzene	2700	U
100-41-4	Ethylbenzene	2700	U
100-42-5	Styrene	2700	U
1330-20-7	Total Xylenes	2700	U

RKS 8/23/91

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET

TENTATIVELY IDENTIFIED COMPOUNDS EPA SAMPLE NO.: CG-3 RE

000036

Lab Name: PACE Contract:

Lab Code: PACE Case no.: EPC SAS No.: SDG No:

Matrix:(soil/water) SOIL Lab Sample ID: 4226.2

Sample wt/vol: 5 (g/mL) ML Lab File ID: >G3417

Level: (low/med) MED Date Received: 06/07/91

% Moisture:not dec. 77.1 dec: Date Analyzed: 06/20/91

Column: (pack/cap) PACK Dilution Factor: 125

Number of TICs found: 0 CONCENTRATION UNITS: (ug/l or ug/kg) UG/KG

CAS NO.	COMPOUND	RT	EST CONC	Q
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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.: BS-3 RE

000058

Lab Name: PACE		Contract:	
Lab Code: PACE	Case no.: EPC	SAS No.:	SDG No:
Matrix:(soil/water)	SOIL	Lab Sample ID:	4229.7
Sample wt/vol:	5 (g/mL)	Lab File ID:	>G3418
Level: (low/med)	MED	Date Received:	06/07/91
% Moisture:not dec.	86.9	Date Analyzed:	06/20/91
Column:(pack/cap)	PACK	Dilution Factor:	125

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/l or ug/kg): UG/KG	Q
74-87-3	Chloromethane	9200	U
74-83-9	Bromomethane	9200	U
75-01-4	Vinyl Chloride	9200	U
75-00-3	Chloroethane	9200	U
75-09-2	Methylene Chloride	4700	U
67-64-1	Acetone	9200	U
75-15-0	Carbon Disulfide	4700	U
75-35-4	1,1-Dichloroethene	4700	U
75-34-3	1,1-Dichloroethane	4700	U
540-59-0	1,2-Dichloroethene(total)	4700	U
67-66-3	Chloroform	4700	U
107-06-2	1,2-Dichloroethane	4700	U
78-93-3	2-Butanone	~~9200~~ ~~U~~ R	
71-55-6	1,1,1-Trichloroethane	3000	J
56-23-5	Carbon Tetrachloride	4700	U
108-05-4	Vinyl Acetate	~~9200~~ ~~U~~ R	
75-27-4	Bromodichloromethane	4700	U
78-87-5	1,2-Dichloropropane	4700	U
10061-01-5	cis-1,3-Dichloropropene	4700	U
79-01-6	Trichloroethene	1600	J
124-48-1	Dibromochloromethane	4700	U
79-00-5	1,1,2-Trichloroethane	4700	U
71-43-2	Benzene	4700	U
10061-02-6	Trans-1,3-Dichloropropene	4700	U
75-25-2	Bromoform	4700	U
108-10-1	4-Methyl-2-Pentanone	9200	U
591-78-6	2-Hexanone	9200	U
127-18-4	Tetrachloroethene	100,000 ~~99000~~	
79-34-5	1,1,2,2-Tetrachloroethene	4700	U
108-88-3	Toluene	4700	U
108-90-7	Chlorobenzene	4700	U
100-41-4	Ethylbenzene	4700	U
100-42-5	Styrene	4700	U
1330-20-7	Total Xylenes	4700	U

L. Schulz 8/23/91

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET

TENTATIVELY IDENTIFIED COMPOUNDS EPA SAMPLE NO.: BS-_ _E

000059

Lab Name: PACE Contract:

Lab Code: PACE Case no.: EPC SAS No.: SDG No:

Matrix:(soil/water) SOIL Lab Sample ID: 4229.7

Sample wt/vol: 5 (g/mL) ML Lab File ID: >G3418

Level: (low/med) MED Date Received: 06/07/91

% Moisture:not dec. 86.9 dec: Date Analyzed: 06/20/91

Column: (pack/cap) PACK Dilution Factor: 125

Number of TICs found: 0 CONCENTRATION UNITS: (ug/l or ug/kg) UG/KG

CAS NO.	COMPOUND	RT	EST CONC	Q
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APPENDIX L
ULTRAVIOLET/CHEMICAL OXIDATION OPTIMIZATION TESTING REPORT

perox-pure™

ORGANIC DESTRUCTION PROCESS

ON-SITE TESTING REPORT

DEMONSTRATION OF ORGANIC CONTAMINANT DESTRUCTION IN GROUNDWATER FROM THE WELLS G & H SUPERFUND SITE WITH THE perox-pure™ PROCESS

FOR

ENVIRONMENTAL PROJECT CONTROL, INC.
GRAFTON, MASSACHUSETTS
PURCHASE ORDER NO. 23006
PSI PROJECT NO. MJD-9000-03662-0084

SEPTEMBER 3, 1991

Peroxidation Systems Inc.

ON-SITE TESTING REPORT

DEMONSTRATION OF ORGANIC CONTAMINANT DESTRUCTION IN GROUNDWATER FROM THE WELLS G & H SUPERFUND SITE WITH THE **perox-pure**™ PROCESS

for

Environmental Project Control, Inc.
Grafton, Massachusetts
Purchase Order No. 23006
PSI Project No. MJD-9000-03662-0084

Peroxidation Systems, Inc.
5151 E. Broadway, Suite 600
Tucson, AZ 85711

September 3, 1991

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1.0 EXECUTIVE SUMMARY

A bench-scale **perox-pure**™ treatability study conducted by Peroxidation Systems, Inc. (PSI) on a sample of groundwater from the Wells G & H Superfund Site in Woburn, Massachusetts indicated that rapid destruction of the organic contaminants occurred with the **perox-pure**™ Process. Approximately 2.4 mg/l of volatile organic contaminants (VOCs) were destroyed to below the 1 μg/l analytical detection limit within one minute of oxidation.

The bench test results were confirmed during an on-site **perox-pure**™ technology demonstration. A **perox-pure**™ Model LVB-60 with support equipment was provided for the demonstration. The **perox-pure**™ equipment was operated for a period of one month during which time a series of optimization tests were conducted to determine the best treatment conditions for destruction of the groundwater contaminants.

The required groundwater treatment objectives for the full-scale installation can be achieved at a flow of 50 gpm using a **perox-pure**™ Model SSB-30. The capital investment for this **perox-pure**™ treatment system is $60,000. Including electricity, hydrogen peroxide, labor and maintenance, the estimated treatment cost is $0.77 per 1000 gallons.

As an alternative, PSI can offer the **perox-pure**™ Process on a Full Service Agreement with no capital investment, or for purchase with a separate service agreement available. The Full Service Agreement includes equipment lease, maintenance, parts and labor, emergency service, regular site visits, and emergency response. Further, PSI will guarantee that the **perox-pure**™ System will meet the agreed upon specification as determined by these tests. A Full Service Agreement for this groundwater is available for $3,075 per month.

In both the bench and pilot **perox-pure**™ studies, destruction of the groundwater contaminants to below analytical detection limits was demonstrated. Neither air-phase nor solid-phase waste by-products were generated from the groundwater treatment, and the only chemical additive, H_2O_2, was consumed in the treatment process. The end result was a groundwater which was treated on-site to well below the required discharge levels without the liabilities and concerns associated with treatment processes which transfer the contaminants to an air or solid phase.

2.0 INTRODUCTION

The **perox-pure**™ Process destroys dissolved organic contaminants in water by means of chemical oxidation. Ultraviolet (UV) light catalyzes the chemical oxidation of organic contaminants in water by its combined effect upon the organic contaminants and its reaction with hydrogen peroxide (H_2O_2). Many organic contaminants absorb UV light and may undergo a change in their chemical structure or may become more reactive with chemical oxidants. More importantly, UV light at less than 400 nm wavelength reacts with H_2O_2 molecules to form hydroxyl radicals. These powerful chemical oxidants then react with the organic contaminants in the water. If carried to completion, the reaction products of hydrocarbon oxidation with the **perox-pure**™ Process are carbon dioxide and water. Any halogens present are converted to the corresponding halide.

In January of 1991, a bench-scale treatability study was conducted by PSI on a sample of the contaminated groundwater from the Wells G & H Superfund Site in Woburn, Massachusetts. PSI was contracted to perform the treatability study by Environmental Project Control, Inc. (EPC) in conjunction with an on-site demonstration. The bench-scale testing was performed at the PSI Testing Laboratory in Tucson, Arizona. The purpose of the study was to determine the feasibility of treating the contaminated groundwater with the PSI **perox-pure**™ photochemical oxidation process. The test results are detailed in this report.

After the successful completion of the bench-scale testing, PSI conducted an on-site pilot-scale **perox-pure**™ demonstration at the Wells G & H Superfund Site. The objectives of this pilot study were to confirm the feasibility of treating the groundwater contaminants with the **perox-pure**™ Process, to demonstrate the long term reliability of the **perox-pure**™ equipment, and to determine the best **perox-pure**™ operating conditions in order to provide full-scale equipment design and cost projections.

The month long pilot-scale study was performed in April and May of 1991. The following report details the pilot testing protocol, test results, a discussion of the best full-scale treatment conditions, and the associated full-scale treatment cost projections.

3.0 BENCH-SCALE perox-pure™ TREATMENT

3.1 Description of Groundwater

On January 18, 1991, twelve gallons of groundwater was received from the Wells G & H Site at the PSI Laboratory in Tucson, Arizona. The water was contained in 1-gallon amber glass bottles with no headspace.

Characterization of the water sample was performed by PSI to determine parameters of importance for **perox-pure™** treatment. The results were as follows:

Visual Appearance:	Clear
Color:	Colorless
pH:	6.6
Iron (mg/l):	<0.1
Chloride (mg/l):	370
Chemical Oxygen Demand (mg/l):	12
Total Organic Carbon (mg/l):	<1
Total Dissolved Solids (mg/l):	320
Alkalinity (mg/l):	62
Turbidity (FTU):	7

3.2 Testing Protocol

3.2.1 Sample Handling and Storage

Upon receipt, the sample bottles were immediately refrigerated. Aliquots were then taken from several of the bottles and analyzed by PSI using EPA Method 601 for purgeable halogenated VOCs.

No VOCs were detected in the groundwater received by PSI. With EPC's approval, it was decided to spike the water to the expected influent contaminant concentrations.

3.2.2 perox-pure™ Tests. The bench-scale **perox-pure™** treatment unit was charged by placing an aliquot of the spiked groundwater into a recycle reservoir. A pump was started which circulated the solution through the reactor and back into the reservoir providing continual mixing in the closed system. The UV lamp was illuminated to start a test, and H_2O_2 was added as required to maintain a constant concentration in solution. All materials in contact with the solution were glass, quartz, stainless steel, viton or teflon.

After the appropriate retention times, samples of the treated water were collected in 40-ml septum vials with no headspace. An untreated sample was also collected in the same way. These samples were analyzed again by PSI using EPA Method 601.

3.3 Treatment Results

One (1) **perox-pure**™ treatability test was performed by PSI on the groundwater. Additional testing was not necessary due to the past experience PSI has acquired on treating groundwaters of this nature. The groundwater pH was not adjusted and the H_2O_2 concentration was 25 mg/l during the test.

The analytical results for the bench test are shown in Table 1. Actual influent contaminant levels were similar to the values expected from spiking the water. All of the contaminants were destroyed to below the 1 μg/l analytical detection limit within one minute of oxidation.

Table 1

Bench-Scale **perox-pure**™ Results
for the Wells G & H Groundwater

Oxidation Time (min.)	Concentration (μg/l)		
	PCE	TCE	DCE
0	2,413	28.4	18.2
1	<1	<1	<1
2	<1	<1	<1

4.0 PILOT-SCALE perox-pure™ TREATMENT

4.1 Testing Protocol

A PSI **perox-pure™** Model LVB-60 was used to perform the pilot-scale testing at the Wells G & H Superfund Site. The PSI equipment was positioned inside a building along with the other equipment comprising the treatment system at the site.

Groundwater from the production well being investigated was pumped through a multi-media filter (not by PSI) and into the oxidation chamber of the LVB-60 where the organic contaminants were oxidized. H_2O_2 was injected into the groundwater at the influent to the oxidation chamber. The treated water from the **perox-pure™** equipment was pumped through a bed of granular activated carbon (not by PSI) before discharge.

For the majority of the month long demonstration, the **perox-pure™** equipment was operated by personnel from EPC. PSI assisted with the start-up of the equipment, and made weekly visits to the site to maintain proper equipment performance. PSI personnel also conducted a series of optimization tests at the site to determine the best treatment conditions. Samples collected by PSI were given to EPC for analysis by their contracted laboratory.

4.2 Treatment Results

Four (4) pilot-scale **perox-pure™** optimization tests were performed with the Wells G & H groundwater. The test conditions are shown in Table 2. The flow rate in each test was 50 gpm. H_2O_2 dosage was the only treatment variable investigated.

Table 2

Pilot-Scale **perox-pure™** Treatment Conditions
for the Wells G & H Groundwater

Test	H_2O_2 Dosage (mg/l)
P1	40
P2	30
P3	20
P4	10

In each test, samples were collected after each of the four UV lamp chambers. The analytical results for these samples are shown in Table 3 along with the averaged contaminant concentrations for the EPC samples collected at the influent to the **perox-pure™** System on that day.

Tetrachloroethene (PCE) was the primary contaminant in the groundwater, as expected. Trichloroethene (TCE) was also detected. Rapid destruction of both contaminants was observed, with each destroyed to below the 0.5 μg/l analytical detection limit within 0.8 minutes of oxidation time in every test, except Test 4 which was conducted at the lowest H_2O_2 dosage of 10 mg/l.

Table 3

Pilot-Scale **perox-pure**™ Treatment Results
for the Wells G & H Groundwater

Test	Sample Point	Oxidation Time (min.)	Concentration (μg/l) PCE	TCE
P1	Influent*	0	2,045	47
	Lamp 1	0.4	8.0	<0.5
	Lamp 2	0.8	<0.5	<0.5
	Lamp 3	1.2	<0.5	<0.5
	Lamp 4	1.6	<0.5	<0.5
P2	Influent*	0	2,045	47
	Lamp 1	0.4	13	<0.5
	Lamp 2	0.8	<0.5	<0.5
	Lamp 3	1.2	<0.5	1.2
	Lamp 4	1.6	<0.5	<0.5
P3	Influent*	0	2,045	47
	Lamp 1	0.4	13	<0.5
	Lamp 2	0.8	<0.5	<0.5
	Lamp 3	1.2	<0.5	<0.5
	Lamp 4	1.6	<0.5	<0.5
P4	Influent*	0	2,045	47
	Lamp 1	0.4	54	<0.5
	Lamp 2	0.8	5.6	<0.5
	Lamp 3	1.2	<0.5	<0.5
	Lamp 4	1.6	<0.5	<0.5

*Average of influent samples collected by EPC on day of testing.

5.0 DISCUSSION OF RESULTS

5.1 Comparison of Bench and Pilot Test Results

The bench and pilot test results on the Wells G & H groundwater compare well. In each case, the VOCs were destroyed to below detectable levels with less than one minute of oxidation. An exact comparison of the treatment results is not possible since the VOCs were completely destroyed in the first sample taken during the bench test.

5.2 Best Treatment Conditions

An evaluation of the pilot test treatment results in Table 3 reveals that a significant increase in the destruction rate of PCE, the rate limiting contaminant, is achieved by increasing the H_2O_2 dosage from 10 mg/l to 20 mg/l (Tests P4 and P3, respectively). Increasing the H_2O_2 dosage from 20 mg/l to 40 mg/l did not affect the PCE destruction rate appreciably.

The optimum treatment was demonstrated in Test P3 which was conducted with a H_2O_2 dosage of 20 mg/l. The conditions from this test will therefore be used to project the full-scale treatment equipment size and costs.

6.0 FULL-SCALE TREATMENT CONDITIONS

6.1 Treatment Criteria

The criteria used to project full-scale treatment conditions for the **perox-pure**™ Process are summarized in Table 4. The flow rate and effluent treatment objectives were specified by EPC. The influent contaminant concentrations were taken to be those detected in the groundwater on the day the optimization tests were conducted.

Table 4

Criteria for Full-Scale Treatment
of the Wells G & H Groundwater

Flow Rate (gpm)	50
Influent Contaminants (μg/l)	
Tetrachloroethene	2,045
Trichloroethene	47
Effluent Objectives (μg/l)	
Tetrachloroethene	15
Trichloroethene	15

6.2 Recommended Process Conditions

Full-scale **perox-pure**™ Process conditions for treatment of the Wells G & H Groundwater are projected in Table 5. The full-scale oxidation time was calculated from the treatment criteria in Table 4 using the full-scale rate data from Test P3, the best pilot test. The full-scale oxidation time was used along with the groundwater flow rate from Table 4 to determine the appropriate **perox-pure**™ model and power demand. The H_2O_2 dosage of 20 mg/l from Test P3 was used to calculate the full-scale dosage in Table 5.

Table 5

Full-Scale **perox-pure**™ Process Conditions
for Treatment of the Wells G & H Groundwater

Oxidation Time (min.)	0.4
perox-pure™ Model	SSB-30
Power Demand (KW)	15
50% H_2O_2 Dosage (lbs./1000 gal)	0.33

The **perox-pure**™ Model SSB-30 selected for this application would not only insure adequate treatment of the groundwater, but would provide excess capacity in the event of an increase in groundwater flow rate and/or contaminant concentration. At the same time, each UV lamp can be operated individually to insure that the lowest possible operating costs are achieved for the current treatment criteria.

7.0 INVESTMENT OPTIONS

7.1 Capital Investment

A **perox-pure**™ Model SSB-30 is projected to meet the treatment criteria in Table 4. The budgetary capital investment for this equipment is $60,000. The PSI H_2O_2 storage and feed system is included with the purchase of the H_2O_2 supply contract from PSI. The customer is responsible for freight costs, site preparation and foundation, power to the battery limit, influent/effluent pipes, pumps and tanks.

7.2 Treatment Cost

The projected cost for **perox-pure**™ treatment of the Wells G & H groundwater are shown below. Operation is assumed to be 24 hours per day, 30 days per month. The energy cost was assumed to be $0.06/KWH. The repair/maintenance costs are estimated at 8% of the capital investment per year.

	Treatment Cost ($/1,000 gal)
UV Energy @ $0.06/KWH	0.30
Hydrogen Peroxide (delivered)	0.17
Repair/Maintenance	0.30
TOTAL	$ 0.77/1000 gal.

7.3 Full Service Agreement

PSI will provide the treatment system under its Full Service Agreement program, which includes lease of the equipment, maintenance, replacement parts and labor, emergency service, and regular service/maintenance visits. Our qualified technical personnel will visit the site on a regular basis to monitor the operation and perform necessary maintenance. Other operator attention is not normally required. A service report on the system will be issued by PSI on a regular basis. PSI will also guarantee that the performance of the **perox-pure**™ System will meet the agreed upon effluent specifications.

All of these services are included in one monthly fee. In addition, if the process conditions change, such as an increase in water flow rate or organic contaminant level, the customer can request equipment replacement. In this way, the treatment facility is always provided with an optimally sized **perox-pure**™ unit, insuring minimal operating costs for current site conditions. Thus, the Full Service Agreement offers guaranteed performance at a guaranteed yearly cost. The Full Service Agreement available for the Wells G & H Site **perox-pure**™ Treatment System for a 5 year term is $3,075.

MAIN OFFICE

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perox-pure tm

ORGANIC DESTRUCTION PROCESS

Regional Offices In
New Jersey
Florida
Texas
California
Illinois
Europe

Peroxidation Systems Inc.

APPENDIX M
REPORT ON THE PERFORMANCE OF THE EXPERIMENTAL DEHALOGENATION MEDIUM

Waterloo Centre for Groundwater Research
University of Waterloo
Waterloo, Ontario, Canada
N2L 3G1
(519) 885-1211, Ext 2892
Fax (519) 888-4654

AUG - 7 1991

August 6, 1991

Ms. Patricia Rhoades
Environmental Project Control
Two Grafton Common
Post Office Box 536
Grafton, Massachusetts
01519

Dear Ms. Rhoades:

Enclosed is the report of the performance of "Above-Ground Reactor Vessels at the Unifirst Site, Wells G & H, Woburn, Massachusetts". If you have any questions, please do not hesitate to contact us.

Sincerely yours,

S. O'Hannesin

Stephanie O'Hannesin
Research Co-ordinator
Centre for Groundwater Research

encl.

cc: John Cherry/Waterloo

Waterloo Centre for Groundwater Research
University of Waterloo
Waterloo, Ontario, Canada
N2L 3G1

(519) 885-1211 Ext 2892
Fax (519) 888-4654

REPORT ON PERFORMANCE OF ABOVE-GROUND REACTOR VESSELS AT THE UNIFIRST SITE, WELLS G & H WOBURN, MASSACHUSETTS

S.F. O'HANNESIN AND R.W. GILLHAM

Waterloo Centre for Groundwater Research
University of Waterloo
Waterloo, Ontario
N2L 3G1

August 6, 1991

INTRODUCTION

Preliminary investigations at the University of Waterloo have shown that contact between contaminated water and metal surfaces, such as iron, for an appropriate length of time, can result in substantial rates of degradation of halogenated organic compounds. The observed rates of degradation are commonly orders of magnitude greater than those reported in the literature for abiotic and biotic degradation. Application of the process to both in-ground and above-ground treatment systems is being investigated in the belief that it offers a highly cost-effective alternative to current methods of groundwater remediation.

An important step in demonstrating the applicability of this technology as a new remediation technique involves both laboratory and small-scale field evaluations. Numerous batch and column laboratory experiments have been conducted and presently both in-ground and above-ground treatment systems are being investigated at Canadian Forces Base Borden, Ontario. At this particular site, a Waterloo project already in progress, is continually generating a plume of groundwater containing chloroform ($CHCl_3$), trichloroethylene (TCE) and tetrachloroethylene (PCE).

In February 1991, a small scale above-ground canister system was installed at the site. It involves two canisters, a control canister containing silica sand and 5% activated carbon and a reactive canister containing iron, silica sand and 5% activated carbon. The contaminated water generated by the plume is being pumped through both canisters at rates that have been varied from about 0.5 to 2.0 L/min. Preliminary results are provided for both the control (Figure 1) and reactive (Figure 2) canisters for chloroform ($CHCl_3$), trichloroethylene (TCE) and tetrachloroethylene (PCE). In these graphs, the organic concentration (μg/L) versus distance along the canister, were plotted for increasing pore volumes. In the control canister, after approximately 3000 pore volumes had passed, the concentration of $CHCl_3$ over the entire length of the canister was similar to that of the input concentration. TCE had progressed a distance

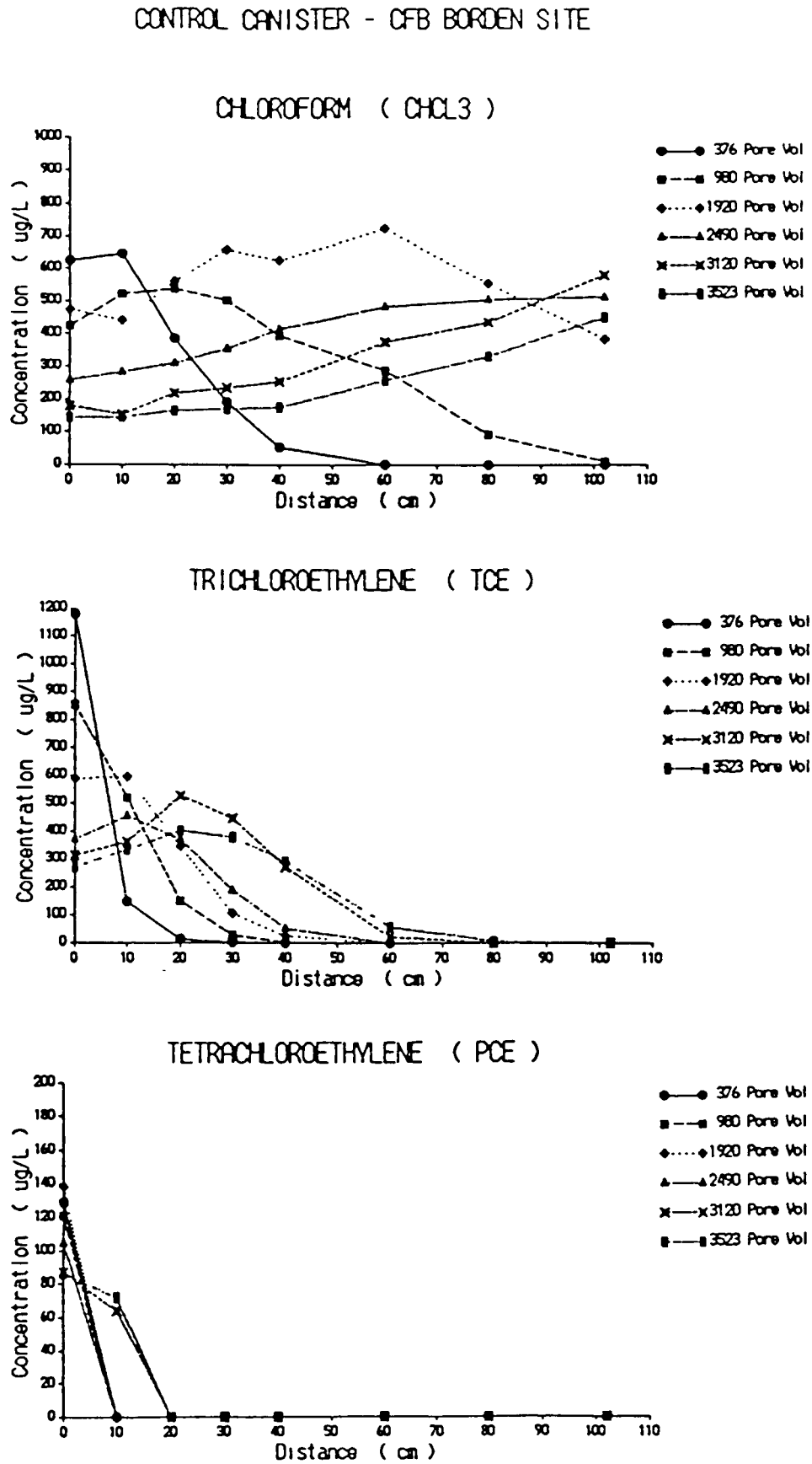


Figure 1: Control canister at CFB Borden, Ontario for $CHCl_3$, TCE, PCE

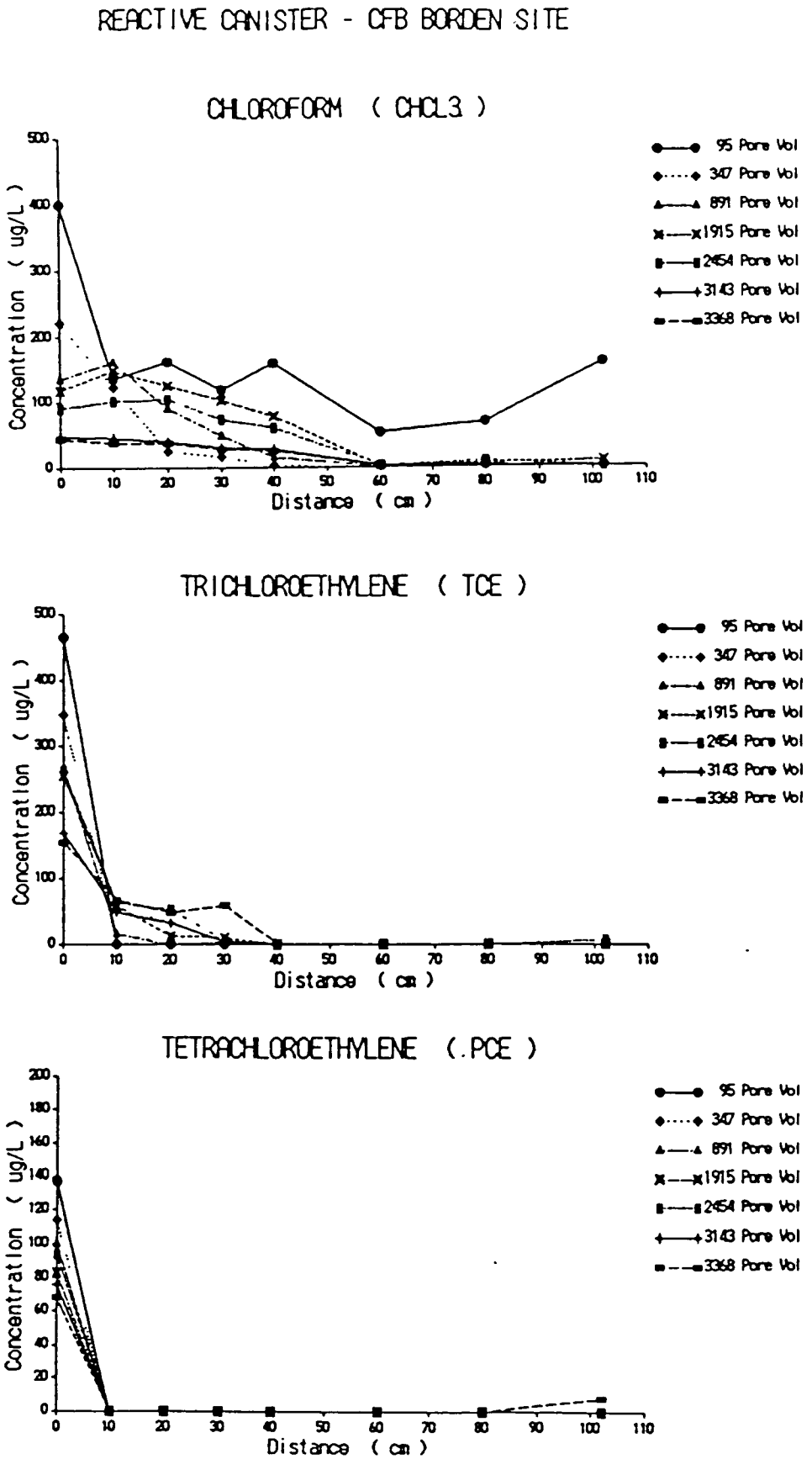


Figure 2: Reactive canister at CFB Borden, Ontario for $CHCl_3$, TCE, PCE.

of about 80 cm from the input and PCE had reached the second sampling port, 20 cm from the input end. In the reactive canister (Figure 2), after an initial slug of $CHCl_3$ had passed by 95 pore volumes, $CHCl_3$ has only progressed a distance of about 60 cm along the canister, after the passage of approximately 3000 pore volumes. TCE had only progressed to a distance of 40 cm, which is half the distance of the control canister, and PCE had not yet reached the first sampling port. It should also be noted that the concentration profiles in the reactive canister are virtually at steady state, indicating that all of the influent organic has been degraded in the time it takes for the influent solution to travel 60 cm in the case of chloroform, 40 cm for TCE and less than 10 cm for PCE. Thus the results indicate complete and effective remediation of the influent water.

Based on the promising results from the Borden site, canisters were installed on April 23, 1991 at the Unifirst site, Wells G & H, Woburn Massachusetts, as an opportunity for further testing, evaluation and demonstration of the technology.

MATERIALS AND METHODS

The above-ground vessels used at the Woburn site consisted of two PVC canisters 1.53 m long and 30 cm in diameter (Figure 3). Each canister was equipped with flow meters to regulate the flow going into the bottom of the canister and pressure gauges (-30 to +30 psi) to monitor pressure changes within the canisters over time. Also located on the top of the canister was a gas release/sampling port. Each canister had an influent and effluent sampling port, as well as six sampling ports along the length of the canister. These ports were positioned along the axis of the canisters.

The control canister contained 97% (by weight) silica sand No. 16 and 3% activated carbon (Filtrasorb 400), while the reactive canister contained the same amount of activated carbon by volume,

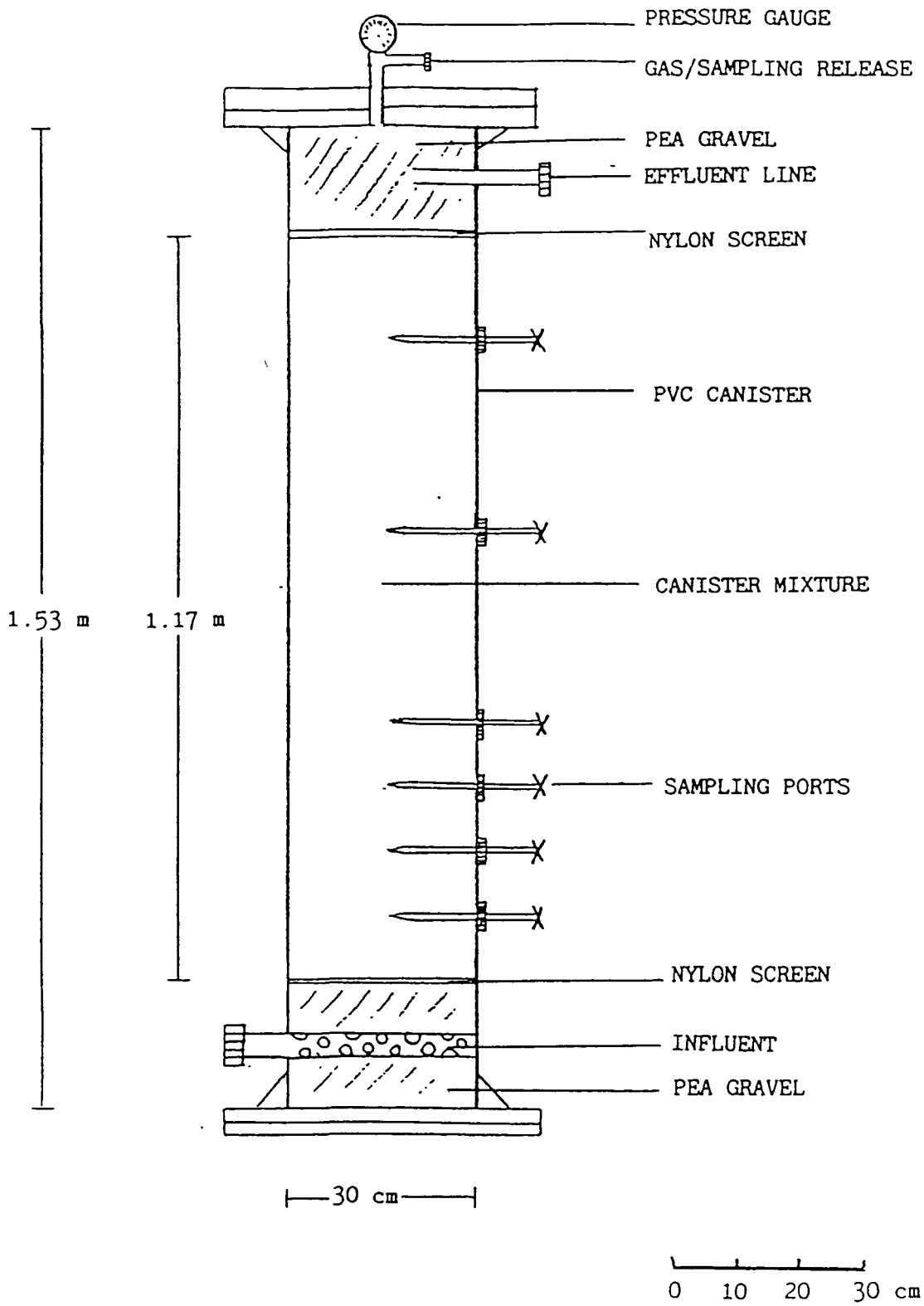


Figure 3: Schematic of Woburn canister.

as the control (2% by weight), 50% (by weight) iron grindings and the balance (48%) was silica sand, No. 16.

The canisters had a layer of pea gravel, 20 cm thick at the influent end (bottom), for the purpose of dispersing the water evenly over the diameter of the canister, a nylon screen (11 x 11) was placed on top of the pea gravel, then the mixture of sand, iron and activated carbon depending on the canister. Another nylon screen, then a 16 cm thick layer of pea gravel was located at the top of each canister. Thus, the effective length of the canister was 1.17 m and attempts were made to mix and pack this region homogeneously. The approximate pore volume was 26 L for each column.

The duration of the pilot test was to be approximately one month. For this reason, and in order to obtain useful results within the short time period, the amount of activated carbon used was less than that used at Borden, and a relatively high flow rate (2.0 L/min) was chosen. With a pore volume of 26 L, this gave a residence time for the water, of approximately 13 minutes. Appendix A shows the sampling dates, flow rates, pore volumes and residence time for each canister.

A total of nine organic sampling sessions were carried out on the canisters, these samples were analyzed for both trichloroethylene (TCE) and tetrachloroethylene (PCE). Samples from each sampling port were collected in glass sample bottles (10 mL) by Environmental Project Control, Inc. and sent by air freight to the University of Waterloo. The samples were at a storage temperature of 4°C.

The halogenated organics were extracted from the aqueous phase using pentane, at a water to pentane ratio of 1.0 to 1.0 mL. The samples were placed on a rotary shaker for 10 minutes to allow equilibration between the water and pentane phases. For analysis, a 0.5-1.0 μL aliquot of pentane was removed and injected directly onto a Hewlett Packard 5710A gas chromatograph. The chromatograph was equipped with a ^{63}Ni electron capture detector (ECD) and a glass column packed with 10% squalane on chromasorb P,AW-DMCS (80/100 mesh). Detection limits for these two compounds are found to be 5.0 μg/L using the EPA procedure for Method Detection Limit (MDL).

At the midpoint and at the end of the experiment samples were collected for GCMS scans, in order to determine if breakdown products were present. Also, total iron analyses were conducted. Results of the organic analyses conducted at the University of Waterloo are included in Appendix B.

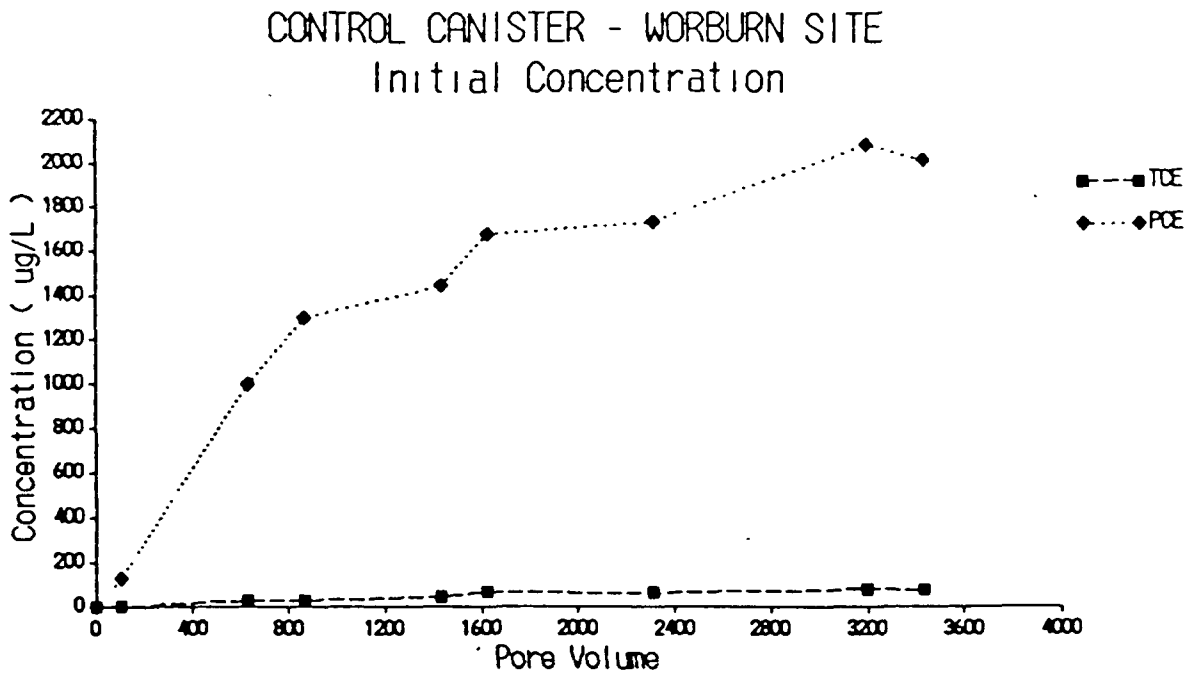
RESULTS AND DISCUSSION

The input concentrations for both the control and reactive canister are given in Figure 4. Both graphs show the concentration range of TCE and PCE versus pore volumes. Because the influent solution for both canisters was from the same source, the input concentrations were expected to be similar. This is confirmed in Figure 4.

Comparing the control and reactive canisters for TCE (Figure 5), the concentration in the control canister at 3434 pore volumes appears to be approaching the input concentration for a distance of about 40 cm from the input end, then gradually declines. For similar pore volumes, results for the reactive canister show a marked decline in concentration over the initial 40 cm distance. This is followed by an increase in concentration, with the effluent concentration exceeding that of the control canister. The results for PCE (Figure 6) show a very similar trend.

The control canister responded as expected base on previous experiments, with the concentration fronts progressing along the canisters. The initial decline in concentration in the reactive canister was also as anticipated, and suggests degradation of the influent organic compounds. The increase in concentration over the top half of the canister is of course not as expected. The results appear to violate mass balance principles. That is, it should not be possible for the effluent concentration to exceed the lower concentration observed half-way along the canister. This would be possible if the compounds (TCE and PCE) were being generated by some process in the upper part of the canister. This would seem to be highly improbable. A second explanation could be that the sampling probes located along the axis of the

(a)



(b)

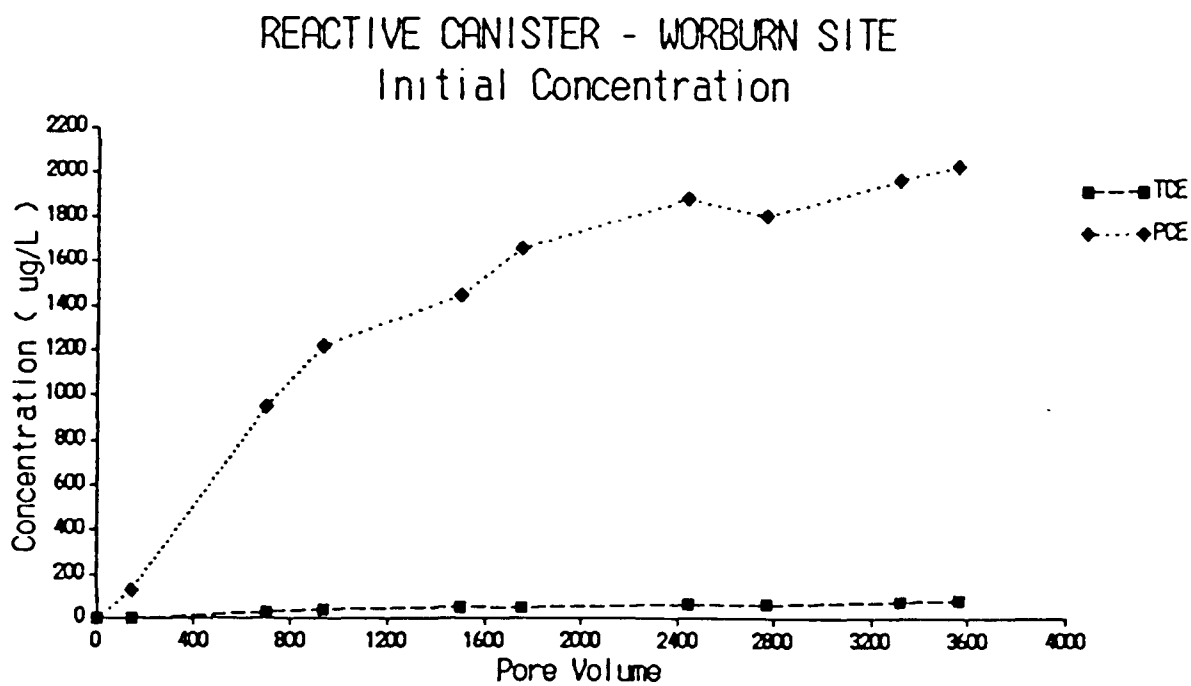
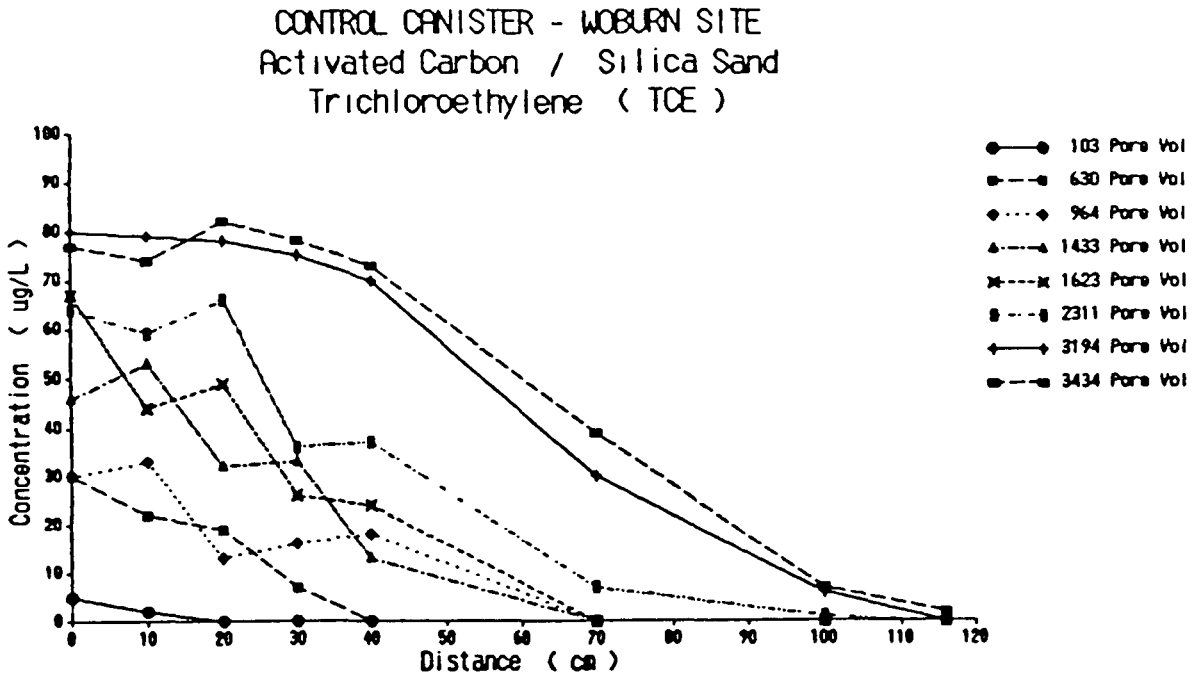


Figure 4: Input concentration for TCE and PCE for (a) control canister; and (b) reactive canister.

(a)



(b)

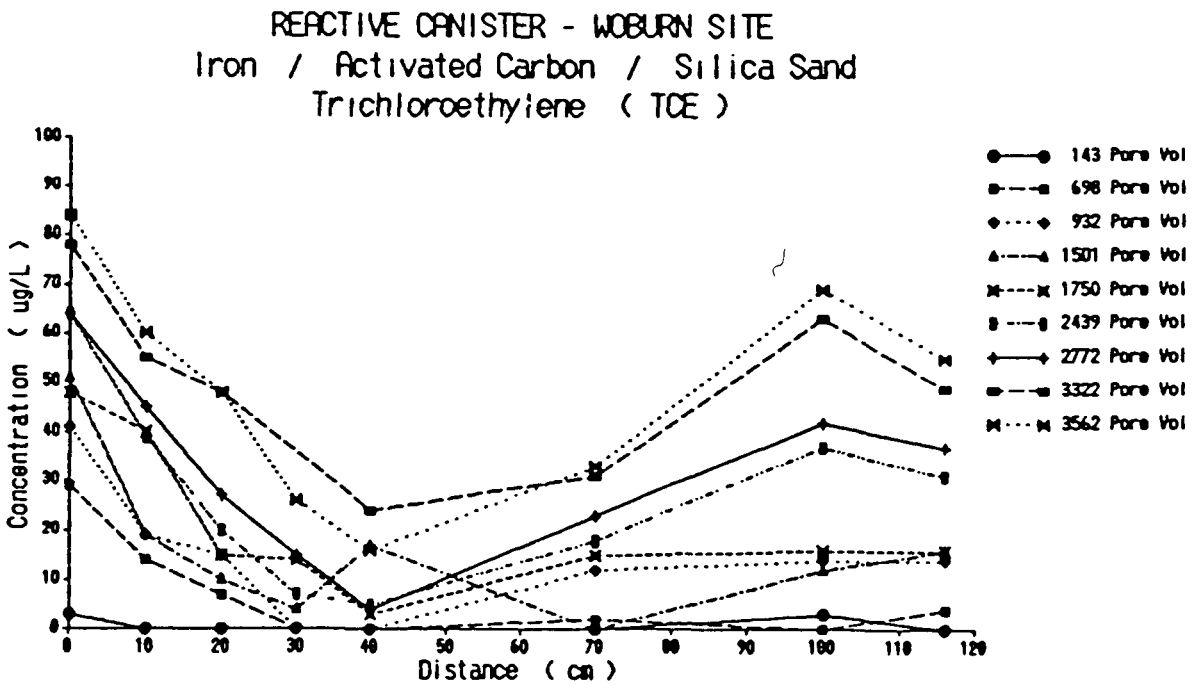
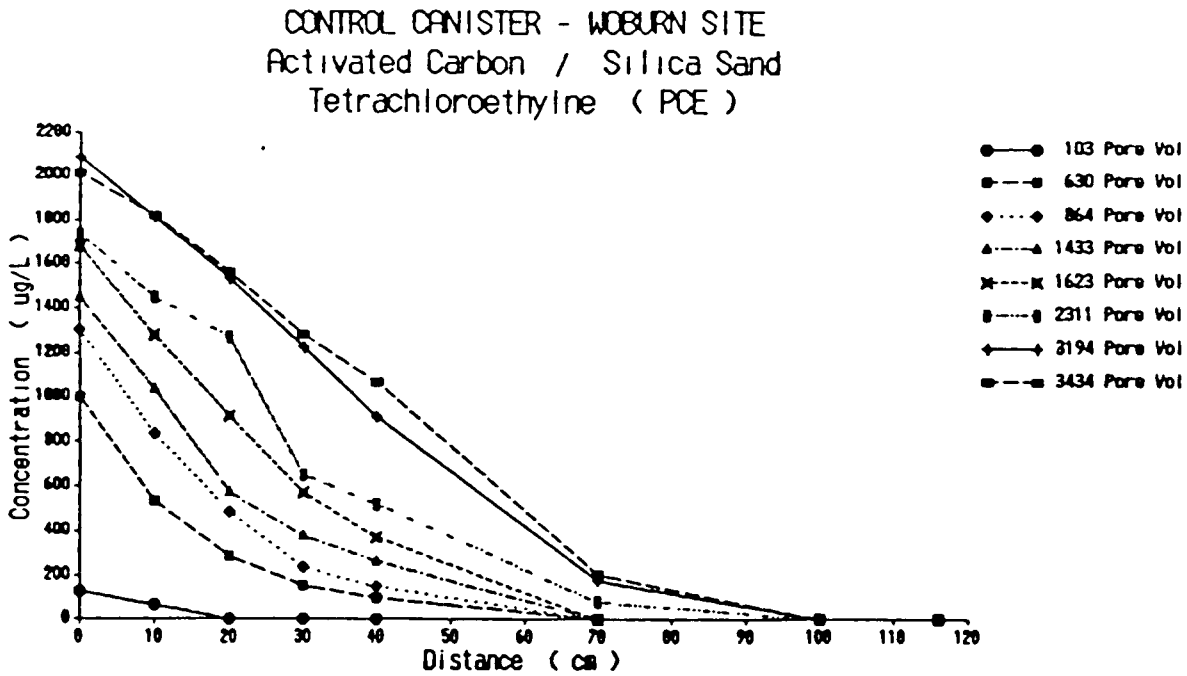


Figure 5: Woburn canister concentration for TCE in (a) control; and (b) reactive.

(a)



(b)

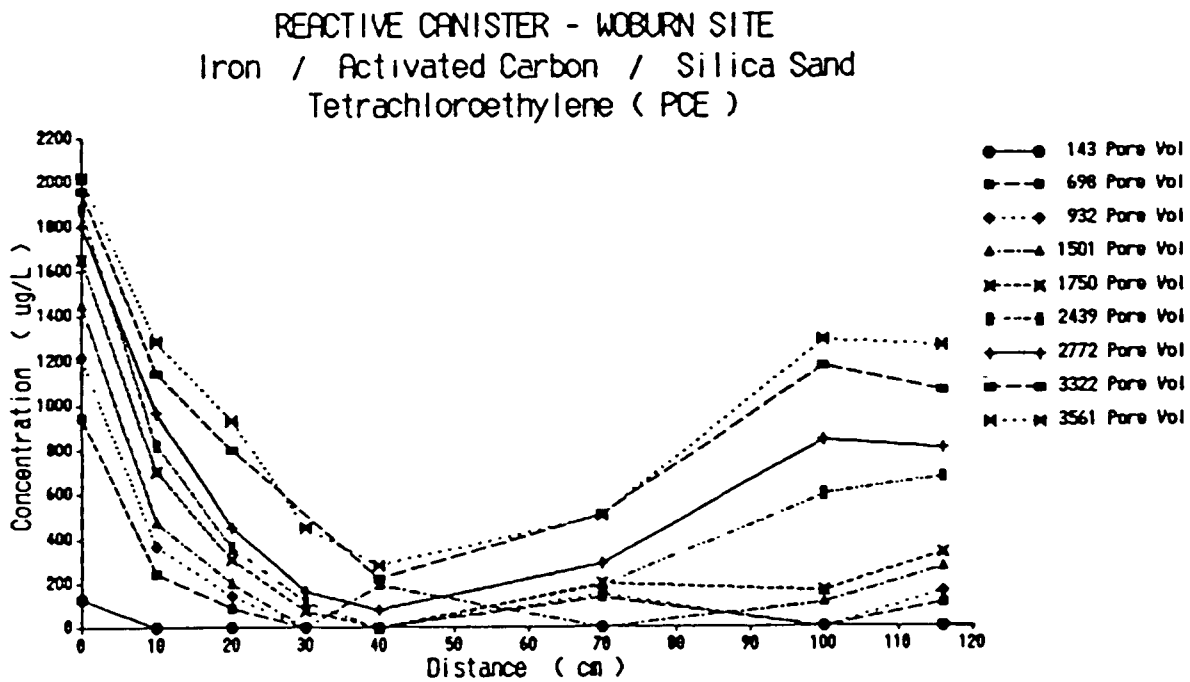


Figure 6: Woburn canister concentration for PCE in (a) control; and (b) reactive.

canister are not giving samples representative of the entire cross-sectional area. This could be particularly important if the canister was not packed uniformly, leading to "by pass". This would appear to be the most plausible explanation of the data. Though an attempt was made to obtain a uniform packing, with the small amount of activated carbon used in this particular test, it is difficult to insure complete mixing and uniform packing. It is therefore our opinion that a portion of the influent water passed through regions having little or no activated carbon. Within these regions there would not be sufficient residence time for degradation of the organics. This hypothesis is consistent with the higher effluent concentrations observed in the reactive canisters than in the control canisters.

The above explanation, though plausible, is certainly not confirmed. Unfortunately, because of the short duration of the test, there was not an opportunity to repack the reactive canister or to otherwise explore the unusual behaviour of the reactive canister.

The only inorganic analyses that were performed were pH and total iron. The pH ranged from an input concentration of 6.3 to an effluent concentration of 7.7, for both the control and reactive canisters. Total iron analyses were conducted on the reactive canister, the input concentration was < 0.05 mg/L (detection level), the concentration along the canister ranged between 3.0 and 4.0 mg/L and the effluent concentration was 2.0 mg/L. The lower iron concentration in the effluent than in samples from the interior of the column also suggests mixing of the water that had not contacted iron (thus no organic degradation) with water that had contacted iron.

Other geochemical parameters such as redox potential and dissolved oxygen were not conducted during this test, but may have been helpful in explaining the increase in both the TCE and PCE concentration in the reactive canister.

CONCLUSION

Clearly the demonstration at Woburn of the reactive canister technology was not successful. The rapid decline in concentration near the influent end of the reactive canister, relative to the control was consistent with expectations and is a promising result. The high effluent concentrations are however, unacceptable. In comparison with laboratory column results and the canister results at Borden, the increasing concentrations toward the effluent end of the reactive canister were not anticipated and appear to be anomalous. The most plausible explanation appears to be "by pass" resulting from incomplete mixing of the activated carbon, a non homogenous packing of the canister. Unfortunately, the test was not of a sufficient duration to test this hypothesis.

Though, as a demonstration, the test was less than successful, we do not believe that the results seriously discount the potential applicability of the technology. Furthermore, though unconfirmed, the results appear to demonstrate the importance of careful preparation and packing of the canister materials.

APPENDIX A

WOBURN CONTROL AND REACTIVE CANISTERS

FLOW RATES, PORE VOLUMES AND SAMPLING DATES

CONTROL CANISTER - WORBURN SITE

DATE - APR 30/91 - MAY 30/91

CONTROL CANISTER - 3% ACTIVATED CARBON
- 97% SILICA SAND

CANISTER VOLUME (L) = 25.6

DATE	TIME	TOTAL TIME (min)	CUMUL TIME (min)	FLOW RATE Before (L/min)	FLOW RATE After (L/min)	TOTAL VOLUME (L)	CUMUL VOLUME (L)	PORE VOLUME	RESID TIME (min)
APR 30/91	1200	0	0	0	0	0	0	0	0.0
MAY 1/91	1215	1460	1460	1.8	2	2628	2628	103	14.2
MAY 6/91	1040	7105	8565	1.9	2	13500	16128	630	13.5
MAY 8/91	1238	2998	11563	2	2	5996	22124	864	12.8
MAY 13/91	1400	7282	18845	2	2	14564	36688	1433	12.8
MAY 15/91	835	2555	21400	1.9	2	4855	41542	1623	13.5
MAY 20/91	1125	8810	30210	2	2	17620	59162	2311	12.8
MAY 22/91	1038	4273	34483	2	2	8546	67708	2645	12.8
May 27/91	748	7030	41513	2	2	14060	81768	3194	12.8
May 29/91	1100	3072	44585	2	2	6144	87912	3434	12.8

REACTIVE CANISTER - WORBURN SITE

DATE - APR 30/91 - MAY 30/91

REACTIVE CANISTER - 50% IRON GRINDINGS
- 2% ACTIVATED CARBON
- 48% SILICA SAND

CANISTER VOLUME (L) = 25.6

DATE	TIME	TOTAL TIME (min)	CUMUL TIME (min)	FLOW RATE Before (L/min)	FLOW RATE After (L/min)	TOTAL VOLUME (L)	CUMUL VOLUME (L)	PORE VOLUME	RESID TIME (min)
APR 30/91	1200	0	0	0	0	0	0	0	0.0
MAY 1/91	1215	1460	1460	2.5	2	3650	3650	143	10.2
MAY 6/91	1040	7105	8565	2	2	14210	17860	698	12.8
MAY 8/91	1238	2998	11563	2	2	5996	23856	932	12.8
MAY 13/91	1400	7282	18845	2	2	14564	38420	1501	12.8
MAY 15/91	835	2555	21400	2.5	2	6388	44808	1750	10.2
MAY 20/91	1125	8810	30210	2	2	17620	62428	2439	12.8
MAY 22/91	1038	4273	34483	2	2	8546	70974	2772	12.8
May 27/91	748	7030	41513	2	2	14060	85034	3322	12.8
May 29/91	1100	3072	44585	2	2	6144	91178	3562	12.8

APPENDIX B

ORGANIC ANALYSES CONDUCTED AT THE UNIVERSITY OF WATERLOO

WOBURN CANISTER

ORGANIC SAMPLING DATA

REACTIVE CANISTER
SAMPLING PORTS 1-8

SAMPLING PORT NO.	DATE	DAY	PORE VOLUME	TCE (ug/L)	PCE (ug/L)
1	Apr 30	0	0	0	0
1	May 1	1	143	3	130
1	May 6	6	698	29	947
1	May 8	8	932	41	1217
1	May 13	13	1501	51	1447
1	May 15	15	1750	48	1652
1	May 20	20	2439	64	1878
1	May 22	22	2772	64	1803
1	May 27	27	3322	78	1961
1	May 29	29	3562	84	2022
2	Apr 30	0	0	0	0
2	May 1	1	143	0	0
2	May 6	6	698	14	243
2	May 8	8	932	19	365
2	May 13	13	1501	19	475
2	May 15	15	1750	40	702
2	May 20	20	2439	39	823
2	May 22	22	2772	45	971
2	May 27	27	3322	55	1144
2	May 29	29	3562	60	1284
3	Apr 30	0	0	0	0
3	May 1	1	143	0	0
3	May 6	6	698	7	89
3	May 8	8	932	15	142
3	May 13	13	1501	10	198
3	May 15	15	1750	15	304
3	May 20	20	2439	20	361
3	May 22	22	2772	27	452
3	May 27	27	3322	48	805
3	May 29	29	3562	48	936
4	Apr 30	0	0	0	0
4	May 1	1	143	0	0
4	May 6	6	698	0	0
4	May 8	8	932	0	0
4	May 13	13	1501	4	0
4	May 15	15	1750	14	77
4	May 20	20	2439	7	119
4	May 22	22	2772	15	165
4	May 27	27	3322	broke	broke
4	May 29	29	3562	26	454

WOBURN CANISTER

ORGANIC SAMPLING DATA

REACTIVE CANISTER
SAMPLING PORTS 1-8

SAMPLING PORT NO.	DATE	DAY	PORE VOLUME	TCE (ug/L)	PCE (ug/L)
5	Apr 30	0	0	0	0
5	May 1	1	143	0	0
5	May 6	6	698	0	0
5	May 8	8	932	0	0
5	May 13	13	1501	17	194
5	May 15	15	1750	3	0
5	May 20	20	2439	5	0
5	May 22	22	2772	4	84
5	May 27	27	3322	24	220
5	May 29	29	3562	16	280
6	Apr 30	0	0	0	0
6	May 1	1	143	0	0
6	May 6	6	698	2	137
6	May 8	8	932	12	152
6	May 13	13	1501	0	0
6	May 15	15	1750	15	200
6	May 20	20	2439	18	189
6	May 22	22	2772	23	288
6	May 27	27	3322	31	513
6	May 29	29	3562	33	505
7	Apr 30	0	0	0	0
7	May 1	1	143	3	0
7	May 6	6	698	0	0
7	May 8	8	932	14	0
7	May 13	13	1501	12	110
7	May 15	15	1750	16	166
7	May 20	20	2439	37	598
7	May 22	22	2772	42	847
7	May 27	27	3322	63	1177
7	May 29	29	3562	69	1289
8	Apr 30	0	0	0	0
8	May 1	1	143	0	0
8	May 6	6	698	4	110
8	May 8	8	932	14	162
8	May 13	13	1501	16	267
8	May 15	15	1750	16	334
8	May 20	20	2439	31	674
8	May 22	22	2772	37	809
8	May 27	27	3322	49	1067
8	May 29	29	3562	55	1266

WOBURN CANISTER

ORGANIC SAMPLING DATA

CONTROL CANISTER
SAMPLING PORTS 9 - 16

SAMPLING PORT NO.	DATE	DAY	PORE VOLUME	TCE (ug/L)	PCE (ug/L)
9	Apr 30	0	0	0	0
9	May 1	1	143	5	131
9	May 6	6	698	30	1001
9	May 8	8	932	30	1300
9	May 13	13	1501	46	1446
9	May 15	15	1750	67	1679
9	May 20	20	2439	64	1736
9	May 22	22	2772	broke	broke
9	May 27	27	3322	80	2085
9	May 29	29	3562	77	2012
10	Apr 30	0	0	0	0
10	May 1	1	143	2	66
10	May 6	6	698	22	535
10	May 8	8	932	33	834
10	May 13	13	1501	53	1036
10	May 15	15	1750	44	1276
10	May 20	20	2439	59	1448
10	May 22	22	2772	71	1654
10	May 27	27	3322	79	1812
10	May 29	29	3562	74	1823
11	Apr 30	0	0	0	0
11	May 1	1	143	0	0
11	May 6	6	698	19	284
11	May 8	8	932	13	485
11	May 13	13	1501	32	571
11	May 15	15	1750	49	915
11	May 20	20	2439	66	1267
11	May 22	22	2772	56	1018
11	May 27	27	3322	78	1534
11	May 29	29	3562	82	1561
12	Apr 30	0	0	0	0
12	May 1	1	143	0	0
12	May 6	6	698	7	154
12	May 8	8	932	16	235
12	May 13	13	1501	33	374
12	May 15	15	1750	26	568
12	May 20	20	2439	36	646
12	May 22	22	2772	broke	broke
12	May 27	27	3322	75	1223
12	May 29	29	3562	78	1281

WOBURN CANISTER

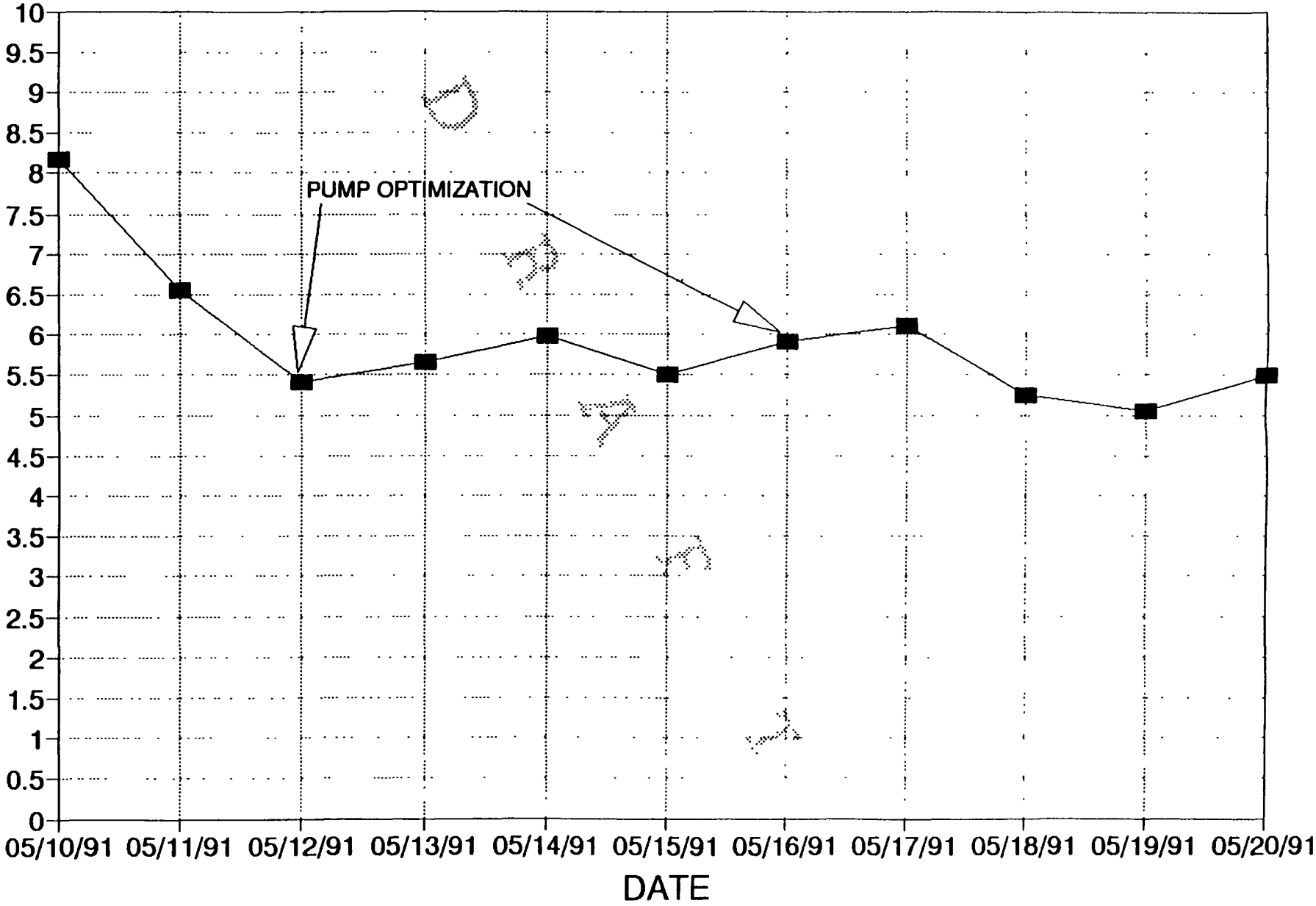
ORGANIC SAMPLING DATA

CONTROL CANISTER
SAMPLING PORTS 9 - 16

SAMPLING PORT NO.	DATE	DAY	PORE VOLUME	TCE (ug/L)	PCE (ug/L)
13	Apr 30	0	0	0	0
13	May 1	1	143	0	0
13	May 6	6	698	0	100
13	May 8	8	932	18	150
13	May 13	13	1501	13	261
13	May 15	15	1750	24	369
13	May 20	20	2439	37	520
13	May 22	22	2772	broke	broke
13	May 27	27	3322	70	911
13	May 29	29	3562	73	1068
14	Apr 30	0	0	0	0
14	May 1	1	143	0	0
14	May 6	6	698	0	0
14	May 8	8	932	0	0
14	May 13	13	1501	0	0
14	May 15	15	1750	0	0
14	May 20	20	2439	7	80
14	May 22	22	2772	14	104
14	May 27	27	3322	30	177
14	May 29	29	3562	39	206
15	Apr 30	0	0	0	0
15	May 1	1	143	0	0
15	May 6	6	698	0	0
15	May 8	8	932	0	0
15	May 13	13	1501	0	0
15	May 15	15	1750	0	0
15	May 20	20	2439	1	0
15	May 22	22	2772	1	0
15	May 27	27	3322	6	0
15	May 29	29	3562	7	0
16	Apr 30	0	0	0	0
16	May 1	1	143	0	0
16	May 6	6	698	0	0
16	May 8	8	932	0	0
16	May 13	13	1501	0	0
16	May 15	15	1750	0	0
16	May 20	20	2439	0	0
16	May 22	22	2772	5	0
16	May 27	27	3322	0	0
16	May 29	29	3562	2	0

APPENDIX N
FLOW DATA

WELLS G & H / W.R. GRACE PILOT PLANT
AVERAGE DAILY INFLUENT FLOWRATES



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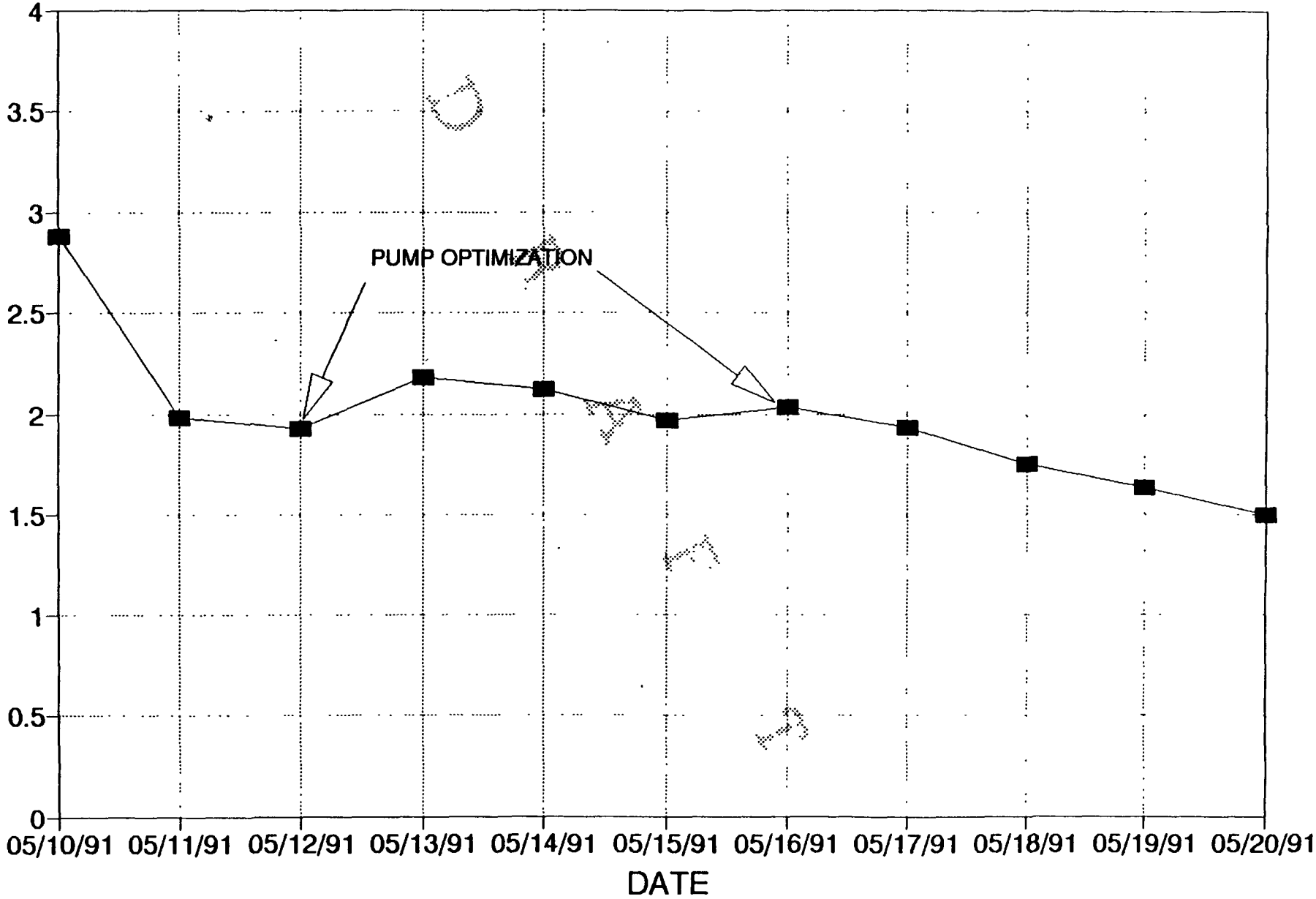
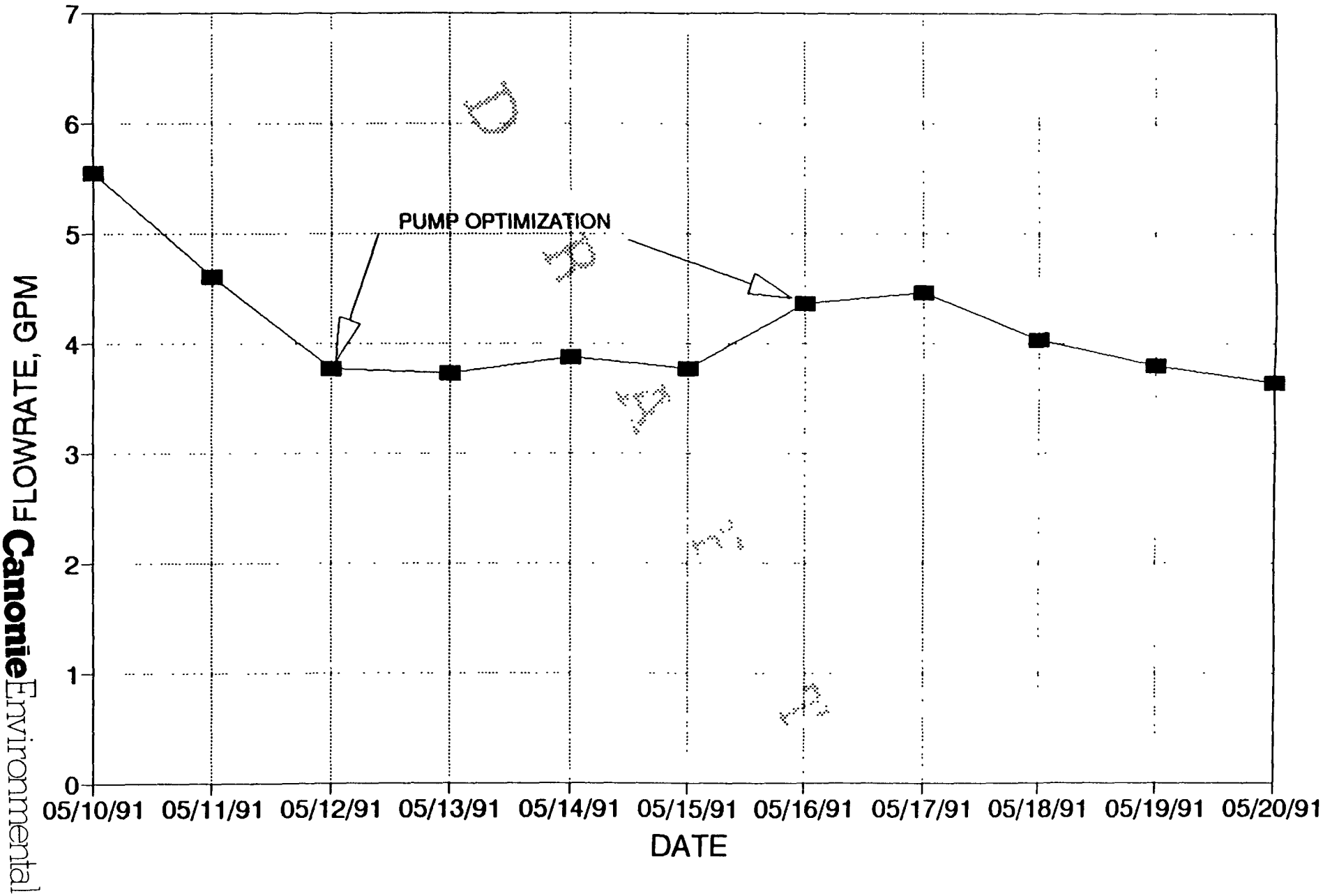
WELLS G & H / W.R. GRACE PILOT PLANT
WELLS RW1-6 FLOWRATES



Canonie Environmental

WELLS G & H / W.R. GRACE PILOT PLANT
WELLS RW7-10 FLOWRATES



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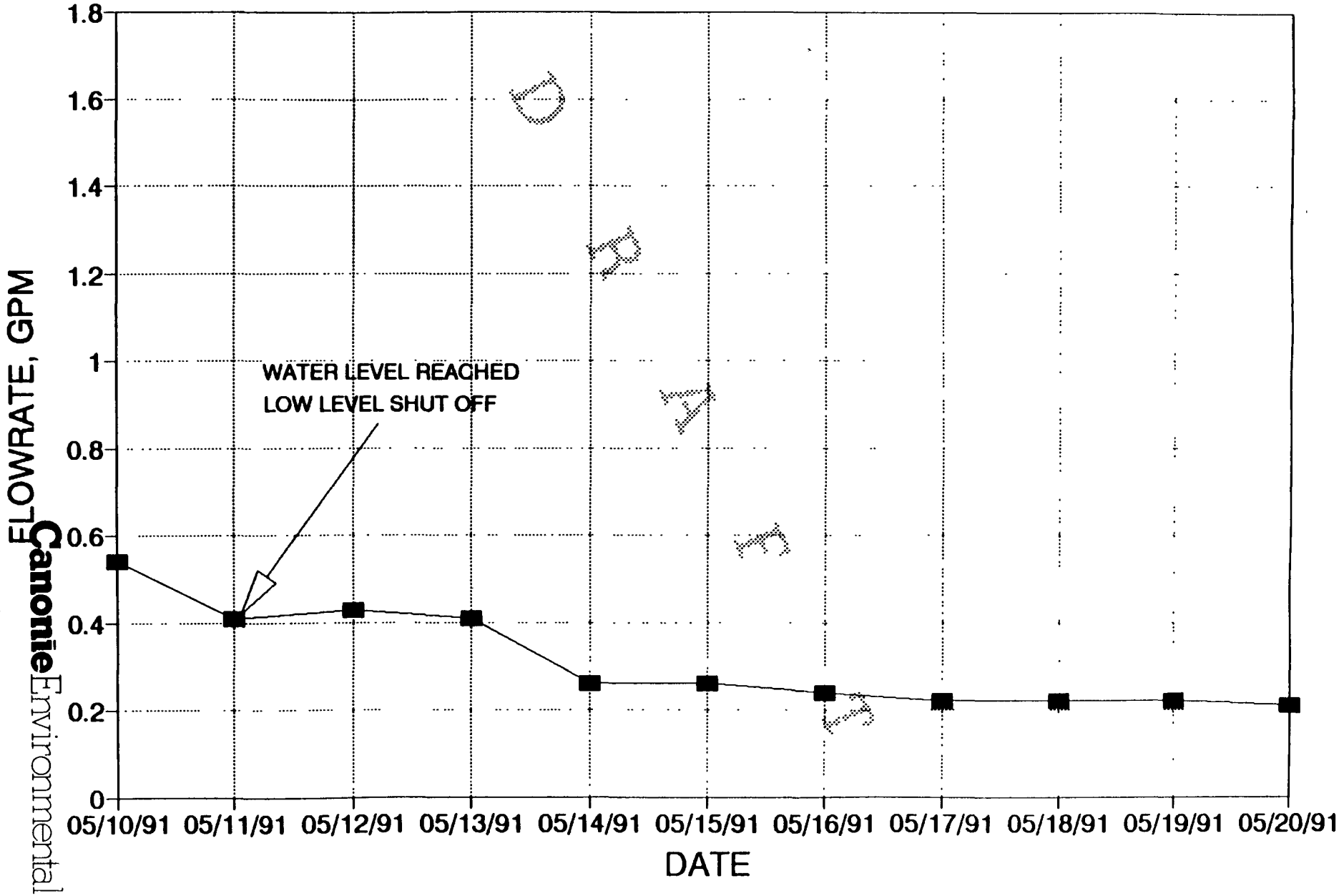
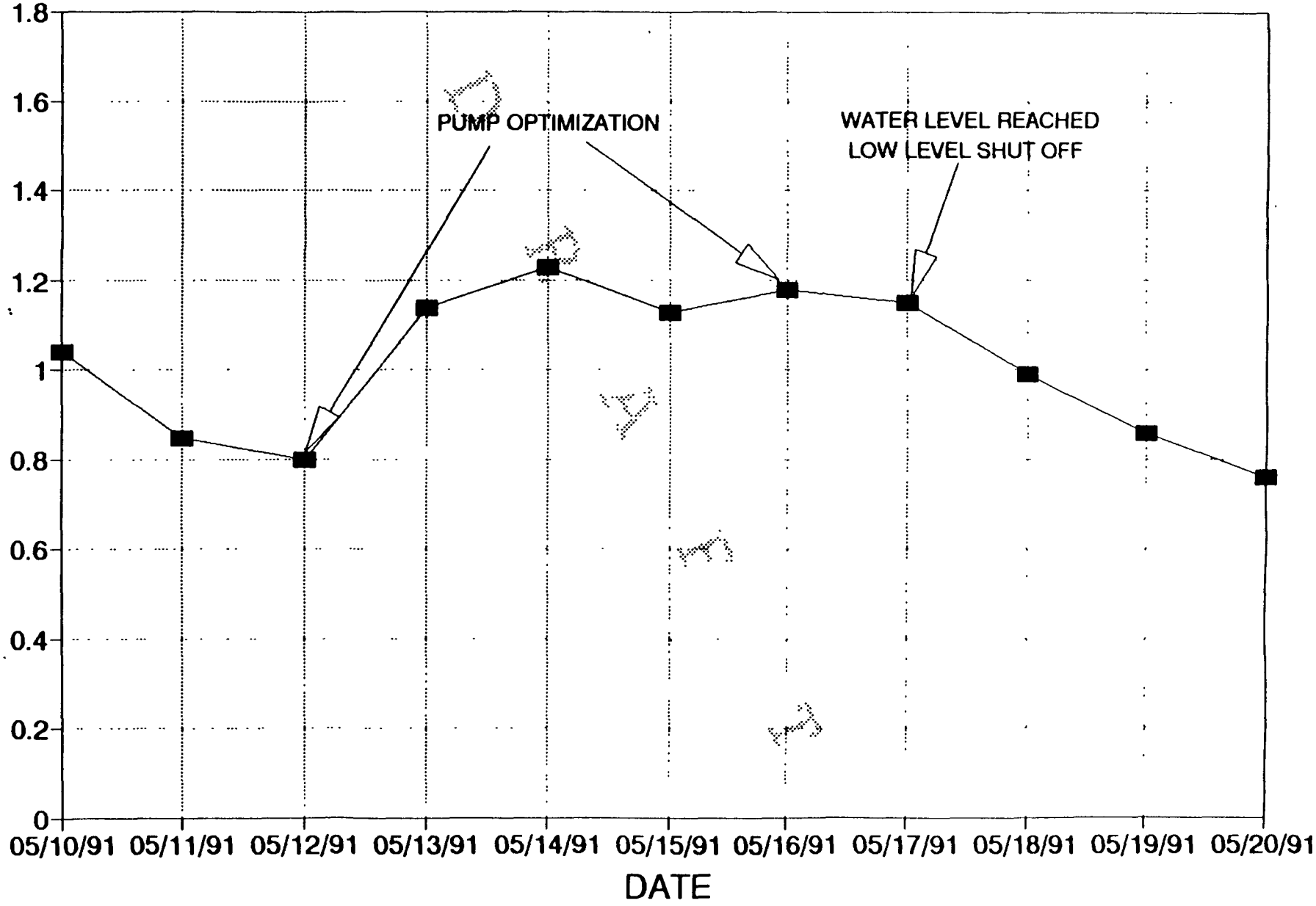
WELLS G & H / W.R. GRACE PILOT PLANT
WELL RW-1 FLOWRATES



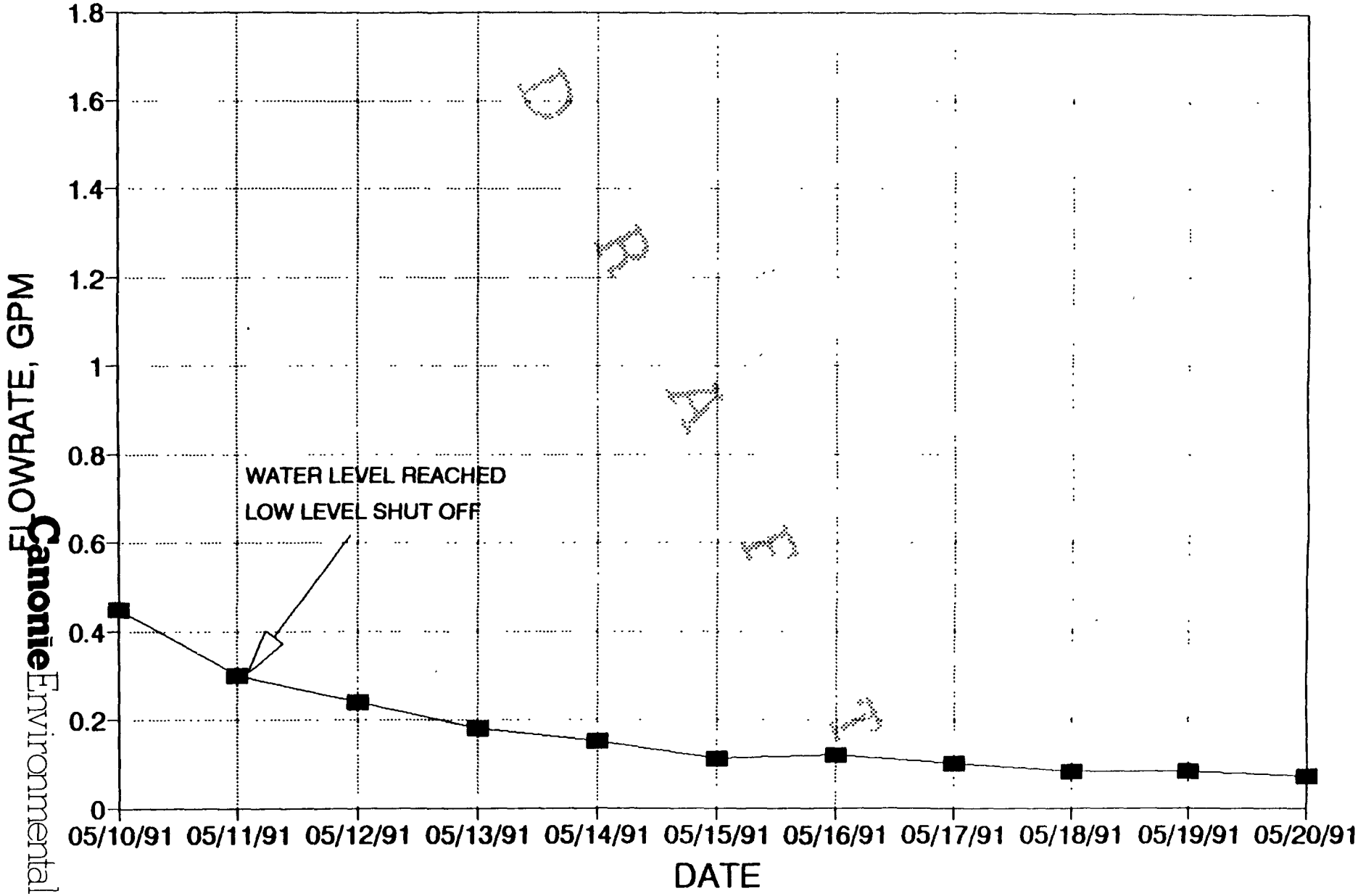
Canonie Environmental

WELLS G & H / W.R. GRACE PILOT PLANT
WELL RW-2 FLOWRATES



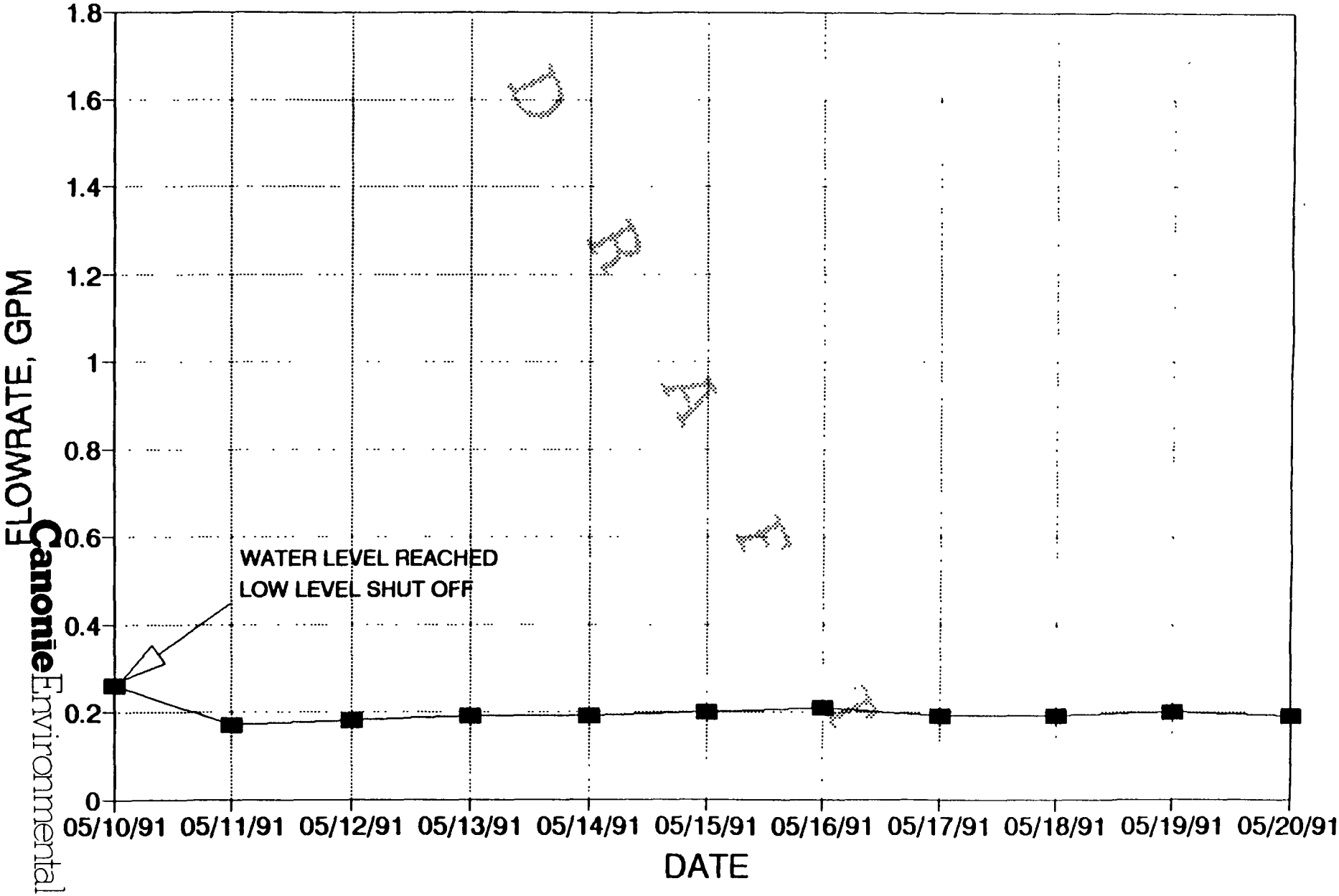
Canonie Environmental

WELLS G & H / W.R. GRACE PILOT PLANT
WELL RW-3 FLOWRATES



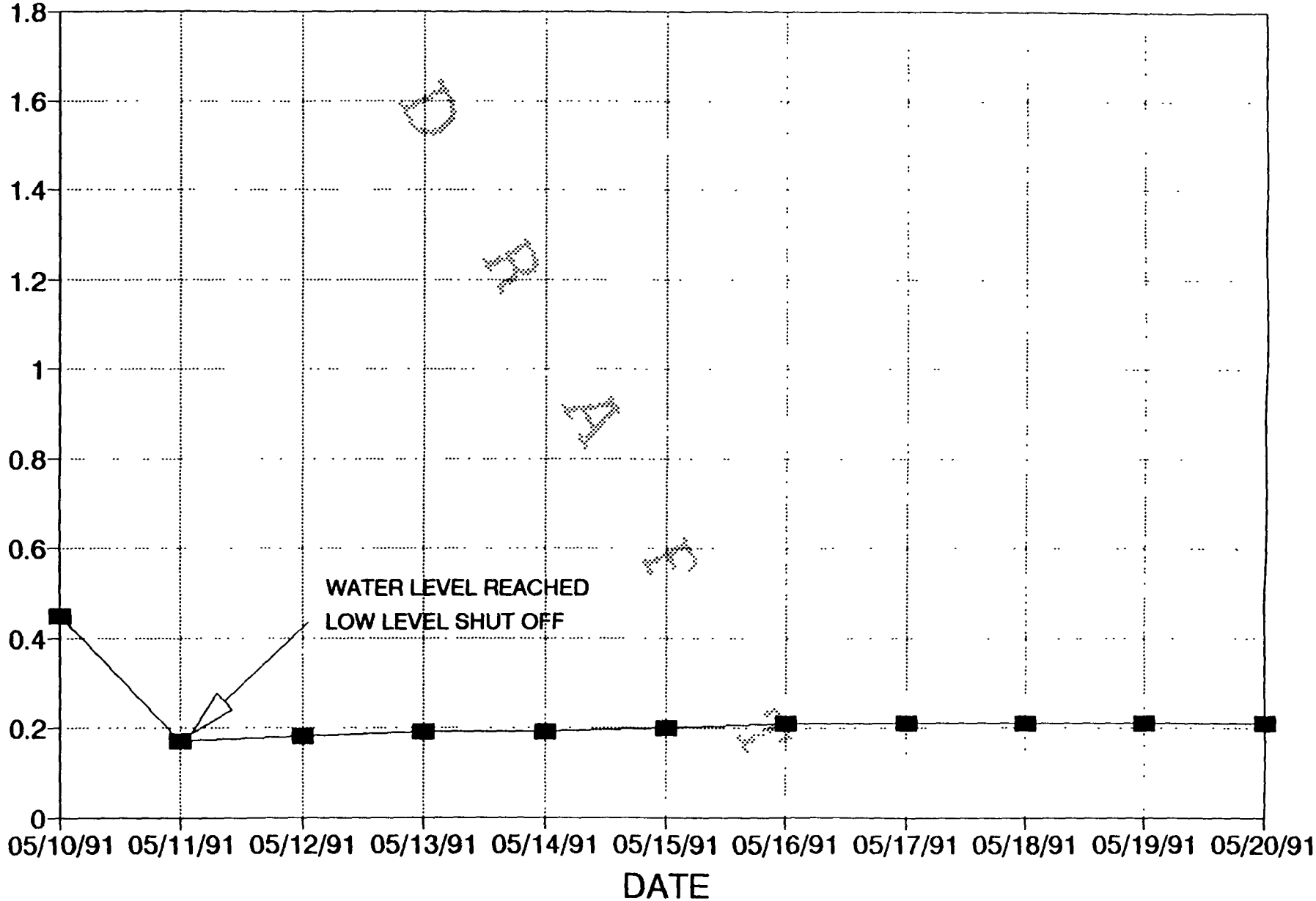
Canonie Environmental

WELLS G & H / W.R. GRACE PILOT PLANT
WELL RW-4 FLOWRATES



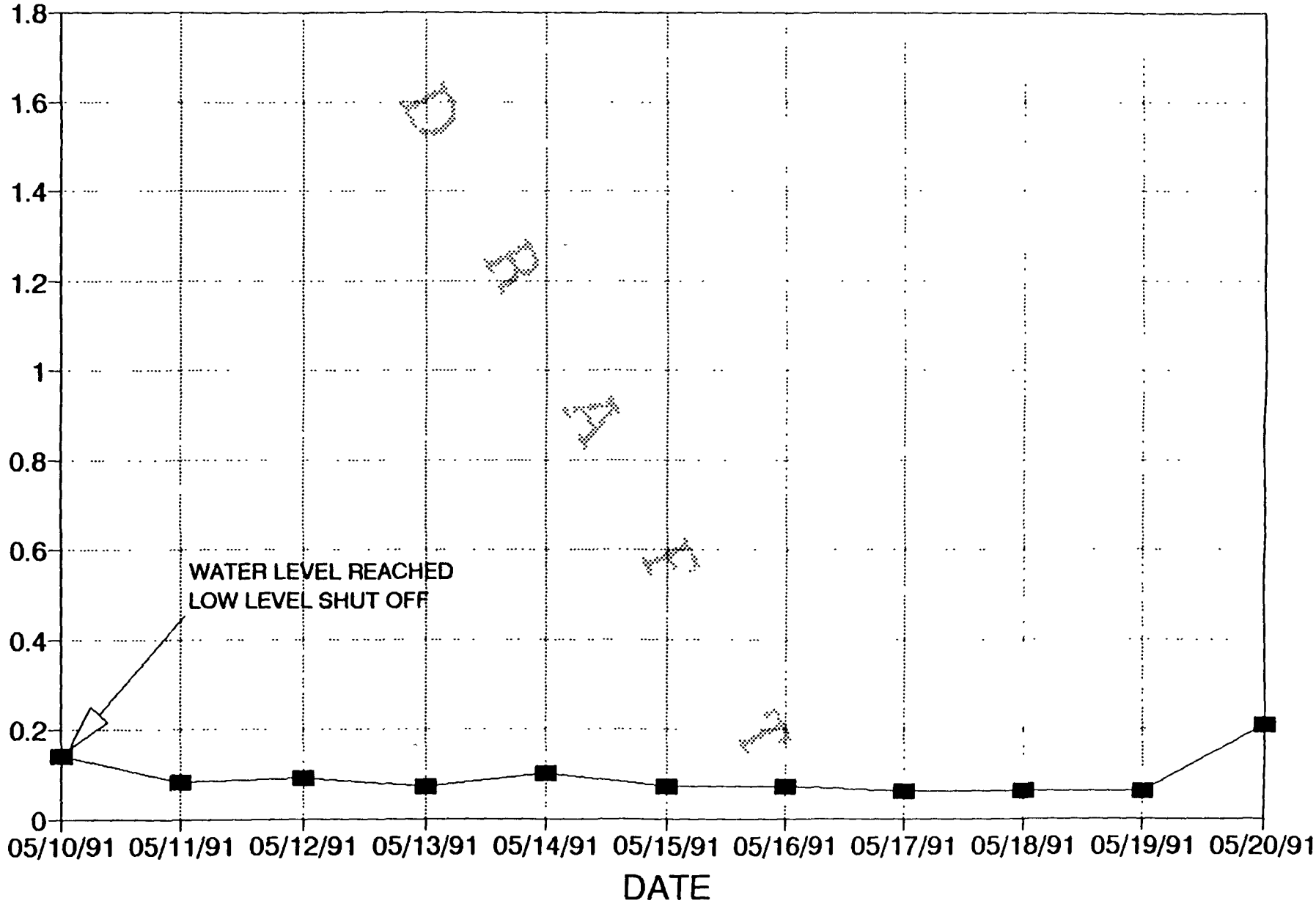
Canonie Environmental

WELLS G & H / W.R. GRACE PILOT PLANT
WELL RW-5 FLOWRATES



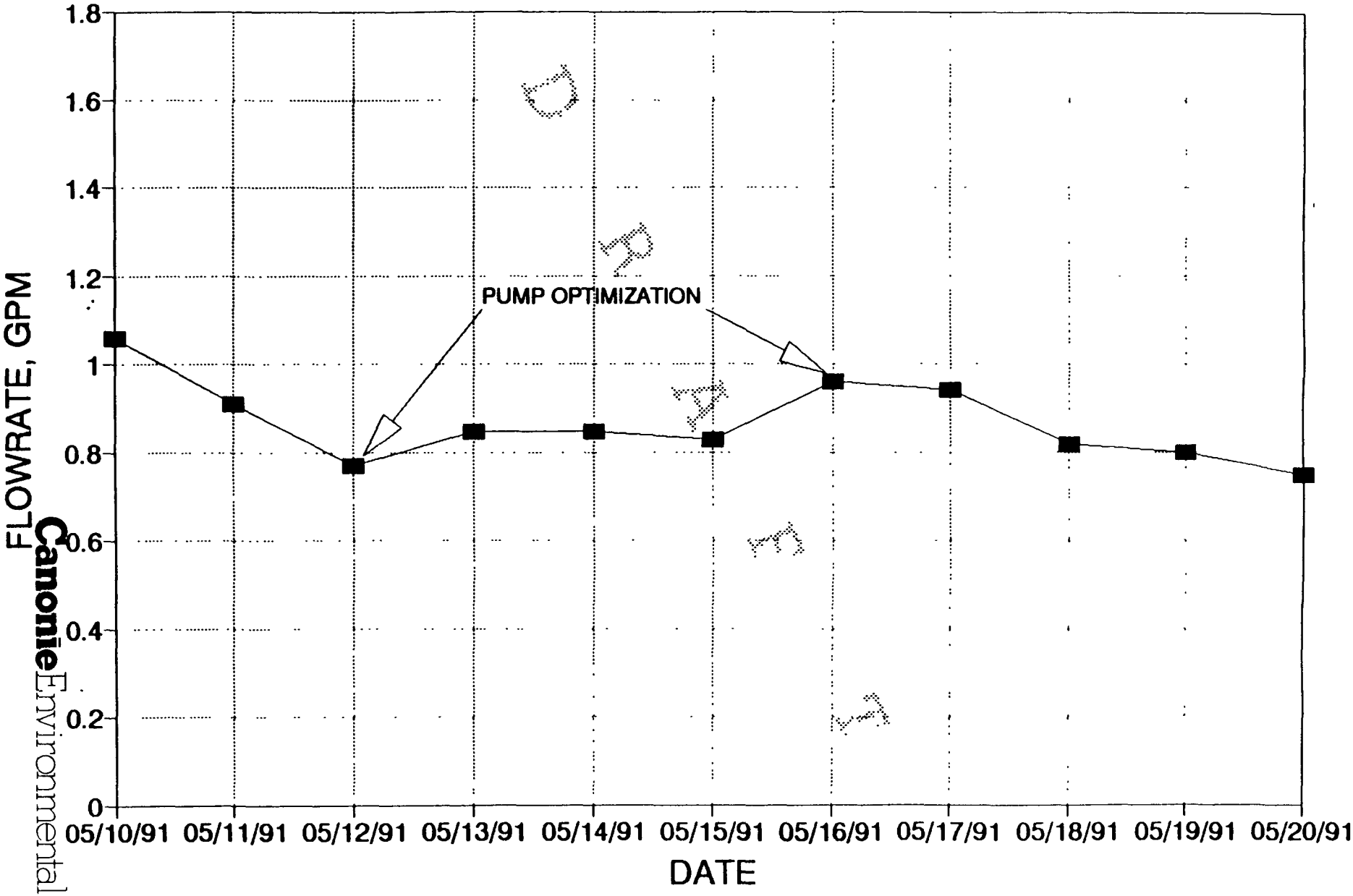
Canonie Environmental

WELLS G & H / W.R. GRACE PILOT PLANT
WELL RW-6 FLOWRATES



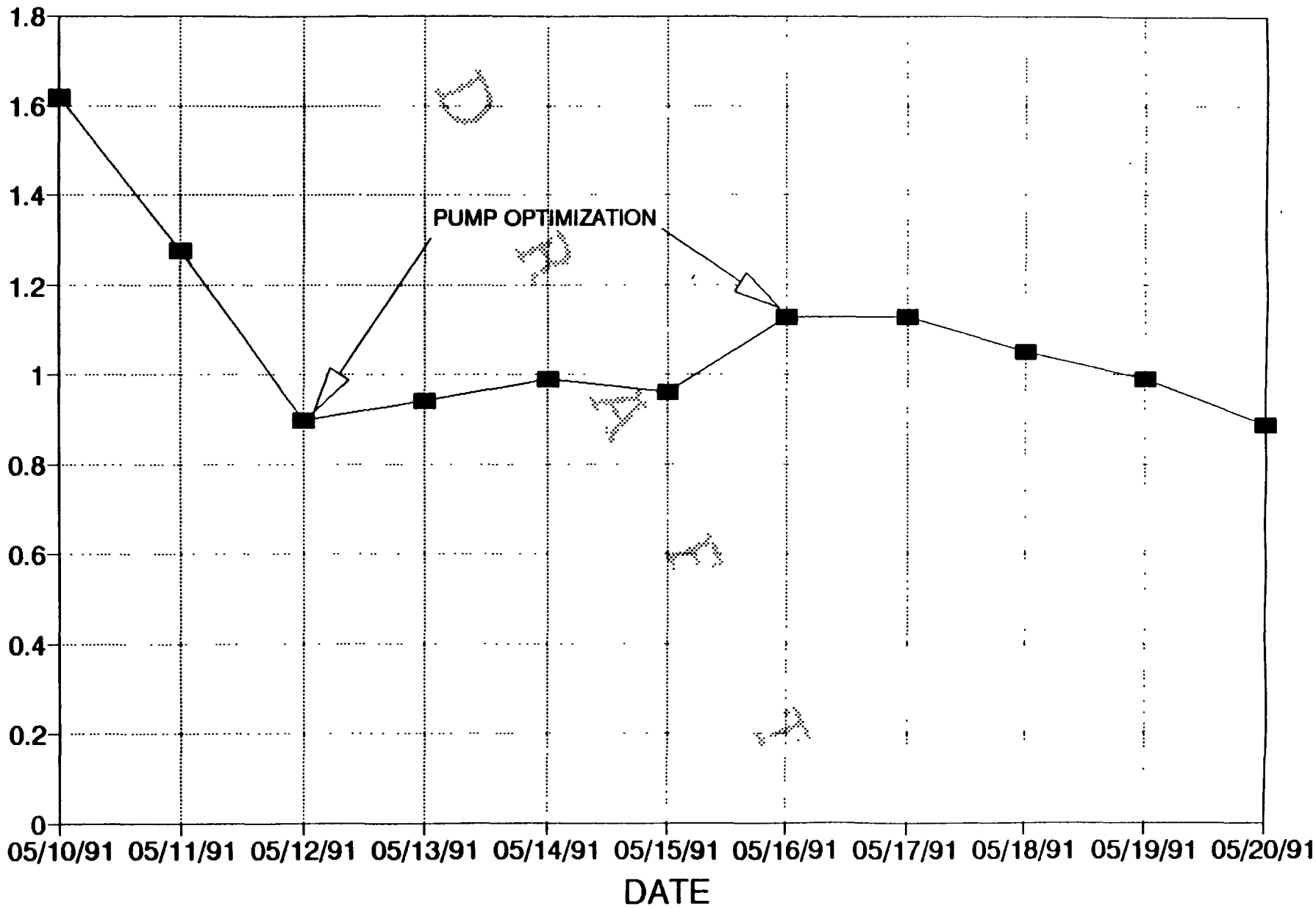
Canonie Environmental

WELLS G & H / W.R. GRACE PILOT PLANT
WELL RW-7 FLOWRATES



Canonie Environmental

WELLS G & H / W.R. GRACE PILOT PLANT
WELL RW-8 FLOWRATES



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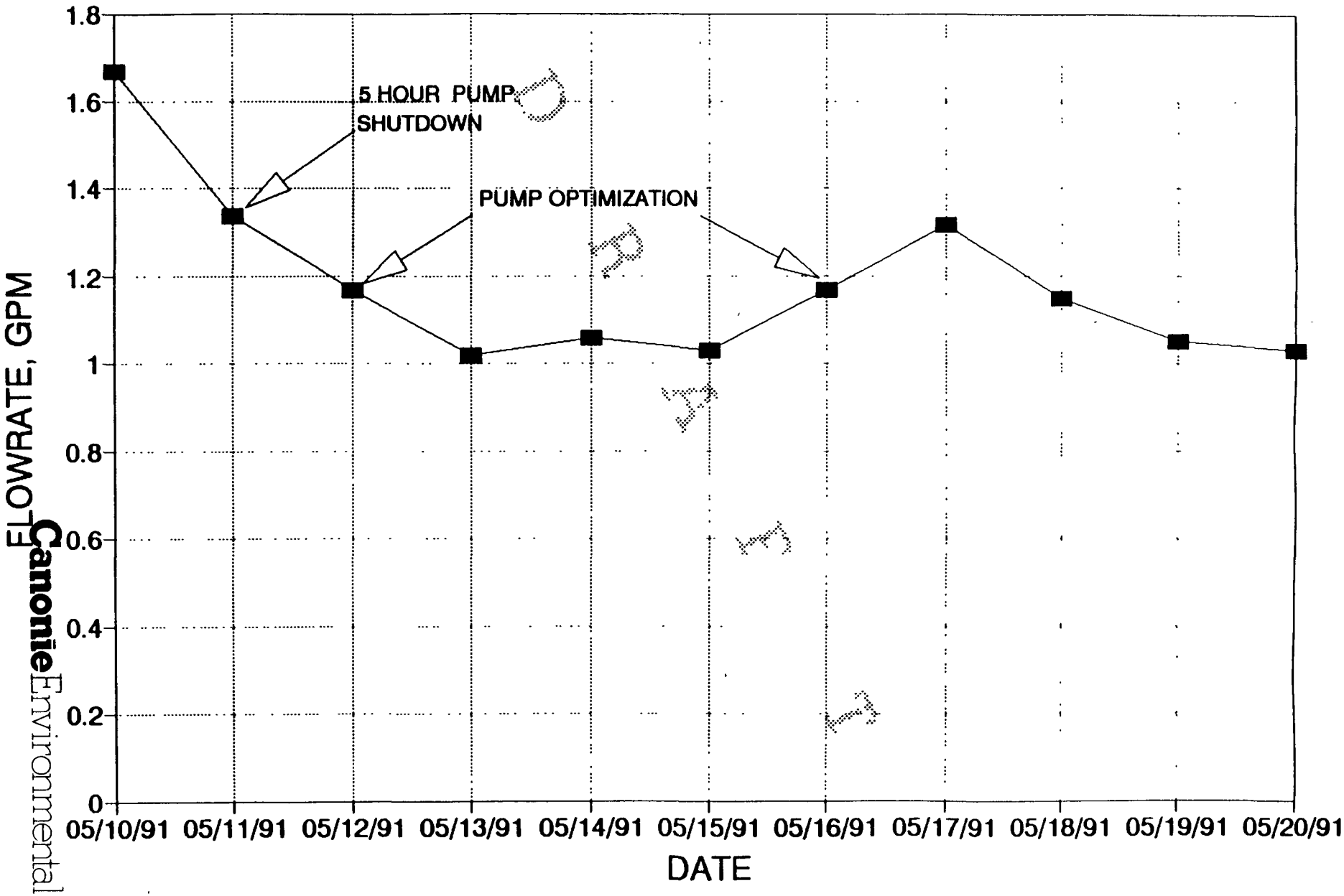
WELL RW-9 FLOWRATES



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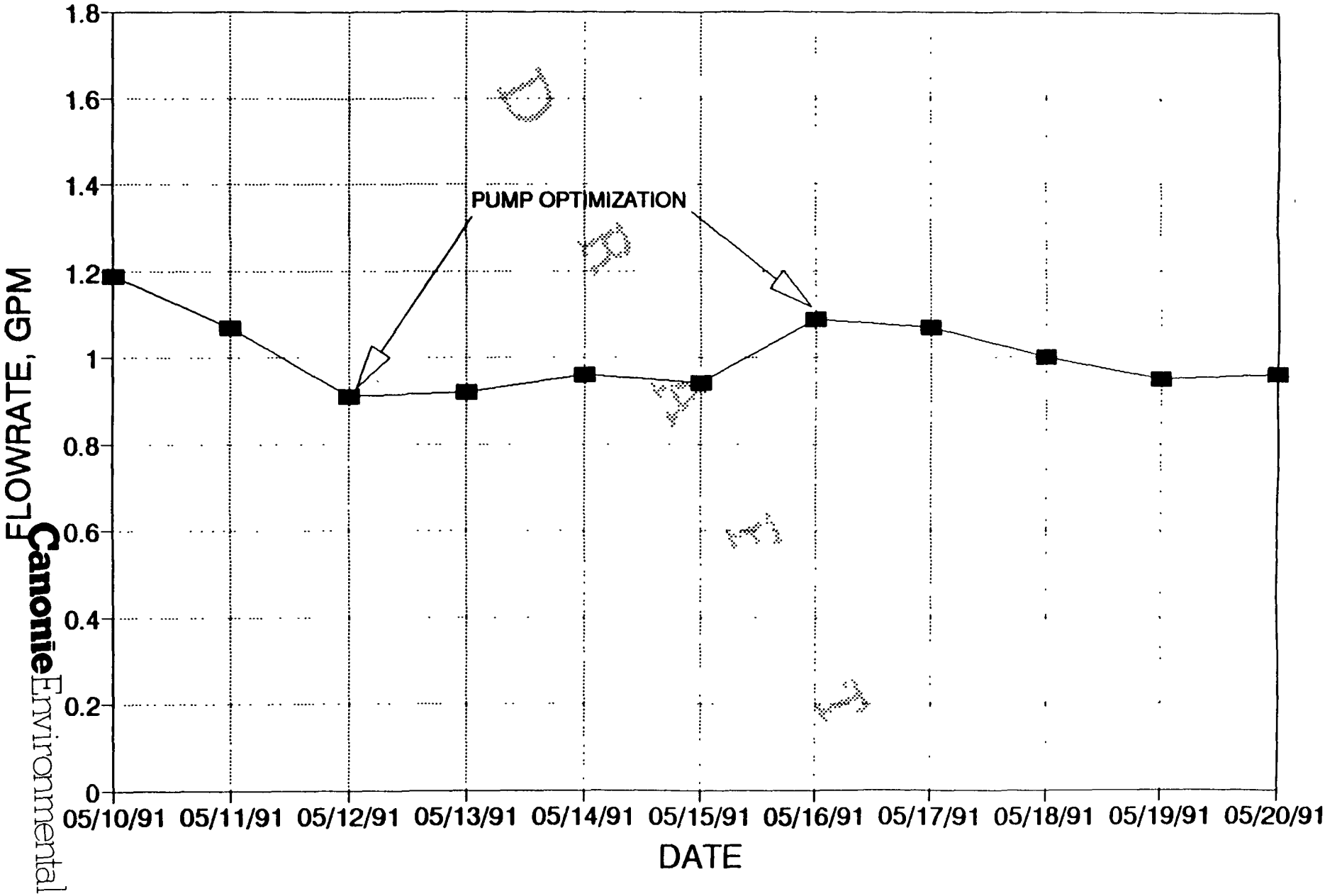
WELL RW-10 FLOWRATES



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W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 1 FLOWRATE

DAY OF REATMENT	TIME	TOTALIZER READING GALLONS	CHANGE IN VOLUME GALLONS	CHANGE IN TIME HOURS	AVERAGE FLOWRATE GPM
DAY 1 5/10/91	12:00	70			
			126	3.0	0.70
	15:00	196			
			174	6.0	0.48
	21:00	370			
			80	3.0	0.44
TOTALS			380	12.0	0.54
DAY 2 5/11/91	0:00	450			
			50	2.0	0.42
	2:00	500			
			50	2.0	0.42
	4:00	550			
			50	2.0	0.42
	6:00	600			
			50	2.0	0.42
	8:00	650			
			60	2.3	0.44
	10:15	710			
			110	4.8	0.39
	15:00	820			
			70	3.0	0.39
	18:00	890			
			90	4.0	0.38
	22:00	980			
			70	3.0	0.39
TOTALS			230	25.0	0.41
DAY 3 5/12/91	1:00	1050			
			60	3.0	0.33
	4:00	1110			
			60	3.0	0.33
	7:00	1170			
			70	3.2	0.36
	10:15	1240			
			110	4.0	0.46
	14:15	1350			
			60	2.8	0.36
	17:00	1410			
			60	3.0	0.33
	20:00	1470			
			110	3.0	0.61
	23:00	1580			
			80	2.0	0.67
TOTALS			610	24.0	0.43

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W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 1 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING GALLONS	CHANGE IN VOLUME GALLONS	CHANGE IN TIME HOURS	AVERAGE FLOWRATE GPM
DAY 4 5/13/91	1:00	1660			
			150	3.0	0.83
	4:00	1810			
			110	3.0	0.61
	7:00	1920			
			40	1.5	0.44
	8:30	1960			
			50	2.5	0.33
	11:00	2010			
			40	2.1	0.32
	13:05	2050			
			70	3.9	0.30
	17:00	2120			
			50	3.0	0.28
	20:00	2170			
			50	3.0	0.28
	23:00	2220			
			30	2.0	0.25
TOTALS			590	24.0	0.41
DAY 5 5/14/91	1:00	2250			
			50	3.0	0.28
	4:00	2300			
			40	3.0	0.22
	7:00	2340			
			20	1.2	0.27
	8:15	2360			
			30	1.8	0.29
	10:00	2390			
			80	4.5	0.30
	14:30	2470			
			50	3.5	0.24
	18:00	2520			
			40	2.0	0.33
	20:00	2560			
			50	3.5	0.24
	23:30	2610			
			20	1.5	0.22
TOTALS			380	24.0	0.26

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 1 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING GALLONS	CHANGE IN VOLUME GALLONS	CHANGE IN TIME HOURS	AVERAGE FLOWRATE GPM
DAY 6 5/15/91	1:00	2630			
			50	3.0	0.28
	4:00	2680			
			40	3.0	0.22
	7:00	2720			
			20	1.0	0.33
	8:00	2740			
			30	2.3	0.22
	10:15	2770			
			30	1.8	0.29
	12:00	2800			
			20	2.0	0.17
	14:00	2820			
			50	3.0	0.28
	17:00	2870			
			50	3.5	0.24
	20:30	2920			
			50	3.4	0.24
	23:55	2970			
			20	1.1	0.32
TOTALS			360	24.0	0.26
DAY 7 5/16/91	1:00	2990			
			40	3.0	0.22
	4:00	3030			
			40	3.0	0.22
	7:00	3070			
			27	1.5	0.30
	8:30	3097			
			21	1.5	0.23
	10:00	3118			
			65	4.5	0.24
	14:30	3183			
			36	2.5	0.24
	17:00	3219			
			38	3.0	0.21
	20:00	3257			
			40	3.0	0.22
	23:00	3297			
			28	2.0	0.23
TOTALS			335	24.0	0.24

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W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 1 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING GALLONS	CHANGE IN VOLUME GALLONS	CHANGE IN TIME HOURS	AVERAGE FLOWRATE GPM
DAY 8 5/17/91	1:00	3325			
			41	3.0	0.23
	4:00	3366			
			42	3.0	0.23
	7:00	3408			
			11	1.0	0.18
	8:00	3419			
			29	2.0	0.24
	10:00	3448			
			13	1.0	0.22
	11:00	3461			
			13	1.0	0.22
	12:00	3474			
			30	2.3	0.22
	14:15	3504			
			41	3.0	0.23
	17:15	3545			
			77	5.8	0.22
	23:00	3622			
			24	2.0	0.20
TOTALS			321	24.0	0.22
DAY 9 5/18/91	1:00	3646			
			46	3.5	0.22
	4:30	3692			
			33	2.5	0.22
	7:00	3725			
			15	1.2	0.20
	8:15	3740			
			12	0.8	0.27
	9:00	3752			
			25	2.0	0.21
	11:00	3777			
			108	8.0	0.23
	19:00	3885			
			27	2.0	0.23
	21:00	3912			
			23	2.0	0.19
	23:00	3935			
			25	2.0	0.21
TOTALS			314	24.0	0.22

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 1 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING GALLONS	CHANGE IN VOLUME GALLONS	CHANGE IN TIME HOURS	AVERAGE FLOWRATE GPM
DAY 10 5/19/91	1:00	3960			
			39	3.0	0.22
	4:00	3999			
			55	4.3	0.21
	8:20	4054			
			35	2.7	0.22
	11:00	4089			
			37	3.0	0.21
	14:00	4126			
			15	1.0	0.25
	15:00	4141			
			47	3.5	0.22
	18:30	4188			
			28	2.5	0.19
	21:00	4216			
			28	2.0	0.23
	23:00	4244			
			25	2.0	0.21
TOTALS			309	24.0	0.22
DAY 11 5/20/91	1:00	4269			
			44	3.5	0.21
	4:30	4313			
			32	2.5	0.21
	7:00	4345			
			13	1.0	0.22
	8:00	4358			
			64	5.0	0.21
	13:00	4422			
TOTALS			153	12.0	0.21

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 2 FLOWRATE

DAY OF REATMENT	TIME	TOTALIZER READING, GALLONS	CHANGE IN VOLUME, GALLONS	CHANGE IN TIME, HOURS	AVERAGE FLOWRATE GPM
DAY 1 5/10/91	12:00	70			
			207	3.0	1.15
	15:00	277			
			353	6.0	0.98
	21:00	630			
			180	3.0	1.00
TOTALS			740	12.0	1.04
DAY 2 5/11/91	0:00	810			
			90	2.0	0.75
	2:00	900			
			100	2.0	0.83
	4:00	1000			
			90	2.0	0.75
	6:00	1090			
			110	2.0	0.92
	8:00	1200			
			120	2.3	0.89
	10:15	1320			
			370	4.8	1.30
	15:00	1690			
			170	3.0	0.94
	18:00	1860			
			150	4.0	0.63
	22:00	2010			
			110	3.0	0.61
TOTALS			430	25.0	0.85
DAY 3 5/12/91	1:00	2120			
			120	3.0	0.67
	4:00	2240			
			110	3.0	0.61
	7:00	2350			
			130	3.2	0.67
	10:15	2480			
			240	4.0	1.00
	14:15	2720			
			140	2.8	0.85
	17:00	2860			
			150	3.0	0.83
	20:00	3010			
			190	3.0	1.06
	23:00	3200			
			80	2.0	0.67
TOTALS			1160	24.0	0.80

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W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 2 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING GALLONS	CHANGE IN VOLUME GALLONS	CHANGE IN TIME HOURS	AVERAGE FLOWRATE GPM
DAY 4 5/13/91	1:00	3280			
			170	3.0	0.94
	4:00	3450			
			180	3.0	1.00
	7:00	3630			
			80	1.5	0.89
	8:30	3710			
			200	2.5	1.33
	11:00	3910			
			170	2.1	1.36
	13:05	4080			
			300	3.9	1.28
	17:00	4380			
			210	3.0	1.17
	20:00	4590			
			280	3.0	1.56
	23:00	4870			
			90	2.0	0.75
TOTALS			1680	24.0	1.14
DAY 5 5/14/91	1:00	4960			
			240	3.0	1.33
	4:00	5200			
			220	3.0	1.22
	7:00	5420			
			80	1.2	1.07
	8:15	5500			
			140	1.8	1.33
	10:00	5640			
			320	4.5	1.19
	14:30	5960			
			270	3.5	1.29
	18:00	6230			
			150	2.0	1.25
	20:00	6380			
			240	3.5	1.14
	23:30	6620			
			110	1.5	1.22
TOTALS			1770	24.0	1.23

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 2 FLOWRATE
(Continued)

DAY 6 5/15/91	1:00	6730			
			210	3.0	1.17
	4:00	6940			
			210	3.0	1.17
	7:00	7150			
			70	1.0	1.17
	8:00	7220			
			150	2.3	1.11
	10:15	7370			
			130	1.8	1.24
	12:00	7500			
			110	2.0	0.92
	14:00	7610			
			220	3.0	1.22
	17:00	7830			
			230	3.5	1.10
	20:30	8060			
			230	3.4	1.12
	23:55	8290			
			70	1.1	1.11
TOTALS			1630	24.0	1.13
DAY 7 5/16/91	1:00	8360			
			200	3.0	1.11
	4:00	8560			
			200	3.0	1.11
	7:00	8760			
			81	1.5	0.90
	8:30	8841			
			80	1.5	0.89
	10:00	8921			
			359	4.5	1.33
	14:30	9280			
			200	2.5	1.33
	17:00	9480			
			224	3.0	1.24
	20:00	9704			
			218	3.0	1.21
	23:00	9922			
			181	2.0	1.51
TOTALS			1743	24.0	1.18

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W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 2 FLOWRATE
(Continued)

DAY 8 5/17/91	1:00	10103			
			268	3.0	1.49
	4:00	10371			
			247	3.0	1.37
	7:00	10618			
			63	1.0	1.05
	8:00	10681			
			140	2.0	1.17
	10:00	10821			
			64	1.0	1.07
	11:00	10885			
			66	1.0	1.10
	12:00	10951			
			147	2.3	1.09
	14:15	11098			
			202	3.0	1.12
	17:15	11300			
			340	5.8	0.99
	23:00	11640			
			132	2.0	1.10
TOTALS			1669	24.0	1.15
DAY 9 5/18/91	1:00	11772			
			218	3.5	1.04
	4:30	11990			
			151	2.5	1.01
	7:00	12141			
			70	1.2	0.93
	8:15	12211			
			54	0.8	1.20
	9:00	12265			
			116	2.0	0.97
	11:00	12381			
			467	8.0	0.97
	19:00	12848			
			118	2.0	0.98
	21:00	12966			
			102	2.0	0.85
	23:00	13068			
			113	2.0	0.94
TOTALS			1409	24.0	0.99

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W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 2 FLOWRATE
(Continued)

DAY 10 5/19/91	1:00	13181			
			177	3.0	0.98
	4:00	13358			
			227	4.3	0.87
	8:20	13585			
			141	2.7	0.88
	11:00	13726			
			154	3.0	0.86
	14:00	13880			
			47	1.0	0.78
	15:00	13927			
			178	3.5	0.85
	18:30	14105			
			112	2.5	0.75
	21:00	14217			
			107	2.0	0.89
	23:00	14324			
			100	2.0	0.83
TOTALS			1243	24.0	0.86
DAY 11 5/20/91	1:00	14424			
			164	3.5	0.78
	4:30	14588			
			112	2.5	0.75
	7:00	14700			
			49	1.0	0.82
	8:00	14749			
			210	5.0	0.70
	13:00	14959			
TOTALS			535	12.0	0.76

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 3 FLOWRATE

DAY OF REATMENT	TIME	TOTALIZER READING GALLONS	CHANGE IN VOLUME GALLONS	CHANGE IN TIME HOURS	AVERAGE FLOWRATE GPM
DAY 1 5/10/91	12:00	50			
			95	3.0	0.53
	15:00	145			
			145	6.2	0.39
	21:10	290			
			70	2.8	0.42
TOTALS			310	12.0	0.45
DAY 2 5/11/91	0:00	360			
			40	2.0	0.33
	2:00	400			
			40	2.0	0.33
	4:00	440			
			40	2.0	0.33
	6:00	480			
			40	2.0	0.33
	8:00	520			
			40	2.3	0.30
	10:15	560			
			90	4.8	0.32
	15:00	650			
			50	3.0	0.28
	18:00	700			
			70	4.0	0.29
	22:00	770			
			40	3.0	0.22
TOTALS			160	25.0	0.30
DAY 3 5/12/91	1:00	810			
			50	3.0	0.28
	4:00	860			
			40	3.0	0.22
	7:00	900			
			50	3.2	0.26
	10:15	950			
			60	4.0	0.25
	14:15	1010			
			40	2.8	0.24
	17:00	1050			
			40	3.0	0.22
	20:00	1090			
			50	3.0	0.28
	23:00	1140			
			10	2.0	0.08
TOTALS			340	24.0	0.24

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W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 3 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING GALLONS	CHANGE IN VOLUME GALLONS	CHANGE IN TIME HOURS	AVERAGE FLOWRATE GPM
DAY 4 5/13/91	1:00	1150			
			40	3.0	0.22
	4:00	1190			
			40	3.0	0.22
	7:00	1230			
			10	1.5	0.11
	8:30	1240			
			30	2.5	0.20
	11:00	1270			
			30	2.1	0.24
	13:05	1300			
			40	3.9	0.17
	17:00	1340			
			30	3.0	0.17
	20:00	1370			
			30	3.0	0.17
	23:00	1400			
			10	2.0	0.08
TOTALS			260	24.0	0.18
DAY 5 5/14/91	1:00	1410			
			30	3.0	0.17
	4:00	1440			
			30	3.0	0.17
	7:00	1470			
			10	1.2	0.13
	8:15	1480			
			20	1.8	0.19
	10:00	1500			
			40	4.5	0.15
	14:30	1540			
			30	3.5	0.14
	18:00	1570			
			20	2.0	0.17
	20:00	1590			
			30	3.5	0.14
	23:30	1620			
			10	1.5	0.11
TOTALS			220	24.0	0.15

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 3 FLOWRATE
(Continued)

DAY OF TREATMENT	TIME	TOTALIZER READING GALLONS	CHANGE IN VOLUME GALLONS	CHANGE IN TIME HOURS	AVERAGE FLOWRATE GPM
DAY 6 5/15/91	1:00	1630			
			20	3.0	0.11
	4:00	1650			
			30	3.0	0.17
	7:00	1680			
			0	1.0	0.00
	8:00	1680			
			20	2.3	0.15
	10:15	1700			
			20	1.8	0.19
	12:00	1720			
			10	2.0	0.08
	14:00	1730			
			30	3.0	0.17
	17:00	1760			
			20	3.5	0.10
	20:30	1780			
			30	3.4	0.15
	23:55	1810			
			0	1.1	0.00
TOTALS			180	24.0	0.11
DAY 7 5/16/91	1:00	1810			
			30	3.0	0.17
	4:00	1840			
			20	3.0	0.11
	7:00	1860			
			12	1.5	0.13
	8:30	1872			
			10	1.5	0.11
	10:00	1882			
			32	4.5	0.12
	14:30	1914			
			17	2.5	0.11
	17:00	1931			
			17	3.0	0.09
	20:00	1948			
			18	3.0	0.10
	23:00	1966			
			13	2.0	0.11
TOTALS			169	24.0	0.12

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W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 3 FLOWRATE
(Continued)

DAY OF TREATMENT	TIME	TOTALIZER READING GALLONS	CHANGE IN VOLUME GALLONS	CHANGE IN TIME HOURS	AVERAGE FLOWRATE GPM
DAY 8	1:00	1979			
			18	3.0	0.10
	4:00	1997			
			18	3.0	0.10
	7:00	2015			
			5	1.0	0.08
	8:00	2020			
			12	2.0	0.10
	10:00	2032			
			6	1.0	0.10
	11:00	2038			
			5	1.0	0.08
	12:00	2043			
			13	2.3	0.10
	14:15	2056			
			17	3.0	0.09
	17:15	2073			
			17	5.8	0.05
	23:00	2090			
			19	2.0	0.16
TOTALS			130	24.0	0.10
DAY 9 5/18/91	1:00	2109			
			19	3.5	0.09
	4:30	2128			
			13	2.5	0.09
	7:00	2141			
			6	1.3	0.08
	8:15	2147			
			4	0.8	0.09
	9:00	2151			
			11	2.0	0.09
	11:00	2162			
			41	8.0	0.09
	19:00	2203			
			11	2.0	0.09
	21:00	2214			
			9	2.0	0.08
	23:00	2223			
			7	2.0	0.06
TOTALS			121	24.0	0.08

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W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 3 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING GALLONS	CHANGE IN VOLUME GALLONS	CHANGE IN TIME HOURS	AVERAGE FLOWRATE GPM
DAY 10 5/19/91	1:00	2230			
			17	3.0	0.09
	4:00	2247			
			21	4.3	0.08
	8:20	2268			
			13	2.7	0.08
	11:00	2281			
			14	3.0	0.08
	14:00	2295			
			5	1.0	0.08
	15:00	2300			
			17	3.5	0.08
	18:30	2317			
			10	2.5	0.07
	21:00	2327			
			10	2.0	0.08
	23:00	2337			
			9	2.0	0.08
TOTALS			116	24.0	0.08
DAY 11 5/20/91	1:00	2346			
			15	3.5	0.07
	4:30	2361			
			11	2.5	0.07
	7:00	2372			
			4	1.0	0.07
	8:00	2376			
			21	5.0	0.07
	13:00	2397			
TOTALS			51	12.0	0.07

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W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 4 FLOWRATE

DAY OF REATMENT	TIME	TOTALIZER READING GALLONS	CHANGE IN VOLUME GALLONS	CHANGE IN TIME HOURS	AVERAGE FLOWRATE GPM
DAY 1 5/10/91	12:00	60			
			64	3.0	0.36
	15:00	124			
			66	6.2	0.18
	21:10	190			
			40	2.8	0.24
TOTALS			170	12.0	0.26
DAY 2 5/11/91	0:00	230			
			20	2.0	0.17
	2:00	250			
			20	2.0	0.17
	4:00	270			
			30	2.0	0.25
	6:00	300			
			20	2.0	0.17
	8:00	320			
			20	2.3	0.15
	10:15	340			
			50	4.8	0.18
	15:00	390			
			30	3.0	0.17
	18:00	420			
			40	4.0	0.17
	22:00	460			
			30	3.0	0.17
TOTALS			100	25.0	0.17
DAY 3 5/12/91	1:00	490			
			30	3.0	0.17
	4:00	520			
			30	3.0	0.17
	7:00	550			
			40	3.2	0.21
	10:15	590			
			50	4.0	0.21
	14:15	640			
			30	2.8	0.18
	17:00	670			
			30	3.0	0.17
	20:00	700			
			40	3.0	0.22
	23:00	740			
			20	2.0	0.17
TOTALS			270	24.0	0.18

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W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 4 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING GALLONS	CHANGE IN VOLUME GALLONS	CHANGE IN TIME HOURS	AVERAGE FLOWRATE GPM
DAY 4 5/13/91	1:00	760			
			30	3.0	0.17
	4:00	790			
			40	3.0	0.22
	7:00	830			
			10	1.5	0.11
	8:30	840			
			30	2.5	0.20
	11:00	870			
			30	2.1	0.24
	13:05	900			
			40	3.9	0.17
	17:00	940			
			40	3.0	0.22
	20:00	980			
			30	3.0	0.17
	23:00	1010			
			20	2.0	0.17
TOTALS			270	24.0	0.19
DAY 5 5/14/91	1:00	1030			
			40	3.0	0.22
	4:00	1070			
			30	3.0	0.17
	7:00	1100			
			10	1.2	0.13
	8:15	1110			
			20	1.8	0.19
	10:00	1130			
			60	4.5	0.22
	14:30	1190			
			40	3.5	0.19
	18:00	1230			
			30	2.0	0.25
	20:00	1260			
			40	3.5	0.19
	23:30	1300			
			10	1.5	0.11
TOTALS			280	24.0	0.19

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 4 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING GALLONS	CHANGE IN VOLUME GALLONS	CHANGE IN TIME HOURS	AVERAGE FLOWRATE GPM
DAY 6 5/15/91	1:00	1310			
			40	3.0	0.22
	4:00	1350			
			40	3.0	0.22
	7:00	1390			
			10	1.0	0.17
	8:00	1400			
			20	2.3	0.15
	10:15	1420			
			30	1.8	0.29
	12:00	1450			
			20	2.0	0.17
	14:00	1470			
			40	3.0	0.22
	17:00	1510			
			40	3.5	0.19
	20:30	1550			
			40	3.4	0.20
	23:55	1590			
			10	1.1	0.16
TOTALS			290	24.0	0.20
DAY 7 5/16/91	1:00	1600			
			40	3.0	0.22
	4:00	1640			
			30	3.0	0.17
	7:00	1670			
			25	1.5	0.28
	8:30	1695			
			18	1.5	0.20
	10:00	1713			
			56	4.5	0.21
	14:30	1769			
			31	2.5	0.21
	17:00	1800			
			33	3.0	0.18
	20:00	1833			
			33	3.0	0.18
	23:00	1866			
			24	2.0	0.20
TOTALS			290	24.0	0.21

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 4 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING GALLONS	CHANGE IN VOLUME GALLONS	CHANGE IN TIME HOURS	AVERAGE FLOWRATE GPM
DAY 8 5/17/91	1:00	1890			
			35	3.0	0.19
	4:00	1925			
			36	3.0	0.20
	7:00	1961			
			10	1.0	0.17
	8:00	1971			
			25	2.0	0.21
	10:00	1996			
			11	1.0	0.18
	11:00	2007			
			11	1.0	0.18
	12:00	2018			
			26	2.3	0.19
	14:15	2044			
			36	3.0	0.20
	17:15	2080			
			60	5.8	0.17
	23:00	2140			
			27	2.0	0.23
TOTALS			277	24.0	0.19
DAY 9 5/18/91	1:00	2167			
			40	3.5	0.19
	4:30	2207			
			28	2.5	0.19
	7:00	2235			
			14	1.2	0.19
	8:15	2249			
			10	0.8	0.22
	9:00	2259			
			22	2.0	0.18
	11:00	2281			
			93	8.0	0.19
	19:00	2374			
			23	2.0	0.19
	21:00	2397			
			21	2.0	0.18
	23:00	2418			
			21	2.0	0.18
TOTALS			272	24.0	0.19

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 4 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING GALLONS	CHANGE IN VOLUME GALLONS	CHANGE IN TIME HOURS	AVERAGE FLOWRATE GPM
DAY 10	1:00	2439			
5/19/91			34	3.0	0.19
	4:00	2473			
			50	4.3	0.19
	8:20	2523			
			30	2.7	0.19
	11:00	2553			
			27	3.0	0.15
	14:00	2580			
			19	1.0	0.32
	15:00	2599			
			40	3.5	0.19
	18:30	2639			
			25	2.5	0.17
	21:00	2664			
			24	2.0	0.20
	23:00	2688			
			22	2.0	0.18
TOTALS			271	24.0	0.20
DAY 11	1:00	2710			
			39	3.5	0.19
5/20/91	4:30	2749			
			28	2.5	0.19
	7:00	2777			
			11	1.0	0.18
	8:00	2788			
			56	5.0	0.19
	13:00	2844			
TOTALS			134	12.0	0.19

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 5 FLOWRATE

DAY OF TREATMENT	TIME	TOTALIZER READING GALLONS	CHANGE IN VOLUME GALLONS	CHANGE IN TIME HOURS	AVERAGE FLOWRATE GPM
DAY 1	12:00	10			
5/10/91			125	3.0	0.69
	15:00	135			
			115	6.2	0.31
	21:10	250			
			60	2.8	0.36
TOTALS			300	12.0	0.45
DAY 2	0:00	310			
5/11/91			30	2.0	0.25
	2:00	340			
			30	2.0	0.25
	4:00	370			
			40	2.0	0.33
	6:00	410			
			30	2.0	0.25
	8:00	440			
			40	2.3	0.30
	10:15	480			
			-90	4.8	-0.32
	15:00	390			
			30	3.0	0.17
	18:00	420			
			40	4.0	0.17
	22:00	460			
			30	3.0	0.17
TOTALS			100	25.0	0.17
DAY 3	1:00	490			
5/12/91			30	3.0	0.17
	4:00	520			
			30	3.0	0.17
	7:00	550			
			40	3.3	0.21
	10:15	590			

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W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 5 FLOWRATE
(Continued)

DAY OF TREATMENT	TIME	TOTALIZER READING GALLONS	CHANGE IN VOLUME GALLONS	CHANGE IN TIME HOURS	AVERAGE FLOWRATE GPM
DAY 3 5/12/91	14:15	640	50	4.0	0.21
	17:00	670	30	2.8	0.18
	20:00	700	30	3.0	0.17
	23:00	740	40	3.0	0.22
			20	2.0	0.17
TOTALS			270	24.0	0.18
DAY 4 5/13/91	1:00	760	30	3.0	0.17
	4:00	790	40	3.0	0.22
	7:00	830	10	1.5	0.11
	8:30	840	30	2.5	0.20
	11:00	870	30	2.1	0.24
	13:05	900	40	3.9	0.17
	17:00	940	40	3.0	0.22
	20:00	980	30	3.0	0.17
	23:00	1010	20	2.0	0.17
TOTALS			270	24.0	0.19
DAY 5 5/14/91	1:00	1030	40	3.0	0.22
	4:00	1070			

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 5 FLOWRATE
(Continued)

DAY OF TREATMENT	TIME	TOTALIZER READING GALLONS	CHANGE IN VOLUME GALLONS	CHANGE IN TIME HOURS	AVERAGE FLOWRATE GPM
DAY 5 5/14/91	7:00	1100			
			30	3.0	0.17
	8:15	1110			
			10	1.3	0.13
	10:00	1130			
			20	1.8	0.19
	14:30	1190			
			60	4.5	0.22
	18:00	1230			
			40	3.5	0.19
	20:00	1260			
			30	2.0	0.25
	23:30	1300			
			40	3.5	0.19
			10	1.5	0.11
TOTALS			280	24.0	0.19
DAY 6 5/15/91	1:00	1310			
			40	3.0	0.22
	4:00	1350			
			40	3.0	0.22
	7:00	1390			
			10	1.0	0.17
	8:00	1400			
			20	2.3	0.15
	10:15	1420			
			30	1.8	0.29
	12:00	1450			
			20	2.0	0.17
	14:00	1470			
			40	3.0	0.22
	17:00	1510			
			40	3.5	0.19
	20:30	1550			
			40	3.5	0.19
	23:55	1590			
			10	1.1	0.16
TOTALS			290	24	0.20

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 5 FLOWRATE
(Continued)

DAY OF TREATMENT	TIME	TOTALIZER READING GALLONS	CHANGE IN VOLUME GALLONS	CHANGE IN TIME HOURS	AVERAGE FLOWRATE GPM
DAY 7 5/16/91	1:00	1600			
			40	3.0	0.22
	4:00	1640			
			30	3.0	0.17
	7:00	1670			
			25	1.5	0.28
	8:30	1695			
			18	1.5	0.20
	10:00	1713			
			56	4.5	0.21
	14:30	1769			
			31	2.5	0.21
	17:00	1800			
			33	3.0	0.18
	20:00	1833			
			33	3.0	0.18
	23:00	1866			
			24	2.0	0.20
TOTALS			290	24.0	0.21

DATA FOR DAY 8 (MAY 17,1991) TO DAY 11 (MAY 20, 1991) WAS NOT AVAILABLE. FOR THESE DAYS, THE AVERAGE FLOWRATE OF 0.21 GPM ON DAY 7 WAS USED.

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 6 FLOWRATE

DAY OF REATMENT	TIME	TOTALIZER READING, GALLONS	CHANGE IN VOLUME, GALLONS	CHANGE IN TIME, HOURS	AVERAGE FLOWRATE GPM
DAY 1 5/10/91	12:00	30			
			39	3.0	0.22
	15:00	69			
			31	6.2	0.08
	21:10	100			
			20	2.8	0.12
TOTALS			90	12.0	0.14
DAY 2 5/11/91	0:00	120			
			10	2.0	0.08
	2:00	130			
			10	2.0	0.08
	4:00	140			
			10	2.0	0.08
	6:00	150			
			10	2.0	0.08
	8:00	160			
			10	2.3	0.07
	10:15	170			
			30	4.8	0.11
	15:00	200			
			20	3.0	0.11
	18:00	220			
			20	4.0	0.08
	22:00	240			
			10	3.0	0.06
TOTALS			50	25.0	0.08
DAY 3 5/12/91	1:00	250			
			20	3.0	0.11
	4:00	270			
			10	3.0	0.06
	7:00	280			
			40	7.3	0.09
	14:15	320			
			20	2.8	0.12
	17:00	340			
			10	3.0	0.06
	20:00	350			
			20	3.0	0.11
	23:00	370			
			10	2.0	0.08
TOTALS			130	24.0	0.09

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W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 6 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING, GALLONS	CHANGE IN VOLUME, GALLONS	CHANGE IN TIME, HOURS	AVERAGE FLOWRATE GPM
DAY 4 5/13/91	1:00	380			
			10	3.0	0.06
	4:00	390			
			20	3.0	0.11
	7:00	410			
			1	1.5	0.01
	8:30	411			
			19	2.5	0.13
	11:00	430			
			10	2.1	0.08
	13:05	440			
			20	3.9	0.09
	17:00	460			
			10	3.0	0.06
	20:00	470			
			10	3.0	0.06
	23:00	480			
			10	2.0	0.08
TOTALS			110	24.0	0.07
DAY 5 5/14/91	1:00	490			
			20	3.0	0.11
	4:00	510			
			10	3.0	0.06
	7:00	520			
			20	1.2	0.27
	8:15	540			
			10	1.8	0.10
	10:00	550			
			10	4.5	0.04
	14:30	560			
			20	3.5	0.10
	18:00	580			
			10	2.0	0.08
	20:00	590			
			10	3.5	0.05
	23:30	600			
			10	1.5	0.11
TOTALS			120	24.0	0.10

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W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 6 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING, GALLONS	CHANGE IN VOLUME, GALLONS	CHANGE IN TIME, HOURS	AVERAGE FLOWRATE GPM
DAY 6 5/15/91	1:00	610			
			10	3.0	0.06
	4:00	620			
			10	3.0	0.06
	7:00	630			
			10	1.0	0.17
	8:00	640			
			10	2.3	0.07
	10:15	650			
			10	1.8	0.10
	12:00	660			
			0	2.0	0.00
	14:00	660			
			20	3.0	0.11
	17:00	680			
			10	3.5	0.05
	20:30	690			
			20	3.4	0.10
	23:55	710			
			0	1.1	0.00
TOTALS			100	24.0	0.07
DAY 7 5/16/91	1:00	710			
			10	3.0	0.06
	4:00	720			
			20	3.0	0.11
	7:00	740			
			5	1.5	0.06
	8:30	745			
			7	1.5	0.08
	10:00	752			
			19	4.5	0.07
	14:30	771			
			10	2.5	0.07
	17:00	781			
			11	3.0	0.06
	20:00	792			
			11	3.0	0.06
	23:00	803			
			9	2.0	0.08
TOTALS			102	24.0	0.07

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 6 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING, GALLONS	CHANGE IN VOLUME, GALLONS	CHANGE IN TIME, HOURS	AVERAGE FLOWRATE GPM
DAY 8 5/17/91	1:00	812			
			12	3.0	0.07
	4:00	824			
			12	3.0	0.07
	7:00	836			
			3	1.0	0.05
	8:00	839			
			9	2.0	0.08
	10:00	848			
			3	1.0	0.05
	11:00	851			
			4	1.0	0.07
	12:00	855			
			9	2.3	0.07
	14:15	864			
			11	3.0	0.06
	17:15	875			
			24	5.8	0.07
	23:00	899			
			6	2.0	0.05
TOTALS			93	24.0	0.06
DAY 9 5/18/91	1:00	905			
			14	3.5	0.07
	4:30	919			
			9	2.5	0.06
	7:00	928			
			5	1.2	0.07
	8:15	933			
			3	0.8	0.07
	9:00	936			
			8	2.0	0.07
	11:00	944			
			30	8.0	0.06
	19:00	974			
			8	2.0	0.07
	21:00	982			
			6	2.0	0.05
	23:00	988			
			8	2.0	0.07
TOTALS			91	24.0	0.06

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 6 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING, GALLONS	CHANGE IN VOLUME, GALLONS	CHANGE IN TIME, HOURS	AVERAGE FLOWRATE GPM
DAY 10 5/19/91	1:00	996			
			12	3.0	0.07
	4:00	1008			
			19	4.3	0.07
	8:20	1027			
			9	2.7	0.06
	11:00	1036			
			11	3.0	0.06
	14:00	1047			
			4	1.0	0.07
	15:00	1051			
			13	3.5	0.06
	18:30	1064			
			8	2.5	0.05
	21:00	1072			
			8	2.0	0.07
	23:00	1080			
			7	2.0	0.06
TOTALS			91	24.0	0.06
DAY 11 5/20/91	1:00	1087			
			543	3.5	2.59
	4:30	1630			
			20	2.5	0.13
	7:00	1650			
			28	1.0	0.47
	8:00	1678			
			10	5.0	0.03
	13:00	1688			
TOTALS			601	12.0	0.80

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 7 FLOWRATE

DAY OF REATMENT	TIME	TOTALIZER READING, GALLONS	CHANGE IN VOLUME, GALLONS	CHANGE IN TIME, HOURS	AVERAGE FLOWRATE GPM
DAY 1 5/10/91	12:00	70			
			170	3.0	0.94
	15:00	240			
			430	6.2	1.16
	21:10	670			
			180	2.8	1.07
TOTALS			780	12.0	1.06
DAY 2 5/11/91	0:00	850			
			110	2.0	0.92
	2:00	960			
			130	2.0	1.08
	4:00	1090			
			120	2.0	1.00
	6:00	1210			
			130	2.0	1.08
	8:00	1340			
			140	3.3	0.70
	11:20	1480			
			320	3.7	1.45
	15:00	1800			
			140	3.0	0.78
	18:00	1940			
			150	4.0	0.63
	22:00	2090			
			100	3.0	0.56
TOTALS			390	25.0	0.91
DAY 3 5/12/91	1:00	2190			
			110	3.0	0.61
	4:00	2300			
			100	3.0	0.56
	7:00	2400			
			330	7.3	0.76
	14:15	2730			
			160	2.8	0.97
	17:00	2890			
			150	3.0	0.83
	20:00	3040			
			170	3.0	0.94
	23:00	3210			
			70	2.0	0.58
TOTALS			1090	24.0	0.77

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W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 7 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING, GALLONS	CHANGE IN VOLUME, GALLONS	CHANGE IN TIME, HOURS	AVERAGE FLOWRATE GPM
DAY 4 5/13/91	1:00	3280			
			130	3.0	0.72
	4:00	3410			
			120	3.0	0.67
	7:00	3530			
			70	1.5	0.78
	8:30	3600			
			120	2.5	0.80
	11:00	3720			
			130	2.1	1.04
	13:05	3850			
			220	3.9	0.94
	17:00	4070			
			170	3.0	0.94
	20:00	4240			
			160	3.0	0.89
	23:00	4400			
			100	2.0	0.83
TOTALS			1220	24.0	0.85
DAY 5 5/14/91	1:00	4500			
			170	3.0	0.94
	4:00	4670			
			140	3.0	0.78
	7:00	4810			
			70	1.2	0.93
	8:15	4880			
			100	1.8	0.95
	10:00	4980			
			230	4.5	0.85
	14:30	5210			
			180	3.5	0.86
	18:00	5390			
			100	2.0	0.83
	20:00	5490			
			160	3.5	0.76
	23:30	5650			
			70	1.5	0.78
TOTALS			1220	24.0	0.85

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 7 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING, GALLONS	CHANGE IN VOLUME, GALLONS	CHANGE IN TIME, HOURS	AVERAGE FLOWRATE GPM
DAY 6 5/15/91	1:00	5720			
			140	3.0	0.78
	4:00	5860			
			140	3.0	0.78
	7:00	6000			
			50	1.0	0.83
	8:00	6050			
			110	2.3	0.81
	10:15	6160			
			100	1.8	0.95
	12:00	6260			
			100	2.0	0.83
	14:00	6360			
			180	3.0	1.00
	17:00	6540			
			160	3.5	0.76
	20:30	6700			
			160	3.4	0.78
	23:55	6860			
			50	1.1	0.79
TOTALS			1190	24.0	0.83
DAY 7 5/16/91	1:00	6910			
			130	3.0	0.72
	4:00	7040			
			150	3.0	0.83
	7:00	7190			
			76	1.5	0.84
	8:30	7266			
			81	1.5	0.90
	10:00	7347			
			296	5.0	0.99
	15:00	7643			
			147	2.0	1.22
	17:00	7790			
			187	3.0	1.04
	20:00	7977			
			203	3.0	1.13
	23:00	8180			
			114	2.0	0.95
TOTALS			1384	24.0	0.96

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 7 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING, GALLONS	CHANGE IN VOLUME, GALLONS	CHANGE IN TIME, HOURS	AVERAGE FLOWRATE GPM
DAY 8 5/17/91	1:00	8294			
			146	3.0	0.81
	4:00	8440			
			152	3.0	0.84
	7:00	8592			
			57	1.0	0.95
	8:00	8649			
			115	2.0	0.96
	10:00	8764			
			56	1.0	0.93
	11:00	8820			
			57	1.0	0.95
	12:00	8877			
			135	2.3	1.00
	14:15	9012			
			186	3.0	1.03
	17:15	9198			
			420	5.8	1.22
	23:00	9618			
			90	2.0	0.75
TOTALS			1414	24.0	0.94
DAY 9 5/18/91	1:00	9708			
			175	3.5	0.83
	4:30	9883			
			121	2.5	0.81
	7:00	10004			
			58	1.2	0.77
	8:15	10062			
			46	0.8	1.02
	9:00	10108			
			104	2.0	0.87
	11:00	10212			
			471	8.0	0.98
	19:00	10683			
			89	2.0	0.74
	21:00	10772			
			78	2.0	0.65
	23:00	10850			
			81	2.0	0.68
TOTALS			1223	24.0	0.82

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W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 7 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING, GALLONS	CHANGE IN VOLUME, GALLONS	CHANGE IN TIME, HOURS	AVERAGE FLOWRATE GPM
DAY 10	1:00	10931			
			132	3.0	0.73
5/19/91	4:00	11063			
			227	4.3	0.87
	8:20	11290			
			133	2.7	0.83
	11:00	11423			
			157	3.0	0.87
	14:00	11580			
			47	1.0	0.78
	15:00	11627			
			178	3.5	0.85
	18:30	11805			
			106	2.5	0.71
	21:00	11911			
			89	2.0	0.74
	23:00	12000			
			97	2.0	0.81
TOTALS			1166	24.0	0.80
DAY 11	1:00	12097			
			156	3.5	0.74
5/20/91	4:30	12253			
			103	2.5	0.69
	7:00	12356			
			50	1.0	0.83
	8:00	12406			
			224	5.0	0.75
	13:00	12630			
TOTALS			533	12.0	0.75

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 8 FLOWRATE

DAY OF REATMENT	TIME	TOTALIZER READING, GALLONS	CHANGE IN VOLUME, GALLONS	CHANGE IN TIME, HOURS	AVERAGE FLOWRATE GPM
DAY 1 5/10/91	12:00	70			
			186	3.0	1.03
	15:00	256			
			514	6.2	1.39
	21:10	770			
			410	2.8	2.44
TOTALS			1110	12.0	1.62
DAY 2 5/11/91	0:00	1180			
			170	2.0	1.42
	2:00	1350			
			330	2.0	2.75
	4:00	1680			
			140	2.0	1.17
	6:00	1820			
			230	2.0	1.92
	8:00	2050			
			90	3.3	0.45
	11:20	2140			
			355	3.7	1.61
	15:00	2495			
			165	3.0	0.92
	18:00	2660			
			160	4.0	0.67
	22:00	2820			
			120	3.0	0.67
TOTALS			445	25.0	1.28
DAY 3 5/12/91	1:00	2940			
			120	3.0	0.67
	4:00	3060			
			130	3.0	0.72
	7:00	3190			
			370	7.3	0.85
	14:15	3560			
			170	2.8	1.03
	17:00	3730			
			160	3.0	0.89
	20:00	3890			
			190	3.0	1.06
	23:00	4080			
			80	2.0	0.67
TOTALS			1220	24.0	0.90

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W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 8 FLOWRATE
(Continued)

DAY OF TREATMENT	TIME	TOTALIZER READING, GALLONS	CHANGE IN VOLUME, GALLONS	CHANGE IN TIME, HOURS	AVERAGE FLOWRATE, GPM
DAY 4 5/13/91	1:00	4160			
			150	3.0	0.83
	4:00	4310			
			150	3.0	0.83
	7:00	4460			
			70	1.5	0.78
	8:30	4530			
			140	2.5	0.93
	11:00	4670			
			140	2.1	1.12
	13:05	4810			
			240	3.9	1.02
	17:00	5050			
			180	3.0	1.00
	20:00	5230			
			190	3.0	1.06
	23:00	5420			
			110	2.0	0.92
TOTALS			1370	24.0	0.94
DAY 5 5/14/91	1:00	5530			
			190	3.0	1.06
	4:00	5720			
			170	3.0	0.94
	7:00	5890			
			80	1.3	1.07
	8:15	5970			
			110	1.8	1.05
	10:00	6080			
			250	4.5	0.93
	14:30	6330			
			220	3.5	1.05
	18:00	6550			
			120	2.0	1.00
	20:00	6670			
			190	3.5	0.90
	23:30	6860			
			80	1.5	0.89
TOTALS			1410	24.0	0.99

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 8 FLOWRATE
(Continued)

DAY OF TREATMENT	TIME	TOTALIZER READING, GALLONS	CHANGE IN VOLUME, GALLONS	CHANGE IN TIME, HOURS	AVERAGE FLOWRATE, GPM
DAY 6					
	1:00	6940			
			170	3.0	0.95
	4:00	7110			
			180	3.0	1.00
	7:00	7290			
			50	1.0	0.83
	8:00	7340			
			130	2.3	0.96
	10:15	7470			
			110	1.8	1.05
	12:00	7580			
			110	2.0	0.92
	14:00	7690			
			200	3.0	1.11
	17:00	7890			
			200	3.5	0.95
	20:30	8090			
			190	3.4	0.93
	23:55	8280			
			60	1.1	0.95
TOTALS			1400	24.0	0.97
DAY 7 5/16/91	1:00	8340			
			180	3.0	1.00
	4:00	8520			
			180	3.0	1.00
	7:00	8700			
			83	1.5	0.92
	8:30	8783			
			92	1.5	1.02
	10:00	8875			
			340	5.0	1.13
	15:00	9215			
			168	2.0	1.40
	17:00	9383			
			217	3.0	1.21
	20:00	9600			
			240	3.0	1.33
	23:00	9840			
			136	2.0	1.13
TOTALS			1636	24.0	1.13

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W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 8 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING, GALLONS	CHANGE IN VOLUME, GALLONS	CHANGE IN TIME, HOURS	AVERAGE FLOWRATE GPM
DAY 8 5/17/91	1:00	9976			
			180	3.0	1.00
	4:00	10156			
			183	3.0	1.02
	7:00	10339			
			54	1.0	0.90
	8:00	10393			
			143	2.0	1.19
	10:00	10536			
			64	1.0	1.07
	11:00	10600			
			64	1.0	1.07
	12:00	10664			
			151	2.3	1.12
	14:15	10815			
			205	5.0	0.68
	19:15	11020			
			505	3.8	2.24
	23:00	11525			
			118	2.0	0.98
TOTALS			1667	24.0	1.13
DAY 9 5/18/91	1:00	11643			
			232	3.5	1.10
	4:30	11875			
			160	2.5	1.07
	7:00	12035			
			75	1.2	1.00
	8:15	12110			
			60	0.8	1.33
	9:00	12170			
			127	2.0	1.06
	11:00	12297			
			557	8.0	1.16
	19:00	12854			
			116	2.0	0.97
	21:00	12970			
			100	2.0	0.83
	23:00	13070			
			110	2.0	0.92
TOTALS			1537	24.0	1.05

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W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 8 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING, GALLONS	CHANGE IN VOLUME, GALLONS	CHANGE IN TIME, HOURS	AVERAGE FLOWRATE GPM
DAY 10 5/19/91	1:00	13180			
			177	3.0	0.98
	4:00	13357			
			322	4.3	1.24
	8:20	13679			
			151	2.7	0.94
	11:00	13830			
			161	3.0	0.89
	14:00	13991			
			64	1.0	1.07
	15:00	14055			
			200	3.5	0.95
	18:30	14255			
			126	2.5	0.84
	21:00	14381			
			122	2.0	1.02
	23:00	14503			
			112	2.0	0.93
TOTALS			1435	24.0	0.99
DAY 11	1:00	14615			
			196	3.5	0.93
5/20/91	4:30	14811			
			119	2.5	0.79
	7:00	14930			
			61	1.0	1.02
	8:00	14991			
			241	5.0	0.80
	13:00	15232			
TOTALS			617	12.0	0.89

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 9 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING, GALLONS	CHANGE IN VOLUME, GALLONS	CHANGE IN TIME, HOURS	AVERAGE FLOWRATE GPM
DAY 1 5/10/91	12:00	90			
			210	3.0	1.17
	15:00	300			
			590	6.2	1.59
	21:10	890			
			380	2.8	2.26
TOTALS			1180	12.0	1.67
DAY 2 5/11/91	0:00	1270			
			170	2.0	1.42
	2:00	1440			
			330	2.0	2.75
	4:00	1770			
			160	2.0	1.33
	6:00	1930			
			160	2.0	1.33
	8:00	2090			
			190	3.3	0.95
	11:20	2280			
			217	3.7	0.99
	15:00	2497			
			263	3.0	1.46
	18:00	2760			
			220	4.0	0.92
	22:00	2980			
			160	3.0	0.89
TOTALS			643	25.0	1.34
DAY 3 5/12/91	1:00	3140			
			180	3.0	1.00
	4:00	3320			
			170	3.0	0.94
	7:00	3490			
			280	7.3	0.64
	14:15	3770			
			400	2.8	2.42
	17:00	4170			
			180	3.0	1.00
	20:00	4350			
			210	3.0	1.17
	23:00	4560			
			100	2.0	0.83
TOTALS			1520	24.0	1.17

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 9 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING, GALLONS	CHANGE IN VOLUME, GALLONS	CHANGE IN TIME, HOURS	AVERAGE FLOWRATE GPM
DAY 4 5/13/91	1:00	4660			
			170	3.0	0.94
	4:00	4830			
			180	3.0	1.00
	7:00	5010			
			80	1.5	0.89
	8:30	5090			
			150	2.5	1.00
	11:00	5240			
			150	2.1	1.20
	13:05	5390			
			250	3.9	1.06
	17:00	5640			
			200	3.0	1.11
	20:00	5840			
			190	3.0	1.06
	23:00	6030			
			110	2.0	0.92
TOTALS			1480	24.0	1.02
DAY 5 5/14/91	1:00	6140			
			210	3.0	1.17
	4:00	6350			
			180	3.0	1.00
	7:00	6530			
			80	1.2	1.07
	8:15	6610			
			120	1.8	1.14
	10:00	6730			
			270	4.5	1.00
	14:30	7000			
			230	3.5	1.10
	18:00	7230			
			130	2.0	1.08
	20:00	7360			
			200	3.5	0.95
	23:30	7560			
			90	1.5	1.00
TOTALS			1510	24.0	1.06

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 9 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING, GALLONS	CHANGE IN VOLUME, GALLONS	CHANGE IN TIME, HOURS	AVERAGE FLOWRATE GPM
DAY 6 5/15/91	1:00	7650			
			190	3.0	1.06
	4:00	7840			
			190	3.0	1.06
	7:00	8030			
			60	1.0	1.00
	8:00	8090			
			130	2.3	0.96
	10:15	8220			
			120	1.8	1.14
	12:00	8340			
			110	2.0	0.92
	14:00	8450			
			210	3.0	1.17
	17:00	8660			
			210	3.5	1.00
	20:30	8870			
			210	3.4	1.02
	23:55	9080			
			60	1.1	0.95
TOTALS			1490	24.0	1.03
DAY 7 5/16/91	1:00	9140			
			190	3.0	1.06
	4:00	9330			
			190	3.0	1.06
	7:00	9520			
			93	1.5	1.03
	8:30	9613			
			94	1.5	1.04
	10:00	9707			
			354	5.0	1.18
	15:00	10061			
			174	2.0	1.45
	17:00	10235			
			265	3.0	1.47
	20:00	10500			
			240	3.0	1.33
	23:00	10740			
			113	2.0	0.94
TOTALS			1713	24.0	1.17

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 9 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING, GALLONS	CHANGE IN VOLUME, GALLONS	CHANGE IN TIME, HOURS	AVERAGE FLOWRATE GPM
DAY 8 5/17/91	1:00	10853			
			192	3.0	1.07
	4:00	11045			
			195	3.0	1.08
	7:00	11240			
			57	1.0	0.95
	8:00	11297			
			149	2.0	1.24
	10:00	11446			
			65	1.0	1.08
	11:00	11511			
			67	1.0	1.12
	12:00	11578			
			155	2.3	1.15
	14:15	11733			
			217	5.0	0.72
	19:15	11950			
			850	3.8	3.78
	23:00	12800			
			125	2.0	1.04
TOTALS			2072	24.0	1.32
DAY 9 5/18/91	1:00	12925			
			247	3.5	1.18
	4:30	13172			
			171	2.5	1.14
	7:00	13343			
			82	1.2	1.09
	8:15	13425			
			74	0.8	1.64
	9:00	13499			
			127	2.0	1.06
	11:00	13626			
			668	8.0	1.39
	19:00	14294			
			123	2.0	1.02
	21:00	14417			
			106	2.0	0.88
	23:00	14523			
			116	2.0	0.97
TOTALS			1714	24.0	1.15

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 9 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING, GALLONS	CHANGE IN VOLUME, GALLONS	CHANGE IN TIME, HOURS	AVERAGE FLOWRATE GPM
DAY 10	1:00	14639			
			184	3.0	1.02
5/19/91	4:00	14823			
			395	4.3	1.52
	8:20	15218			
			157	2.7	0.98
	11:00	15375			
			166	3.0	0.92
	14:00	15541			
			66	1.0	1.10
	15:00	15607			
			208	3.5	0.99
	18:30	15815			
			131	2.5	0.87
	21:00	15946			
			124	2.0	1.03
	23:00	16070			
			116	2.0	0.97
TOTALS			1547	24.0	1.05
DAY 11	1:00	16186			
			201	3.5	0.96
5/20/91	4:30	16387			
			150	2.5	1.00
	7:00	16537			
			70	1.0	1.17
	8:00	16607			
			301	5.0	1.00
	13:00	16908			
TOTALS			722	12.0	1.03

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 10 FLOWRATE

DAY OF REATMENT	TIME	TOTALIZER READING GALLONS	CHANGE IN VOLUME GALLONS	CHANGE IN TIME HOURS	AVERAGE FLOWRATE GPM
DAY 1 5/10/91	12:00	80			
			170	3.0	0.94
	15:00	250			
			490	6.2	1.32
	21:10	740			
			220	2.8	1.31
TOTALS			880	12.0	1.19
DAY 2 5/11/91	0:00	960			
			140	2.0	1.17
	2:00	1100			
			160	2.0	1.33
	4:00	1260			
			130	2.0	1.08
	6:00	1390			
			140	2.0	1.17
	8:00	1530			
			150	3.3	0.75
	11:20	1680			
			335	3.7	1.52
	15:00	2015			
			175	3.0	0.97
	18:00	2190			
			200	4.0	0.83
	22:00	2390			
			150	3.0	0.83
TOTALS			525	25.0	1.07
DAY 3 5/12/91	1:00	2540			
			160	3.0	0.89
	4:00	2700			
			150	3.0	0.83
	7:00	2850			
			400	7.3	0.92
	14:15	3250			
			160	2.8	0.97
	17:00	3410			
			160	3.0	0.89
	20:00	3570			
			180	3.0	1.00
	23:00	3750			
			80	2.0	0.67
TOTALS			1290	24.0	0.91

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W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 10 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING GALLONS	CHANGE IN VOLUME GALLONS	CHANGE IN TIME HOURS	AVERAGE FLOWRATE GPM
DAY 4 5/13/91	1:00	3830			
			160	3.0	0.89
	4:00	3990			
			150	3.0	0.83
	7:00	4140			
			70	1.5	0.78
	8:30	4210			
			140	2.5	0.93
	11:00	4350			
			130	2.1	1.04
	13:05	4480			
			230	3.9	0.98
	17:00	4710			
			180	3.0	1.00
	20:00	4890			
			170	3.0	0.94
	23:00	5060			
			110	2.0	0.92
TOTALS			1340	24.0	0.92
DAY 5 5/14/91	1:00	5170			
			180	3.0	1.00
	4:00	5350			
			170	3.0	0.94
	7:00	5520			
			70	1.2	0.93
	8:15	5590			
			110	1.8	1.05
	10:00	5700			
			250	4.5	0.93
	14:30	5950			
			210	3.5	1.00
	18:00	6160			
			120	2.0	1.00
	20:00	6280			
			180	3.5	0.86
	23:30	6460			
			80	1.5	0.89
TOTALS			1370	24.0	0.96

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 10 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING GALLONS	CHANGE IN VOLUME GALLONS	CHANGE IN TIME HOURS	AVERAGE FLOWRATE GPM
DAY 6 5/15/91	1:00	6540			
			170	3.0	0.94
	4:00	6710			
			180	3.0	1.00
	7:00	6890			
			50	1.0	0.83
	8:00	6940			
			120	2.3	0.89
	10:15	7060			
			114	1.8	1.09
	12:00	7174			
			96	2.0	0.80
	14:00	7270			
			200	3.0	1.11
	17:00	7470			
			190	3.5	0.90
	20:30	7660			
			190	3.4	0.93
	23:55	7850			
			60	1.1	0.95
TOTALS			1370	24.0	0.94
DAY 7 5/16/91	1:00	7910			
			160	3.0	0.89
	4:00	8070			
			180	3.0	1.00
	7:00	8250			
			85	1.5	0.94
	8:30	8335			
			87	1.5	0.97
	10:00	8422			
			314	5.0	1.05
	15:00	8736			
			154	2.0	1.28
	17:00	8890			
			201	3.0	1.12
	20:00	9091			
			278	3.0	1.54
	23:00	9369			
			125	2.0	1.04
TOTALS			1584	24.0	1.09

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 10 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	*TOTALIZER READING GALLONS	CHANGE IN VOLUME GALLONS	CHANGE IN TIME HOURS	AVERAGE FLOWRATE GPM
DAY 8 5/17/91	1:00	9494			
			171	3.0	0.95
	4:00	9665			
			172	3.0	0.96
	7:00	9837			
			51	1.0	0.85
	8:00	9888			
			132	2.0	1.10
	10:00	10020			
			59	1.0	0.98
	11:00	10079			
			70	1.0	1.17
	12:00	10149			
			131	2.3	0.97
	14:15	10280			
			196	5.0	0.65
	19:15	10476			
			479	3.8	2.13
	23:00	10955			
			110	2.0	0.92
TOTALS			1571	24.0	1.07
DAY 9 5/18/91	1:00	11065			
			218	3.5	1.04
	4:30	11283			
			151	2.5	1.01
	7:00	11434			
			72	1.2	0.96
	8:15	11506			
			55	0.8	1.22
	9:00	11561			
			121	2.0	1.01
	11:00	11682			
			528	8.0	1.10
	19:00	12210			
			115	2.0	0.96
	21:00	12325			
			99	2.0	0.83
	23:00	12424			
			107	2.0	0.89
TOTALS			1466	24.0	1.00

W.R. GRACE TREATMENT PLANT
WOBURN, MA
WELL 10 FLOWRATE
(Continued)

DAY OF REATMENT	TIME	TOTALIZER READING GALLONS	CHANGE IN VOLUME GALLONS	CHANGE IN TIME HOURS	AVERAGE FLOWRATE GPM
DAY 10 5/19/91	1:00	12531			
			171	3.0	0.95
	4:00	12702			
			309	4.3	1.19
	8:20	13011			
			146	2.7	0.91
	11:00	13157			
			155	3.0	0.86
	14:00	13312			
			61	1.0	1.02
	15:00	13373			
			192	3.5	0.91
	18:30	13565			
			122	2.5	0.81
	21:00	13687			
			113	2.0	0.94
	23:00	13800			
			113	2.0	0.94
TOTALS			1382	24.0	0.95
DAY 11	1:00	13913			
			188	3.5	0.90
5/20/91	4:30	14101			
			142	2.5	0.95
	7:00	14243			
			63	1.0	1.05
	8:00	14306			
			279	5.0	0.93
	13:00	14585			
TOTALS			672	12.0	0.96

APPENDIX O
HEALTH AND SAFETY DATA REPORT

SUMMARY OF GAS CHROMATOGRAPHY RESULTS COLLECTED IN WORKER BREATHING ZONE

DATE	TIME	ACTIVITY/LOCATION	SAMPLE LOCATION	CONCENTRATION VINYL CHLORIDE (PPM)
5/10/91	9:40 AM	North wall by Solarchem unit	Breathing Zone	ND
5/10/91	10:17 AM	Outside NW corner, 20' from building	Breathing Zone	ND
5/10/91	12:25 PM	V-197 sample port, venting	Breathing Zone	ND
5/10/91	1:25 PM	By influent filter, initial venting of air	Breathing Zone	0.098
5/10/91	1:55 PM	10' from influent valve - support zone	Breathing Zone	ND
5/10/91	2:55 PM	By Solarchem unit	Breathing Zone	ND
5/10/91	3:05 PM	By influent (equalization tank - EQ)	Breathing Zone	ND
5/10/91	8:45 PM	By influent valve, V-197	Breathing Zone	ND
5/10/91	9:00 PM	By influent valve, V-197	Breathing Zone	ND
5/11/91	8:35 AM	Outside near effluent tanks	Breathing Zone	ND
5/11/91	1:10 PM	By EQ tank, venting, tarp slightly unsealed	Breathing Zone	1.1
5/11/91	1:15 PM	By EQ tank, venting, tarp slightly unsealed	Breathing Zone	0.121
5/12/91	8:15 AM	At influent filter	Breathing Zone	ND
5/12/91	8:50 AM	At effluent filter	Breathing Zone	ND
5/12/91	11:55 PM	At influent filter	Breathing Zone	ND
5/13/91	11:13 AM	At influent filter	Breathing Zone	ND
5/13/91	12:05 PM	Sampling at V-131	Breathing Zone	ND
5/13/91	12:15 PM	Sampling at V-197	Breathing Zone	ND
5/13/91	12:25 PM	Sampling at V-157	Breathing Zone	ND
5/13/91	3:00 PM	At influent filter	Breathing Zone	ND
5/14/91	10:00 AM	By Solarchem unit	Breathing Zone	ND
5/14/91	10:20 AM	By effluent tank	Breathing Zone	ND
5/14/91	1:21 PM	By Solarchem unit	Breathing Zone	ND
5/14/91	2:13 PM	By Solarchem unit	Breathing Zone	ND
5/15/91	9:00 AM	At influent filter	Breathing Zone	ND
5/15/91	11:20 AM	50' south of Solarchem unit	Breathing Zone	ND
5/15/91	12:00 PM	At influent filter	Breathing Zone	ND
5/15/91	2:15 PM	Sampling V-140 (effluent)	Breathing Zone	ND
5/15/91	2:30 PM	Sampling V-131	Breathing Zone	ND
5/15/91	3:25 PM	At influent filter	Breathing Zone	ND
5/16/91	11:00 AM	Changing influent filter bag	Breathing Zone	0.749
5/17/91	2:40 PM	At Solarchem unit while being sampled	Breathing Zone	ND
5/18/91	8:50 AM	At influent filter	Breathing Zone	ND
5/18/91	9:00 AM	At Solarchem unit	Breathing Zone	ND
5/18/91	10:00 AM	At the gas chromatograph (GC)	Breathing Zone	ND
5/18/91	11:40 AM	Sampling V-140	Breathing Zone	ND
5/19/91	8:45 AM	Equalization tank, venting	Breathing Zone	ND
5/19/91	9:45 AM	Sampling V-140	Breathing Zone	ND
5/19/91	11:00 AM	Sampling V-197	Breathing Zone	ND
5/20/91	8:15 AM	By equalization tank	Breathing Zone	ND
5/20/91	9:10 AM	Placing charcoal tube sample inside EQ tank	Breathing Zone	0.139
5/20/91	12:10 PM	Sampling V-131	Breathing Zone	ND
5/21/91	9:10 AM	Pumping drum containing well purge water	Breathing Zone	ND
5/21/91	9:25 AM	Top off drum containing well purge water	Breathing Zone	ND

SUMMARY OF GAS CHROMATOGRAPHY RESULTS COLLECTED IN WORKER BREATHING ZONE

DATE	TIME	ACTIVITY/LOCATION	SAMPLE LOCATION	CONCENTRATION VINYL CHLORIDE (PPM)
5/21/91	9:35 AM	Drum containing well purge water opened	Breathing Zone	0.299
5/21/91	10:20 AM	Open drum containing well purge water - WW	Breathing Zone	ND
5/21/91	10:30 AM	Open drum - well purge water - WW1,2,4	Breathing Zone	ND
5/21/91	10:40 AM	By GC, ambient air	Breathing Zone	ND
5/21/91	10:55 AM	Support zone - by desks	Breathing Zone	ND
5/21/91	11:15 AM	Changing influent filter bag	Breathing Zone	ND
5/21/91	2:40 PM	Pumping drums - open lids	Breathing Zone	ND
5/21/91	3:00 PM	Pumping drums - open lids	Breathing Zone	ND
5/21/91	3:20 PM	Support zone - by desks	Breathing Zone	ND
5/21/91	3:55 PM	Pumping drums - open lids	Breathing Zone	ND
5/22/91	8:45 AM	Drum opening area	Breathing Zone	ND
5/22/91	9:20 AM	Drum #35, #39 opened	Breathing Zone	ND
5/22/91	10:10 AM	Opening drums	Breathing Zone	ND
5/22/91	10:15 AM	Opening drums	Breathing Zone	ND
5/22/91	10:45 AM	Changing filter bag	Breathing Zone	ND
5/22/91	12:00 PM	Opening drums	Breathing Zone	ND
5/22/91	1:00 PM	Opening drums	Breathing Zone	ND
5/22/91	3:00 PM	Opening drums	Breathing Zone	ND
5/22/91	3:40 PM	At GC, 100' west of drum opening	Breathing Zone	ND
5/22/91	4:30 PM	Opening drums	Breathing Zone	ND
5/22/91	4:32 PM	Opening drums	Breathing Zone	ND
5/22/91	4:45 PM	Support area	Breathing Zone	ND
5/22/91	7:30 PM	Canonie employee venting tank	Breathing Zone	0.6
5/22/91	7:40 PM	At gas chromatograph (GC)	Breathing Zone	ND
5/22/91	7:44 PM	Around equalization tank	Breathing Zone	0.078
5/22/91	8:30 PM	At equalization tank	Breathing Zone	0.332
5/22/91	8:51 PM	At GC, support zone work nearby	Breathing Zone	ND
5/22/91	9:00 PM	Near equalization tank after tarp removed	Breathing Zone	ND
5/22/91	9:05 PM	Warehouse walkway	Breathing Zone	ND

NOTE: The Photovac 10S70 GC was calibrated with vinyl chloride calibration gas at 1.04 ppm and ultrapure zero air prior to analyzing the sample.

PPM: part per million, one minute average sample

WELLS G & H
CHARCOAL TUBE SAMPLE RESULTS

SAMPLE ID#	W5109102(FF)	W5109102(FB)	Blank (FF)	Blank (FB)	W5129101(FF)	W5129101(FB)	W5139101(F)	W5139101(FB)	W5149101(FF)
DATE:	5/10/91	5/10/91	5/10/91	5/10/91	5/12/91	5/12/91	5/13/91	5/13/91	5/14/91
TARGET COMPOUNDS									
Vinyl chloride	2 0U	2 0U	2 0U	2 0U	2 0U	2 0U	2 0U	2 0U	2 0U
TCE	5 0U	5 0U	5 0U	5 0U	5 0U	5 0U	5 0U	5 0U	5 0U
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND
PCE	5 0U	5 0U	5 0U	5 0U	5 0U	5 0U	5 0U	5 0U	5 0U
Chlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-DCA	5 0U	5 0 U	5 0U	5 0U	5 0U	5 0U	5 0U	5 0U	5 0U
t-1,2-DCE	20U	20U	20U	20U	20U	20U	20U	20U	20U
1,2-DCA	1 0U	1 0U	1 0U	1 0U	1 0U	1 0U	1 0U	1 0U	1 0U
1,1,1,-TCA	5 0U	5 0U	5 0U	5 0U	5 0U	5 0U	5 0U	5 0U	5 0U
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND
c-1,2-DCE	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cyclohexane	ND	ND	ND	ND	ND	ND	ND	ND	ND

SAMPLE ID#	W5149101(FB)	W5149102(FF)	W5149102(FB)	W5209101(FF)	W5209101(FB)	W5209101(BF)	W5209101(BB)	W5219101(FF)	W5219101(FB)
DATE:	5/14/91	5/14/91	5/14/91	5/20/91	5/20/91	5/20/91	5/20/90	5/21/91	5/21/91
TARGET COMPOUNDS									
Vinyl chloride	2 0U	2 0U	2 0U	70	210	170	7	2 0U	2 0U
TCE	5 0U	5 0U	5 0U	440	10	5 0U	5 0U	5 0U	5 0U
Toluene	ND	ND	ND	7	ND	ND	ND	ND	ND
PCE	5 0U	5 0U	5 0U	15	5 0U	5 0U	5 0U	5 0U	5 0U
Chlorobenzene	ND	ND	ND	44J	ND	ND	ND	ND	ND
1,1-DCA	5 0U	5 0U	5 0U	2 0J	40	5 0U	5 0U	5 0U	5 0U
t-1,2-DCE	20U	20U	20U	20U	20U	20U	20U	20U	20U
1,2-DCA	1 0U	1 0U	1 0U	1 0U	1 0U	1 0U	1 0U	1 0U	1 0U
1,1,1,-TCA	5 0U	5 0U	5 0U	5 0U	5 0U	5 0U	5 0U	5 0U	5 0U
Ethylbenzene	ND	ND	ND	1 2	ND	ND	ND	ND	ND
c-1,2-DCE	ND	ND	ND	295	40	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	20	ND
m-Cyclohexane	ND	ND	ND	5	ND	ND	ND	ND	ND

Notes

ND= Sample analysis not requested for these compounds, but reported by the laboratory as ND (not detected)
U = Compound not detected above the given detection limit
J = Compound present below detection limit
FF= Front section of the first charcoal tube in the series
FB= Back section of the first charcoal tube in the series
BF= Front section of the second charcoal tube in the series
BB= Back section of the second charcoal tube in the series

Canonie Environmental

WELLS G & H
CHARCOAL TUBE SAMPLE LOCATIONS

SAMPLE ID #:	LOCATION SAMPLED:
W5109102FF	Perimeter air sample - 10 ft west of influent filter
W5109102FB	Perimeter air sample - 10 ft west of influent filter
BLANK FF	Perimeter air sample - 10 ft west of influent filter - Field Blank
BLANK FB	Perimeter air sample - 10 ft west of influent filter - Field Blank
W5129101FF	Personnel air sample - Solarchem employee sampling at valve location 131 & 140
W5129101FB	Personnel air sample - Solarchem employee sampling at valve location 131 & 140
W5139101FF	Personnel air sample- Geotrans employee taking water levels at existing wells west of the warehouse
W5139101FB	Personnel air sample- Geotrans employee taking water levels at existing wells west of the warehouse
W5149101FF	Personnel air sample - Geotrans employee taking water levels at existing wells east of the warehouse
W5149101FB	Personnel air sample - Geotrans employee taking water levels at existing wells east of the warehouse
W5149102FF	Personnel air sample - Canonie employee sampling water at the treatment plant valve locations
W5149102FB	Personnel air sample - Canonie employee sampling water at the treatment plant valve locations
W5209101FF	Area air sample - inside equalization tank (head space)
W5209101FB	Area air sample - inside equalization tank (head space)
W5209101BF	Area air sample - inside equalization tank (head space)
W5209101BB	Area air sample - inside equalization tank (head space)
W5219101FF	Personnel air sample - Canonie employee pumping purge water out of stored drums
W5219101FB	Personnel air sample - Canonie employee pumping purge water out of stored drums

Wells G &H
Charcoal Tube Conversions from UG/Tube to PPM for compounds
detected within the headspace of the equilizing tank.

DATE	SAMPLE #	COMPOUND DETECTED	UG/ SAMPLE	AIR SAMPLED (liters)	CONVERSIONS UG/TUBE TO PPM	PPM
5/20/91	W5209101FF	Vinyl Chloride	457	6.7	(68.2*24.5)/62.5	26.74
5/20/91	W5209101FF	TCE	450	6.7	(67.16*24.5)/131.5	12.52
5/20/91	W5209101FF	1,1 DCA	42	6.7	(6.26*24.5)/99	1.55
5/20/91	W5209101FF	c-1,2 DCE	335	6.7	(50.0*24.5)/97	12.63
5/20/91	W5209101FF	Ethylbenzene	1.2	6.7	(0.18*24.5)/106	0.04
5/20/91	W5209101FF	Chlorobenzene	0.44	6.7	(.07*24.5)/112.6	0.01
5/20/91	W5209101FF	PCE	15	6.7	(2.24*24.5)/165.8	0.33
5/20/91	W5209101FF	m-Cyclohexane	5	6.7	(0.75*24.5)/184.2	0.22
5/20/91	W5209101FF	Toluene	7	6.7	(1.04*24.5)/92.1	0.28

CONVERSION EQUATION:

$$PPM = \frac{mg/m3 * 24.5}{MW}$$

where,

$$PPM = \frac{\text{Volume of gas or vapor} * 10E6}{\text{Volume of air}}$$

$$mg/m3 = \frac{\text{mg of compound}}{\text{m3 of air sampled}}$$

24.5 = Liters of vapor per mole of contaminant at 25 degrees C and 760 mm Hg

MW = Molecular weight of compound (grams/mole)

Canonie Environmental

WESTON
MANAGERS DESIGNERS/CONSULTANTS
208 WELSH POOL ROAD
PICKERING CREEK INDUSTRIAL PARK
LIONVILLE PA 19341 1313
PHONE 215 524-7360
TELEX 83 5348

CANONIE
KOP
RECEIVED
AUG 09 1991

CANONIE
KOP
RECEIVED
AUG 26 1991

7 August 1991

Mr. Clayton Bock
Canonie Environmental, Inc.
500 North Gulph Road
Suite 315
King of Prussia, PA 19406

Dear Clayton:

Enclosed is the revised data package for samples received on May 22, 1991.

If you are in need of any additional help, please do not hesitate to call.

Very truly yours,

ROY F. WESTON, INC.

Stephen D. Wesson
Project Manager

mh
Enclosure

ROY F. WESTON, INC.
Lionville Laboratory

CLIENT: CANONIE ENVIRONMENTAL SAMPLES RECEIVED: 5/22/91
RFW #: 9105L667 GC SCAN
W.O. #: 3281-33-01-0000

NARRATIVE

This set of samples consisted of nine samples (charcoal tubes) collected on May 10, 12, 13, 14, 20, 21, 1991.

The samples were extracted with 1mL Carbon Disulfide (CS2) and analyzed by Direct Injection - GC/FID for Trichloroethene (TCE), Tetrachloroethene (PCE), Vinyl Chloride (VC), 1,2-Dichloroethane (12DCA), 1,1,1-Trichloroethane (111TCA) , 1,1-Dichloroethene (11DCE), and trans-1,2-dichloroethene (t12DCE), and any other identifiable hydrocarbons on May 23, 1991.

The following is a summary of the QC results accompanying these sample results and a description of any problems encountered during their analysis:

1. A GC Capillary column was utilized in these analyses. All target compounds except 1,1 Dichloroethene were calibrated in the continuing calibrations. Only TCE, PCE, trans-1,2-Dichloroethene, and 1,1,1-Trichlroethane were in the spiking solution from the target compound list.

2. Results for target compounds were obtained by External Standard Quantification Method using the average calibration factor from the initial calibration.

3. Method blank was free of contamination.

4. All blank spike recoveries were within laboratory control limits, except trans 1,2-Dichloroethene which was low.

5. CS2 solvent contained Benzene at reporting limit. Results for Benzene and Cyclohexane were corrected for solvent background.

6. Samples 9105L667-013 and -014 appear to be reversed. The samples were rerun and are correctly identified.

ROY F. WESTON, INC.
Lionville Laboratory

CLIENT: CANONIE ENVIRONMENTAL SAMPLES RECEIVED: 5/22/91
RFW #: 9105L667 GC SCAN
W.O. #: 3281-33-01-0000

NARRATIVE

7. The COC requested quantification for TCE, PCE, VC, 111TCA, 11DCE, 12DCA, and t12DCA. All other compounds reported are qualitative assessments.

8. The compound m-Cyclohexane is MethylCyclohexane.

9. The original COC incorrectly identified 1,1-Dicloroethene , as 1,1-Dichloroethane, on the target compound list.

8-07-91

J. Michael Taylor
Project Director
Lionville Analytical Laboratory
CANNJ667.CN

Date
Revised 08/06/91

DRAFT

Roy F. Weston, Inc. - Lionville Laboratory
GCSC ANALYTICAL DATA PACKAGE FOR
CANONIE ENVIRONMENTAL

DATE RECEIVED: 05/22/91 RFW LOT # :9105L667

CLIENT ID	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
W5129101 (F) F	001	AI	91DGC359	05/12/91	05/23/91	05/23/91
W5129101 (F) B	002	AI	91DGC359	05/12/91	05/23/91	05/23/91
W5139101 (F) F	003	AI	91DGC359	05/13/91	05/23/91	05/24/91
W5139101 (F) B	004	AI	91DGC359	05/13/91	05/23/91	05/24/91
W5149101 (F) F	005	AI	91DGC359	05/14/91	05/23/91	05/24/91
W5149101 (F) B	006	AI	91DGC359	05/14/91	05/23/91	05/24/91
W5149102 (F) F	007	AI	91DGC359	05/14/91	05/23/91	05/24/91
W5149102 (F) B	008	AI	91DGC359	05/14/91	05/23/91	05/24/91
W5109102 (F) F	009	AI	91DGC359	05/10/91	05/23/91	05/24/91
W5109102 (F) B	010	AI	91DGC359	05/10/91	05/23/91	05/24/91
BLANK 5-10-91 F	011	AI	91DGC359	05/10/91	05/23/91	05/24/91
BLANK 5-10-91 B	012	AI	91DGC359	05/10/91	05/23/91	05/24/91
W5209101 (F) F	013	AI	91DGC359	05/20/91	05/23/91	05/24/91
W5209101 (F) B	014	AI	91DGC359	05/20/91	05/23/91	05/24/91
W5209101 (B) F	015	AI	91DGC359	05/20/91	05/23/91	05/24/91
W5209101 (B) B	016	AI	91DGC359	05/20/91	05/23/91	05/24/91
W5219101 (F) F	017	AI	91DGC359	05/21/91	05/23/91	05/24/91
W5219101 (F) B	018	AI	91DGC359	05/21/91	05/23/91	05/24/91

LAB QC:

PBLK	MB1	AI	91DGC359	N/A	05/23/91	05/23/91
PBLK	MB2 BS	AI	91DGC359	N/A	05/23/91	05/23/91
PBLK	MB3 BS	AI	91DGC359	N/A	05/23/91	05/23/91

Roy F. Weston, Inc. - Lionville Laboratory
GC SCAN

RFW Batch Number: 9105L667 Client: CANONIE ENVIRONMENTAL Work Order: 3281-33-01-0000 Report Date: 05/29/91 15:49 Page: 1

	Cust ID:	W5129101 (F) F	W5129101 (F) B	W5139101 (F) F	W5139101 (F) B	W5149101 (F) F	W5149101 (F) B
Sample Information	RFW#:	001	002	003	004	005	006
	Matrix:	AIR	AIR	AIR	AIR	AIR	AIR
	D.F.:	1.00	1.00	1.00	1.00	1.00	1.00
	Units:	total ug	total ug	total ug	total ug	total ug	total ug
1,1-Dichloroethene		ND	ND	ND	ND	ND	ND
Vinyl Chloride		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
TCE		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Toluene		ND	ND	ND	ND	ND	ND
PCE		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Chlorobenzene		ND	ND	ND	ND	ND	ND
Ethylbenzene		ND	ND	ND	ND	ND	ND
1,1-Dichloroethane		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
t-1,2-Dichloroethene		20 U	20 U	20 U	20 U	20 U	20 U
1,2-Dichloroethane		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1-Trichloroethane		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
c-1,2-Dichloroethene		ND	ND	ND	ND	ND	ND
m-Cyclohexane		ND	ND	ND	ND	ND	ND
Acetone		ND	ND	ND	ND	ND	ND

U= Analyzed, not detected. J= Present below detection limit. B= Present in blank. NR= Not requested. NS= Not spiked.
%= Percent recovery. D= Diluted out. I= Interference. NA= Not Applicable. *= Outside of EPA CLP QC

Canonie Environmental

Roy F. Weston, Inc. - Lionville Laboratory
GC SCAN

RFW Batch Number: 9105L667 Client: CANONIE ENVIRONMENTAL Work Order: 3281-33-01-0000 Report Date: 05/29/91 15:49 Page: 2

	Cust ID:	W5149102 (F) F		W5149102 (F) B		W5109102 (F) F		W5109102 (F) B		BLANK 5-10-9 1 F		BLANK 5-10-9 1 B	
Sample Information	RFW#:	007		008		009		010		011		012	
	Matrix:	AIR		AIR		AIR		AIR		AIR		AIR	
	D.F.:	1.00		1.00		1.00		1.00		1.00		1.00	
	Units:	total ug		total ug		total ug		total ug		total ug		total ug	
1,1-Dichloroethene		ND		ND		ND		ND		ND		ND	
Vinyl Chloride		2.0	U	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
TCE		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Toluene		ND		ND		ND		ND		ND		ND	
PCE		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Chlorobenzene		ND		ND		ND		ND		ND		ND	
Ethylbenzene		ND		ND		ND		ND		ND		ND	
1,1-Dichloroethane		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
t-1,2-Dichloroethene		20	U	20	U	20	U	20	U	20	U	20	U
1,2-Dichloroethane		1.0	U	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
1,1,1-Trichloroethane		5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
c-1,2-Dichloroethene		ND		ND		ND		ND		ND		ND	
m-Cyclohexane		ND		ND		ND		ND		ND		ND	
Acetone		ND		ND		ND		ND		ND		ND	

U= Analyzed, not detected. J= Present below detection limit. B= Present in blank. NR= Not requested. NS= Not spiked.
%= Percent recovery. D= Diluted out. I= Interference. NA= Not Applicable. *= Outside of EPA CLP QC

Canonie Environmental

Roy F. Weston, Inc. - Lionville Laboratory
GC SCAN

RFW Batch Number: 9105L667 Client: CANONIE ENVIRONMENTAL Work Order: 3281-33-01-0000 Report Date: 05/29/91 15:49 Page: 3

	Cust ID:	W5209101 (F)	W5209101 (F)	W5209101 (B)	W5209101 (B)	W5219101 (F)	W5219101 (F)
		F	B	F	B	F	B
Sample Information	RFW#:	013	014	015	016	017	018
	Matrix:	AIR	AIR	AIR	AIR	AIR	AIR
	D.F.:	1.00	1.00	1.00	1.00	1.00	1.00
	Units:	total ug	total ug	total ug	total ug	total ug	total ug
1,1-Dichloroethene		ND	ND	ND	ND	ND	ND
Vinyl Chloride		210	70	170	7.0	2.0 U	2.0 U
TCE		10	440	5.0 U	5.0 U	5.0 U	5.0 U
Toluene		ND	7.0	ND	ND	ND	ND
PCE		5.0 U	15	5.0 U	5.0 U	5.0 U	5.0 U
Chlorobenzene		ND	0.44 J	ND	ND	ND	ND
Ethylbenzene		ND	1.2	ND	ND	ND	ND
1,1-Dichloroethane		40	2.0 J	5.0 U	5.0 U	5.0 U	5.0 U
t-1,2-Dichloroethene		20 U	20 U	20 U	20 U	20 U	20 U
1,2-Dichloroethane		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1-Trichloroethane		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
c-1,2-Dichloroethene		40	295	ND	ND	ND	ND
m-Cyclohexane		ND	5.0	ND	ND	ND	ND
Acetone		ND	ND	ND	ND	20	ND

U= Analyzed, not detected. J= Present below detection limit. B= Present in blank. NR= Not requested. NS= Not spiked.
%= Percent recovery. D= Diluted out. I= Interference. NA= Not Applicable. *= Outside of EPA CLP QC

Canonie Environmental

Roy F. Weston, Inc. - Lionville Laboratory

GC SCAN

RFW Batch Number: 91051667 Client: CANONIE ENVIRONMENTAL Work Order: 3281-33-01-0000 Report Date: 05/29/91 15:49 Page: 4

	Cust ID:	PBLK		PBLK BS		PBLK BS	
Sample Information	RFW#:	91DGC359-MB1		91DGC359-MB2		91DGC359-MB3	
	Matrix:	AIR		AIR		AIR	
	D.F.:	1.00		1.00		1.00	
	Units:	total ug		total ug		total ug	
1,1-Dichloroethene		ND		NS		NS	
Vinyl Chloride		2.0	U	NS		NS	
TCE		5.0	U	83	%	84	%
Toluene		1.0	U	NS		NS	
PCE		5.0	U	90	%	82	%
Chlorobenzene		1.0	U	NS		NS	
Ethylbenzene		1.0	U	NS		NS	
1,1-Dichloroethane		5.0	U	79	%	85	%
t-1,2-Dichloroethene		20	U	75	%	79	%
1,2-Dichloroethane		1.0	U	NS		NS	
1,1,1-Trichloroethane		1.0	U	84	%	85	%
c-1,2-Dichloroethene		5.0	U	NS		NS	
m-Cyclohexane		1.0	U	NS		NS	
Acetone		1.0	U	NS		NS	

U= Analyzed, not detected. J= Present below detection limit. B= Present in blank. NR= Not requested. NS= Not spiked.
%= Percent recovery. D= Diluted out. I= Interference. NA= Not Applicable. *= Outside of EPA CLP QC

Canonie Environmental

Custody Transfer Record/Lab Work Request

WESTON

WESTON Analytics Use Only: 91052667

Client: [illegible]
Work Order: 3251-0201
Date Rec'd: ~~5-1-91~~ 5/2/91 Date Due: 5/27/91
RFW Contact: [illegible]
Client Contact/Phone: B. Polley [illegible]

Refrigerator#												
#/Type Container												
Volume												
Preservative												
ANALYSES REQUESTED												
WA Use Only Lab ID	Client ID/Description	Matrix	Date Collected	OGCSC								
001/002	W5[illegible]101(F) / 5.5L		5-[illegible]-91	X								
003/004	W5[illegible]101(F) / [illegible]		5-[illegible]-91	X								
005/006	W5[illegible]101(F) / 5.65L		5-[illegible]-91	X								
007/008	W5[illegible]102(F) / 7.74L		5-[illegible]-91	X								
009/010	W5[illegible]102(F) / 4.3L		5-10-91	X								
011/012	Blank 5-10-91 —		5-10-91	X								
013/014	W5209101(F) [illegible]L		5-[illegible]-91	X								
015/016	W5209101(B) [illegible]L		[illegible]	X								
017/018	W5[illegible]101(F) / [illegible]		5-[illegible]-91	X								

Chemical Tubes

OGCSC-Dedlab 1375

QC/Del = Std
TAT = 5 day

Matrix: S - Soil, SE - Sediment, SO - Solid, W - Water, O - Oil, A - Air, WI - Wipe, DS - Drum Solids, DL - Drum Liquids, F - Fish, L - EP/TCLP Leachate, X - Other

* Special Instructions: Analyse for: Trichloroethene, Vinyl chloride, 1,2-dichloroethane, Trans-1,2-dichloroethene, 1,1-dichloroethane, 1,1,1-trichloroethane, Tetrachloroethene

Item/Reason	Relinquished by	Received by	Date	Time	Item/Reason	Relinquished by	Received by	Date	Time
	B. Polley	[illegible]	5-2-91	1630					
	[illegible]	[illegible]	[illegible]	9:30 am					
1	[illegible]	[illegible]	[illegible]	[illegible]					

WESTON Analytics Use Only

Samples Were
1 Shipped or Hand Delivered
NOTES

2 Ambient or Chilled
NOTES

3 Received Broken/Leaking (Improperly Sealed)
Y N
NOTES

4 Properly Preserved
Y N
NOTES

5 Received Within Holding Times
Y N
NOTES
[illegible]

COC Tape Was
1 Present on Outer Package Y N
2 Unbroken on Outer Package Y N
3 Present on Sample Y N
4 Unbroken on Sample Y N
NOTES

COC Record Was
1 Present Upon Receipt of Samples Y N

Discrepancies Between Sample Labels and COC Record? Y N
NOTES

Canonie Environmental

RFW 21-2 001/A 12/88

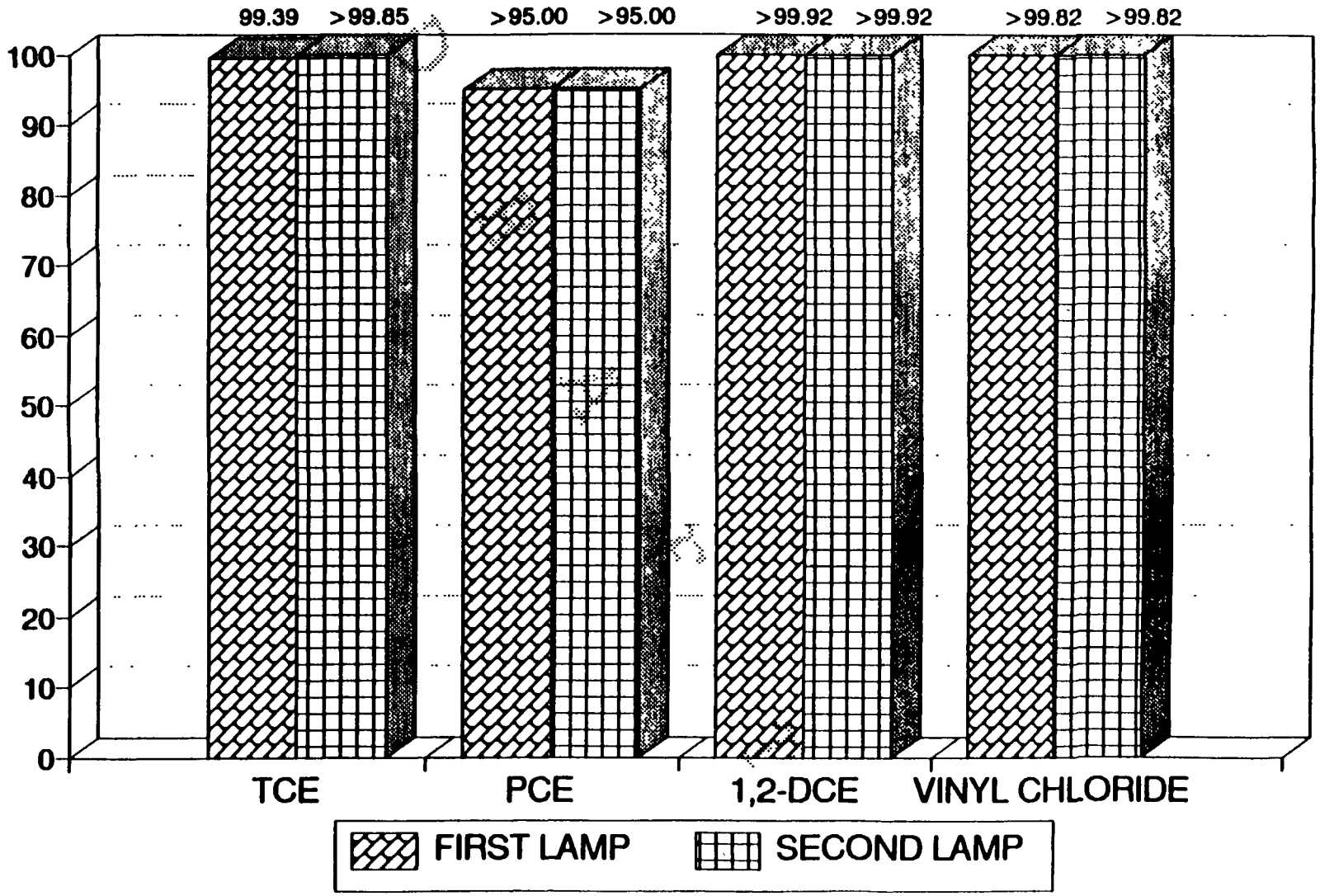
7 115

C#7
R#

APPENDIX P
REMOVAL EFFICIENCY BAR CHARTS

FLOWRATE: 10 GPM

H202 CONC (mg/L): INFLUENT: 40 INTERMEDIATE: 33 EFFLUENT: 25



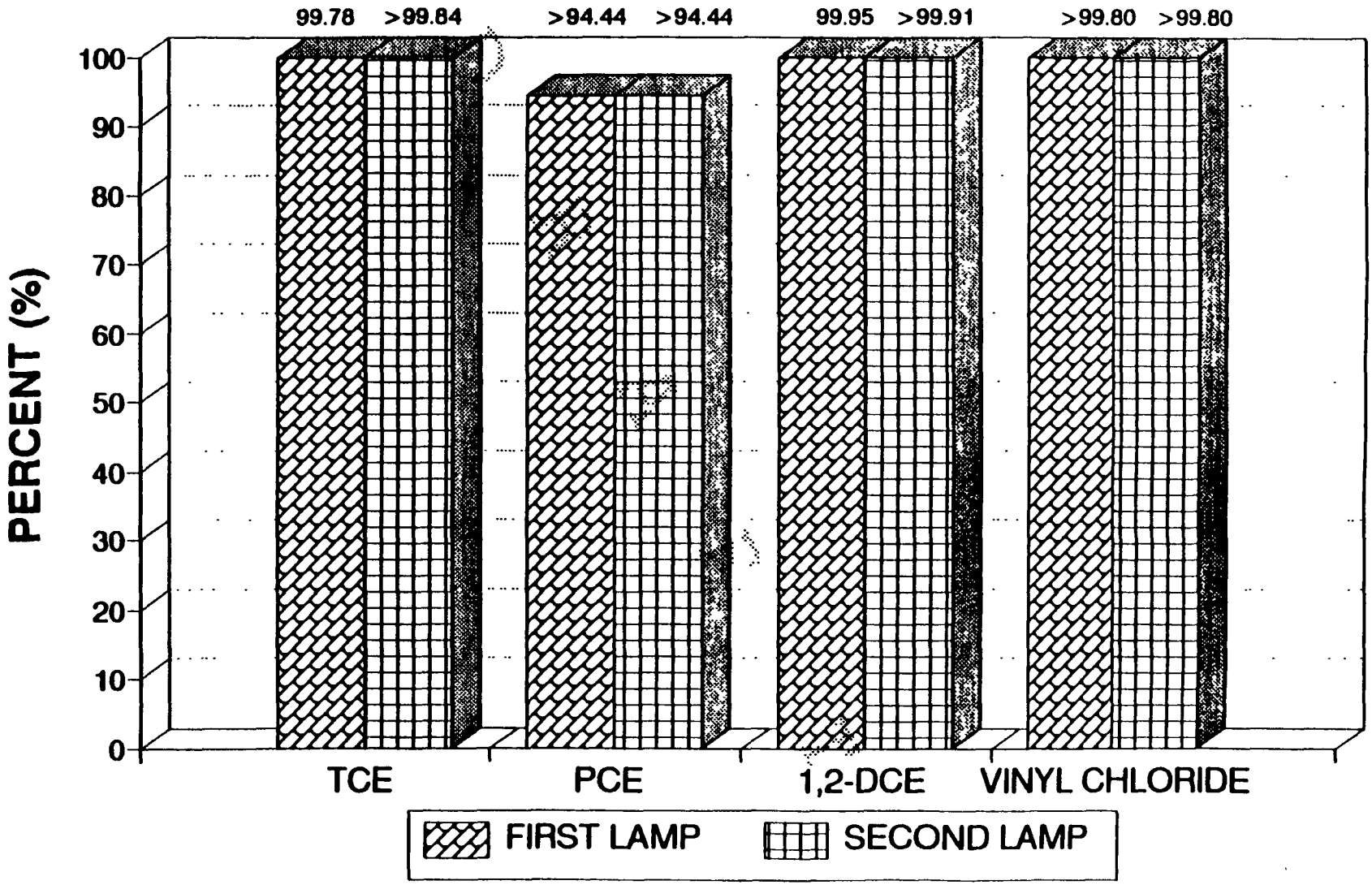
DRAFT

Canonie Environmental

Removal Efficiency, Trial #16-3
Wells G&H/W R Grace Pilot Plant

FLOWRATE: 20 GPM

H202 CONC (mg/L): INFLUENT: 50 INTERMEDIATE: 45 EFFLUENT: 40



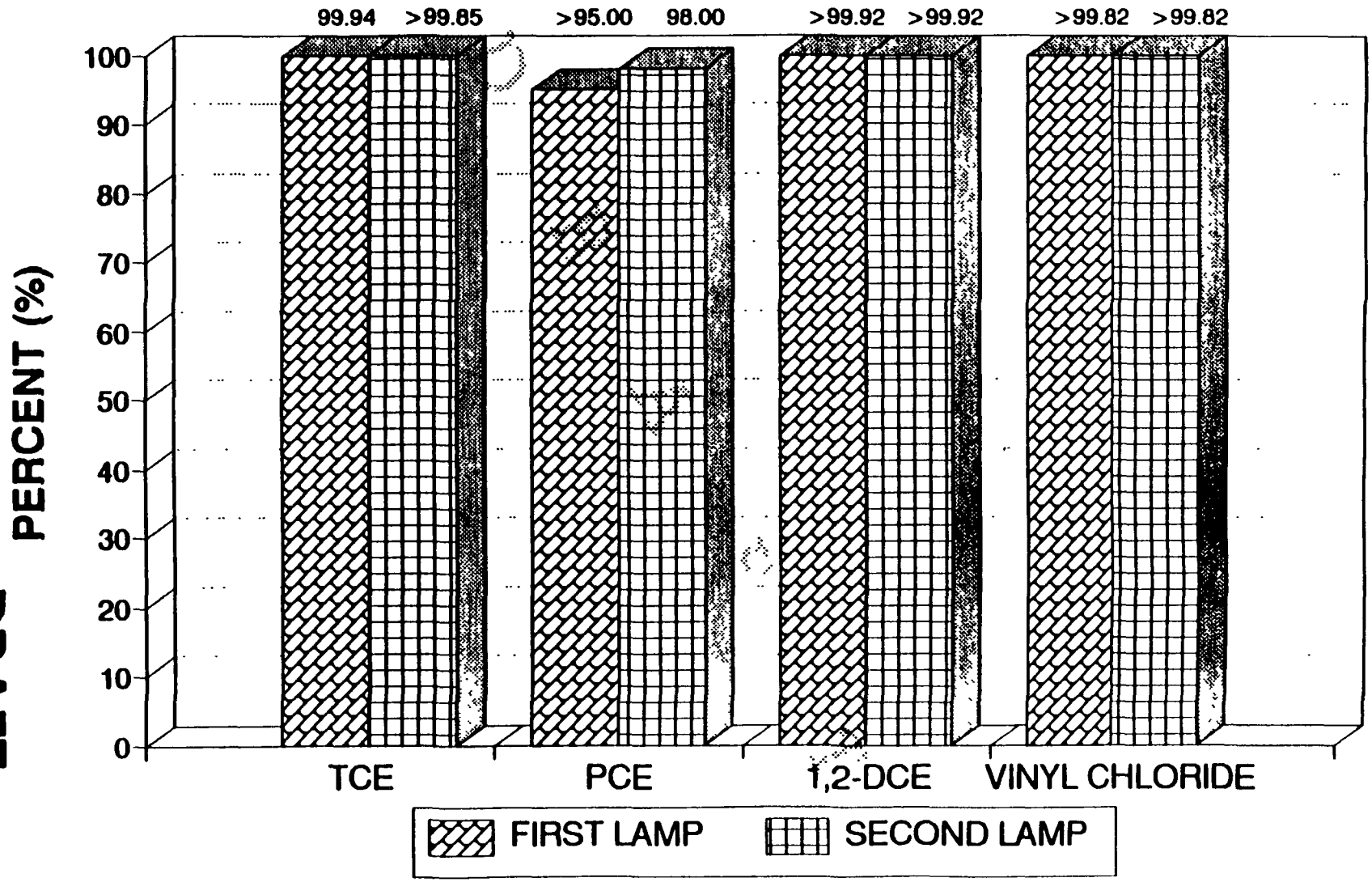
DRAFT

Canonie Environmental

Removal Efficiency, Trial #17-1
Wells G&H/W R Grace Pilot Plant

FLOWRATE: 5 GPM

H202 CONC (mg/L): INFLUENT: 90 INTERMEDIATE: 75 EFFLUENT: 60



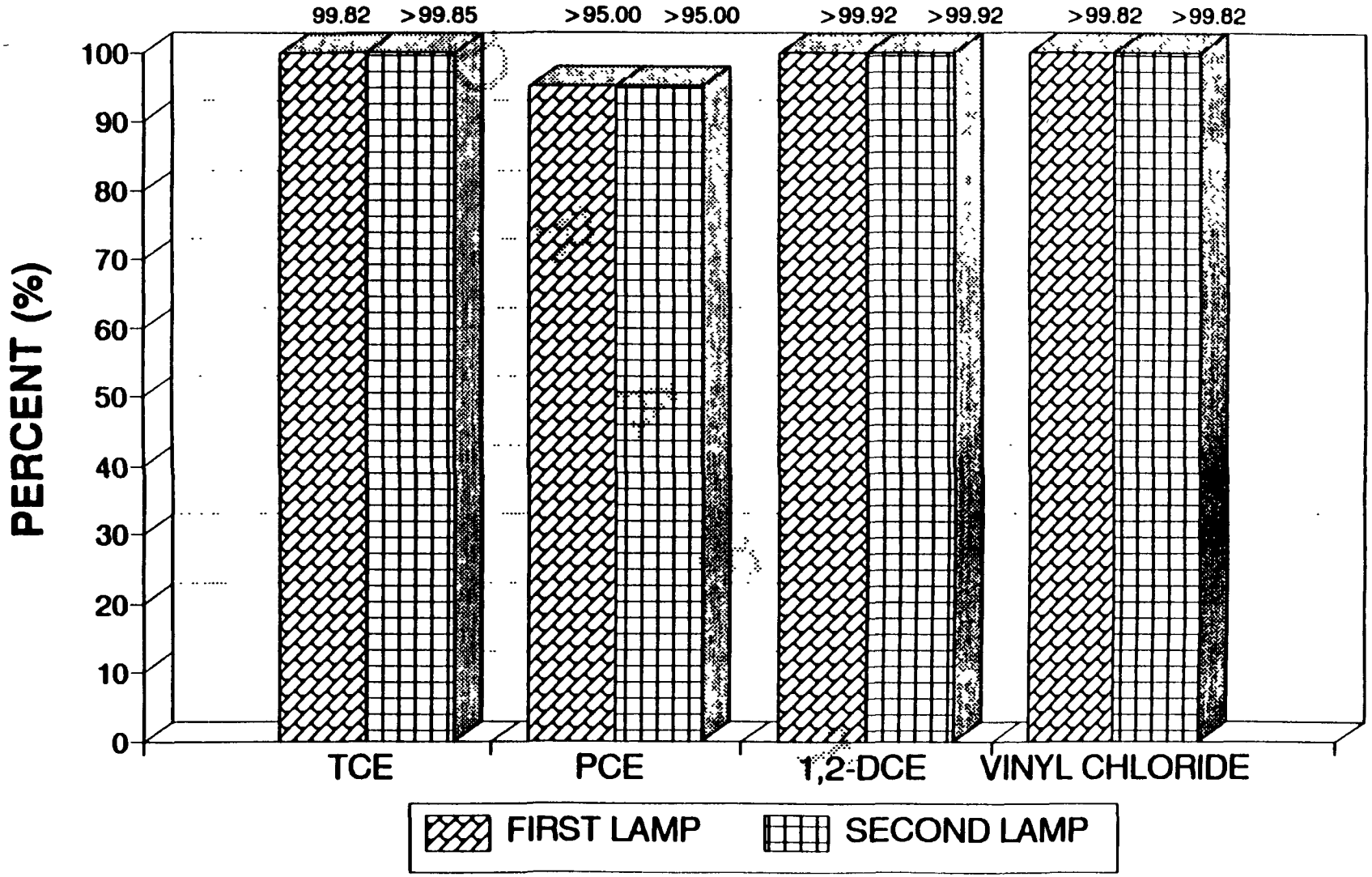
DRAFT

Canonie Environmental

Removal Efficiency, Trial #16-1
Wells G&H/W R Grace Pilot Plant

FLOWRATE: 5 GPM

H202 CONC (mg/L): INFLUENT: 40 INTERMEDIATE: 30 EFFLUENT: 20



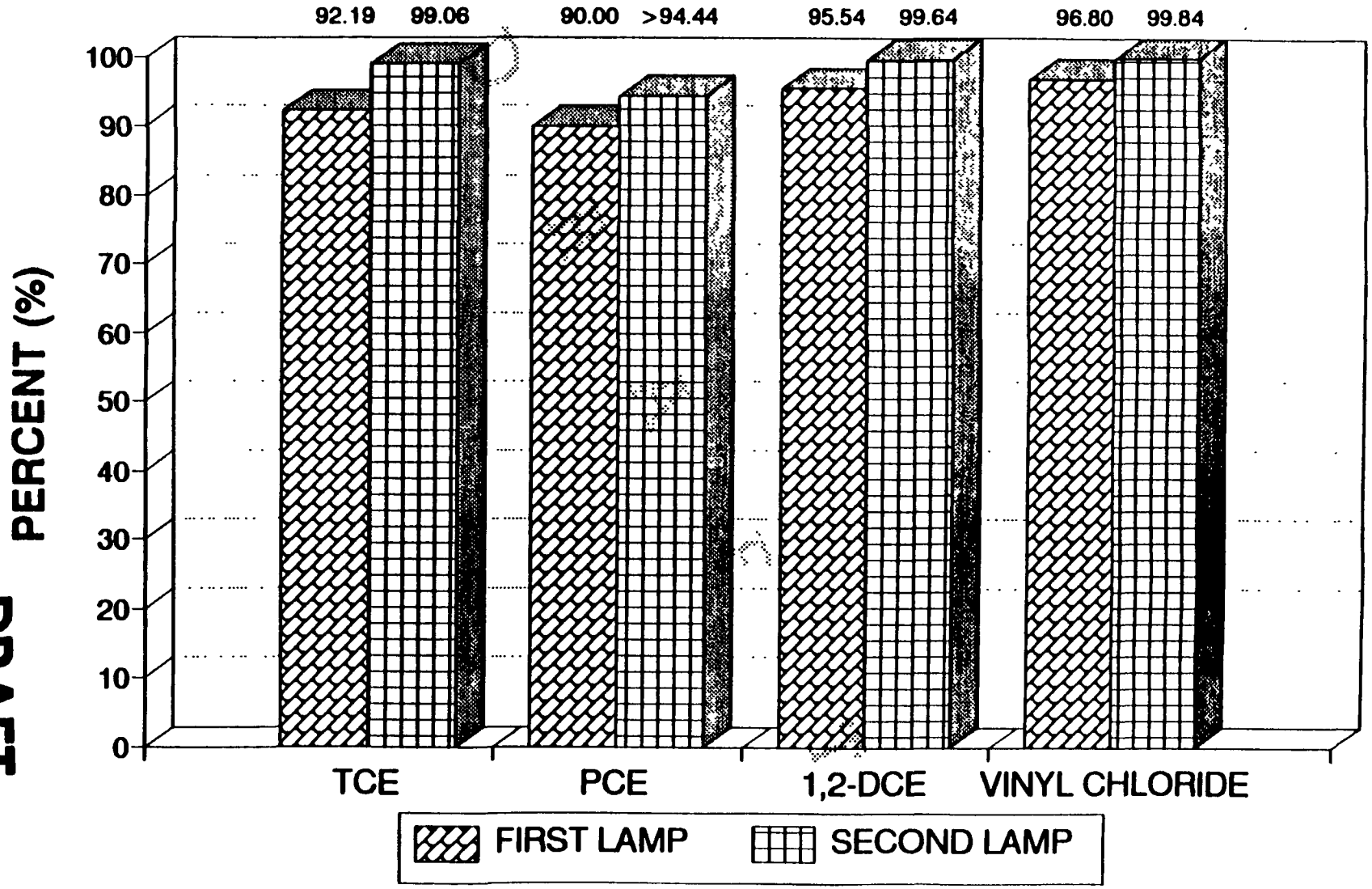
DRAFT

Canonie Environmental

Removal Efficiency, Trial #16-2
Wells G&H/W R Grace Pilot Plant

FLOWRATE: 20 GPM

H202 CONC (mg/L): INFLUENT: 20 INTERMEDIATE: 15 EFFLUENT: 15



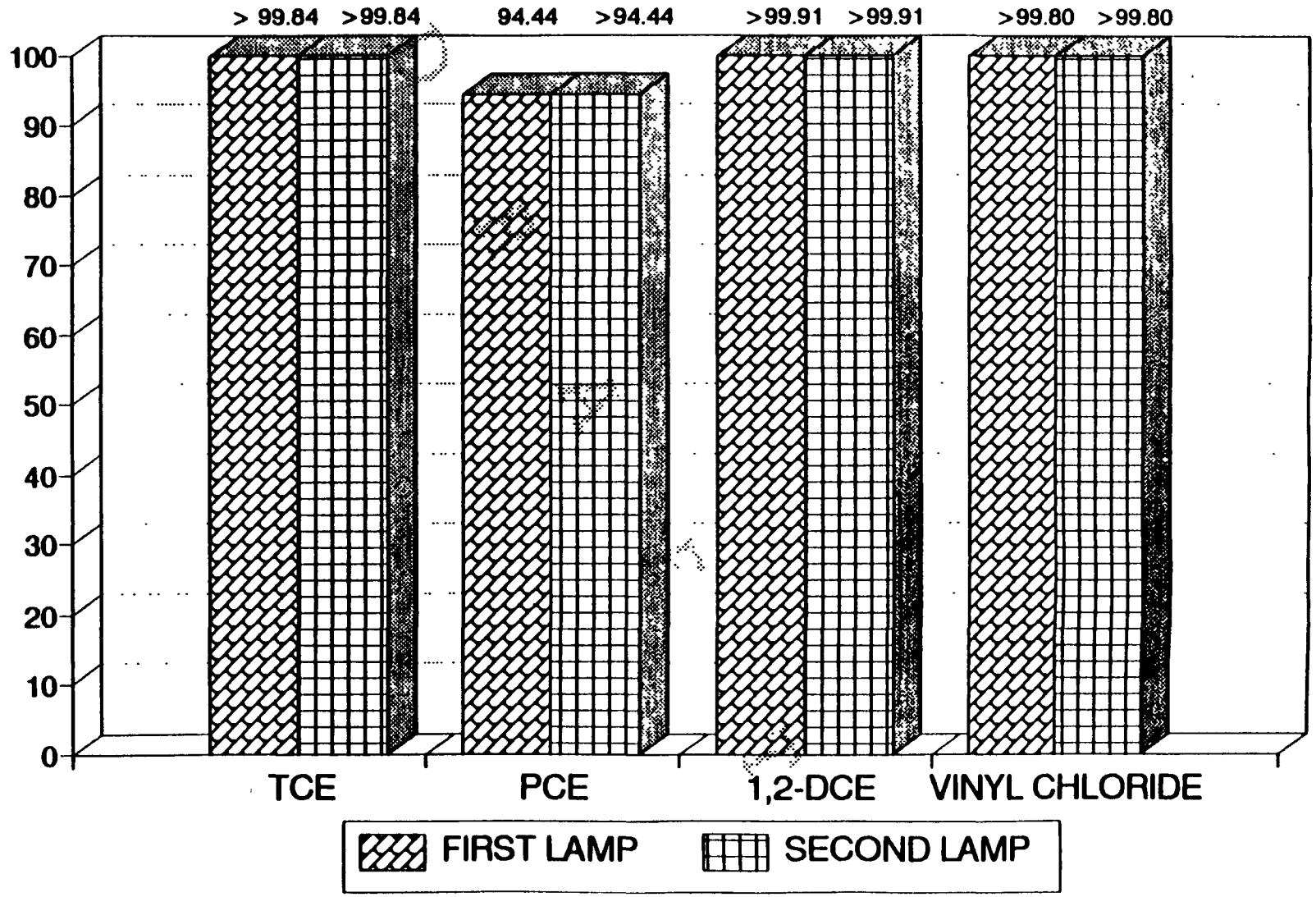
DRAFT

Canonie Environmental

Removal Efficiency, Trial #17-2
Wells G&H/W.R. Grace Pilot Plant

FLOWRATE: 5 GPM

H202 CONC (mg/L): INFLUENT: 90 INTERMEDIATE: 75 EFFLUENT: 60



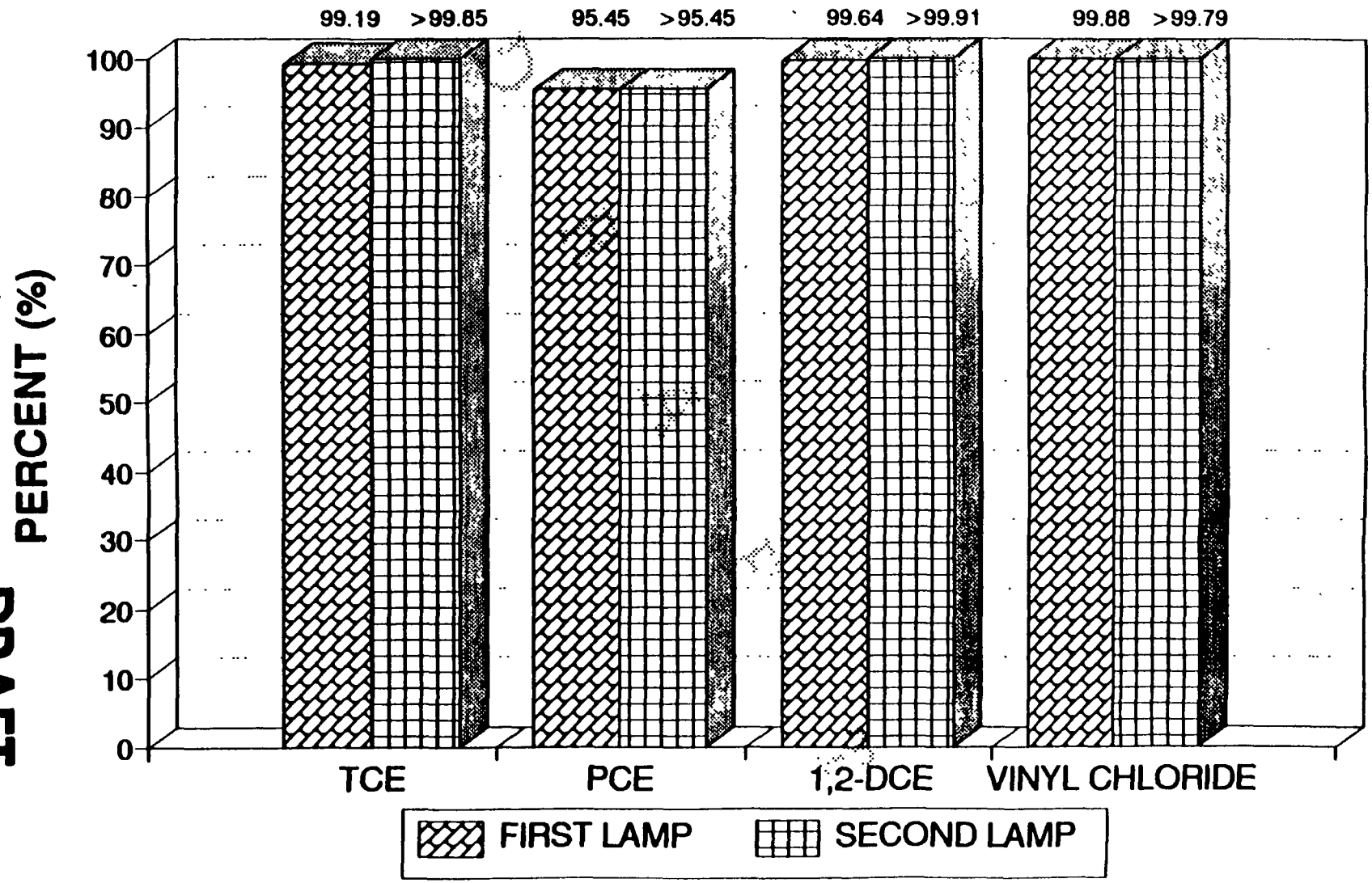
DRAFT

Canonie Environmental

Removal Efficiency, Trial #17-3

Wells G&H/W R Grace Pilot Plant

FLOWRATE: 30 GPM
H202 CONC (mg/L): INFLUENT: 50 INTERMEDIATE: 48 EFFLUENT: 46



DRAFT
Canonie Environmental

Removal Efficiency, Trial #18-1
Wells G&H/W R Grace Pilot Plant

ENVIRONMENTAL
PROJECT CONTROL

Two Grafton Common
Post Office Box 536
Grafton
Massachusetts
01519

FAX 508/839-7852
TEL 508/839-0033

Via Facsimile & U.S. Mail

March 14, 1991

Barbara Newman
Remedial Project Manager
US EPA, Region I
Waste Management Division
JFK Federal Building (HRS-CAN7)
Boston, Massachusetts 02203-2211

Re: Soil Vapor Data, UniFirst Corporation Site
Wells G & H Site, Woburn, Massachusetts
EPC Reference No: 9007/100

Dear Barbara:

As you requested, I have prepared this letter to respond to your comments regarding the data package which I forwarded to you on December 21, 1990. The additional information includes a map of the UniFirst property showing the locations of the sampling devices and the former test pit and a log of the test pit. Also included is a copy of my July 31, 1991 letter describing our interpretation of the data.

As indicated on the test-pit log, the 1986 test pit was located near the loading dock at the east end of the building, between the dock and well UC5. The test borings made in 1989 at the location of this test pit were known as VB4 and VB5. During excavation of the original test pit, head-space PID readings indicated that volatile organic compounds were present in the soil. Laboratory analysis of soil samples was not undertaken at that time. Soil samples collected in 1989 from these borings also clearly indicated the presence of tetrachloroethene in the non-native material that was used to backfill the test pit. It would appear, then, that the backfill material had become contaminated after being placed in the excavation. It is our opinion

ENVIRONMENTAL
PROJECT CONTROL

that this contamination resulted from the emission of vapors from the ground water into the soil.

The approximate locations of the soil-vapor-collection devices are shown on the enclosed map. These devices, VB1, VB2, and VB3, are constructed of PVC pipe which is open only at the bottom to facilitate collection of vapor from the unsaturated zone immediately above the water table. The samples contained significant concentrations of tetrachloroethene, and, since the method of constructing these devices precluded vapor from migrating laterally beneath the pavement of the parking lot, the measured vapor concentrations could have only emanated from the ground water surface. We believe that the data from these devices indicate that the presence of contaminated ground water beneath the UniFirst property is causing, and will continue to cause the contamination of shallow soil materials.

I trust that you will find these clarifications useful. Should you have any questions, please do not hesitate to contact me.

Sincerely,

Timothy M. Cosgrave
Senior Hydrogeologist

TMC:hs

cc; G. Augustyn, UniFirst Corp.
J.C. Bates, Esq., Goodwin, Procter, & Hoar
M.B. Moore, ENSR
R. Willey, US EPA Region I
J.T. Lawson, EPC

APPENDIX Q
UNIFIRST SOIL REMEDIAL DESIGN

ENVIRONMENTAL PROJECT CONTROL, INC.
TWO GRAFTON COMMON
POST OFFICE BOX 536
GRAFTON, MASSACHUSETTS 01519

TELEPHONE 508-839-0033
FAX 508-839-7852

July 31, 1990

Ms. Barbara Newman
Remedial Project Manager
US EPA Region I
Waste Management Division
JFK Federal Building (HRS-CAN 7)
Boston, MA 02203-2211

RE: RD/RA Vapor Extraction, UniFirst Corporation Site
Wells G & H Site, Woburn, MA

Dear Barbara:

As discussed at our meeting on July 25, 1990, we do not believe that vapor extraction from the unsaturated zone in the vicinity of the loading dock at the UniFirst site will effectively remediate shallow soil contamination while contamination persists in the ground water. As you requested, our reasons are presented in this brief technical memorandum.

You will recall that our response in March, 1989 to the proposed remedy for the site stated that the source of the shallow soil contamination beneath the parking lot is the tetrachloroethene-contaminated ground water that lies at a depth of approximately 10 feet. This conclusion was drawn from actual field investigations at the site, from our experience at other sites, and from modeling based on actual conditions at the UniFirst site. You may recall that the evidence from these studies that supported this position included the following:

- Soil samples collected from two borings made in 1989 through a test pit that had been backfilled in 1986 with non-native material were found to have tetrachloroethene concentrations immediately below the asphalt surface of 6.5 and 23 mg/kg. Residual soil contamination, which may have been present in the soil in 1986 was removed from the test pit and replaced with clean backfill. Thus, there is no leaching of contamination

from the soil to the ground water at the UniFirst site; instead the physical process is actually the reverse, with vapor emanating from the ground water, contaminating the soil. The site is paved, and, significantly, no contamination has been found in the unpaved areas. The detection of these concentrations of tetrachloroethene in 1989 indicated that vapor phase transport of tetrachloroethene caused recontamination of soils in a very short period of time.

- To test this hypothesis, we installed soil vapor collection devices in the unsaturated zone at three locations near the loading dock in March, 1989 in order to obtain soil vapor samples from immediately above the water table. These devices were constructed of PVC pipe which was open only at the lower end. Because of this method of construction, vapors that were collected from the device were those present in the unsaturated zone immediately above the water table and not those that might have migrated laterally.

  One week after installation and sealing of these devices, the seals were broken and vapor samples were collected and analyzed for tetrachloroethene. In each of these devices, which are located near locations of previous detections of tetrachloroethene in the shallow soil, the tetrachloroethene concentrations in the vapor were 6, 22, and 34 ppb.

- To confirm our conclusions, we retained Dr. Stan Feenstra to model site conditions through use of a vapor transport model validated at other DNAPL sites. This modeling demonstrated that the contamination of the shallow soils at the site was achievable through volatilization of tetrachloroethene from the water table and diffusive migration through the vapor phase in the unsaturated zone. The vapor concentrations estimated by the modeling effort were in agreement with those measured in the vapor collection devices.

Finally, vapor extraction would not remove a significant amount of mass from the ground water at the UniFirst site. The bulk of the ground water contamination is in the bedrock at depths exceeding 100 feet. The soil contains little or no DNAPL residual and is so tight that it would be very inefficient to try to extract vapor from it. It is thus far better not to induce contaminant migration from the water to the soil, since the water is much easier to extract.

As we discussed, we therefore have proposed to sequence the remedial action. The proposed remediation sequence would be as follows:

1. pump ground water to control migration from the source area and retrieve contaminated ground water from on-site areas;
2. when monitoring of ground water quality in the site area indicates that ground water quality has reached a concentration that will not cause recontamination of the unsaturated zone, begin vapor extraction from the unsaturated zone; and,
3. when monitoring of unsaturated zone vapor indicates that remediation is complete, cease vapor extraction and continue extraction of ground water.

Following our discussion, we asked Dr. Feenstra to perform one-dimensional vapor transport modeling to provide an estimate of the ground water concentration below which the ground water would not be expected to cause recontamination of shallow soil to levels that would exceed the soil cleanup standard (36.7 ug/kg). Preliminarily, this modeling indicates that tetrachloroethene in the ground water at a concentration of less than about 85 ug/l would not cause recontamination of unsaturated zone soils to concentrations above cleanup standards. Changes in ground water concentrations by the pumping of UC22 (to be tested later this year) could provide an estimate of the time required to achieve that concentration.

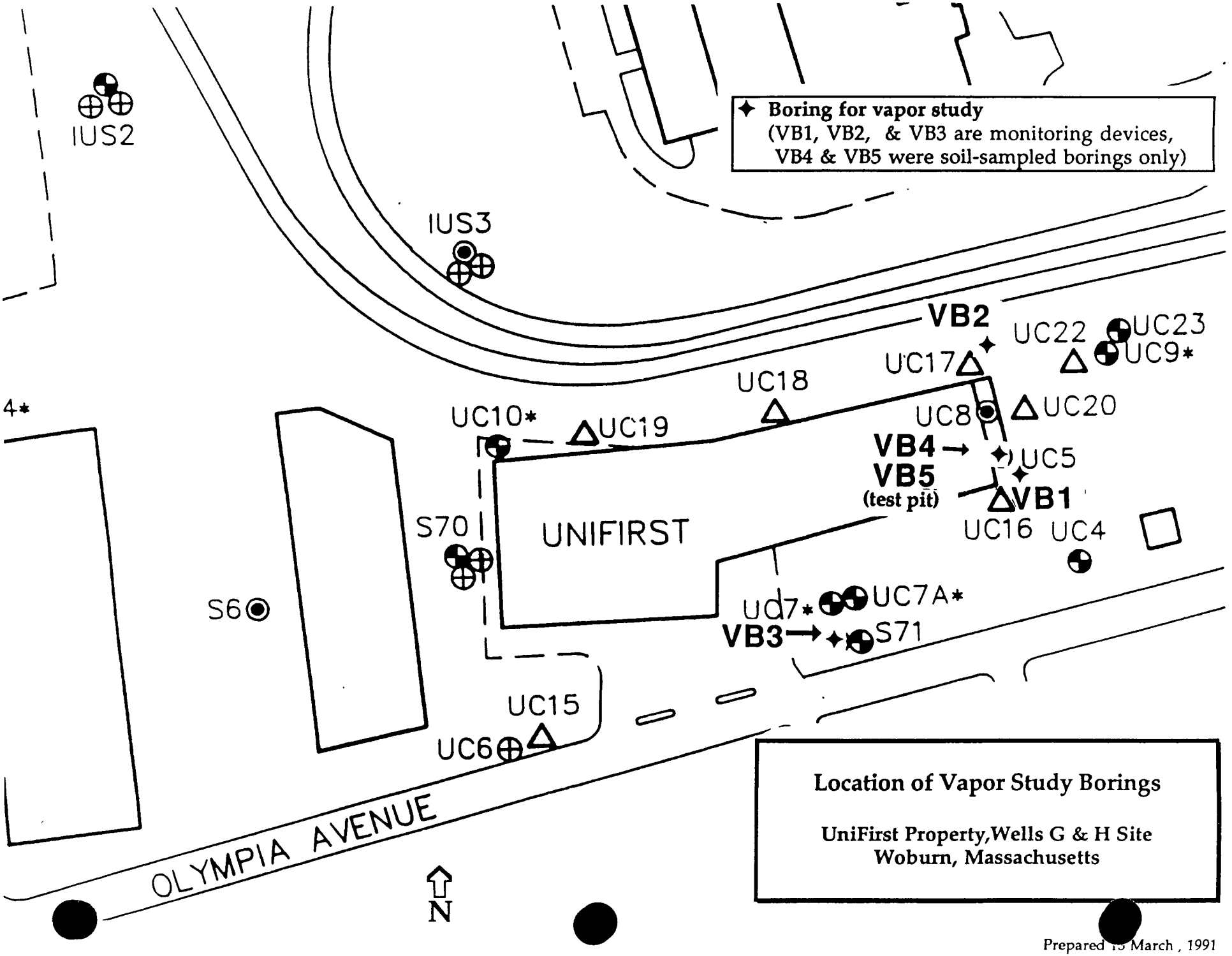
Should you have any questions, please do not hesitate to contact me.

Sincerely,

Timothy M. Cosgrave
Senior Hydrogeologist

TMC:hs

cc: G. Augustyn, UniFirst Corp.
J.C. Bates, Esq., Goodwin, Procter, & Hoar
M.B. Moore, ENSR
R. Willey, US EPA Region I
J.T. Lawson, EPC



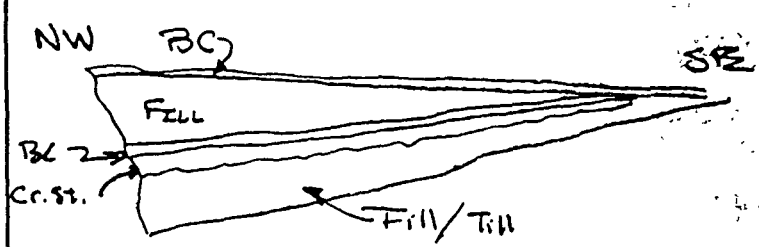
Location of Vapor Study Borings

UniFirst Property, Wells G & H Site
Woburn, Massachusetts

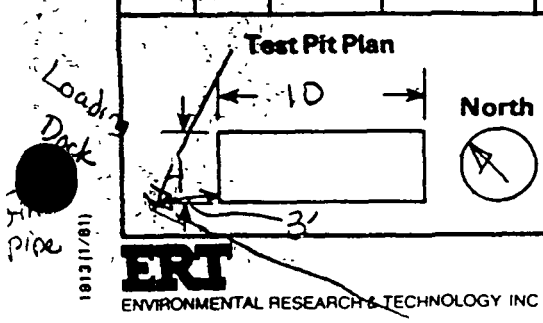
Prepared 15 March , 1991

Project UNIFIRST Site WOBURN **TEST PIT** 1 Sh ___ of ___
Date 12/4/86 Location ___ Ground Elevation ___
Total Depth 3.0 Contractor MT [illegible]
Equipment Used Komatsu PC 220LC [illegible] J.T. [illegible]

Elev. Feet	Depth Feet	Sample Type & No.	Sample Depth Range	Soil & Rock Description & Comments
				Northeast Corner
				0.0-0.2 Bituminous Concrete Pavement.
	1			0.2 - 1.5 Tan to yellow-tan crs-f SAND & GRAVEL trace silt, lightly stained on surface in contact with bit-con. light "perc." odor below lower pavement
	2			
	3			
	4			1.5- 1.7 Bituminous Concrete Pavement
				1.7-2.0 3/4-1 in crushed stone
				2.0-3.0 Tan to Yellow-tan crs-f SAND & GRAVEL trace silt
				3.0 ft large > 3ft pink granite boulder machine refusal
				ambient HNu Readings — HS jar
				0.0'-0.5': 0-5 — <50
				1.8'-2.0': <10 — <100
				>2.0': 5-8 — <50



Test Pit Plan



Groundwater

Date	Time (Hours After Completion)	Depth (Feet)
12/4/86		Dry

ERT
ENVIRONMENTAL RESEARCH & TECHNOLOGY INC

1813(1/81)

ENVIRONMENTAL
PROJECT CONTROL

Two Grafton Common
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01519

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TEL 508/839-0033

December 21, 1990

Ms. Barbara Newman
Remedial Project Manager
US EPA Region I
Waste Management Division
JFK Federal Building (HRS-CAN 7)
Boston, Massachusetts 02203-2211

Re: Soil & Vapor Data, UniFirst Corporation Site
Wells G & H Site, Woburn, MA
EPC Reference No: 9014/006

Dear Barbara:

As you requested, I have assembled the field and laboratory data that support the position taken in my July 31, 1990 letter regarding the proposed soil vapor extraction system at the UniFirst site. The data enclosed are:

- ENSR memorandum (February 2, 1989) describing the installation of the soil vapor monitors, including ENSR boring logs for VB-1, VB-2, and VB-3.

- ENSR memorandum (March 14, 1989) describing the borings (VB-4 & VB-5) made into the former test pit. Also described was the sampling of vapor from the soil vapor monitors.

- ENSR Laboratories report (March 24, 1989) on the analysis of soil samples and vapor samples collected from VB-1 through VB-5.

- Cross-reference table describing the depths of the samples.

ENVIRONMENTAL
PROJECT CONTROL

- Borings logs produced by the drilling subcontractor (Soil Exploration). These logs are B-5 (ENSR's VB-1), B-17 (ENSR's VB-2), B-7 (ENSR's VB-3), VB-4 and VB-5.

- March 1989 report by Stan Feenstra (Applied Groundwater Research Ltd.) describing the results of simulating tetrachloroethene vapor migration and contamination of soils by vapors. This effort was undertaken to demonstrate that the field conditions that had been measured could be achieved theoretically.

- Letter Report (July 30, 1990) from Stan Feenstra which reevaluated the March 1989 modeling effort to determine a ground water concentration that would be preventative of further soil contamination.

Should you have any questions or require any clarification of this information, please feel free to call me.

Sincerely,

Timothy M. Cosgrave
Senior Hydrogeologist

TMC:hs

cc: M.B. Moore, ENSR
J. Bridge, GeoTrans, Inc.
R. Willey, EPA
letter only:
G. Augustyn, UniFirst
J.C. Bates, Esq., Goodwin, Procter, & Hoar

Sample Numbering Cross-Reference

Field ID	ENSR ID	Depth Interval	Medium
VB1-1	65925	3" - 2'3"	Soil
VB1-2	65926	2'3" - 3'3"	Soil
VB1-2	65937&	2'3" - 3'3"	Duplicate Soil
VB2-1	65927	3" - 2'3"	Soil
VB2-2	65928	2'3" - 4'3"	Soil
VB2-3	65929	4'3" - 5'3"	Soil
VB3-1	65930	3" - 2'3"	Soil
VB3-2	65931	2'3" - 4'3"	Soil
VB3-3	65932	4'3" - 6'	Soil
VB3-4	65933	8' - 10'	Soil
VB3-5	65934	10' - 12'	Soil
VB3-5	65945&	10' - 12'	Duplicate Soil
VB3-6	65935	12' - 13'	Soil
VB4-1M	66129	6" - 2'	Soil
VB4-2M	66130	2' - 3'8"	Soil
VB5-1M	66131	6" - 2'	Soil
VB5-2M	66132	2' - 3'	Soil
3289-1	66118	Zero Bag	Vapor
3289-2	66119	150 ppb Standard	Vapor
3289-3	66120	VB1*	Vapor
3289-4	66121	VB2*	Vapor
3289-5	66122	VB3*	Vapor
3289-6	66123	VB3* Split	Vapor

---

* Vapor collection devices are open only at the bottom. The total depth of these devices are:

VB1 3'
VB2 4'8"
VB3 10

M E M O R A N D U M

TO: Tim Cosgrave

FROM: Larry Pannell **FILE:** 53-LP-009

DATE: March 14, 1989

SUBJECT: Unifirst Test Pit and Soil Gas Sampling

Soil Sampling

On March 2nd 1989, Soil Ex. conducted 2 shallow soil explorations in the test pit fill on the Woburn property of Unifirst.

The sampling was accomplished by first coring through the concrete pads and then hand driving a split spoon. Refusal was encountered at 3'8" (VB-4) and 3'0" (VB-5) (boring logs are attached).

Samples from each spoon were placed in VOA bottles, half of which contained a pre-weighed amount of methanol. The MeOH VOA's received only a small amount of soil and were labeled for Field Extractable VOC's. The dry VOA bottles were filled to the top with soil (no headspace) and were labeled for Regular VOC's.

A sample of the proposed soil vapor pipe fill (clean sand & gravel) was similarly submitted for analysis.

Headspace Analysis

Sample	HNu Units
VB 4-1	45
VB 4-2	45
VB 5-1	10 (less headspace than other samples)
VB 5-2	52
Cleanfill	0

Soil Vapor Sampling

Later that morning, Steve Wagner from Air Toxics Engineering arrived and proceeded to sample the gases within the soil vapor pipes installed on 2/23/89. Fittings were installed on the top of each vapor pipe cap. Tubing was connected to the fittings and to a tedlar bag housed inside a small drum. As air was pumped out of the drum at a measured rate (~ 250 cm^3/sec), the tedlar bag expanded, drawing in soil vapors.

Location	Volume Sampled
VB-1 (B5)	2 liters
VB-2 (B17)	5 liters
VB-3 (B7)	5 liters

A 5 liter duplicate was simultaneously drawn from VB-3.

Along with the vapor samples, a perc standard and blank were also submitted.

SAMPLE DATA SHEET

DATE: 3-2-89

CLIENT:

PROJECT#: 3140-001-009

OPERATOR: SLJ

RUN #: 1-3

LOCATION: Wilmington

AMBIENT TEMP: 30°F TIME:

SAMPLE ID#	SORBENT TYPE	SAMPLE LOCATION	PUMP #	START TIME	END TIME	ELAPSED TIME	FLOW RATE	COMMENTS
3289-1	BBG	—	—	—	—	—	—	Zero Bag
3289-2		—	—	—	—	—	—	150 PPB PERC
3289-3		3' VB1 well	10027	10:47	10:52	8 min	≈ 250 cc	(≈ 2 liters)
3289-4		5' VB2 well		11:08	11:28	20 min	≈ 250 cc	(≈ 5 liters)
3289-5		10' VB3 well		11:52	12:32	40 min	≈ 250 cc	(≈ 5 liters Duplicate
3289-6		10' VB3 well		11:52	12:32	40 min	≈ 250 cc	

Project UNIFIRST Site WOBURN **BORING** VB-4 Sh 1 of 1

Date Started 3/7/89 Completed 3/7/89 Ground Elevation

Total Depth 3' 8" Location Old. Test pit Logged by Harry Pannell

Casing I.D. none Contractor SOIL EX (Rich Bonetti)

Remarks Hand driven spoon
~ 50 lb hammer with a 30" drop

Elev. Feet	Depth Feet	Sample Type & Number	Sample Blows per 6 In.	Sample Depth Range	Sample Rec.	Graphic Log	Sample Description	Equipment Installed
							6" concrete with gravel on bottom	
	1	SS-1	18-22 34	6"-2'	8.5"		15" washed gravel over 6" poorly sorted grey SAND & GRAVEL. Mostly fine-med, some very coarse. 1" broken asphalt pieces.	
	2	SS-2	39-18 17-9/2"	2'-3'8"	4"		poorly sorted light brown SAND & GRAVEL, fine-v. coarse, little asphalt mixed throughout.	
	3						refusal at 3' 8"	
	4							

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Project UNIFIRST Site WOBURN **BORING** VB-5 Sh 1 of 1

Date Started 3/2/89 Completed 3/2/89 Ground Elevation

Total Depth 3' 0" Location Old Test Pit Logged by Larry Pannell

Casing I.D. none Contractor SOIL EX (Rich Bonetti)

Remarks Hand driven spoon
~ 50 lb hammer with a 30" drop

Elev. Feet	Depth Feet	Sample Type & Number	Sample Blows per 6 In.	Sample Depth Range	Sample Rec.	Graphic Log	Sample Description	Equipment Installed
							6" concrete with gravel on bottom.	
	1	SS-1	31-31 30	6"-2'	11"		poorly sorted, light brown, fine-coarse SAND. Some gravel, trace asphalt.	
	2	SS-2	31-60 50/0"	2'-3'	7.5"		poorly sorted, light brown, SAND; mostly med-coarse; little asphalt.	
							refusal at 3' 0"	
	3							

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SOIL EXPLORATION CORPORATION

Geotechnical Drilling and Groundwater Monitor Wells

23 Ingalls St
Nashua, NH 03060
(603) 882-3601

Client: E N S R — Date: 03/02/89 — Job No.: 89-0101

Location: UNIFIRST COMPANY, OLYMPIA STREET, WOBURN, MASSACHUSETTS

BORING: VB-4 — Ground Elev: — Date Start: 03/02/89 — Date Complete: 03/02/89 — Drilling Foreman: R.B. — Eng /Hydrol Geologist:

DEPTH	Sample No	Sample Depth (ft)	Blows 6" Penetration	Rec Inches	Casing Blows Per ft	Strata Change Depth	Visual Identification of Soil and/or Rock Strata
	1	0'6"- 2'0"				0'5"	CONCRETE. Gravel.
	2	2'0"- 3'8"				0'7"	Damp, fine to medium SAND, some asphalt, and medium gravel, (fill).
5						3'8"	Refusal at 3'8" No water encountered upon completion
10							
15							
20							
25							
30							
35							
40							

Type of Boring: Casing Size — Hollow Stem Auger Size — HAND HELD HAMMER

Proportion Percentages
Trace 0 to 10%
Some 10 to 40%
And 40 to 50%

Granular Soils (blows per ft.)
0 to 4 Very Loose
4 to 10 Loose
10 to 30 Medium Dense
30 to 50 Dense
Over 50 Very Dense

Cohesive Soils (blows per ft.)
0 to 2 Very Soft
2 to 4 Soft
4 to 8 Medium Stiff
8 to 15 Stiff
15 to 30 Very Stiff
Over 30 Hard

Standard penetration test (SPT) = 140# hammer falling 30"
Blows are per 6" taken with an 18" long x 2" O D x 1 3/8" I D split spoon sampler unless otherwise noted

The terms and percentages used to describe soil and or rock are based on visual identification of the retrieved samples ■ Moisture content indicated may be affected by time of year and water added during the drilling process ■ Water levels indicated may vary with seasonal fluctuation and the degree of soil saturation when the boring was taken ■ The stratification lines represent the approximate boundaries between soil types, the actual transitions may be gradual ■

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Nashua, NH 03060
(603) 882-3601

Client: E N S R — Date: 03/02/89 — Job No.: 89-0101

Location: UNIFIRST COMPANY, OLYMPIA STREET, WOBURN, MASSACHUSETTS

BORING NO.: VB-5 — Ground Elev: — Date Start: 03/02/89 — Date Complete: 03/02/89 — Drilling Foreman: R.B. — Eng./Hydrol Geologist:

DEPTH	Sample No	Sample Depth (ft.)	Blows 6" Penetration	Rec. Inches	Casing Blows Per ft	Strata Change Depth	Visual Identification of Soil and/or Rock Strata
	1	0'6"- 2'0"				0'5"	CONCRETE. Gravel.
	2	2'0"- 3'0"				0'6"	Damp, fine to medium SAND, some asphalt and fine to medium gravel, (fill).
						3'0"	Refusal at 3'0" No water encountered upon completion
5							
10							
15							
20							
25							
30							
35							
40							

Type of Boring: Casing Size: Hollow Stem Auger Size: HAND HELD HAMMER

Proportion Percentages
Trace 0 to 10%
Some 10 to 40%
And 40 to 50%

Granular Soils (blows per ft.)
0 to 4 Very Loose
4 to 10 Loose
10 to 30 Medium Dense
30 to 50 Dense
Over 50 Very Dense

Cohesive Soils (blows per ft.)
0 to 2 Very Soft
2 to 4 Soft
4 to 8 Medium Stiff
8 to 15 Stiff
15 to 30 Very Stiff
Over 30 Hard

Standard penetration test (SPT) = 140# hammer falling 30"
Blows are per 6" taken with an 18" long x 2" OD x 1 3/8" ID split spoon sampler unless otherwise noted

The terms and percentages used to describe soil and or rock are based on visual identification of the retrieved samples ■ Moisture content indicated may be affected by time of year and water added during the drilling process ■ Water levels indicated may vary with seasonal fluctuation and the degree of soil saturation when the boring was taken ■ The stratification lines represent the approximate boundaries between soil types, the actual transitions may be gradual ■

MEMORANDUM

TO: Tim Cosgrave

MEMO NO.: 3140-001-009

FROM: Larry Pannell LP

FILE NO.: 53-LP-006

SUBJECT: Soil Vapor Pipe installation at Unifirst Site, Woburn, MA

DATE: February 28, 1989

On February 23rd 1989, Soil Ex installed 3 soil vapor pipes at the old Unifirst facility in Woburn, Ma. ENSR personnel on-site included myself and John Dadoly. The drillers name was Scott Lamarche.

The first boring (VB-1) was conducted along the southeast side of the building by UC5. This boring was advanced through poorly sorted sand and gravel to refusal at 3'3". A 3 foot long piece of 4" pvc pipe was installed just above refusal. VB-1 had the highest soil vapor reading of the 3 borings, registering 60 ppm on the Photovac Tip. (All field Photovac readings were taken on soil immediately beneath the asphalt.)

The second boring (VB-2) was conducted on the northeast side of the building by UC-17. This boring was also in poorly sorted sand and gravel, and encountered refusal (assumed to be bedrock) at approximately 5 1/2 feet. The soil vapor reading was 5.7 ppm. A 4'8" section of pvc pipe was installed.

The third boring (VB-3) took place near the front gate by VC-7. Here the poorly sorted sand and gravel transitioned to mostly sand around 7 feet. The boring continued to refusal at 13', with ground-water encountered at 12 feet. A 10 foot section of pvc pipe was installed. The Photovac Tip reading of 0.2 ppm was the lowest reading of the three borings.

SAMPLING

Soil samples from each spoon were placed in sets of 4 VOA vials. Each set consisted of 2 vials containing pre-measured amounts of methanol, and 2 empty vials. A small amount of soil was placed into each vial containing MeOH while the other 2 vials were filled approximately 2/3rds full for headspace analysis. Due to a malfunction of the Tip, headspace analysis was not conducted until the following morning, after refrigerating the samples overnight.

Results of the headspace analysis:

Sample I.D.	Depth	Photovac Tip Reading (ppm)
VB1-1	3" - 2'3"	735
VB1-2	2'3" - 3'3"	242
VB2-1	3" - 2'3"	32.1
VB2-2	2'3" - 4'3"	14.0
VB2-3	4'3" - 5'3"	11.1
VB3-1	3" - 2'3"	10.5
VB3-2	2'3" - 4'3"	8.7
VB3-3	4'3" - 6'	6.5
VB3-4	8' - 10'	10.8
VB3-5	10' - 12'	6.3
VB3-6	12' - 13'	7.1

Attached are copies of the boring logs for VB1-3

Project UNIFIRST Site Woburn **BORING** VB-1 (B-5) Sh 1 of 1

Date Started 2/23/89 Completed 2/23/89 Ground Elevation

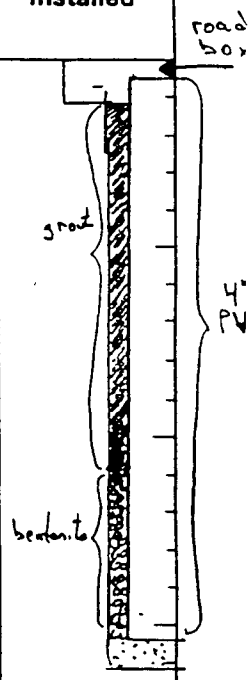
Total Depth 3' 3" Location Logged by Larry Pannell

Casing I.D. 4" PVC Contractor SOIL EX

Remarks

6 1/4" HSA installed 3' of 4" PVC

Elev. Feet	Depth Feet	Sample Type & Number	Sample Blows per 6 In.	Sample Depth Range	Sample Rec.	Graphic Log	Sample Description	Equipment Installed
							3" asphalt	road box
							soil immediately beneath asphalt registered 60 on TIP.	grout
1		SS-1	28-11 17-19	3"-2'3"	16"		Poorly sorted, light brown SAND; mostly fine-medium; trace coarse, some gravel	4" PV
2								
		SS-2	18-17 100/0	2'3"-3'3"	6"		Poorly sorted light brown SAND; fine-coarse, trace very coarse, trace gravel. Refusal at 3'3".	bentonite
3								



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Project UNIFIRST Site WOBURN **BORING** VB-2(B-17) Sh 1 of 1

Date Started 2/23/89 Completed 2/23/89 Ground Elevation

Total Depth 5' 5" Location Logged by Larry Pannell

Casing I.D. 4" Contractor SOIL EX

Remarks

6 1/4 HSA installed 4' 8" of 4" PVC pipe

Elev. Feet	Depth Feet	Sample Type & Number	Sample Blows per 6 in.	Sample Depth Range	Sample Rec.	Graphic Log	Sample Description	Equipment Installed
							3" asphalt. soil directly beneath asphalt registered 5.7 on TIP	road box
1		SS-1	11-23 31-19	3"-2'3"	16"		poorly sorted brown SAND; fine - coarse, mostly medium; some gravel.	grout
2								
3		SS-2	17-30 41-47	2' 3"- 4' 3"	11"		8" Tan. poorly sorted SAND; fine - coarse, some gravel over 3" brown SAND; fine - coarse, mostly fine-medium, some gravel.	bentonite
4		SS-3	43-69 100/0	4' 3"- 5' 3"	10"		tan SAND; very fine - coarse, mostly v. fine - fine, Some gravel, trace weathered bedrock Refusal at 5' 3"	
5							Augered ~ 2" into bedrock. Finished hole at 5'5". Set pipe at 5' 0".	11.5"

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Project UNIFIRST Site WOBURN **BORING** VB-3 (B-7) Sh 1 of 1

Date Started 2/23/89 Completed 2/23/89 Ground Elevation

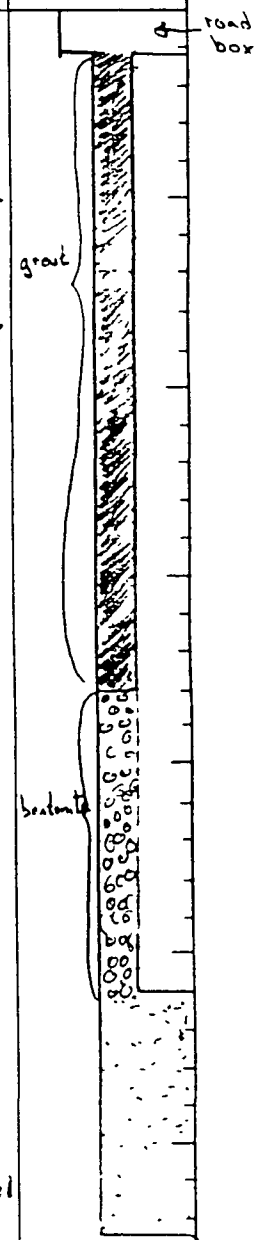
Total Depth 13' Location Logged by Larry Pannell

Casing I.D. 4" PVC Contractor Soil Ex

Remarks

6 1/4 HSA installed 10' of 4" PVC pipe

Elev. Feet	Depth Feet	Sample Type & Number	Blows per 6 In.	Depth Range	Rec.	Graphic Log	Sample Description	Equipment Installed
							3" asphalt	road box
		SS-1	23-11 17-28	3" - 2'3"	12"		Soil directly beneath asphalt registered 0.2 on TIP. Poorly sorted light brown SAND. v-fine - v. coarse, mostly med-coarse; some gravel.	
2								grout
		SS-2	29-38 46-50	2'3" - 4'3"	14"		light gray SAND; v-fine - v-coarse, mostly fine - coarse; some gravel	
4								
		SS-3	31-48 63-79/3"	4'3" - 6'0"	10"		"	
							augered through refusal at 6'	
6								
							no sample from 6'-8'	
8								bentonite
		SS-4	7-9 9-11	8'-10'	18"		light gray-tan SAND. Fine - Coarse; trace gravel.	
10								
		SS-5	11-12 12-11	10'-12'	13"		"	
12								
		SS-6	15-18 100/0"	12'-13'	12"	▽	light gray-tan SAND. v-fine - Coarse; trace silt, some gravel	
							Water at ~ 12'.	
14							note: pipe set at just over 10'	



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SOIL EXPLORATION CORPORATION

Geotechnical Drilling and Groundwater Monitor Wells

23 Ingalls St
Nashua, NH 03060
(603) 882-3601

Client: E N S R — Date: 02/23/89 — Job No: 89-0091

Location: UNIFIRST COMPANY, OLYMPIA STREET, WOBURN, MASSACHUSETTS

BORING NO.: B-5 — Ground Elev: — Date Start: 02/23/89 — Date Complete: 02/23/89 — Drilling Foreman: S.L. — Eng./Hydrol Geologist: L.P.

DEPTH	Sample No	Sample Depth (ft)	Blows 6" Penetration	Rec. Inches	Casing Blows Per ft.	Strata Change Depth	Visual Identification of Soil and/or Rock Strata
	1	0'2"- 2'2"	28-11-18-19			0'2"	ASPHALT. Dense, dry, fine SAND, some medium to coarse sand, and fine to coarse gravel, trace cobbles, and inorganic silt.
	2	2'2"- 3'2"	18-17-100/0"			3'2"	Refusal at 3'2" with hollow stem auger No water encountered upon completion Set 4" PVC Casing at 2'6" then grouted to surface. Well Materials; 1 - 5' x 4" PVC riser 1 - 4" PVC expansion plug 1 large- buffalo box ½ pail - bentonite pellets 1 bag - sakrete sand 1 bag - bentonite powder 7 bags - Portland cement
5							
10							
15							
20							
25							
30							
35							
40							

Type of Boring: Casing Size — Hollow Stem Auger Size: 6¼

Proportion Percentages	Granular Soils (blows per ft.)		Cohesive Soils (blows per ft.)	
Trace 0 to 10%	0 to 4 Very Loose	30 to 50 Dense	0 to 2 Very Soft	8 to 15 Stiff
Some 10 to 40%	4 to 10 Loose	Over 50 Very Dense	2 to 4 Soft	15 to 30 Very Stiff
And 40 to 50%	10 to 30 Medium Dense		4 to 8 Medium Stiff	Over 30 Hard

Standard penetration test (SPT) = 140# hammer falling 30"
Blows are per 6" taken with an 18" long x 2" O.D x 1 3/8" I D split spoon sampler unless otherwise noted

The terms and percentages used to describe soil and or rock are based on visual identification of the retrieved samples ■ Moisture content indicated may be affected by time of year and water added during the drilling process ■ Water levels indicated may vary with seasonal fluctuation and the degree of soil saturation when the boring was taken ■ The stratification lines represent the approximate boundaries between soil types, the actual transitions may be gradual ■

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SOIL EXPLORATION CORPORATION

Geotechnical Drilling and Groundwater Monitor Wells

23 Ingalls St.
Nashua, NH 03060
(603) 882-3601

Client: E N S R — Date: 02/23/89 — Job No: 89-0091

Location: UNIFIRST COMPANY, OLYMPIA STREET, WOBURN, MASSACHUSETTS

BORING: B-7 — Ground Elev: — Date Start: 02/23/89 — Date Complete: 02/23/89 — Drilling Foreman: S.L. — Eng./Hydrol. Geologist: L.P.

DEPTH	Sample No	Sample Depth (ft)	Blows 6" Penetration	Rec Inches	Casing Blows Per ft	Strata Change Depth	Visual Identification of Soil and/or Rock Strata
	1	0'2"- 2'2"	23-11-17-28				ASPHALT.
						0'2"	Dense to very dense, dry, fine to coarse SAND, and gravel, trace cobbles and inorganic silt.
	2	2'2"- 4'2"	29-38-46-50				
5	3	4'2"- 6'0"	31-48-63-70/4"				
	4	8'0"- 10'0"	7-9-9-11			7'6"	Medium dense to dense, dry to wet, fine to medium sand, trace fine to medium gravel, and inorganic silt.
10	5	10'0"- 12'0"	11-12-12-11				
	4	12'0"- 13'0"	15-18-100/0"				
15						13'0"	Refusal at 13'0" with split spoon Water level at 12'4" upon completion Set 4" PVC Casing at 10'0" then grouted to surface. Well Materials; 1 - 10' x 4" PVC riser 1 - 4" PVC expansion plug 1 large- buffalo box ½ pail - bentonite pellets
20							
25							
30							
35							
40							

Type of Boring: Casing Size — Hollow Stem Auger Size: 6¼

Proportion Percentages	Granular Soils (blows per ft.)		Cohesive Soils (blows per ft.)	
Trace 0 to 10%	0 to 4 Very Loose	30 to 50 Dense	0 to 2 Very Soft	8 to 15 Stiff
Some 10 to 40%	4 to 10 Loose	Over 50 Very Dense	2 to 4 Soft	15 to 30 Very Stiff
And 40 to 50%	10 to 30 Medium Dense		4 to 8 Medium Stiff	Over 30 Hard

Standard penetration test (SPT) = 140# hammer falling 30"
Blows are per 6" taken with an 18" long x 2" O D x 1 3/8" I D split spoon sampler unless otherwise noted

The terms and percentages used to describe soil and or rock are based on visual identification of the retrieved samples ■ Moisture content indicated may be affected by time of year and water added during the drilling process ■ Water levels indicated may vary with seasonal fluctuation and the degree of soil saturation when the boring was taken ■ The stratification lines represent the approximate boundaries between soil types, the actual transitions may be gradual ■

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SOIL EXPLORATION CORPORATION

Geotechnical Drilling and Groundwater Monitor Wells

23 Ingalls St
Nashua, NH 03060
(603) 882-3601

Client: E N S R — Date: 02/23/89 — Job No: 89-0091

Location: UNIFIRST COMPANY, OLYMPIA STREET, WOBURN, MASSACHUSETTS

BORING NO.: B-17 — Ground Elev: — Date Start: 02/23/89 — Date Complete: 02/23/89 — Drilling Foreman: S.L. — Eng/Hydrol Geologist: L.P.

DEPTH	Sample No	Sample Depth (ft)	Blows 6" Penetration	Rec. Inches	Casing Blows Per ft	Strata Change Depth	Visual Identification of Soil and/or Rock Strata
	1	0'2"- 2'2"	11-23-31-19				ASPHALT.
						0'2"	Very dense, dry, fine SAND, some medium to coarse sand, and fine to coarse gravel, trace cobbles, and boulders.
	2	2'2"- 4'2"	17-30-41-47				
5	3	4'2"- 5'2"	43-69-100/0"				
						5'6"	Refusal at 5'6" with hollow stem auger No water encountered upon completion Set 4" PVC Casing at 5'0" then grouted to surface. Well Materials; 1 - 5' x 4" PVC riser 1 - 4" PVC expansion plug 1 large- buffalo box ½ pail - bentonite pellets
10							
15							
20							
25							
30							
35							
40							

Type of Boring: Casing Size — Hollow Stem Auger Size: 6¼

Proportion Percentages	Granular Soils (blows per ft.)		Cohesive Soils (blows per ft.)	
Trace 0 to 10%	0 to 4 Very Loose	30 to 50 Dense	0 to 2 Very Soft	8 to 15 Stiff
Some 10 to 40%	4 to 10 Loose	Over 50 Very Dense	2 to 4 Soft	15 to 30 Very Stiff
And 40 to 50%	10 to 30 Medium Dense		4 to 8 Medium Stiff	Over 30 Hard

Standard penetration test (SPT) = 140# hammer falling 30"
Blows are per 6" taken with an 18" long x 2" OD x 1 3/8" ID split spoon sampler unless otherwise noted

The terms and percentages used to describe soil and or rock are based on visual identification of the retrieved samples ■ Moisture content indicated may be affected by time of year and water added during the drilling process ■ Water levels indicated may vary with seasonal fluctuation and the degree of soil saturation when the boring was taken ■ The stratification lines represent the approximate boundaries between soil types, the actual transitions may be gradual ■

ENSR

Formerly ERT

ENSR Consulting
and Engineering

33 Industrial Way
Wilmington MA 01887
(508) 657-4290

March 24, 1989

DEC 21 1990

Mr. Tim Cosgrave
ENSR Consulting & Engineering
35 Nagog Park
Acton, MA 01720

REFERENCE: Project No. : 8500-089-021A, B
(3140-001-009)
Project Name : Unifirst, Woburn, MA
Date Received: February 23 and March 2, 1989

Dear Mr. Cosgrave:

Enclosed please find the revised report for the projects referenced above. This report contains additional information relevant to both projects; it is a result of analyses authorized subsequent to the initial report of March 10, 1989. As the additional work clarifies data contained in the original report, this should replace the earlier document in its entirety.

Sincerely yours,

Karen A. Perito
Laboratory Project Mgr.
(508) 657-4290

Martha S. Sparlin
Laboratory QA Manager

Marilyn Hoyt
Laboratory Manager

LABORATORY ANALYTICAL REPORT

I. INTRODUCTION

This report represents the results of analyses conducted on ENSR Project No. 8500-087-021A, B (3140-001-009), received by the Wilmington Laboratory on February 23 and March 2, 1989. Upon receipt by the laboratory, the samples were inspected for condition, Chain of Custody field identification accountability, and individual sample analytical requirements. The submitted samples were entered into the computerized Laboratory Information Management data base and unique laboratory identification numbers were assigned to each sample. The sample I.D. number is subsequently used throughout the laboratory to provide positive sample accountability in accordance with recommended USEPA sample management protocol. Table I summarizes the field identification, laboratory sample numbers, and analytical methodologies performed for this project.

TABLE 1

PROJECT SAMPLE SUMMARY

PROJECT NO. 8500-089-021A,B
PROJECT NAME: UNIFIRST
DATE SUBMITTED: FEBRUARY 23 AND MARCH 2, 1989

FIELD ID	SAMPLE NUMBER	SAMPLE MATRIX	ANALYTICAL METHOD AND REFERENCE
VB1-1	65925	SOIL/MEOH	SW846-3580/8000
VB1-2	65926	SOIL/MEOH	SW846-3580/8000
VB2-1	65927	SOIL/MEOH	SW846-3580/8000
VB2-2	65928	SOIL/MEOH	SW846-3580/8000
VB2-3	65929	SOIL/MEOH	SW846-3580/8000
VB3-1	65930	SOIL/MEOH	SW846-3580/8000
VB3-2	65931	SOIL/MEOH	SW846-3580/8000
VB3-3	65932	SOIL/MEOH	SW846-3580/8000
VB3-4	65933	SOIL/MEOH	SW846-3580/8000
VB3-5	65934	SOIL/MEOH	SW846-3580/8000
VB1-1	65935	SOIL/MEOH	SW846-3580/8000
VB1-2	65936	* SOIL	SW846-3580/8000
VB2-1	65937	SOIL	SW846-3580/8000
VB2-2	65938	* SOIL	SW846-3580/8000
VB2-3	65939	* SOIL	SW846-3580/8000
VB3-1	65940	* SOIL	SW846-3580/8000
VB3-2	65941	* SOIL	SW846-3580/8000
VB3-3	65942	* SOIL	SW846-3580/8000
VB3-4	65943	* SOIL	SW846-3580/8000
VB3-5	65944	* SOIL	SW846-3580/8000
VB3-6	65945	SOIL	SW846-3580/8000
VB3-6	65946	* SOIL	SW846-3580/8000
3289-1	66118	TEDLAR BAG	ENSR
3289-2	66119	TEDLAR BAG	ENSR
3289-3	66120	TEDLAR BAG	ENSR
3289-4	66121	TEDLAR BAG	ENSR
3289-5	66122	TEDLAR BAG	ENSR
3289-6	66123	TEDLAR BAG	ENSR
VB4-1	66124	* SOIL	SW846-3580/8000
VB4-2	66125	* SOIL	SW846-3580/8000
VB5-1	66126	* SOIL	SW846-3580/8000
VB5-2	66127	* SOIL	SW846-3580/8000
SVPF	66128	* SOIL	SW846-3580/8000
VB4-1M	66129	SOIL/MEOH	SW846-3580/8000
VB4-2M	66130	SOIL/MEOH	SW846-3580/8000
VB5-1M	66131	SOIL/MEOH	SW846-3580/8000
VB5-2M	66132	SOIL/MEOH	SW846-3580/8000
SVPF-M	66133	SOIL/MEOH	SW846-3580/8000

* NOT ANALYZED PER TIM COSGRAVE'S INSTRUCTIONS, 3/7/89

II. QUALITY ASSURANCE AND QUALITY CONTROL

As an indication of the overall quality of the data generated by the ENSR Laboratory for this report, one or more of the following types of Quality Control analyses may be included in this report as required by the analytical methodology referenced in the project summary contained in TABLE I.

1. Method Blanks (MB)
2. Sample Duplicate Analyses
3. Laboratory Control Samples (LCS)
4. Matrix Spikes and Duplicates (MS/MSD)
5. Surrogate Compound Recoveries

Results of the quality control and quality assurance samples analyzed concurrently with the submitted samples for this project were within acceptable ranges. Quality control analyses and criteria for all methodologies performed by this laboratory are established by regulatory agencies and are constantly monitored as part of the laboratory's formal QA/QC program. Appendix I contains descriptions of the various types of QA/QC requirements which may have been required in this project.

III. ANALYTICAL RESULTS AND DISCUSSION

The results of analyses included in this report have been reviewed by the appropriate analytical department managers, the Laboratory Quality Assurance Manager, and the Laboratory Project Manager for accuracy and completeness. Method descriptions and summaries of procedures used in this project are available upon request. Appendix II contains general references to analytical procedures used by this laboratory.

Analyses of all samples were performed by direct injection gas chromatography / electron capture detection. This method permits sensitive detection of chlorinated organics. Component identification is based upon gas chromatographic retention time.

Subsequent to the sample analyses and submittal of a report by the ENSR Laboratory to the Project Manager, mass spectral analyses of two highly contaminated samples were requested to provide unequivocal confirmation of detected components. These analyses confirmed the presence of analytes reported from the gas chromatographic analyses with one exception; the peak reported as 1,2-transdichloroethene was determined to be chloroform. These compounds elute from the gas chromatographic column very near each other; the high levels of chloroform present in the samples evidently resulted in a retention time shift sufficient to account for the misidentification of the peak.

Data for the peak previously reported as transdichloroethene have been recalculated based upon the established response factor for chloroform.

Recoveries for the laboratory fortification sample, which was prepared by spiking a standard solution onto clean sand, indicate that the method employed worked; recoveries were within acceptable control limits. The matrix spike samples were prepared by spiking a standard solution onto Unifirst sample VB1-2. This sample was collected dry (not into methanol) in a VOA vial containing headspace, making it difficult to obtain homogeneous aliquots for analysis. Recoveries for these samples are far more varied than the laboratory fortification samples; two analytes recovered low, and tetrachloroethylene recovered high. It is believed that the tetrachloroethylene content of the samples taken for matrix spike analyses was not homogeneous. The low recoveries noted for two spiked compounds suggest matrix interference.

Fluctuations in detection limits are due to differing volumes of samples collected. Results have been calculated based upon wet weights. Samples were collected in the field into VOA vials containing methanol to reduce the incidence of loss of volatile compounds, therefore dry weights were not determined.

METHODOLOGY SUMMARIES

AND

PROJECT DATA

APPENDIX I

QUALITY CONTROL AND ASSURANCE PROCEDURES

1. Method Blanks (MB) - Analytical control consisting of all reagents, internal standards, and surrogate compounds carried through an analytical procedure to check for laboratory or instrumental contamination.

2. Surrogates - Isotope labelled compounds added to analyses used to evaluate analytical efficiency by measuring recovery.

3. Duplicate Analysis - A quality assurance check on the integrity of sample preparation as well as sample collection and shipping. Field duplicates and laboratory duplicates may be analyzed for each submission of samples when requested and where sample volumes permit. A laboratory duplicate is an aliquot of a field sample.

4. Laboratory Control Sample (LCS) - A standard control matrix spiked with a group of target compounds representative of the method analytes. The LCS is used to monitor the day-to-day accuracy of routine analytical methods within defined QC limits. An LCS has been established for most routine analytical methods. Control limits are defined by the most recent six months of LCS data for the appropriate methodology with an acceptable range for each analyte of the mean plus or minus 3 standard deviations.

5. Matrix Spike and Matrix Spike Duplicate (MS/MSD) - An aliquot of the sample matrix spiked with known quantities of specific compounds and subjected to the entire analytical procedure in order to evaluate the effect of sample matrix on measurable analyte recovery. The MSD is a duplicate analysis of the matrix used to measure method precision.

APPENDIX II

ANALYTICAL PROCEDURE REFERENCES

1. "Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act", 40 CFR, Part 136; Federal Register, Vol.49, No.209, 1984.

2. US EPA. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. (SW 846) Washington, D.C., April, 1984.

3. US EPA. Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020. Cincinnati, OH, March, 1983.

4. American Public Health Association, American Water Works Association, Water Pollution Control Federation. Standard Methods for the Examination of Water and Wastewater, 15th & 16th Ed., Washington, D.C., April, 1985.

5. 1984 Annual Book of ASTM Standards Section 4: Construction, Vol. 04.08: Soil & Rock; Building Stones.

6. 1984 Book of ASTM Standards, Part 31: Water.

7. Manuals of Soil Laboratory Testing, Vol. 1: Soil Classification and Compaction Tests, K.H. Head, 1980.

8. US EPA. Methods for the Determination of Organic Compounds in Finished Drinking Water and Raw Source Water. Cincinnati, OH, Sep 1986.

9. Methods of Soil Analysis Agronomy No. 9, Part 2: Chemical and Microbiological Properties, 1965.

10. Current EPA Contract Laboratory Program (CLP) Invitation for Bid protocols for analysis of organic and inorganic hazardous substances.

11. ENSR/ERT developed and validated screening methods and specialized techniques for parameters not covered by published EPA protocols.

ENSR ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
HALOGENATED VOLATILES IN SOIL

ROJECT NO: 8500-089-021A

IENT: UNIFIRST

METHOD: SW846 3580/8000

MPLING SITE: WOBURN, MA.

DATE RECEIVED: 02/23/89

FIELD ID:	VB1-1	VB1-2	VB2-1	VB2-2	VB2-3	VB3-1	VB3-2	VB3-3	VB3-4	VB3-5	VB3-6	VB1-2	VB3-5
ENSR ID:	65925	65926	65927	65928	65929	65930	65931	65932	65933	65934	65935	65937&	65945&
DATE ANALYZED:	02/28/89	02/28/89	02/28/89	02/27/89	02/27/89	02/27/89	02/27/89	02/25/89	02/25/89	02/27/89	02/28/89	02/24/89	02/25/89
COMPOUND	UG/KG @	UG/KG	UG/KG @	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
THYLENE CHLORIDE	<95	<1100 @	<85	<24	<33	<56	<40	<34	<28	<24	<20	<48	<70
ICHLOROETHYLENE	<38	<500 @	640	17	<13	<22	<16	<13	<11	<9.5	73	<19	<28
TRACHLOROETHYLENE *	580	2500 @	1200	82	57	<22	<16	79	<11	54	110	150	<28
LOROFORM $	980	11000 I	5600 I	870	4900	3100	<40	<34	1400	<24	24	<48	<70
OMODICHLOROMETHANE	480	<8.6	<34	<9.4	<13	<22	<16	<13	<11	<9.5	<7.8	<19	<28
LORODIBROMOMETHANE	,38	<8.6	<34	20	<13	<22	<16	<13	<11	<9.5	<7.8	<19	<28
OMOFORM	1200	<21	<85	<24	<33	<56	<40	<34	<28	<24	<20	<48	<70
1-DICHLOROETHYLENE	10000	1200	<85	190	2700	1700	68	53	130	30	34	<48	<70
2-DICHLOROETHANE	<95	<21	<85	<24	<33	<56	500	580	<11	430	<7.8	<48	<70
1,1-TRICHLOROETHANE	<38	<8.6	<34	<9.4	<13	<22	<16	<13	<11	<9.5	<7.8	<19	<28
RBON TETRACHLORIDE	<38	<8.6	<34	<9.4	19	<22	<16	<13	<11	<9.5	<7.8	<19	<28
-DICHLOROPROPANE	<95	<21	<85	<24	<33	<56	<40	<34	<28	<24	<20	<48	<70
1,3-DICHLOROPROPENE	<95	<21	<85	<24	<33	<56	<40	<34	<28	<24	<20	<48	<70
,2-TRICHLOROETHANE #	<38	<8.6	<34	<9.4	<13	<22	<16	<13	<11	<9.5	<7.8	<19	<28

co-elutes with 1,1,2,2-TETRACHLOROETHANE
co-elutes with trans 1,3-DICHLOROPROPENE
co-elutes with trans-1,2-DICHLOROETHYLENE

identification confirmed by GC/MS
results based on sample dilution
dry soil samples (not sampled in Methanol)

REVIEWED BY: PN QC: K.M

ENSR ANALYTICAL LABORATORY
QUALITY CONTROL SUMMARY
HALOGENATED VOLATILES IN SOIL

PROJECT NO: 8500-089-021A & B

CLIENT: UNIFIRST

METHOD: SW846 3580/8000

SAMPLING SITE: WOBURN, MA.

FIELD ID:	MB890149	MB890150	MB890189	LF890198	LF890199	VB1-2MS	VB1-2MSD
ENSR ID:						65937MS	65937MSD
DATE ANALYZED:	02/24/89	02/24/89	03/05/89	03/05/89	03/05/89	02/24/89	02/24/89

COMPOUND	UG/KG	UG/KG	UG/KG	% RECOVERY	% RECOVERY	% RECOVERY	% RECOVERY
METHYLENE CHLORIDE	<45	<77	<62	142%	138%	28%	23%
trans 1,2-DICHLOROETHYLENE $	<45	<77	<62	89%	94%	39%	25%
TRICHLOROETHYLENE	<18	<31	<25	96%	91%	114%	79%
TETRACHLOROETHYLENE *	<18	<31	<25	69%	64%	538%	232%
CHLOROFORM @	<45	<77	<62				
BROMODICHLOROMETHANE	<18	<31	<25				
CHLORODIBROMOMETHANE	<18	<31	<25				
BROMOFORM	<45	<77	<62				
1,1-DICHLOROETHYLENE	<45	<77	<62				
1,2-DICHLOROETHANE	<45	<77	<62				
1,1,1-TRICHLOROETHANE	<18	<31	<25				
CARBON TETRACHLORIDE	<18	<31	<25				
1,2-DICHLOROPROPANE	<45	<77	<62				
cis1,3-DICHLOROPROPENE	<45	<77	<62				
1,1,2-TRICHLOROETHANE #	<18	<31	<62				

* = co-elutes with 1,1,2,2-TETRACHLOROETHANE
# = co-elutes with trans 1,3-DICHLOROPROPENE
$ = co-elutes with Chloroform
@ = co-elutes with trans-1,2-Dichloroethylene
MS = Matrix Spike MSD = Martix Spike Duplicate

Reviewed by: PN QC: [illegible]

ENSR ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
HALOGENATED VOLATILES IN SOIL

PROJECT NO: 8500-089-021 B

CLIENT: UNIFIRST

METHOD: SW846 3580/8000

SAMPLING SITE: WOBURN, MA.

DATE RECEIVED: 02/23/89

FIELD ID:	VB4-1M	VB4-2M	VB5-1M	VB5-2M	SVPF-M	SVPF-M
ENSR ID:	66129	66130	66131	66132	66133	66133 DUP
DATE ANALYZED:	3/06/89	3/06/89	3/06/89	3/06/89	3/05/89	3/05/89
COMPOUND	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
METHYLENE CHLORIDE	1500	2100	2200	2100	<62	<62
TRICHLOROETHYLENE	<1400 @	<1400 @	<1400 @	<1400 @	<25	<25
TETRACHLOROETHYLENE *	6500	<700 @	23000	1200	<25	<25
CHLOROFORM $	<35	<35	<35	<35	<55	<55
BROMODICHLOROMETHANE	<15	<15	<15	<15	<22	<22
CHLORODIBROMOMETHANE	<15	<15	<15	<15	<22	<22
BROMOFORM	<36	<36	<36	<36	<55	<55
1,1-DICHLOROETHYLENE	<36	45	69	<36	<55	<55
1,2-DICHLOROETHANE	<36	<36	<36	<36	<55	<55
1,1,1-TRICHLOROETHANE	220	3000	800	1200	<22	<22
CARBON TETRACHLORIDE	<15	<15	<15	<15	<22	<22
1,2-DICHLOROPROPANE	<36	<36	<36	<36	<55	<55
cis1,3-DICHLOROPROPENE	<36	43	<36	42	<55	<55
1,1,2-TRICHLOROETHANE #	<36	<36	<36	<36	<55	<55

* = co-elutes with 1,1,2,2-TETRACHLOROETHANE
# = co-elutes with trans 1,3-DICHLOROPROPENE
$ = co-elutes with trans-1,2-DICHLOROETHYLENE

@ = results based on sample dilution

REVIEWED BY: PN QC: K.M.

ENSR ANALYTICAL LABORATORY
QUALITY CONTROL SUMMARY
HALOGENATED VOLATILES IN SOIL

PROJECT NO: 8500-089-021B

CLIENT: UNIFIRST

METHOD: SW846 3580/80(

SAMPLING SITE: WOBURN, MA.

FIELD ID:	MB890189	LF890198	LF890199
ENSR ID:			
DATE ANALYZED:	03/05/89	03/05/89	03/05/89

COMPOUND	UG/KG	% RECOVERY	% RECOVERY
METHYLENE CHLORIDE	<62	142%	138%
trans 1,2-DICHLOROETHYLENE @	<62	89%	94%
TRICHLOROETHYLENE	<25	96%	91%
TETRACHLOROETHYLENE *	<25	69%	64%
CHLOROFORM $	<62		
BROMODICHLOROMETHANE	<25		
CHLORODIBROMOMETHANE	<25		
BROMOFORM	<62		
1,1-DICHLOROETHYLENE	<62		
1,2-DICHLOROETHANE	<62		
1,1,1-TRICHLOROETHANE	<25		
CARBON TETRACHLORIDE	<25		
1,2-DICHLOROPROPANE	<62		
cis1,3-DICHLOROPROPENE	<62		
1,1,2-TRICHLOROETHANE #	<62		

* = co-elutes with 1,1,2,2-TETRACHLOROETHANE
# = co-elutes with trans 1,3-DICHLOROPROPENE
@ = co-elutes with Chloroform
$ = co-elutes with trans-1,2-Dichloroethylene

Reviewed by: PN

QC: B. 222

ENSR ANALYTICAL LABORATORY
SUMMARY OF ANALYTICAL RESULTS
PERCHLOROETHYLENE IN SOIL GAS

PROJECT NO: 8500-089-0218

CLIENT: UNIFIRST METHOD: ENSR

SAMPLING SITE: WOBURN, MA. DATE RECEIVED: 03/02/89

FIELD ID:	3289-1	3289-2	3289-3	3289-4	3289-5	3289-6
ENSR ID:	66118	66119	66120	66121	66122	66123
DATE ANALYZED:	03/02/89	03/02/89	03/03/89	03/02/89	03/03/89	03/03/89
COMPOUND	PPB	PPB	PPB	PPB	PPB	PPB
PERCHLOROETHYLENE	<20	300	34000	22000	6020	4900

Reviewed by: PN QC: M.M.

ENSR ANALYTICAL LABORATORY
QUALITY CONTROL SUMMARY
PERCHLOROETHYLENE IN SOIL GAS

PROJECT NO: 8500-089-021B

CLIENT: UNIFIRST METHOD: ENSR

SAMPLING SITE: WOBURN, MA.

FIELD ID:	MB89196	MB89197
ENSR ID:		
DATE ANALYZED:	03/02/89	03/03/89

COMPOUND	PPB	PPB
PERCHLOROETHYLENE	<20	<20

Reviewed by: PN QC: H.M.

CHAIN OF CUSTODY SHEETS

AND

SAMPLE RECEIVING CHECKLISTS

8500-089-0210

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
UNIFIRST	WOBURN MA.

Project No	Field Logbook No
3140-001-009	

Sampler (Signature)	Chain of Custody Tape No
John Dadoly Lawrence Parnell	

ANALYSES

Sample No / Identification	Date	Time	Lab Sample Number	Type of Sample	Field Extractable VOC's	~~regular VOC's (Dry)~~					REMARKS
VB1-1	2/23/89	9:30	65925	2 VOA's Soil in Meat	✓						
VB1-2	↓	"	65926	↓	✓						
VB2-1		11:30	65927		✓						
VB2-2		"	65928		✓						
VB2-3		"	65929		✓						
VB3-1		14:00	65930		✓						
VB3-2		"	65931		✓						
VB3-3	↓	"	65932	↓	✓						

Relinquished by: (Signature)	Date	Time	Received by (Signature)	Date	Time
John Dadoly	2/23/89	4:25			
Relinquished by (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by. (Signature)	Date	Time	Received for Laboratory. (Signature)	Date	Time
			James Powers	2/23/89	4:25

Sample Disposal Method	Disposed of by. (Signature)	Date	Time

SAMPLE COLLECTOR

ANALYTICAL LABORATORY

Environmental Research and Technology, Inc.
33 Industrial Way
Wilmington, MA 01887
617-657-4290

ERT

Nº 26549

71 3 81

8500-089-021A

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
UNIFIRST	WOBURN MA

Project No	Field Logbook No
3140-001-009	

Sampler (Signature)	Chain of Custody Tape No
John Dadoly Lauren Parnell	

ANALYSES

Sample No / Identification	Date	Time	Lab Sample Number	Type of Sample	Field Extractable VOC's	regular VOC's (dry)					REMARKS
VB3-4	2/23/89	14:00	65933	2 VOA's Soil in MeOH	✓						
VB3-5			65934	"	✓						
VB1-1		9:30	65936	2 VOA's SOIL		✓					CONTACT TIM
VB1-2		"	65937			✓					COSGRAVE BEFORE
VB2-1		11:30	65938			✓					ANALYZING ANY
VB2-2		"	65939			✓					REGULAR VOC's (dry)
VB2-3		"	65940			✓					
VB3-1		14:00	65941			✓					

Relinquished by (Signature)	Date	Time	Received by. (Signature)	Date	Time
John P. Dadoly	2/23/89	4:25			
Relinquished by: (Signature)	Date	Time	Received by (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received for Laboratory (Signature)	Date	Time
			James Powers	2/23/89	4:25

Sample Disposal Method	Disposed of by. (Signature)	Date	Time

SAMPLE COLLECTOR

ANALYTICAL LABORATORY

Environmental Research and Technology, Inc.
33 Industrial Way
Wilmington, MA 01887
617-657-4290

ERT

Nº 26550

8500-089-0 A

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
UNIFIRST	WOBURN
Project No	**Field Logbook No**
3140-001-009	
Sampler: (Signature) John Dadoly, Lauren Powell	**Chain of Custody Tape No.**

ANALYSES

Sample No./ Identification	Date	Time	Lab Sample Number	Type of Sample	Region VOC's (Dry)	Field extractable VOC's					REMARKS
VB3-2	2/23/89	14:00	65942	2 VOA's SOIL	✓						CONTACT TIM
VB3-3	↓	↓	65943	↓	✓						COSHRAVE BEFORE
VB3-4			65944		✓						ANALYZING ANY
VB3-5	↓	↓	65945	↓	✓						REGULAR VOC'S (dry)
VB3-6	↓	↓	65946	↓	✓						
VB3-6	↓	↓	65935	↓		✓					

Relinquished by: (Signature)	Date	Time	Received by (Signature)	Date	Time
John Dadoly	2/23/89	4:25			
Relinquished by: (Signature)	**Date**	**Time**	**Received by (Signature)**	**Date**	**Time**
Relinquished by: (Signature)	**Date**	**Time**	**Received for Laboratory. (Signature)**	**Date**	**Time**
			James Torres	2/23/89	4:25
Sample Disposal Method	**Disposed of by: (Signature)**			**Date**	**Time**

SAMPLE COLLECTOR

ANALYTICAL LABORATORY

Environmental Research and Technology, Inc.
33 Industrial Way
Wilmington, MA 01887
617-657-4290

ERT

№ 26551

ERT LABORATORIES
SAMPLE RECEIPT CHECKLIST

CLIENT WiFirST PROJECT NO. 8500-089-021A AUTHORIZATION NUMBER 3140-001-009

1. ____ shipped
   ✓ hand-delivered
   NOTES: John Dudley

2. ✓ COC present on receipt
   ____ no COC
   NOTES:

3. ____ COC tape on shipping container
   ✓ no COC tape
   NOTES:

4. ____ samples broken/leaking
   ✓ samples intact of receipt
   ____ other, see notes
   NOTES:

5. ____ ambient on receipt
   ✓ chilled on receipt
   NOTES:

6. ✓ samples preserved correctly
   ____ improper preservatives
   ____ N/A, no recommended preservatives
   ____ other, see notes
   NOTES:

7. ✓ received within holding time
   ____ not received within holding times
   ____ N/A, no recommended holding time
   ____ other, see notes
   NOTES:

8. ____ COC tapes on samples
   ✓ no COC tapes
   NOTES:

9. ____ discrepancies between COC and sample labels
   ✓ no discrepancies noted
   ____ N/A, no COC received
   NOTES:

10. Storage Location R8
Additional comments:

Samples inspected and logged in by: [signature] Date/Time: 7/22/99

8500-089-021

CHAIN OF CUSTODY RECORD

lient/Project Name: UNIFIRST	Project Location: WOBURN
roject No.: 3140-001-009	Field Logbook No
ampler: (Signature) Lawrence Pannell	Chain of Custody Tape No.

ANALYSES

Sample No / dentification	Date	Time	Lab Sample Number	Type of Sample	VOC's (dry)	Field extractable VOC's (w/ MeOH)					REMARKS
VB4-1	3/2/89	8:30	66124	Set of 2 VOA's (SOIL)	✓						
VB4-1M			66129	Set of 2 VOA's (SOIL)		✓					
VB4-2			66125		✓						
VB4-2M			66130			✓					
VB5-1		9:30	66126		✓						
VB5-1M			66131			✓					
VB5-2			66127		✓						
VB5-2M			66132			✓					

	Date	Time		Date	Time
elinquished by: (Signature) Lawrence Pannell	3/2/89	13:08	Received by (Signature)		
elinquished by: (Signature)			Received by: (Signature)		
elinquished by: (Signature)			Received for Laboratory: (Signature) James Powers	3/2/89	1310
ample Disposal Method.			Disposed of by: (Signature)		

AMPLE COLLECTOR

ANALYTICAL LABORATORY

Environmental Research and Technology, Inc.
33 Industrial Way
Wilmington, MA 01887
617-657-4290

ERT

№ 26552

1 3-84

8500-089-021B

CHAIN OF CUSTODY RECORD

lient/Project Name: UNIFIRST	Project Location: WOBURN
roject No.: 3140-001-009	Field Logbook No.
ampler. (Signature): James Pannell	Chain of Custody Tape No

ANALYSES

Sample No / dentification	Date	Time	Lab Sample Number	Type of Sample	regular VOC's (dry)	field extractable VOC's (MeOH)					REMARKS
NPF	3/1/89	20:00	66128	set of 2 VOA's (SOIL)	✓						
VPF-M	"	"	66133	"		✓					

	Date	Time		Date	Time
linquished by: (Signature) James Pannell	3/2/89	13:08	Received by (Signature)		
linquished by: (Signature)			Received by (Signature)		
linquished by: (Signature)			Received for Laboratory: (Signature) James Powers	3/2/89	1310
mple Disposal Method			Disposed of by (Signature)		

AMPLE COLLECTOR

ANALYTICAL LABORATORY

Environmental Research and Technology, Inc.
33 Industrial Way
Wilmington, MA 01887
617-657-4290

ERT

Nº 24449

4 3-84

8500-089-0213

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
Unifirst	Woburn, MA
Project No.	**Field Logbook No.**
3140-001-009	
Sampler. (Signature)	**Chain of Custody Tape No.**
S. Wagner	

ANALYSES

Sample No / Identification	Date	Time	Lab Sample Number	Type of Sample	PERC.						REMARKS
3289-1	3-2-89	–	66118	* Bag	✓						
3289-2		–	66119		✓						
3289-3		1052	66120		✓						
3289-4		1128	66121		✓						
3289-5		1232	66122		✓						
3289-6		1232	66123		✓						

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Steven C. Wagner	3-2-89	1235	Lawrence Pannell	3/2/89	12:35
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Lawrence Pannell	3/2/89	13:08			
Relinquished by: (Signature)	Date	Time	Received for Laboratory: (Signature)	Date	Time
			James Powers	3/2/89	1310
Sample Disposal Method:	Disposed of by: (Signature)			Date	Time

SAMPLE COLLECTOR

* Evacuated Drum Method for Bag Collection

ANALYTICAL LABORATORY

ENSR

974 3 84

ERT LABORATORIES
SAMPLE RECEIPT CHECKLIST

CLIENT UNiFirst PROJECT NO. 8500-089-0213 AUTHORIZATION NUMBER 3140-001-009

1. _____ shipped
   ✓ hand-delivered
   NOTES: Larry Panaelli

2. ✓ COC present on receipt
   _____ no COC
   NOTES:

3. ✓ COC tape on shipping container
   _____ no COC tape
   NOTES:

4. _____ samples broken/leaking
   ✓ samples intact of receipt
   _____ other, see notes
   NOTES:

5. _____ ambient on receipt
   ✓ chilled on receipt
   NOTES:

6. ✓ samples preserved correctly
   _____ improper preservatives
   _____ N/A, no recommended preservatives
   _____ other, see notes
   NOTES:

7. ✓ received within holding time
   _____ not received within holding times
   _____ N/A, no recommended holding time
   _____ other, see notes
   NOTES:

8. _____ COC tapes on samples
   ✓ no COC tapes
   NOTES:

9. _____ discrepancies between COC and sample labels
   ✓ no discrepancies noted
   _____ N/A, no COC received
   NOTES:

10. Storage Location R8
Additional comments: GC (Perc BAGS)

Samples inspected and logged in by: [illegible] Date/Time: 3/5/89

Applied Groundwater Research Ltd.

Stan Feenstra M.Sc., CGWP

The Seasons Building, 220 Britannia Rd. E.
Mississauga, Ontario, Canada L4Z 1S6

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Home: 416-824-1304

Monday July 30, 1990

Environmental Project Control, Inc.
Two Grafton Common
Post Office Box 536
Grafton, MA
01519

ATTENTION: Mr. Tim Cosgrave

RE: UNIFIRST SITE, VAPOR TRANSPORT

Dear Tim,

Further to our telephone conversation on Friday July 27, 1990 I have considered some additional issues regarding the transport of PCE vapors upward from the water table into the overlying soils at the Unifirst site.

Previous simulations of vapor transport (Applied Groundwater Research Ltd. report to John Cherry, dated March 15, 1989) suggested that PCE concentrations of up to 1,500 µg/L in the groundwater could potentially result in PCE concentrations of several hundred µg/kg in the overlying soils. With the scenario that a pump and treat system is implemented to remediate the PCE-contaminated groundwater and a vapor extraction system is subsequently implemented to remediate the PCE-contaminated soils, the question is: To what concentration must PCE concentrations in the groundwater be reduced to prevent contamination of the overlying soils via vapor transport to levels exceeding the clean-up target of 36.7 µg/kg?

For this scenario, the simulations performed previously are still valid. The vapor concentration profiles shown for the various cases in Figures 1 through 7 are identical because concentrations are expressed as concentrations relative to the initial concentration at the water table. The calculated PCE concentrations in soil can be recalculated for a lower groundwater concentration. To ensure that PCE concentrations in soil remain below approximately 40 µg/kg, the initial vapor concentration at the water table must be less than 25 µg/L and the corresponding groundwater concentration must be less than 85 µg/L. The recalculated soil concentrations are attached here and referred to as Tables 1R, 2R and 3R.

I hope that this letter provides the information you needed.

Best Regards,

Stan Feenstra

Stan Feenstra

Applied Groundwater Research Ltd.

Transmitted via Facsimile

TABLE 1R. CALCULATED PCE CONCENTRATIONS IN SOIL FOR COVERED CASE FOR Øw=0.10

TIME - 1 YEAR

Depth below cover (cm)	Relative C(air)	C(air) (µg/L)	C(water) (µg/L)	C(solids) (µg/kg)	C(total soil) (µg/kg)
10	0.258	6	22	8	10
20	0.264	7	22	8	10
30	0.275	7	23	9	11
40	0.290	7	25	9	11
50	0.310	8	26	10	12
60	0.334	8	28	10	13
70	0.362	9	31	11	14
80	0.394	10	33	12	15
90	0.429	11	36	13	16
100	0.468	12	40	14	18
110	0.511	13	43	16	20
120	0.557	14	47	17	21
130	0.606	15	51	19	23
140	0.657	16	56	20	25
150	0.710	18	60	22	27
160	0.766	19	65	24	29
170	0.823	21	70	25	31
180	0.881	22	75	27	34
190	0.941	24	80	29	36
200	1.000	25	85	31	38

TIME - 2 YEARS

Depth below cover (cm)	Relative C(air)	C(air) (µg/L)	C(water) (µg/L)	C(solids) (µg/kg)	C(total soil) (µg/kg)
10	0.562	14	48	17	21
20	0.568	14	48	18	22
30	0.572	14	49	18	22
40	0.582	15	49	18	22
50	0.594	15	50	18	23
60	0.608	15	52	19	23
70	0.625	16	53	19	24
80	0.644	16	55	20	25
90	0.666	17	57	21	25
100	0.689	17	59	21	26
110	0.714	18	61	22	27
120	0.742	19	63	23	28
130	0.770	19	65	24	29
140	0.800	20	68	25	31
150	0.832	21	71	26	32
160	0.864	22	73	27	33
170	0.897	22	76	28	34
180	0.931	23	79	29	36
190	0.966	24	82	30	37
200	1.000	25	85	31	38

C(air) at Source (µg/L)	25	Bulk Density (g/cm3)	1.85
Henry's Constant	0.294	Water Porosity	0.1
Distribution coefficient	0.364	Air Porosity	0.2

7/30/90

TABLE 1R. CALCULATED PCE CONCENTRATIONS IN SOIL FOR COVERED CASE FOR Øw=0.10

TIME - 5 YEARS

Depth below cover (cm)	Relative C(air)	C(air) (µg/L)	C(water) (µg/L)	C(solids) (µg/kg)	C(total soil) (µg/kg)
10	0.991	25	84	31	38
20	0.912	23	78	28	35
30	0.913	23	78	28	35
40	0.915	23	78	28	35
50	0.918	23	78	28	35
60	0.921	23	78	29	35
70	0.924	23	79	29	35
80	0.928	23	79	29	35
90	0.932	23	79	29	36
100	0.937	23	80	29	36
110	0.942	24	80	29	36
120	0.948	24	81	29	36
130	0.953	24	81	30	36
140	0.960	24	82	30	37
150	0.966	24	82	30	37
160	0.972	24	83	30	37
170	0.979	24	83	30	37
180	0.986	25	84	31	38
190	0.993	25	84	31	38
200	1.000	25	85	31	38

TIME - 10 YEARS

Depth below cover (cm)	Relative C(air)	C(air) (µg/L)	C(water) (µg/L)	C(solids) (µg/kg)	C(total soil) (µg/kg)
10	0.994	25	85	31	38
20	0.994	25	85	31	38
30	0.994	25	85	31	38
40	0.994	25	85	31	38
50	0.994	25	85	31	38
60	0.994	25	85	31	38
70	0.995	25	85	31	38
80	0.995	25	85	31	38
90	0.995	25	85	31	38
100	0.996	25	85	31	38
110	0.996	25	85	31	38
120	0.996	25	85	31	38
130	0.997	25	85	31	38
140	0.997	25	85	31	38
150	0.998	25	85	31	38
160	0.998	25	85	31	38
170	0.999	25	85	31	38
180	0.999	25	85	31	38
190	1.000	25	85	31	38
200	1.000	25	85	31	38

C(air) at Source (µg/L)	25	Bulk Density (g/cm3)	1.85
Henry's Constant	0.294	Water Porosity	0.1
Distribution coefficient	0.364	Air Porosity	0.2

7/30/90

TABLE 2R. CALCULATED PCE CONCENTRATIONS IN SOIL FOR COVERED CASE FOR Øw=0.15

TIME - 1 YEAR

Depth below cover (cm)	Relative C(air)	C(air) (µg/L)	C(water) (µg/L)	C(solids) (µg/kg)	C(total soil) (µg/kg)
10	0.008	0	1	0	0
20	0.011	0	1	0	0
30	0.015	0	1	0	1
40	0.021	1	2	1	1
50	0.030	1	3	1	1
60	0.043	1	4	1	2
70	0.060	1	5	2	2
80	0.082	2	7	3	3
90	0.111	3	9	3	4
100	0.147	4	13	5	6
110	0.192	5	16	6	8
120	0.246	6	21	8	10
130	0.310	8	26	10	12
140	0.384	10	33	12	15
150	0.469	12	40	15	19
160	0.562	14	48	17	22
170	0.664	17	56	21	26
180	0.772	19	68	24	31
190	0.885	22	75	27	35
200	1.000	25	85	31	40

TIME - 2 YEARS

Depth below cover (cm)	Relative C(air)	C(air) (µg/L)	C(water) (µg/L)	C(solids) (µg/kg)	C(total soil) (µg/kg)
10	0.083	2	7	3	3
20	0.089	2	8	3	4
30	0.100	2	8	3	4
40	0.115	3	10	4	5
50	0.135	3	11	4	5
60	0.159	4	14	5	6
70	0.188	5	16	6	8
80	0.223	6	19	7	9
90	0.262	7	22	8	10
100	0.307	8	26	10	12
110	0.358	9	30	11	14
120	0.413	10	35	13	16
130	0.474	12	40	15	19
140	0.539	13	46	17	21
150	0.609	15	52	19	24
160	0.682	17	58	21	27
170	0.759	19	65	23	30
180	0.838	21	71	26	33
190	0.918	23	78	28	37
200	1.000	25	85	31	40

C(air) at Source (µg/L)	25	Bulk Density (g/cm3)	1.85
Henry's Constant	0.294	Water Porosity	0.15
Distribution coefficient	0.364	Air Porosity	0.15

7/30/90

TABLE 2R. CALCULATED PCE CONCENTRATIONS IN SOIL FOR COVERED CASE FOR Øw=0.15

TIME - 5 YEARS

Depth below cover (cm)	Relative C(air)	C(air) (µg/L)	C(water) (µg/L)	C(solids) (µg/kg)	C(total soil) (µg/kg)
10	0.391	10	33	12	16
20	0.397	10	34	12	16
30	0.406	10	35	13	16
40	0.419	10	36	13	17
50	0.435	11	37	13	17
60	0.455	11	39	14	18
70	0.479	12	41	15	19
80	0.505	13	43	16	20
90	0.535	13	45	17	21
100	0.567	14	48	18	23
110	0.603	15	51	19	24
120	0.640	16	54	20	26
130	0.680	17	58	21	27
140	0.722	18	61	22	29
150	0.766	19	65	24	31
160	0.811	20	69	25	32
170	0.857	21	73	27	34
180	0.904	23	77	28	36
190	0.952	24	81	29	38
200	1.000	25	85	31	40

TIME - 10 YEARS

Depth below cover (cm)	Relative C(air)	C(air) (µg/L)	C(water) (µg/L)	C(solids) (µg/kg)	C(total soil) (µg/kg)
10	0.707	18	60	22	28
20	0.710	18	60	22	28
30	0.715	18	61	22	28
40	0.721	18	61	22	29
50	0.729	18	62	23	29
60	0.739	18	63	23	29
70	0.750	19	64	23	30
80	0.763	19	65	24	30
90	0.777	19	66	24	31
100	0.792	20	67	25	32
110	0.809	20	69	25	32
120	0.828	21	70	26	33
130	0.847	21	72	26	34
140	0.867	22	74	27	35
150	0.888	22	75	27	35
160	0.909	23	77	28	36
170	0.932	23	79	29	37
180	0.954	24	81	30	38
190	0.977	24	83	30	39
200	1.000	25	85	31	40

C(air) at Source (µg/L)	25	Bulk Density (g/cm3)	1.85
Henry's Constant	0.294	Water Porosity	0.15
Distribution coefficient	0.364	Air Porosity	0.15

7/30/90

TABLE 3R. CALCULATED PCE CONCENTRATIONS IN SOIL FOR COVERED CASE FOR Øw=0.20

TIME - 1 YEAR

Depth below cover (cm)	Relative C(air)	C(air) (µg/L)	C(water) (µg/L)	C(solids) (µg/kg)	C(total soil) (µg/kg)
10	0.000	0	0	0	0
20	0.000	0	0	0	0
30	0.000	0	0	0	0
40	0.000	0	0	0	0
50	0.000	0	0	0	0
60	0.000	0	0	0	0
70	0.000	0	0	0	0
80	0.000	0	0	0	0
90	0.000	0	0	0	0
100	0.000	0	0	0	0
110	0.001	0	0	0	0
120	0.004	0	0	0	0
130	0.013	0	1	0	1
140	0.033	1	3	1	1
150	0.075	2	6	2	3
160	0.155	4	13	5	6
170	0.286	7	24	9	12
180	0.477	12	41	15	20
190	0.722	18	61	22	30
200	1.000	25	85	31	41

TIME - 2 YEARS

Depth below cover (cm)	Relative C(air)	C(air) (µg/L)	C(water) (µg/L)	C(solids) (µg/kg)	C(total soil) (µg/kg)
10	0.000	0	0	0	0
20	0.000	0	0	0	0
30	0.000	0	0	0	0
40	0.000	0	0	0	0
50	0.000	0	0	0	0
60	0.000	0	0	0	0
70	0.001	0	0	0	0
80	0.003	0	0	0	0
90	0.006	0	0	0	0
100	0.001	0	0	0	0
110	0.024	1	2	1	1
120	0.044	1	4	1	2
130	0.078	2	7	2	3
140	0.131	3	11	4	5
150	0.208	5	18	6	9
160	0.314	8	27	10	13
170	0.450	11	38	14	19
180	0.615	15	52	19	26
190	0.801	20	68	25	33
200	1.000	25	85	31	41

C(air) at Source (µg/L)	25	Bulk Density (g/cm3)	1.85
Henry's Constant	0.294	Water Porosity	0.2
Distribution coefficient	0.364	Air Porosity	0.1

7/30/90

TABLE 3R. CALCULATED PCE CONCENTRATIONS IN SOIL FOR COVERED CASE FOR Øw=0.20

TIME - 5 YEARS

Depth below cover (cm)	Relative C(air)	C(air) (µg/L)	C(water) (µg/L)	C(solids) (µg/kg)	C(total soil) (µg/kg)
10	0.003	0	0	0	0
20	0.005	0	0	0	0
30	0.007	0	1	0	0
40	0.011	0	1	0	0
50	0.017	0	1	1	1
60	0.026	1	2	1	1
70	0.039	1	3	1	2
80	0.056	1	5	2	2
90	0.080	2	7	2	3
100	0.112	3	9	3	5
110	0.152	4	13	5	6
120	0.203	5	17	6	8
130	0.265	7	23	8	11
140	0.340	8	29	11	14
150	0.426	11	36	13	18
160	0.525	13	45	16	22
170	0.633	16	54	20	26
180	0.750	19	64	23	31
190	0.874	22	74	27	36
200	1.000	25	85	31	41

TIME - 10 YEARS

Depth below cover (cm)	Relative C(air)	C(air) (µg/L)	C(water) (µg/L)	C(solids) (µg/kg)	C(total soil) (µg/kg)
10	0.051	1	4	2	2
20	0.056	1	5	2	2
30	0.065	2	6	2	3
40	0.079	2	7	2	3
50	0.096	2	8	3	4
60	0.119	3	10	4	5
70	0.146	4	12	5	6
80	0.179	4	15	6	7
90	0.217	5	18	7	9
100	0.261	7	22	8	11
110	0.312	8	27	10	13
120	0.368	9	31	11	15
130	0.431	11	37	13	18
140	0.500	12	43	15	21
150	0.574	14	49	18	24
160	0.653	16	56	20	27
170	0.736	18	63	23	31
180	0.822	21	70	25	34
190	0.910	23	77	28	38
200	1.000	25	85	31	41

C(air) at Source (µg/L)	25	Bulk Density (g/cm3)	1.85
Henry's Constant	0.294	Water Porosity	0.2
Distribution coefficient	0.364	Air Porosity	0.1

7/30/90

Applied Groundwater Research Ltd.

Stan Feenstra M.Sc - Hydrogeochemist
The Seasons Building, 220 Britannia Rd E.
Mississauga, Ontario, Canada L4Z 1S6

Office: 416-890-9150
Home. 416-824-1304

Draft Report on:

SIMULATION OF PCE VAPOR MIGRATION AND CONTAMINATION OF SOILS BY PCE VAPORS

Prepared for:

Dr. John A. Cherry
Geoflow Ltd.
26 Academy Cresent
Waterloo, Ontario
N2L 5H7
(519)-884-4448

Date of Draft Report:
March 15, 1989

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2. Calculated PCE concentrations in soil for covered case for Øw=0.15.
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2. PCE in soil vapor for covered case after 2 years.
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6. PCE in soil vapor for uncovered case after 0.5 year.
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1. INTRODUCTION

This report describes the results of preliminary simulations of the rate and extent of migration of tetrachloroethylene (PCE) vapors upward from contaminated groundwater through soils and the potential for these vapors to cause contamination of the overlying soils. The conditions used for these simulations were selected to reflect the field conditions at the Unifirst site in Woburn, Massachusetts. At this site, there is concern regarding the degree to which PCE vapors migrating upward from PCE contaminated groundwater in the bedrock has resulted in contamination of the overlying soils. In addition, there is concern that if the presently contaminated soil is removed by excavation, PCE vapor migration upward from the bedrock may result in contamination of the replaced fill materials. Vapor migration simulations were performed using existing one-dimensional analytical solutions for diffusive vapor transport in the vadose (unsaturated) zone in porous media.

2. VAPOR MIGRATION SCENARIOS

In situations where PCE or other volatile organic chemicals are present in shallow groundwater, the soil air in equilibrium with the groundwater will contain concentrations of PCE. The partitioning of PCE between the groundwater and the soil air will be determined by the value of Henry's Constant for PCE at the prevailing temperature. For the situation where PCE contaminated groundwater flows beneath previously uncontaminated soils in the vadose zone, there will be a chemical concentration gradient between the higher PCE concentrations in the soil air at the water table and the lower PCE concentrations above. This gradient will result in the migration of PCE vapors upward by diffusion.

The migration of PCE vapors upward will depend on the gaseous phase diffusion coefficient for PCE, the tortuosity of the air-filled pore space through which the PCE vapor must diffuse, attenuation of vapor migration due to dissolution of the PCE vapors in the soil water and attenuation by sorption of PCE on the soil solids. Vapor migration will also depend on whether the ground surface boundary is covered and is relatively impervious to vapors, or is uncovered and allows vapor to pass readily into the atmosphere. For the covered condition, vapor migration will occur more slowly because the diffusion gradients will decrease as vapor concentrations build-up in the vadose zone. However, the ultimate distribution of vapor concentrations will result in a uniform vertical profile of high vapor concentrations throughout the vadose zone. For the uncovered condition, vapor migration will occur more raidly because diffusion gradients are higher However, because vapors are released to the atmosphere, vapor concentrations cannot increase to the same level throughout the vadose zone as is the case for the covered condition

3. ANALYTICAL SOLUTIONS

The migration of PCE vapor for the covered case was simulated using a one-dimensional analytical solution described by Crank (1975). The relative concentration of vapor in the soil air at a specified time and distance from the source compared to the soil air concentration at the source is calculated by:

$$\frac{C_a(x,t)}{C_a^o} = 1 - \frac{4}{\pi} \sum \frac{(-1)^n}{(2n+1)} \exp\left\{\frac{-D_e (2n+1)^2 \pi^2 t}{4 L^2}\right\} \cos \frac{(2n+1)\pi (L-x)}{2L} \quad \textit{where } n = 0 \rightarrow \infty$$

The migration of PCE vapor for the uncovered case was simulated using a one-dimensional analytical described by Green and Evans (1985). The relative concentration of vapor in the soil air at a specified time and distance from the source compared to the soil air concentration at the source is calculated by:

$$\frac{C_a(x,t)}{C_a^o} = \frac{2}{\pi} \sum \sin\left\{\frac{n \pi x}{L}\right\} \frac{1}{n} \left[1 - \exp\left\{\frac{-D_e n^2 \pi^2 t}{L^2}\right\}\right] \quad \textit{where } n = 1 \rightarrow \infty$$

Where:

$C_a(x,t)$	is the vapor concentration in soil air at distance ,x, from the source at time, t
C_a^o	is the vapor concentration in soil air at the source
$\frac{C_a(x,t)}{C_a^o}$	is the relative vapor concentration
D_e	is the effective diffusion coefficient for vapor in the medium
L	is the height of the soil column from the source to the ground surface

The effective diffusion coefficient for a reactive vapor through the vadose zone is described by:

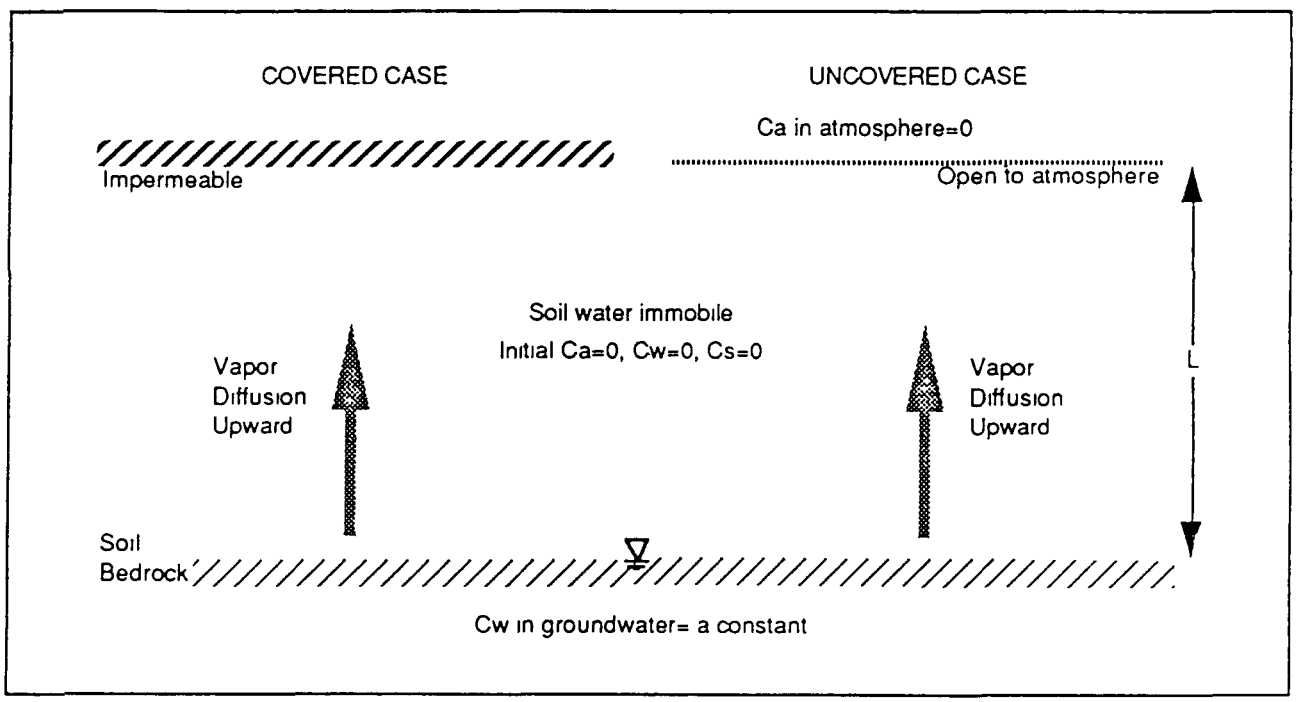
$$D_e = \frac{\tau^* D_o}{R} \qquad \text{for} \quad \tau^* = \frac{\emptyset_a^{3.33}}{\emptyset_t^2} \quad \text{and} \quad R = 1 + \frac{1}{H_c} \frac{\rho_b K_d + \emptyset_w}{\emptyset_a}$$

Where:

D_o	is the free air diffusion coefficient
τ^*	is the effective tortuosity. Relation described by Karimi *et al.* (1987)
R	is the retardation factor. Relation described by Baehr (1987)
$\emptyset_a$	is the air-filled porosity
$\emptyset_w$	is the water-filled porosity or volumetric water content

$\emptyset_t$	is the total porosity
H_c	is the dimensionless Henry's Constant = $\frac{C_a}{C_w}$
ρ_b	is the dry bulk density of the medium
K_d	is the distribution coefficient = $\frac{C_s}{C_w}$ Estimated by $K_d = K_{oc} f_{oc}$
C_a	is the chemical concentration in the soil air
C_w	is the chemical concentration in the soil water
C_s	is the chemical concentration on the soil solids
K_{oc}	is the organic carbon partition coefficient. PCE value from Schwille (1988)
f_{oc}	is the organic carbon content of the soil solids

The initial and boundary conditions for the covered and uncovered cases are shown in the following sketch.



For both cases, the source of PCE vapor is the groundwater in which the dissolved concentration of PCE remains constant with time. The PCE vapor concentration at the source is defined by the dissolved concentration in the groundwater and Henry's Constant The initial PCE concentrations in the overlying soil air, soil water and soil solids is zero PCE concentrations increase with time in the vadose zone as PCE vapor diffuses upward from the source For the covered case, the soil is capped by an impermeable cover and no vapor is released to the

atmosphere. This case would represent areas of soil which are covered by buildings, parking lots and roadways. This case is most representative of the conditions at the Unifirst site. For the uncovered case, the soil at the ground surface is open to the atmosphere and there is a sufficient dilution effect to maintain a PCE vapor concentration of zero in the atmosphere. This case would most represent an unobstructed ground surface such as a lawn area.

In both the covered and uncovered cases, it is assumed that the soil water is immobile, that is, there is no infiltration of water downward through the vadose zone. This is a reasonable assumption for the covered case and may also be appropriate for the uncovered case if the time period considered for diffusion is short relative to the time interval between major infiltration events. The infiltration of water downward through the vadose zone will restrict the upward diffusion of vapors.

The input parameters used in the simulations were selected to reflect typical conditions at the Unifirst site. A soil thickness (L) of 2 m (6.6 feet) was specified. A dry bulk density (ρ_b) of 1.85 g/cm^3 and a total porosity ($\emptyset_t$) of 0.3 was specified to reflect a silty sand. A fraction organic carbon (f_{oc}) of 0.001 or organic carbon content of 0.1 weight % was specified. For PCE, the Henry's Constant (H_c) at 10°C, free-air diffusion coefficient (D_o) and organic carbon partition coefficient (K_{oc}) was specified as 0.294 (from Gossett, 1987), 7.4 x 10^{-2} cm^2/s (estimated from Perry and Chilton, 1973) and 364 (from Schwille, 1988) respectively. A PCE concentration in the groundwater of 1,500 µg/L was specified. This concentration reflects the highest concentration observed in shallow groundwater at the Unifirst site.

All the aforementioned parameters remained constant for all the simulations. The air-filled porosity ($\emptyset_a$) and water-filled porosity ($\emptyset_w$) were varied in concert to reflect different soil moisture conditions. Water-filled porosity or volumetric water contents of 0.10, 0.15 and 0 20 were specified for various simulations. For a silty sand, a water content of 0.15 likely represents field capacity. Time (t) was varied from 0.1 to 10 years to assess the time period required for PCE vapor profiles to develop in the vadose zone.

4. SIMULATION RESULTS

A groundwater PCE concentration of 1,500 µg/L results in a soil air source concentration of 440 µg/L or approximately 65,000 ppb (volume/volume). This soil air concentration is the same order as the maximum soil air concentration of 34,000 ppb (v/v) measured at the Unifirst site

The results of the simulations for the covered case are listed in Tables 1, 2 and 3 and are plotted in Figures 1, 2, 3 and 4 Figure 1, 2, 3 and 4 show the PCE concentrations in soil air through the vadose

zone for varying water contents for time periods of 1 year, 2 years, 5 years and 10 years respectively. At later times, the vapor concentration profiles approach a uniform concentration equal to the source concentration. This pattern is due to the impermeable cover at the ground surface. These figures illustrate that the rate of vapor diffusion upward through the soil is highly dependent on the water content of the soil. The differences in the vapor profiles for water contents of 0.10 and 0.20 are substantial. For the lower water content of 0.10, significant vapor concentrations occur throughout the soil column after only 1 year. For the higher water content of 0.20, more than 10 years are required for the development of comparable concentration profiles. There are two principal reasons for this dependence on water content. Firstly, higher water content reduces the proportion of the air-filled pore space and increases the tortuosity of the pathways for vapor diffusion. This effect reduces the effective diffusion coefficient. Secondly, higher water contents cause a larger mass of PCE to be removed from the soil air due to dissolution into the soil water. This effect increases the retardation factor, thereby also reduces the effective diffusion coefficient for PCE.

Given the PCE concentration profiles calculated for the soil air, it is possible to calculate the concentration of PCE dissolved in the soil water and sorbed on the soil solids for equilibrium conditions using the relations described in Section 3.

For a given C_a, K_d and H_c:

$$K_d = \frac{C_s}{C_w} \quad \text{and} \quad H_c = \frac{C_a}{C_w}$$

Therefore:

$$C_s = \frac{K_d\, C_a}{H_c} \quad \text{and} \quad C_w = \frac{C_a}{H_c}$$

For a soil sample containing solids, soil water and soil air, all phases are included in a soil analysis for volatiles when the sample is extracted using a solvent. The total soil concentration in the soil (C_t) expressed typically as mass of chemical per dry weight of soil can be calculated by:

$$C_t = \frac{(\rho_b\, C_s) + (\varnothing_w\, C_w) + (\varnothing_a\, C_a)}{\rho_b}$$

where ρ_b, C_s, $\varnothing_w$, C_w, $\varnothing_a$ and C_a are expressed in compatible units.

The calculated total soil concentrations for the covered case simulations are listed in Tables 1, 2 and 3. Relative vapor concentrations exceeding 0.75 result in total soil PCE concentrations in the

range of 500 to 730 μg/kg (ppb). Relative vapor concentrations of 0.25 to 0.75 result in total soil concentrations of 175 to 500 μg/kg. Relative vapor concentrations of less than 0 01 result in total soil concentrations of less than approximately 10 μg/kg. These relations are applicable for the specified PCE concentration in the groundwater. If groundwater concentrations are higher, the soil air PCE concentrations will be higher and the corresponding total soil concentrations will also be proportionally higher.

The results of the simulations for the uncovered case are shown in Figure 5, 6 and 7 for times of 0.1 year, 0.5 year and 1 year respectively. Unlike those for the covered case, at later times the vapor concentration profiles approach a uniform gradient across the vadose zone between the source concentration and the zero concentration at the ground surface. Also, unlike the covered case, the vapor concentration profiles for the uncovered case develop much more rapidly, generally less than a year. Like the covered case, the vapor concentration profiles for the uncovered case are highly dependent on the water content of the soil. The relations between the relative vapor concentrations and the total soil concentrations described previously for the covered case are also applicable to the uncovered case.

5. CONCLUSIONS

The results of the PCE vapor migration simulations indicate that the presence of contaminated groundwater containing 1,500 μg/L PCE underlying the soil can potentially contaminate the soil to levels of up to several hundred μg/kg (ppb). The time required for such profiles to develop will depend on the soil water content and whether the soil column is covered by an impermeable cap. Profiles will develop more rapidly when water contents are lower. Time periods of several years may be required to develop soil contamination profiles for the covered case and approximately a year or less for the uncovered case. All the simulations are necessarily based on simplified conditions and were performed assuming a constant concentration of PCE in the groundwater and a uniform distribution of soil properties such as water content, porosity and soil organic carbon content. For conditions where the groundwater concentrations vary with time or the soil properties vary spatially, the vapor concentration profiles will differ from those presented here.

6. REFERENCES

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TABLE 1 CALCULATED PCE CONCENTRATIONS IN SOIL FOR COVERED CASE FOR Øw=0.10

TIME - 1 YEAR

Depth below cover (cm)	Relative C(air)	C(air) (µg/L)	C(water) (µg/L)	C(solids) (µg/kg)	C(total soil) (µg/kg)
10	0 258	113	385	140	173
20	0.264	116	395	144	178
30	0 275	121	412	150	185
40	0.290	128	435	158	196
50	0 310	136	464	169	209
60	0.334	147	500	182	225
70	0 362	159	541	197	244
80	0.394	173	589	214	265
90	0.429	189	642	234	289
100	0 468	206	701	255	315
110	0.511	225	765	278	344
120	0.557	245	833	303	375
130	0.606	266	906	330	408
140	0.657	289	983	358	442
150	0.710	313	1063	387	478
160	0.766	337	1146	417	516
170	0.823	362	1232	448	554
180	0.881	388	1319	480	593
190	0.941	414	1408	512	633
200	1.000	440	1497	545	673

TIME - 2 YEARS

Depth below cover (cm)	Relative C(air)	C(air) (µg/L)	C(water) (µg/L)	C(solids) (µg/kg)	C(total soil) (µg/kg)
10	0.562	247	840	306	378
20	0.566	249	847	308	381
30	0.572	252	857	312	385
40	0.582	256	871	317	392
50	0.594	261	889	323	400
60	0.608	268	910	331	409
70	0.625	275	936	341	421
80	0.644	283	964	351	434
90	0.666	293	996	363	448
100	0.689	303	1031	375	464
110	0.714	314	1069	389	481
120	0.742	326	1110	404	499
130	0.770	339	1153	420	519
140	0 800	352	1198	436	539
150	0 832	366	1245	453	560
160	0.864	380	1293	471	582
170	0.897	395	1343	489	604
180	0.931	410	1394	507	627
190	0.966	425	1445	526	650
200	1.000	440	1497	545	673

C(air) at Source (µg/L)	440	Bulk Density (g/cm3)	1 85
Henry's Constant	0.294	Water Porosity	0 1
Distribution coefficient	0 364	Air Porosity	0 2

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TABLE 1. CALCULATED PCE CONCENTRATIONS IN SOIL FOR COVERED CASE FOR Øw=0 10

TIME - 5 YEARS

Depth below cover (cm)	Relative C(air)	C(air) (µg/L)	C(water) (µg/L)	C(solids) (µg/kg)	C(total soil) (µg/kg)
10	0.991	436	1483	540	667
20	0 912	401	1365	497	614
30	0.913	402	1367	497	615
40	0 915	403	1370	499	616
50	0 918	404	1373	500	618
60	0 921	405	1378	502	620
70	0 924	407	1383	503	622
80	0.928	408	1389	505	625
90	0.932	410	1395	508	628
100	0.937	412	1402	510	631
110	0.942	414	1410	513	634
120	0 948	417	1418	516	638
130	0.953	419	1427	519	642
140	0.960	422	1436	523	646
150	0.966	425	1445	526	650
160	0 972	428	1455	530	655
170	0.979	431	1465	533	659
180	0.986	434	1476	537	664
190	0.993	437	1486	541	669
200	1.000	440	1497	545	673

TIME - 10 YEARS

Depth below cover (cm)	Relative C(air)	C(air) (µg/L)	C(water) (µg/L)	C(solids) (µg/kg)	C(total soil) (µg/kg)
10	0 994	437	1487	541	669
20	0.994	437	1487	541	669
30	0.994	437	1487	541	669
40	0.994	437	1488	541	669
50	0.994	437	1488	542	669
60	0.994	438	1488	542	669
70	0.995	438	1489	542	670
80	0.995	438	1489	542	670
90	0.995	438	1489	542	670
100	0.996	438	1490	542	670
110	0.996	438	1490	543	670
120	0 996	438	1491	543	671
130	0.997	439	1492	543	671
140	0.997	439	1492	543	671
150	0.998	439	1493	543	672
160	0.998	439	1494	544	672
170	0 999	439	1494	544	672
180	0.999	440	1495	544	673
190	1.000	440	1496	544	673
200	1 000	440	1497	545	673

C(air) at Source (µg/L)	440	Bulk Density (g/cm3)	1 85
Henry's Constant	0 294	Water Porosity	0 1
Distribution coefficient	0 364	Air Porosity	0 2

TABLE 2 CALCULATED PCE CONCENTRATIONS IN SOIL FOR COVERED CASE FOR Øw=0.15

TIME - 1 YEAR

Depth below cover (cm)	Relative C(air)	C(air) (µg/L)	C(water) (µg/L)	C(solids) (µg/kg)	C(total soil) (µg/kg)
10	0.008	4	12	4	6
20	0.011	5	16	6	7
30	0 015	6	22	8	10
40	0 021	9	31	11	15
50	0 030	13	45	16	21
60	0.043	19	64	23	30
70	0.060	26	89	32	42
80	0 082	36	123	45	57
90	0.111	49	166	60	78
100	0.147	65	220	80	103
110	0.192	84	287	105	135
120	0.246	108	368	134	173
130	0.310	136	464	169	218
140	0.384	169	575	209	270
150	0.469	206	701	255	329
160	0.562	247	841	306	394
170	0.664	292	993	362	466
180	0 772	340	1155	420	542
190	0.885	389	1324	482	621
200	1.000	440	1497	545	702

TIME - 2 YEARS

Depth below cover (cm)	Relative C(air)	C(air) (µg/L)	C(water) (µg/L)	C(solids) (µg/kg)	C(total soil) (µg/kg)
10	0.083	36	124	45	58
20	0.089	39	133	49	63
30	0.100	44	149	54	70
40	0.115	51	172	63	81
50	0.135	59	201	73	94
60	0 159	70	238	87	112
70	0.188	83	282	103	132
80	0.223	98	333	121	156
90	0 262	115	393	143	184
100	0.307	135	460	167	216
110	0.358	157	535	195	251
120	0 413	182	618	225	290
130	0 474	208	709	258	332
140	0.539	237	807	294	378
150	0 609	268	911	332	427
160	0 682	300	1021	372	479
170	0 759	334	1135	413	532
180	0 838	369	1254	456	588
190	0 918	404	1374	500	645
200	1.000	440	1497	545	702

C(air) at Source (µg/L)	440	Bulk Density (g/cm3)	1.85
Henry's Constant	0 294	Water Porosity	0 15
Distribution coefficient	0 364	Air Porosity	0 15

TABLE 2 CALCULATED PCE CONCENTRATIONS IN SOIL FOR COVERED CASE FOR Øw=0 15

TIME - 5 YEARS

Depth below cover (cm)	Relative C(air)	C(air) (µg/L)	C(water) (µg/L)	C(solids) (µg/kg)	C(total soil) (µg/kg)
10	0.391	172	585	213	274
20	0 397	175	594	216	278
30	0 406	179	608	221	285
40	0 419	184	627	228	294
50	0 435	192	652	237	306
60	0.455	200	682	248	320
70	0 479	211	716	261	336
80	0.505	222	756	275	355
90	0.535	235	800	291	375
100	0.567	250	849	309	398
110	0.603	265	902	328	423
120	0 640	282	958	349	449
130	0 680	299	1018	370	477
140	0.722	318	1080	393	507
150	0.766	337	1146	417	537
160	0.811	357	1213	442	569
170	0.857	377	1282	467	601
180	0.904	398	1353	493	634
190	0.952	419	1425	519	668
200	1.000	440	1497	545	702

TIME - 10 YEARS

Depth below cover (cm)	Relative C(air)	C(air) (µg/L)	C(water) (µg/L)	C(solids) (µg/kg)	C(total soil) (µg/kg)
10	0.707	311	1059	385	496
20	0.710	312	1063	387	498
30	0.715	314	1069	389	501
40	0 721	317	1079	393	506
50	0.729	321	1091	397	511
60	0.739	325	1105	402	518
70	0 750	330	1122	408	526
80	0.763	336	1141	415	535
90	0.777	342	1163	423	545
100	0.792	349	1186	432	556
110	0.809	356	1211	441	568
120	0 828	364	1238	451	581
130	0.847	373	1267	461	594
140	0 867	381	1297	472	608
150	0 888	391	1329	484	623
160	0.909	400	1361	495	638
170	0.932	410	1394	507	654
180	0.954	420	1428	520	670
190	0 977	430	1462	532	686
200	1 000	440	1497	545	702

C(air) at Source (µg/L)	440	Bulk Density (g/cm3)	1 85
Henry's Constant	0 294	Water Porosity	0 15
Distribution coefficient	0 364	Air Porosity	0 15

TABLE 3 CALCULATED PCE CONCENTRATIONS IN SOIL FOR COVERED CASE FOR Øw=0 20

TIME - 1 YEAR

Depth below cover (cm)	Relative C(air)	C(air) (µg/L)	C(water) (µg/L)	C(solids) (µg/kg)	C(total soil) (µg/kg)
10	0.000	0	0	0	0
20	0.000	0	0	0	0
30	0.000	0	0	0	0
40	0 000	0	0	0	0
50	0 000	0	0	0	0
60	0.000	0	0	0	0
70	0.000	0	0	0	0
80	0.000	0	0	0	0
90	0.000	0	0	0	0
100	0.000	0	1	0	0
110	0.001	1	2	1	1
120	0 004	2	7	2	3
130	0.013	6	19	7	9
140	0.033	14	49	18	24
150	0.075	33	113	41	55
160	0.155	68	232	84	113
170	0.286	126	428	156	209
180	0.477	210	713	260	348
190	0.722	318	1081	393	527
200	1.000	440	1497	545	730

TIME - 2 YEARS

Depth below cover (cm)	Relative C(air)	C(air) (µg/L)	C(water) (µg/L)	C(solids) (µg/kg)	C(total soil) (µg/kg)
10	0.000	0	0	0	0
20	0.000	0	0	0	0
30	0.000	0	0	0	0
40	0.000	0	0	0	0
50	0.000	0	0	0	0
60	0.000	0	1	0	0
70	0.001	0	2	1	1
80	0.003	1	4	1	2
90	0.006	2	8	3	4
100	0.001	1	2	1	1
110	0.024	10	35	13	17
120	0.044	19	66	24	32
130	0.078	34	117	43	57
140	0.131	58	196	71	96
150	0.208	92	312	114	152
160	0.314	138	470	171	229
170	0.450	198	674	245	329
180	0.615	271	920	335	449
190	0.801	353	1199	437	585
200	1.000	440	1497	545	730

C(air) at Source (µg/L)	440	Bulk Density (g/cm3)	1.85
Henry's Constant	0 294	Water Porosity	0 2
Distribution coefficient	0 364	Air Porosity	0.1

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TABLE 3. CALCULATED PCE CONCENTRATIONS IN SOIL FOR COVERED CASE FOR Øw=0 20

TIME - 5 YEARS

Depth below cover (cm)	Relative C(air)	C(air) (µg/L)	C(water) (µg/L)	C(solids) (µg/kg)	C(total soil) (µg/kg)
10	0 003	1	5	2	2
20	0 005	2	7	3	3
30	0 007	3	11	4	5
40	0.011	5	16	6	8
50	0 017	8	26	9	12
60	0 026	11	39	14	19
70	0.039	17	58	21	28
80	0 056	25	84	31	41
90	0.080	35	120	44	59
100	0.112	49	167	61	82
110	0.152	67	228	83	111
120	0.203	89	304	111	148
130	0.265	117	397	145	194
140	0.340	149	508	185	248
150	0 426	188	638	232	311
160	0.525	231	785	286	383
170	0.633	279	947	345	462
180	0.750	330	1123	409	548
190	0.874	384	1307	476	638
200	1.000	440	1497	545	730

TIME - 10 YEARS

Depth below cover (cm)	Relative C(air)	C(air) (µg/L)	C(water) (µg/L)	C(solids) (µg/kg)	C(total soil) (µg/kg)
10	0.051	22	76	28	37
20	0.056	25	84	31	41
30	0.065	29	98	36	48
40	0.079	35	118	43	58
50	0 096	42	144	53	70
60	0.119	52	177	65	87
70	0.146	64	218	79	107
80	0.179	79	267	97	130
90	0.217	95	325	118	158
100	0.261	115	391	142	191
110	0.312	137	466	170	228
120	0.368	162	551	201	269
130	0 431	190	645	235	315
140	0.500	220	748	272	365
150	0.574	252	859	313	419
160	0.653	287	977	356	477
170	0.736	324	1101	401	537
180	0.822	362	1230	448	600
190	0 910	401	1363	496	665
200	1.000	440	1497	545	730

C(air) at Source (µg/L)	440	Bulk Density (g/cm3)	1 85
Henry's Constant	0 294	Water Porosity	0 2
Distribution coefficient	0 364	Air Porosity	0 1

FIGURE 1. PCE IN SOIL VAPOR FOR COVERED CASE AFTER 1 YEAR

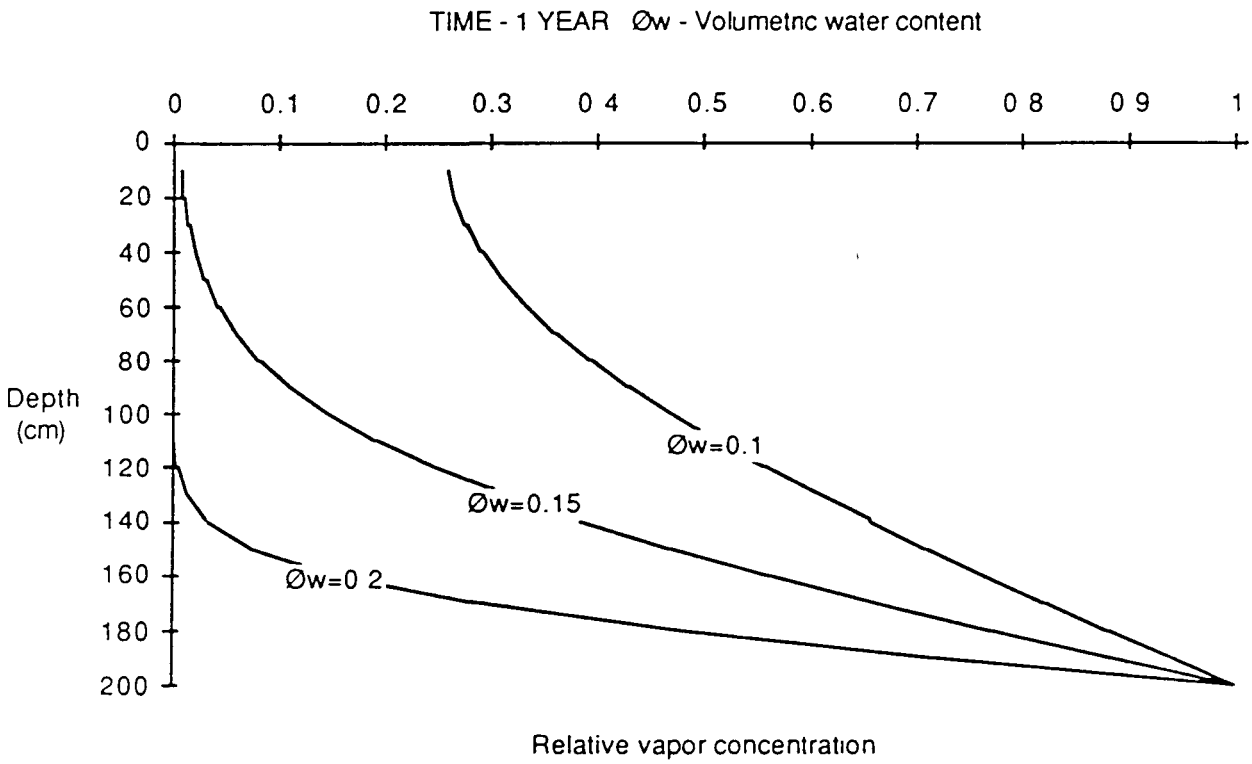

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FIGURE 2. PCE IN SOIL VAPOR FOR COVERED CASE AFTER 2 YEARS

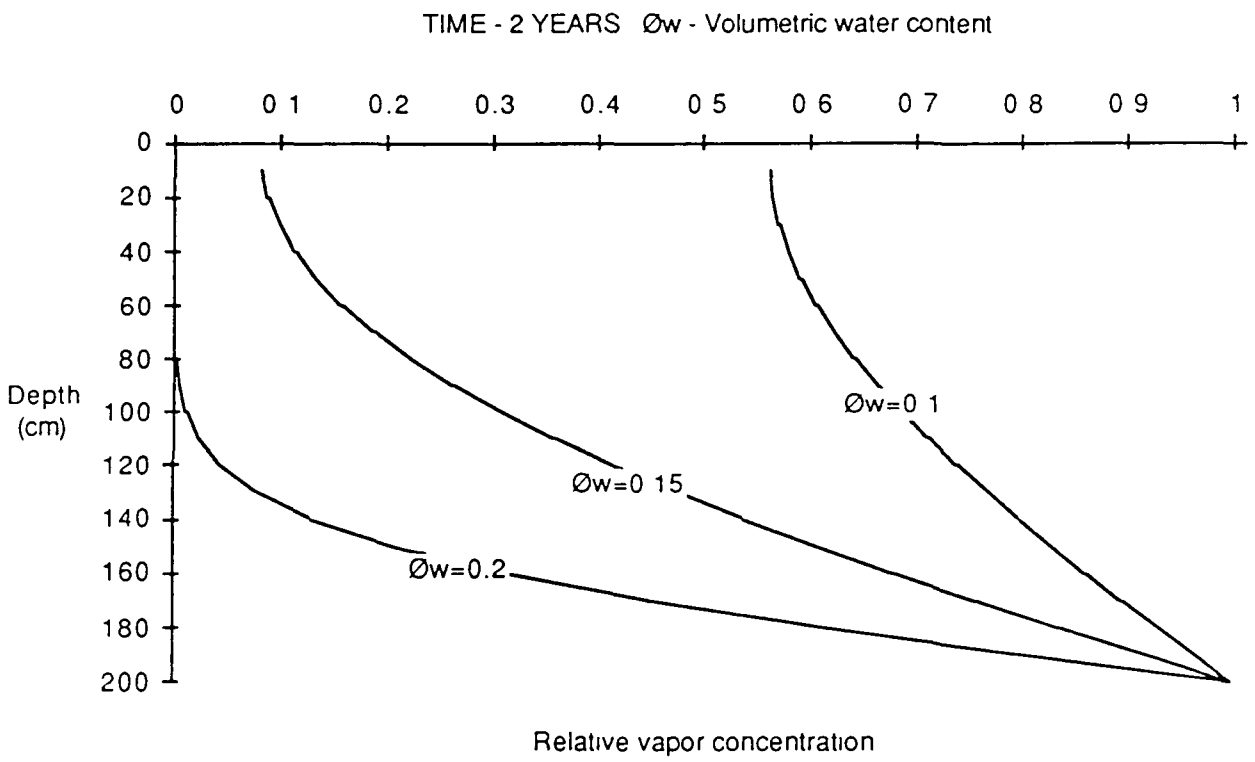

FIGURE 3. PCE IN SOIL VAPOR FOR COVERED CASE AFTER 5 YEARS

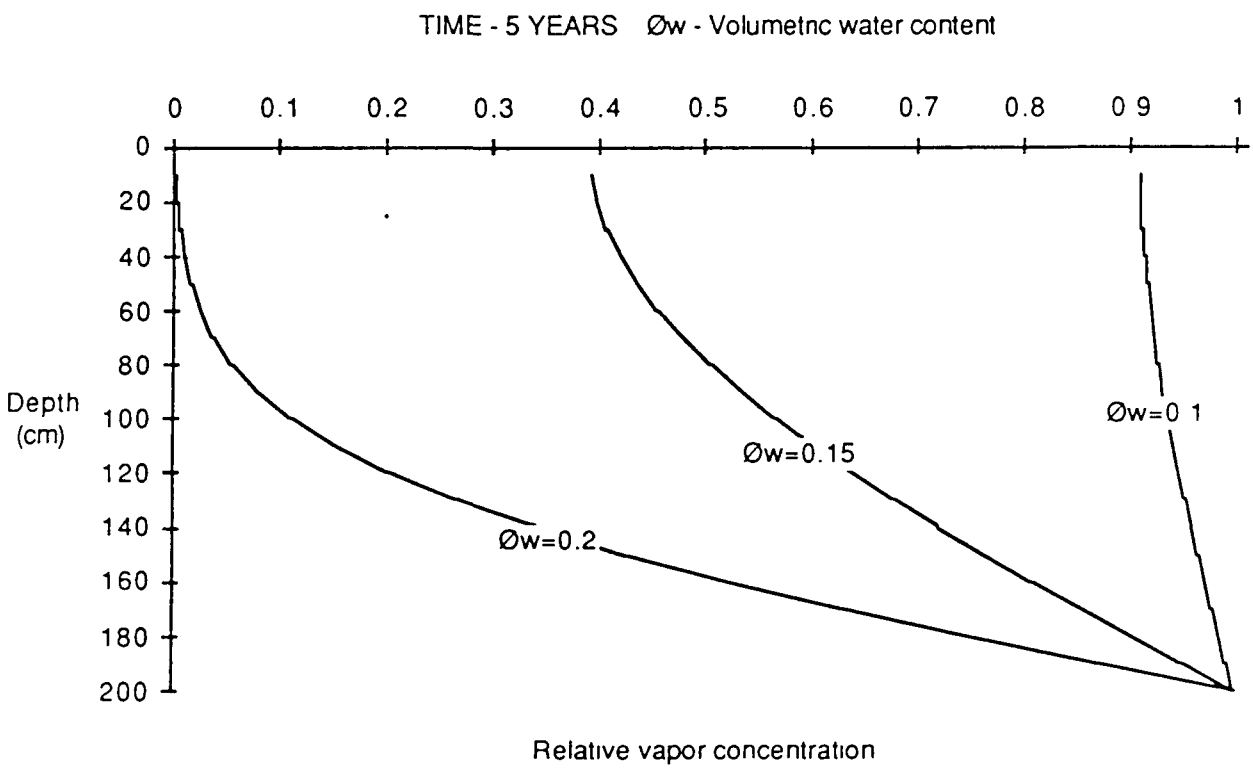

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FIGURE 4. PCE IN SOIL VAPOR FOR COVERED CASE AFTER 10 YEARS

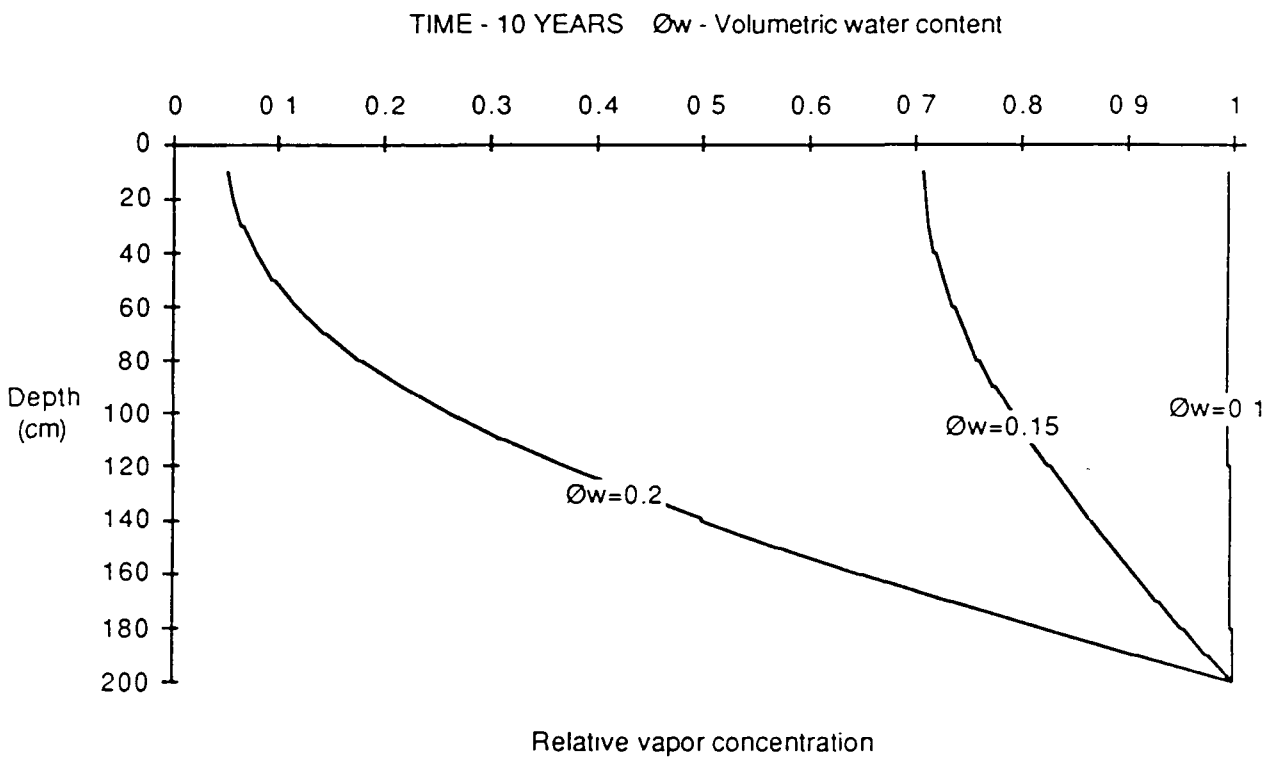

FIGURE 5. PCE IN SOIL VAPOR FOR UNCOVERED CASE AFTER 0.1 YEAR

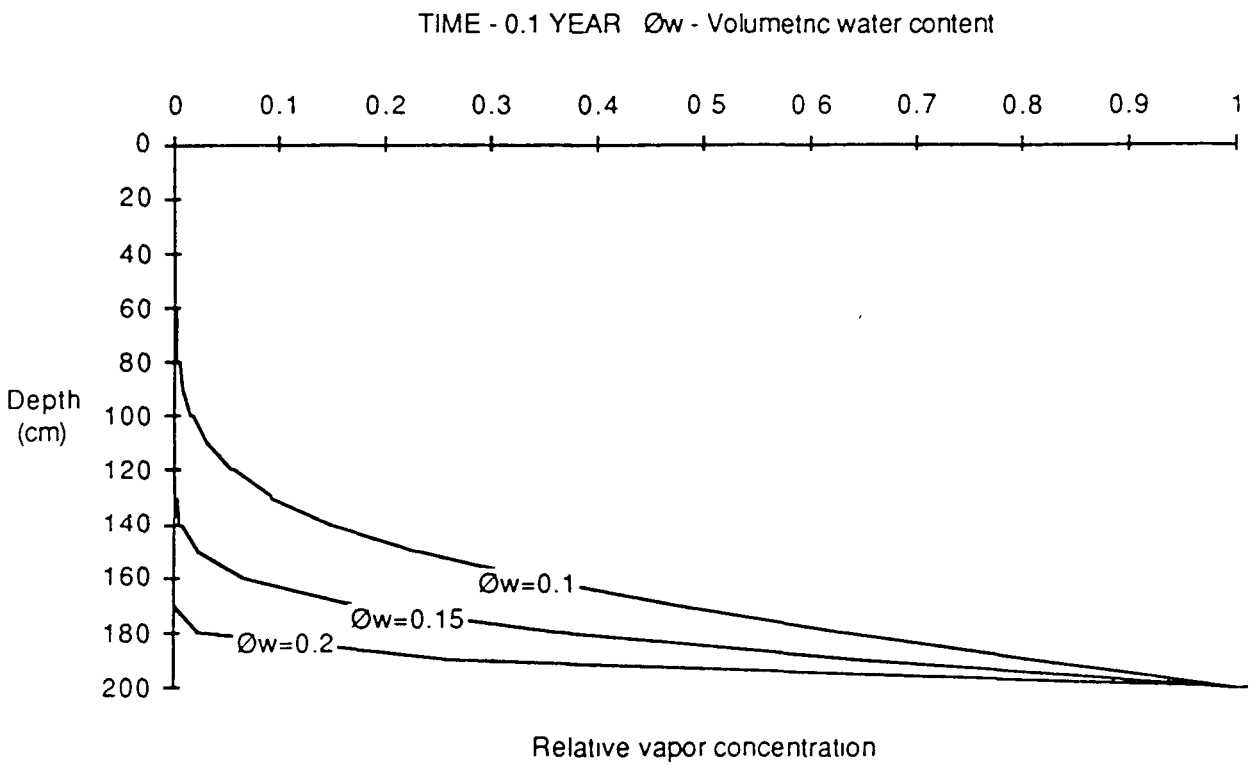

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FIGURE 6. PCE IN SOIL VAPOR FOR UNCOVERED CASE AFTER 0.5 YEAR

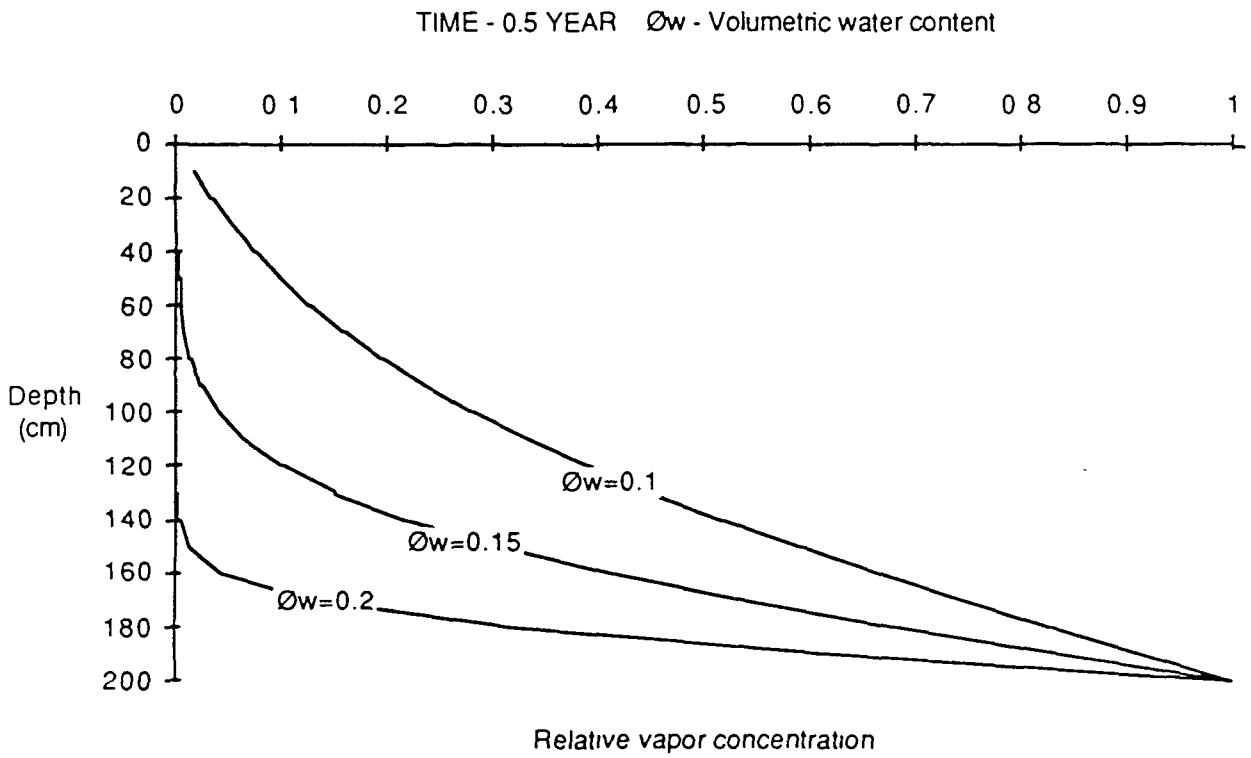

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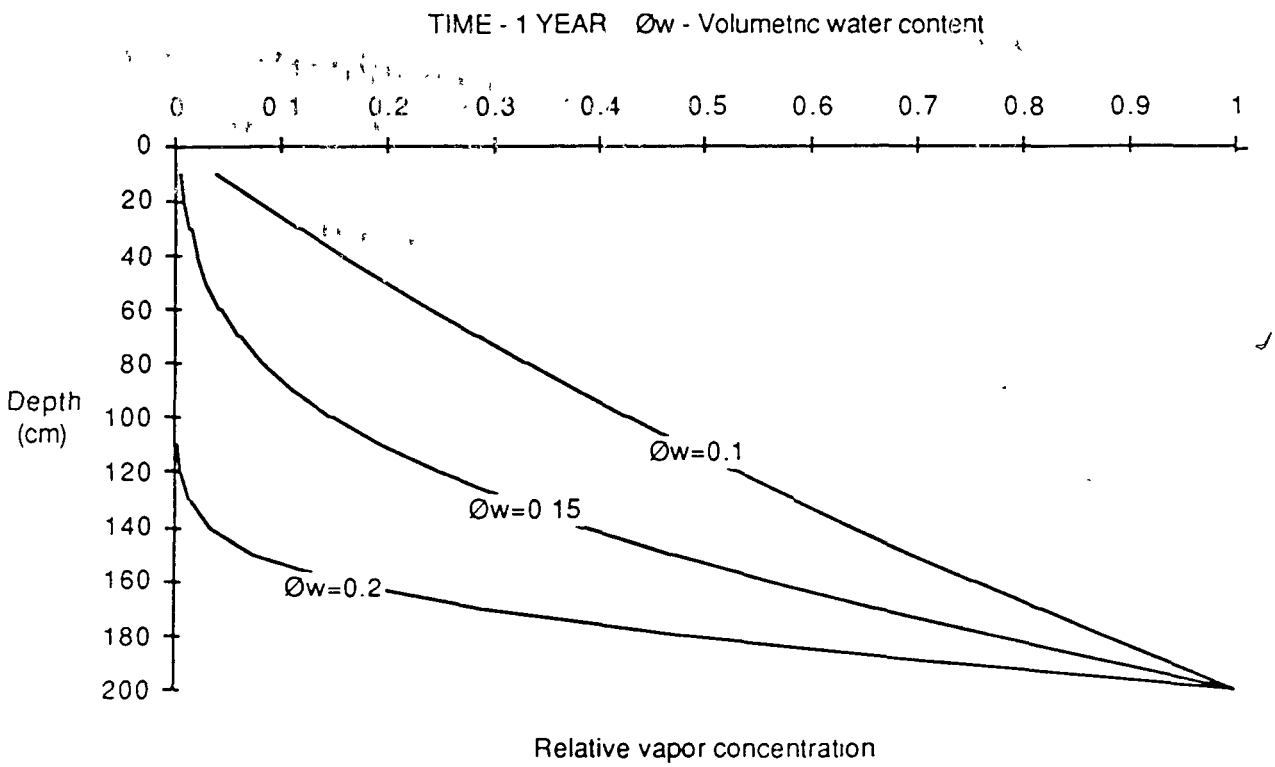
FIGURE 7. PCE IN SOIL VAPOR FOR UNCOVERED CASE AFTER 1 YEAR



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