Frontier Chemical - Pendleton Site
September 1998

Semi-Annual Report #3

Frontier Chemical - Pendleton Site
Order on Consent (#B9-0270-89-05)
Pendleton, New York

Prepared by Pendleton PRP Group
September 1998

Frontier Chemical - Pendleton Site
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Frontier Chemical - Pendleton Site
September 1998

Introduction

This is the third semi-annual report from the Frontier Chemical - Pendleton Site PRP Group (PRP Group) for the Frontier Chemical - Pendleton Site located in Pendleton, New York. This report summarizes the activities performed since March 1998 for Post-Closure Operation, Maintenance, and Monitoring of the Closure Components of the Frontier Chemical-Pendleton Site by the Pendleton PRP Group.

Background

The Frontier Chemical-Pendleton Site is located on Town Line Road in the Town of Pendleton, Niagara County, New York. The total site comprises approximately 22 acres of the 75-acre Frontier Chemical property. Prior to remediation activities, Quarry Lake, a flooded quarry that resulted from the excavation of clay for use in clay brick and tile manufacturing at an on-site facility, occupied 15 acres of the 22-acre site. The remaining 7 acres, identified as the former Process Area, were utilized by Frontier Chemical Waste Process, Inc. (Frontier) when the site was operated as an industrial waste treatment facility from 1958 to 1974. Plating wastes, pickle liquors and other liquid acid wastes from plating and metal finishing industries were treated at the site, with residuals from the waste treatment process being discharged into Quarry Lake. Much of the former Process Area was filled and graded following termination of waste treatment operations.

The site remediation project with remedial designed by O'Brien & Gere Engineers, Inc. and remedial action by Sevenson Environmental Services, Inc. included the following major components:

1. Dewatering Quarry Lake to allow drying and consolidation of sediments
2. Excavation and relocation of sediments from Quarry Lake after dewatering operations to within the limits of the capped area
3. Excavation and relocation of surface soils, fill or debris to within the limits of the capped area
4. Capping of consolidated sediments, previously dredged materials, and surface soils with a low-permeability cap
5. Installation, in conjunction with a cap, of a low-permeability barrier to ground water flow
6. Construction of a ground water collection trench along the eastern shore of Quarry Lake and the southern portion of the capped area
7. Reconstruction of the berm around Quarry Lake and installation of a new outlet structure
8. Construction of a ground water pumping station consisting of a wet well and dry vault
9. Installation of a ground water pre-treatment system within the dry vault
10. Conveyance of collected and pre-treated ground water to the local Publicly Owned Treatment Works (POTW)
11. Creation of new wetlands at the site
12. Construction of a surface water swale adjacent to the cap access road to direct surface water away from the capped area
13. Installation of piezometers inside and outside the capped area and a standpipe within the ground water collection trench
14. Installation of a chain link fence around the capped area and pump station to limit access.

Discussion

Post-closure operation, maintenance, and monitoring of the closure components of the Frontier Chemical-Pendleton Site are the responsibility of the Pendleton PRP Group. Operation, maintenance, and monitoring activities performed by the Pendleton PRP Group during this reporting period includes the following five elements:

1. Routine inspection and maintenance of constructed features, including the capped area, ground water collection and conveyance system, surface water runoff facilities, constructed wetlands, access road, perimeter and containment berms, and outlet weir,

Regarding routine inspection and maintenance of constructed features, two site inspections were conducted during this reporting period, one on April 27-29, 1998 and another on September 21 1998. The completed inspection forms are included in Attachment A.

Wolf's Nursery planted relocated wetlands inside the perimeter berm with the species shown in the project specification as a part of the site maintenance work by Sevenson Environmental Services during the time period of April 27-30, 1998. The relocated wetlands inside the Quarry Lake levee have elevations of 574 feet for aquatic bed species (Zone A), 575 feet for non-persistent emergent species (Zone B), and 576 feet for persistent emergence species (Zone C). A water elevation chart is included as Attachment A-2. This water level chart shows the history of the lake elevation starting in April 1996 until present.

2. Operation and maintenance of the ground water pre-treatment system, as described in the Pre-Treatment System Operations Plan,

Regarding Operation and maintenance of the ground water pre-treatment system, the monthly submittals to the Niagara Country Sewer District #1 detailing analytical and flow data for this reporting period are included in Attachment B. Six months (April 1998 through September 1998) of submittals as shown in Table 3-1 are included with this report.

Table 2-1 Niagara County Sewer District #1 Submittals

Submittal Date	Sampling Date
April 6, 1998	March 5, 1998
May 4, 1998	April 3, 1998
June 9, 1998	May 7&18, 1998
July 6, 1998	June 11, 1998
August 3, 1998	July 2, 1998
September 9, 1998	August 6, 1998

Also included in Attachment B is Table 2-2 which summarizing Operation, Maintenance, and Monitoring Activities for the site during this reporting period.

3. Performance of a ground water monitoring program to monitor ground water conditions at the site and to verify the inward hydraulic gradient within the capped area,

Regarding performance of a Fourth Quarterly Piezometer/Monitoring well inspection and ground water elevation monitoring, the letter report dated June 10, 1998 is included as Attachment C-1.

Regarding performance of a ground water monitoring program, the report "Frontier Chemical - Pendleton Site, Semi-Annual Ground Water Monitoring Report" dated September 1998 is included as Attachment C-2.

4. Evaluation of operation, maintenance, and monitoring activities and identification of proposed changes to the O&M Manual or site procedures and policies which would provide a safer and/or more cost-effective operation, and

Regarding evaluation of operation, maintenance, and monitoring activities and identification of proposed changes, a letter detailing the status of the maintenance work completed in April 1998 is include in Attachment D-1. Detail Field Observation Reports by Glynn Geotechnical Engineering for operation, maintenance, and monitoring activities are also included in Attachment D-2.

5. Recordkeeping.

Regarding recordkeeeping activities, Jim Reed maintains at the Site and at Olin's Niagara Falls Plant daily and weekly logs and charts. Glynn Geotechnical (Jesse Grossman) provides assistance to Jim Reed and updates O&M documentation. O'Brien & Gere (Steve Anagnost) provide ground water measurement and monitoring field and office support. John Burns maintains analytical results and reports to NCSD #1 and NYSDEC from Olin's Charleston Plant. All these records are available for review and inspection upon reasonable notice.

6. Miscellaneous

The PRP Group requested in correspondence dated August 26, 1998 to Abul Barkat that NYSDEC allow the PRP Group to discontinue sampling and analysis of TCL SVOCs and PCBs/Pesticides as specified in the Operating and Maintenance Manual for the Site. Permission was granted by NYSDEC and the sampling and analysis were discontinued prior to the September 1998 sampling event.

The PRP Group's discharge permit, #96-11, with the Niagara County Sewer District #1 was up for renewal during August. The PRP Group has submitted completed permit forms to for the renewal.

Conclusion

The work performed for the Site from March 1998 to September 1998 was reviewed and found to be in accordance with the approved O&M Manual for the Site.

Attachments

Attachment A – Site Inspection Reports and Quarry Lake Level Plot versus Time

Attachment B – Niagara County Sewer District #1 Submittals and Operation, Maintenance and Monitoring Activities

Attachment C – Frontier Chemical – Pendleton Site; Semi-Annual Ground Water; March 1998

Attachment D – Site Maintenance Work Items and Field Observation Reports

Attachment A – Site Inspection Reports and Quarry Lake Level Plot versus Time

1 Site Inspection Reports

- April 27-29, 1998
- September 21, 1998

2 Quarry Lake Level

- April 27-29, 1998
- September 21, 1998

1 Site Inspection Reports

- April 27-29, 1998
- September 21, 1998

Table 2· ;er Chemical - Pendleton Site - inspection checklist.

Date Performed: April (27-29) 1998

Weather: Sunny & Cool

Site Name: Frontier-Pendelton

Inspector Name: James Reed

Site Location: Pendelton N.Y.

Inspector Signature: James Reed

Item	Task	Response		Comments
		Yes	No	
Low-Permeability Cover	**Visually inspect surface conditions.**			
	1. Erosion problem?		✓	
	2. Lack or thinning of vegetation?		✓	
	3. Mowing required?		✓	
	4. Drainage problems?		✓	
	5. Areas of settlement?	✓		Covered with Topsoil & Seeded
	6. Areas of slope instability?		✓	
	7. Areas of damage?	✓		Covered with Topsoil & seeded
Ground Water Collection and Conveyance System	**Visually inspect manholes and cleanouts.**			
	1. Buildup of solids/precipitates to the extent that the flow of ground water is affected?		✓	
	2. Measure water levels in manholes and Quarry Lake. a. MH-1? b. MH-2? c. MH-3? d. Quarry Lake?	✓		O'Brien & Gere
	3. Closed and opened pinch valve?		✓	Completed Feb. 1998
	4. Leakage, degradation or corrosion of valves, pipes, or appurtenances?		✓	
	5. Areas of damage?		✓	

Table 2- er Chemical - Pendleton Site - inspection checklist.

Date Performed: April 27 - 29, 1998

Weather: Sunny & Cool

Site Name: Frontier - Pendelton

Inspector Name: James Reed

Site Location: Pendelton, N.Y.

Inspector Signature: James Reed

Item	Task	Response		Comments
		Yes	No	
Ground Water Pre-Treatment System (including Dry Vault and Wet Well)	**Perform inspection in accordance with Pre-Treatment System Operations Plan.**		✓	Note. Planted all Vegetation required by Permit on North side of Lake shore
Surface Water Runoff Facilities	**Visually inspect ditches and culverts.**			
	1. Accumulation of debris?		✓	
	2. Excessive scouring?		✓	
	3. Areas of damage?		✓	
Perimeter Berm, Containment Berm, and Outlet Weir	**Visually inspect condition.**			
	1. Erosion problems?		✓	
	2. Areas of settlement?		✓	
	3. Areas of slope instability?		✓	
	4. Areas of damage?		✓	
Ground Water Monitoring Wells and Piezometers	**Visually inspect condition.**			
	1. Casings secured and locked?	✓		Installed caps on P4 & P7 (cut + resurveyed)
	2. Areas of damage?		✓	

Table 2-1 ɛr Chemical - Pendleton Site - inspection checklist.

Date Performed: April 27-29, 1998 Weather: _____

Site Name: Frontier - Pendelton Inspector Name: _____

Site Location: Pendelton, N.Y. Inspector Signature: _____

Item	Task	Response		Comments
		Yes	No	
Access Road	**Visually inspect surface conditions of access roads.**			
	1. Rutting?	✓		Spread new stone in needed areas
	2. Potholes?	✓		" " " " "
	3. Settlement?		✓	
	4. Areas of damage?		✓	
Physical Site Security	**Visually inspect fences and gates.**			
	1. Signs intact?		✓	
	2. Fence breached?	✓		4/16/98 Repaired same day (Vandals)
	3. Access gates locked?		✓	
	4. Areas of damage?	✓		4/16/98 Repaired same day (Vandals)
Notes:	**Note any additional comments.**			
Water levels measured in Piezometers + Wells				

Table 2-1. ('er Chemical - Pendleton Site - inspection checklist.

Date Performed: 9.24.98 (0830-1030)

Weather: MILD, PARTLY CLOUDY 60°F

Site Name: Frontier

Inspector Name: JIM REED (PTRT), JESSE GROSSMAN (GGE)

Site Location: PENDLETON, NY

Inspector Signature: James Reed, J. E.

Item	Task	Response		Comments
		Yes	No	
Low-Permeability Cover	**Visually inspect surface conditions.**			
	1. Erosion problem?		X	COVER IN GOOD CONDITION
	2. Lack or thinning of vegetation?		X	
	3. Mowing required?		X	
	4. Drainage problems?		X	
	5. Areas of settlement?		X	
	6. Areas of slope instability?		X	
	7. Areas of damage?		X	
Ground Water Collection and Conveyance System	**Visually inspect manholes and cleanouts.**			
	1. Buildup of solids/precipitates to the extent that the flow of ground water is affected?		X	
	2. Measure water levels in manholes and Quarry Lake. a. MH-1? b. MH-2? c. MH-3? d. Quarry Lake?	X X X (9.21.98)	X	M.H.-1 INV. DRY, NO FLOW NOTED. MH-3 WATER BELOW PUMP ON LEVEL 577.42' (9.21.94)
	3. Closed and opened pinch valve?	X		NOTE FLOW RESPONSE
	4. Leakage, degradation or corrosion of valves, pipes, or appurtenances?		X	PIPE SECTIONS INSPECTED 7.30.98
	5. Areas of damage?		X	

GGE F.O.R. #98-06 PAGE 2 of 4

Table 2-1. er Chemical - Pendleton Site - inspection checklist.

Date Performed: 9.24.98 (0830 - 1030)

Site Name: Frontier

Site Location: Pendleton, NY

Weather: Mild, Partly Cloudy, 60°F

Inspector Name: Jim Reed (CRA) Jesse Grossman (GGE)

Inspector Signature: Jim Reed, Jr Eng

Item	Task	Response		Comments
		Yes	No	
Ground Water Pre-Treatment System (including Dry Vault and Wet Well)	**Perform inspection in accordance with Pre-Treatment System Operations Plan.**	X		• SYSTEM OPERATED 9.24.98 • HAIRLINE CRACKS @ VAULT JOINTS, NO LEAKAGE NOTED • VAULT INTERIOR GOOD CONDITION / DOORS SECURE
Surface Water Runoff Facilities	**Visually inspect ditches and culverts.**			
	1. Accumulation of debris?		X	
	2. Excessive scouring?		X	
	3. Areas of damage?		X	
Perimeter Berm, Containment Berm, and Outlet Weir	**Visually inspect condition.**			
	1. Erosion problems?		X	LIKE PERIMETER GOOD CONDITION
	2. Areas of settlement?		X	VEGETATION RE-ESTABLISHING
	3. Areas of slope instability?		X	
	4. Areas of damage?		X	
Ground Water Monitoring Wells and Piezometers	**Visually inspect condition.**			
	1. Casings secured and locked?	X		
	2. Areas of damage?		X	

GGE FOR. #98-06 PAGE 3 of 4

Table 2-1. [illegible]er Chemical - Pendleton Site - inspection checklist.

Date Performed: 7-2-98 (0830 - 1030)

Weather: MILD, PARTLY CLOUDY, 60°F

Site Name: Frontier

Inspector Name: JIM REED (PTET), JESSE GROSSMAN (GGE)

Site Location: Pendleton NY

Inspector Signature: James Reed, J. E.

Item	Task	Response		Comments
		Yes	No	
Access Road	**Visually inspect surface conditions of access roads.**			
	1. Rutting?		X	
	2. Potholes?		X	
	3. Settlement?		X	
	4. Areas of damage?		X	
Physical Site Security	**Visually inspect fences and gates.**			
	1. Signs intact?	X		
	2. Fence breached?		X	
	3. Access gates locked?	X		
	4. Areas of damage?		X	
Notes:	**Note any additional comments.**			

- REMOVED AIR REED VALVE ON GAC 2 - 8.14.98 / BLOWER FAN REDUCED - 2/98.
- ON 7.30.98, O&M PERSONNEL REMOVE 1" PVC PITOT SECTIONS FOR INST. (HORIZ. & VERTICAL) LIGHT RUST-COLORED DEPOSIT NOTED ON PIPE WALL, HOWEVER, NO REDUCTION IN X-SECT. AREA NOTED. PITOT WAS BETWEEN BF #2 & GAC #1.
- PTET O&M ALSO COLLECTS 'MAKE-UP' CONT. VOA, TSS, & CN SAMPLES FOR 7/98.

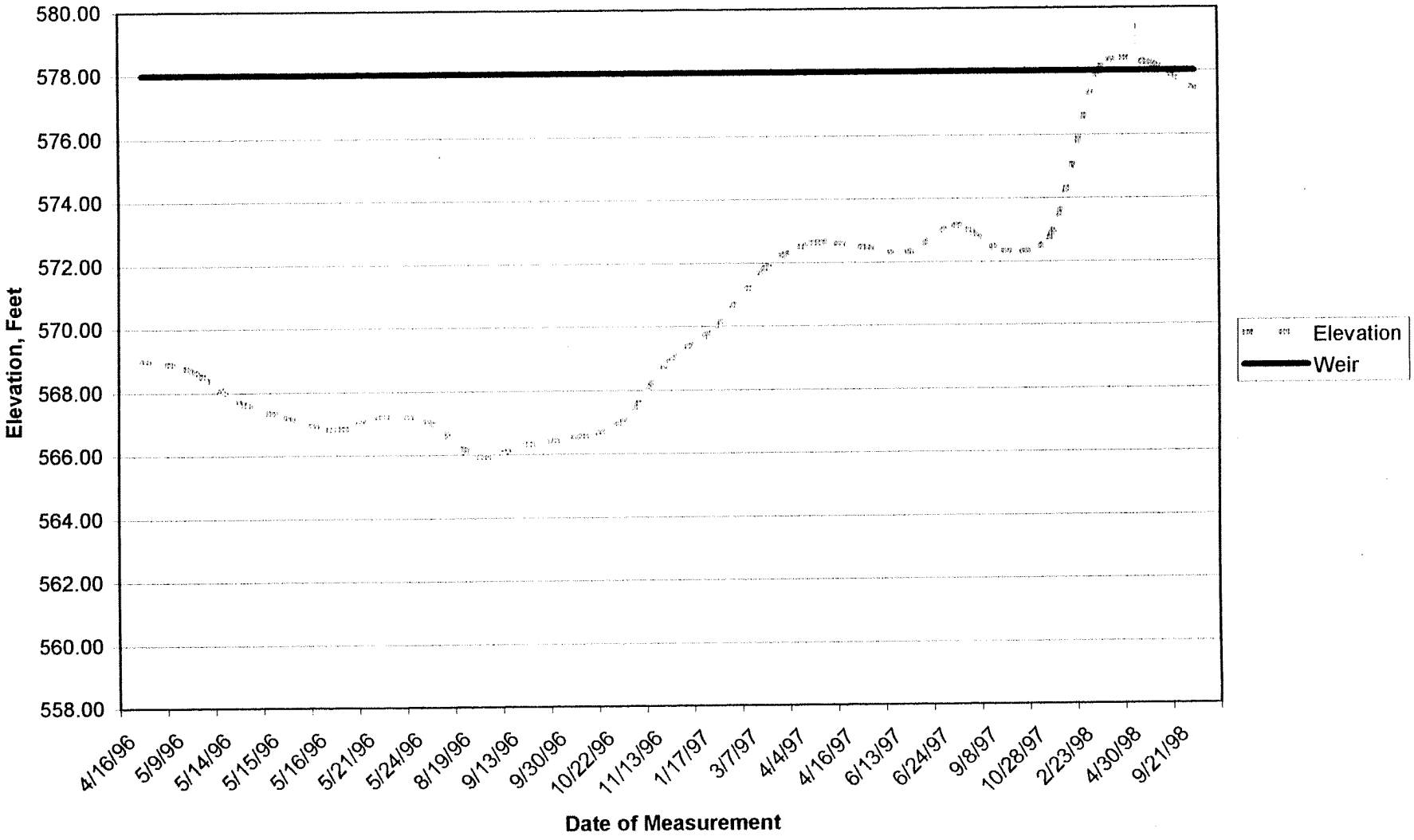
GGE F.O.R. #98-06 PAGE 4 of 4

2 Quarry Lake Level

- Table A-2
- Chart A-2

Table A-2 Frontier Chemical – Pendleton Site Quarry Lake Level Plot versus Time	
Date	Elevation
4/16/96	569.00
5/9/96	568.70
5/14/96	567.70
5/15/96	567.20
5/16/96	566.80
5/21/96	567.20
5/24/96	567.00
8/19/96	565.92
9/13/96	566.30
9/30/96	566.50
10/22/96	567.00
11/13/96	568.90
1/17/97	570.00
3/7/97	571.80
4/4/97	572.60
4/16/97	572.50
6/13/97	572.30
6/24/97	573.15
9/8/97	572.34
10/28/97	572.88
2/23/98	578.00
4/30/98	578.26
9/21/98	577.42

Chart A-2
Frontier Chemical - Pendleton Site
Quarry Lake Water Elevations



9/30/98

Attachment B – Niagara County Sewer District #1 Submittals and Operation, Maintenance and Monitoring Activities

1 Niagara County Sewer District #1 Submittals

2 Operation, Maintenance and Monitoring Activities

1 Niagara County Sewer District #1 Submittals

Table B-1
Frontier Chemical – Pendleton Site
Niagara County Sewer District #1 Submittals

Submittal Date	Sampling Date
April 6, 1998	March 5, 1998
May 4, 1998	April 3, 1998
June 9, 1998	May 7&18, 1998
July 6, 1998	June 11, 1998
August 3, 1998	July 2, 1998
September 9, 1998	August 6, 1998

ORGANIC DATA QUALIFIERS

U - Indicates compound was analyzed for but not detected.

J - Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, or when the mass spectral data indicates the presence of a compound that meets indentification criteria, but the result is less than the sample quantitation limit but greater than zero.

C - This flag applies to pesticide results where the identification has been confirmed by GC/MS.

B - This flag is used when the analyte is found in the associated blank as well as the sample.

E - This flag identifies all compounds whose concentrations exceed the calibration range of the GC/MS instrument of that specific analysis.

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

G - Matrix spike recovery is greater than the expected upper limit of analytical performance.

L - Matrix spike recovery is less than the expected lower limit of analytical performance.

- Indicates that a surrogate recovery was found to be outside the expected limits of analytical performance.

$ - Indicates that the surrogate compound was diluted out. The sample had to be diluted to obtain analytical results and a recovery could not be calculated.

(%) - Indicates that the compound is a surrogate and that the value reported for this compound is in percent recovery. The quality control recovery limits (QC Limits) are indicated in the detection limit column.

FILE COPY

April 6, 1998

Mr. Frank Nerone
Chief Operator
Niagara County Sewer District #1
7346 Liberty Drive
Niagara Falls, NY 14304

Subject: Analytical Sampling Results (3/5/98 Sample)
Groundwater Discharge Through Pre-Treatment System
Pendleton (Frontier Chemical) Site

Dear Mr. Nerone:

Enclosed for your review are analytical results from the March 5, 1998, monthly sampling event for discharge of collected groundwater from the pre-treatment system. Analytical results for this sampling event are compared against the Permit (#96-11) requirements on the attached Analytical Summary and Daily Flow sheets.

A review of the analytical and flow data shows that all permit parameters are significantly below the stated permit requirements.

This data is being provided for your review and concurrence that all permit parameters are well within their limits. If, following review of the enclosed information, you are not in agreement with the above stated conclusion, please contact me at 423-336-4057 as soon as possible so we may discuss any future monitoring requirements.

Sincerely,

John M. Burns

John M. Burns
for the Frontier Chemical - Pendleton Site PRP Group

enclosures: as stated

cc: D. Kummer
Pendleton Site Technical Committee

DAILY FLOW DATA - PENDLETON SITE
MARCH 1998

DATE	TOTALIZER READING	DAILY FLOW	
3/1/98	254696	328	
3/2/98	255024	225	
3/3/98	255249	162	
3/4/98	255411	205	
3/5/98	255616	112	
3/6/98	255728	111	
3/7/98	255839	163	
3/8/98	256002	441	
3/9/98	256443	502	
3/10/98	256945	165	
3/11/98	257110	166	
3/12/98	257276	143	
3/13/98	257419	166	
3/14/98	257585	164	
3/15/98	257749	112	
3/16/98	257861	165	
3/17/98	258026	161	
3/18/98	258187	448	
3/19/98	258635	557	
3/20/98	259192	338	
3/21/98	259530	397	
3/22/98	259927	277	
3/23/98	260204	279	
3/24/98	260483	222	
3/25/98	260705	279	
3/26/98	260984	946	
3/27/98	261930	1162	
3/28/98	263092	566	
3/29/98	263658	217	
3/30/98	263875	158	
3/31/98	264033		
AVERAGE DAILY FLOW IN GALLONS		311	

	= DRY VAULT GROUNDWATER RELIEF		
			gallons
			gallons
			gallons
			gallons
	TOTAL GALLONS	0	

avg =flow between data points divided by days of missing data

Frontier Chemical - Pendleton Site
Analytical Summary for WS 001
Permit # 96-11
Groundwater Discharge Point: D 002

249,658 Gallons Discharged Prior To 2/5/98
5,958 Gallons Since Last Report
205 Average Daily Flow Based on 29 days Between Samples

Parameters / Treatment System Discharge	Permit Limit GPD	Detection Limits		3/5/98 Sample Results GPD
Discharge Rate(1)	662			
624 Analytes	**ug/L**	**ug/L**		**ug/L**
Toluene	10.0	1.0		
1,2-Dichloroethane	10.0	1.0		
4-Methyl-2-Pentanone	10.0	5.0		
Vinyl Chloride	10.0	2.0		
Methylene Chloride	10.0	2.8		
trans-1,2-Dichloroethene	10.0	1.0		
1,1,1-Trichloroethane	10.0	1.0		
Trichloroethene	10.0	1.0		
Benzene	10.0	1.0		
Chloromethane		2.0		
Bromomethane		2.0		
Chloroethane		2.0		
Chloroform		1.0		
Carbon Tetrachloride		1.0		
1,1-Dichloroethene		1.0		
Trichlorofluoromethane		2.0		
1,1-Dichloroethane		1.0		
1,2-Dichloropropane		1.0		
Bromodichloromethane		1.0		
2-Chloroethylvinyl ether		2.0		
cis-1,3-Dichloropropene		1.0		
trans-1,3-Dichloropropene		1.0		
1,1,2-Trichloroethane		1.0		
Tetrachloroethene		1.2		
Dibromochloromethane		1.0		
Chlorobenzene		1.0		
Ethylbenezene		1.0		
Bromoform		1.0		
1,1,2,2-Tetrachloroethane		1.0		
1,3-Dichlorobenzene		1.0		
1,4-Dichlorobezene		1.0		
1,2-Dichlorobenzene		1.0		
Sum of 624 Analytes		100.0		
608 Pesticides	**ug/L**	**ug/L**		**ug/L**
alpha BHC	10.0	0.003		
beta BHC	20.0	0.006		
delta BHC	10.0	0.010		
gamme BHC	10.0	0.003		
Heptachlor	8.0	0.022		
Aldrin	8.0	0.018		
Heptachlor Epoxide	9.0	0.009		
4,4-DDE	20.0	0.005		
Methoxychlor	18.0	0.007		
Metals	**mg/L**	**mg/L**		**mg/L**
Antimony	0.1	0.009	<	0.009
Boron	4.00	0.012		0.409
Chromium	5.33	0.005		0.008
Cyanide(T)	2.0	0.005	<	0.005
Other	**mg/L**	**mg/L**		**mg/L**
Total Phenolics	NA	0.005	<	0.005
TSS	300	4.000	<	4.000

Legend:
(1) Permit limit @ 662 GPD with maximum daily discharged @ 2500 GPD
(a) Detected in blank
NA Not applicable

WASTE STREAM TECHNOLOGY, INC.
302 Grote Street
Buffalo, NY 14207
(716) 876-5290

Analytical Data Report
Report Date : 03/20/98
Group Number : 9801-285

Prepared For :
Mr. John Burns
Olin Corporation
P.O. Box 248
1186 Lower River Road NW
Charleston, TN 37310

Site : Frontier Chemical

Field and Laboratory Information

Client Id	WST Lab #	Matrix	Date Sampled	Date Received	Time
GAC #2	WS40306	Aqueous	3/5/98	3/6/98	0930
Sample Status Upon Receipt : No irregularities.					

Analytical Services

Analytical Parameters	Number of Samples	Turnaround Time
Metals	1	Standard
Cyanide	1	Standard
Phenol	1	Standard
Total Suspended Solids	1	Standard

Report Released By : Daniel W. Voll
Daniel Vollmer, Laboratory QA/QC Officer

ENVIRONMENTAL LABORATORY ACCREDITATION CERTIFICATION NUMBERS
NYSDOH ELAP #11179 NJDEPE #73977 CDHS ELAP #2189

METHODOLOGIES

The specific methodologies employed in obtaining the analytical data reported are indicated on each of the result forms. The method numbers shown refer to the following analytical method references:

Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020, March 1979, Revised 1983, U.S. Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

Federal Register, 40 CFR Part 136: Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. Revised July 1992.

Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. Third Edition, Revised December 1996, United States EPA SW-846.

Annual Book of ASTM Standards, Volume II. ASTM, 100 Harbor Drive, West Conshohocken, PA 19428-2959.

Standard Methods for the Examination of Water and Wastewater. (18th Edition). American Public Health Association, 1105 18th Street, NW, Washington, D.C. 20036.

Waste Stream Technology, Inc.
Total Recoverable Phenol
EPA 420.1

Site: FRONTIER CHEMICAL
Date Sampled: 03/05/98
Date Received: 03/06/98

Group Number: 9801-285
Report Units: mg/L
Matrix: Aqueous

WST Lab ID	Client ID	Analysis Date	Detection Limit	Result
WS40306	GAC #2	03/19/98	0.005	< 0.005

Waste Stream Technology, Inc.
Cyanide in Water
EPA 335.2

Site: FRONTIER CHEMICAL
Date Sampled: 03/05/98
Date Received: 03/06/98

Group Number: 9801-285
Report Units: mg/L
Matrix: Aqueous

WST Lab ID	Client ID	Analysis Date	Detection Limit	Result
WS40306	GAC #2	03/11/98	0.005	< 0.005

Waste Stream Technology, Inc.
Total Suspended Solids
EPA 160.2

Site: FRONTIER CHEMICAL
Date Sampled: 03/05/98
Date Received: 03/06/98

Group Number: 9801-285
Report Units: mg/L
Matrix: Aqueous

WST Lab ID	Client ID	Analysis Date	Detection Limit	Result
WS40306	GAC #2	03/10/98	4.0	< 4.0

Waste Stream Technology, Inc.
Metals Analysis Result Report

Site: FRONTIER CHEMICAL
Date Sampled: 03/05/98
Date Received: 03/06/98

Group Number: 9801-285
Report Units: mg/L
Matrix: Aqueous

Lab ID Number	WS40306	
Client ID	GAC #2	
Date Digested	03/10/98	

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Antimony by GFAA	0.009	< 0.009	03/19/98	EPA 200.9
Boron by ICP	0.012	0.409	03/12/98	EPA 200.7
Chromium by ICP	0.005	0.008	03/12/98	EPA 200.7

WASTESTREAM TECHNOLOGY

302 GROTE STREET
BUFFALO, NY 14207
(716) 876-5290

9801-285

CHAIN OF CUSTODY RECORD

PROJECT NO: SITE NAME: Pendelton, N.Y. - Frontier

SAMPLERS (SIGNATURE): James Reed

SAMPLE NO.	DATE	TIME	COMP	GRAB	MATRIX	SAMPLE LOCATION	SIZE & NO. OF CONTAINERS	Phenol	Br. Cr. + Sb	C.N.	T. Cr.				PRESERVATIVES	REMARKS
8C05 583	3/5 98	13:15 PM	✓		H_2O	GAC "Z	1-L	✓							H_2SO_4	
8C05 584	"	"	✓		"	"	1-L		✓						HNO_3	WS40306
8C05 585	"	"	✓		"	"	1-500ml			✓					NaOH	
8C05 586	"	"	✓		"	"	1-500ml				✓				Ø	

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
	3/6/98 8:00	Tony Pontello	Tony Pontello	3/6/98 930	
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

SPECIAL INSTRUCTIONS:

TURNAROUND TIME _____

LAB USE: REFRIGERATOR # _____ SHELF # _____ GROUP # _____ DUE DATE _____

FILE COPY

May 4, 1998

Mr. Frank Nerone
Chief Operator
Niagara County Sewer District #1
7346 Liberty Drive
Niagara Falls, NY 14304

Subject: Analytical Sampling Results (4/3/98 Sample)
Groundwater Discharge Through Pre-Treatment System
Pendleton (Frontier Chemical) Site

Dear Mr. Nerone:

Enclosed for your review are analytical results from the April 3, 1998, monthly sampling event for discharge of collected groundwater from the pre-treatment system. Analytical results for this sampling event are compared against the Permit (#96-11) requirements on the attached Analytical Summary and Daily Flow sheets.

A review of the analytical and flow data shows that all permit parameters are significantly below the stated permit requirements.

This data is being provided for your review and concurrence that all permit parameters are well within their limits. If, following review of the enclosed information, you are not in agreement with the above stated conclusion, please contact me at 423-336-4057 as soon as possible so we may discuss any future monitoring requirements.

Sincerely,

John M. Burns
for the Frontier Chemical - Pendleton Site PRP Group

enclosures: as stated
cc: D. Kummer
Pendleton Site Technical Committee

Frontier Chemical - Pendleton Site
Analytical Summary for WS 001
Permit # 96-11
Groundwater Discharge Point: D 002

255,616 Gallons Discharged Prior To 3/5/98

9,227 Gallons Since Last Report

318 Average Daily Flow Based on 29 days Between Samples

Parameters Treatment System Discharge	Permit Limit GPD	Detection Limits		4/3/98 Sample Results GPD
Discharge Rate(1)	662			
624 Analytes	**ug/L**	**ug/L**		**ug/L**
Toluene	10.0	1.0		
1,2-Dichloroethane	10.0	1.0		
4-Methyl-2-Pentanone	10.0	5.0		
Vinyl Chloride	10.0	2.0		
Methylene Chloride	10.0	2.8		
trans-1,2-Dichloroethene	10.0	1.0		
1,1,1-Trichloroethane	10.0	1.0		
Trichloroethene	10.0	1.0		
Benzene	10.0	1.0		
Chloromethane		2.0		
Bromomethane		2.0		
Chloroethane		2.0		
Chloroform		1.0		
Carbon Tetrachloride		1.0		
1,1-Dichloroethene		1.0		
Trichlorofluoromethane		2.0		
1,1-Dichloroethane		1.0		
1,2-Dichloropropane		1.0		
Bromodichloromethane		1.0		
2-Chloroethylvinyl ether		2.0		
cis-1,3-Dichloropropene		1.0		
trans-1,3-Dichloropropene		1.0		
1,1,2-Trichloroethane		1.0		
Tetrachloroethene		1.2		
Dibromochloromethane		1.0		
Chlorobenzene		1.0		
Ethylbenezene		1.0		
Bromoform		1.0		
1,1,2,2-Tetrachloroethane		1.0		
1,3-Dichlorobenzene		1.0		
1,4-Dichlorobezene		1.0		
1,2-Dichlorobenzene		1.0		
Sum of 624 Analytes		100.0		
608 Pesticides	**ug/L**	**ug/L**		**ug/L**
alpha BHC	10.0	0.003		
beta BHC	20.0	0.006		
delta BHC	10.0	0.010		
gamme BHC	10.0	0.003		
Heptachlor	8.0	0.022		
Aldrin	8.0	0.018		
Heptachlor Epoxide	9.0	0.009		
4,4-DDE	20.0	0.005		
Methoxychlor	18.0	0.007		
Metals	**mg/L**	**mg/L**		**mg/L**
Antimony	0.1	0.009	<	0.009
Boron	4.00	0.012		0.396
Chromium	5.33	0.005	<	0.005
Cyanide(T)	2.0	0.005	<	0.005
Other	**mg/L**	**mg/L**		**mg/L**
Total Phenolics	NA	0.005	<	0.005
TSS	300	4.000	<	4.000

Legend:
(1 Permit limit @ 662 GPD with maximum daily discharged @ 2500 GPD
(a Detected in blank
N Not applicable

DAILY FLOW DATA - PENDLETON SITE
APRIL 1998

DATE	TOTALIZER READING	DAILY FLOW	
4/1/98	264462	120	avg.
4/2/98		120	avg.
4/3/98		120	avg.
4/4/98	264821	167	
4/5/98	264988	108	
4/6/98	265096	166	
4/7/98	265262	165	
4/8/98	265427	169	
4/9/98	265596	164	
4/10/98	265760	106	
4/11/98	265866	163	
4/12/98	266029	115	
4/13/98	266144	157	
4/14/98	266301	157	
4/15/98	266458	167	
4/16/98	266625	496	
4/17/98	267121	393	
4/18/98	267514	302	avg.
4/19/98		302	avg.
4/20/98	268117	386	
4/21/98	268503	222	
4/22/98	268725	162	
4/23/98	268887	156	
4/24/98	269043	212	
4/25/98	269255	111	
4/26/98	269366	161	
4/27/98	269527	160	
4/28/98	269687	154	
4/29/98	269841	154	
4/30/98	269995		
AVERAGE DAILY FLOW IN GALLONS		191	

	= DRY VAULT GROUNDWATER RELIEF		
			gallons
			gallons
			gallons
			gallons
	TOTAL GALLONS	0	

avg =flow between data points divided by days of missing data
avg =(26484-264462)/3 or 120 gallons per day for data between 4/1/98 and 4/4/98

FILE COPY

RECEIVED
APR 24 1998
JOHN BURNS

WASTE STREAM TECHNOLOGY, INC.
302 Grote Street
Buffalo, NY 14207
(716) 876-5290

Analytical Data Report
Report Date : 04/20/98
Group Number : 9801-432

Prepared For :
Mr. John Burns
Olin Corporation
P.O. Box 248
1186 Lower River Road NW
Charleston, TN 37310

Site : Frontier Chemical - Pendelton

Field and Laboratory Information

Client Id	WST Lab #	Matrix	Date Sampled	Date Received	Time
GAC II	WS41255	Aqueous	4/3/98	4/6/98	0815
Sample Status Upon Receipt : No irregularities.					

Analytical Services

Analytical Parameters	Number of Samples	Turnaround Time
Metals	1	Standard
Cyanide	1	Standard
Phenol	1	Standard
Total Suspended Solids	1	Standard

Report Released By : Daniel W. Voll

Daniel Vollmer, Laboratory QA/QC Officer

ENVIRONMENTAL LABORATORY ACCREDITATION CERTIFICATION NUMBERS
NYSDOH ELAP #11179 NJDEPE #73977 CDHS ELAP #2189

WASTE STREAM TECHNOLOGY

METHODOLOGIES

The specific methodologies employed in obtaining the analytical data reported are indicated on each of the result forms. The method numbers shown refer to the following U.S. Environmental Protection Agency Reference:

Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020, March 1979, Revised 1983, U.S. Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

Federal Register, 40 CFR Part 136: Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. Revised July 1992.

Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. Third Edition, Revised December 1996, U.S. EPA SW-846.

Annual Book of ASTM Standards, Volume II. ASTM, 100 Harbor Drive, West Conshohocken, PA 19428-2959.

Standard Methods for the Examination of Water and Wastewater. (18th Edition). American Public Health Association, 1105 18th Street, NW, Washington, D.C. 20036.

Waste Stream Technology, Inc.
Metals Analysis Result Report

Site: FRONTIER CHEMICAL
Date Sampled: 04/03/98
Date Received: 04/06/98

Group Number: 9801-432
Report Units: mg/L
Matrix: Aqueous

Lab ID Number	WS41255	
Client ID	GAC II	
Date Digested	04/10/98	

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Antimony by GFAA	0.009	< 0.009	04/14/98	EPA 200.9
Boron by ICP	0.012	0.396	04/13/98	EPA 200.7
Chromium by ICP	0.005	< 0.005	04/13/98	EPA 200.7

Waste Stream Technology, Inc.

Analysis Result Report

Site: FRONTIER CHEMICAL
Date Sampled: 04/03/98
)ate Received: 04/06/98

Group Number: 9801-432
Report Units: mg/L
Matrix: Aqueous

	Lab ID Number:	WS41255			
	Client ID:	GAC II			
Analyte	**Detection Limit**	**Result**		**Date Analyzed**	**Analysis Method**
Total Recoverable Phenol	0.005	<	0.005	04/15/98	EPA 420.1
Cyanide in Water	0.005	<	0.005	04/13/98	EPA 335.2

Waste Stream Technology, Inc.
Total Suspended Solids
EPA 160.2

Site: FRONTIER CHEMICAL
Date Sampled: 04/03/98
Date Received: 04/06/98

Group Number: 9801-432
Report Units: mg/L
Matrix: Aqueous

WST Lab ID	Client ID	Analysis Date	Detection Limit	Result
WS41255	GAC II	04/09/98	4.0	< 4.0

WASTE STREAM TECHNOLOGY
302 GROTE STREET
BUFFALO, NY 14207
(716) 876-5290

9801-432

CHAIN OF CUSTODY RECORD

PROJECT NO: E414 SITE NAME: Frontier Pendelton

SAMPLERS (SIGNATURE): James Reed

SAMPLE NO.	DATE	TIME	COMP	GRAB	MATRIX	SAMPLE LOCATION	SIZE & NO. OF CONTAINERS	Phenol	Br, Cr, Sb	CN	T.S.S.				PRESERVATIVES	REMARKS
8D 02587	4/3/98	10Am	✓		H_2O	GAC II	1-L	✓							H_2SO_4	WS41255
8D 02588	"	"	✓		"	"	1-L		✓						HNO_3	
8D 02589	"	"	✓		"	"	1-500mL			✓					NaOH	
8D 02590	"	"	✓		"	"	1-500mL				✓				Ø	

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
Craig E.	4/6/98	Tony Portale	Tony Portale	4/6/98 1515	
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

SPECIAL INSTRUCTIONS:

TURNAROUND TIME 10 B.D.

LAB REFRIGERATOR # _____ SHELF # _____ GROUP # _____ DUE DATE _____

FILE COPY

June 9, 1998

Mr. Frank Nerone
Chief Operator
Niagara County Sewer District #1
7346 Liberty Drive
Niagara Falls, NY 14304

Subject: Analytical Sampling Results (5/7/98 & 5/18/98 Samples)
Groundwater Discharge Through Pre-Treatment System
Pendleton (Frontier Chemical) Site

Dear Mr. Nerone:

Enclosed for your review are analytical results from the May 7, 1998 and May 18, 1998, monthly sampling events for discharge of collected groundwater from the pre-treatment system. Voice's where omitted from the analyses listed on the chain of record and had to be resampled on May 18, 1998. Analytical results for these sampling events are compared against the Permit (#96-11) requirements on the attached Analytical Summary and Daily Flow sheets.

A review of the analytical and flow data shows that all permit parameters are significantly below the stated permit requirements.

This data is being provided for your review and concurrence that all permit parameters are well within their limits. If, following review of the enclosed information, you are not in agreement with the above stated conclusion, please contact me at 423-336-4057 as soon as possible so we may discuss any future monitoring requirements.

Sincerely,

John M. Burns
for the Frontier Chemical - Pendleton Site PRP Group

Enclosures: as stated
cc: D. Kummer
Pendleton Site Technical Committee

DAILY FLOW DATA - PENDLETON SITE
MAY 1998

DATE	TOTALIZER READING	DAILY FLOW	
5/1/98	270160	161	avg.
5/2/98		161	avg.
5/3/98		161	avg.
5/4/98	270642	162	
5/5/98	270804	167	avg.
5/6/98		167	avg.
5/7/98	271138	162	
5/8/98	271300	161	avg.
5/9/98		161	avg.
5/10/98	271622	278	
5/11/98	271900	788	
5/12/98	272688	324	
5/13/98	273012	218	
5/14/98	273230	160	
5/15/98	273390	159	avg.
5/16/98		159	avg.
5/17/98	273707	162	
5/18/98	273869	202	
5/19/98	274071	157	
5/20/98	274228	161	
5/21/98	274389	166	
5/22/98	274555	165	
5/23/98	274720	169	
5/24/98	274889	162	
5/25/98	275051	161	
5/26/98	275212	159	
5/27/98	275371	165	
5/28/98	275536	161	
5/29/98	275697	159	
5/30/98	275856	158	
5/31/98	276014		

AVERAGE DAILY FLOW IN GALLONS 195

	= DRY VAULT GROUNDWATER RELIEF		
			gallons
			gallons
			gallons
			gallons
	TOTAL GALLONS	0	

avg =flow between data points divided by days of missing data
avg =(270642-270160)/3 or 161 gallons per day for data between 5/1/98 AND 5/4/98

Frontier Chemical - Pendleton Site
Analytical Summary for WS 001
Permit # 96-11
Groundwater Discharge Point: D 002

264,843 Gallons Discharged Prior To 4/3/98
6,295 Gallons Since Last Report
185 Average Daily Flow Based on 34 days Between Samples

Parameters Treatment System Discharge	Permit Limit GPD	Detection Limits	5/7/98 Sample Results GPD
Discharge Rate(1)	662		
624 Analytes	**ug/L**	**ug/L**	**ug/L***
Toluene	10.0	1.0	1.0
1,2-Dichloroethane	10.0	1.0	1.0
4-Methyl-2-Pentanone	10.0	5.0	5.0
Vinyl Chloride	10.0	2.0	2.0
Methylene Chloride	10.0	2.8	2.8
trans-1,2-Dichloroethene	10.0	1.0	1.0
1,1,1-Trichloroethane	10.0	1.0	1.0
Trichloroethene	10.0	1.0	1.0
Benzene	10.0	1.0	1.0
Chloromethane		2.0	2.0
Bromomethane		2.0	2.0
Chloroethane		2.0	2.0
Chloroform		1.0	1.0
Carbon Tetrachloride		1.0	1.0
1,1-Dichloroethene		1.0	1.0
Trichlorofluoromethane		2.0	2.0
1,1-Dichloroethane		1.0	1.0
1,2-Dichloropropane		1.0	1.0
Bromodichloromethane		1.0	1.0
2-Chloroethylvinyl ether		2.0	2.0
cis-1,3-Dichloropropene		1.0	1.0
trans-1,3-Dichloropropene		1.0	1.0
1,1,2-Trichloroethane		1.0	1.0
Tetrachloroethene		1.2	1.2
Dibromochloromethane		1.0	1.0
Chlorobenzene		1.0	1.0
Ethylbenezene		1.0	1.0
Bromoform		1.0	1.0
1,1,2,2-Tetrachloroethane		1.0	1.0
1,3-Dichlorobenzene		1.0	1.0
1,4-Dichlorobezene		1.0	1.0
1,2-Dichlorobenzene		1.0	1.0
Sum of 624 Analytes		100.0	44.0
608 Pesticides(2)	**ug/L**	**ug/L**	**ug/L**
alpha BHC	10.0	0.003	
beta BHC	20.0	0.006	
delta BHC	10.0	0.010	
gamma BHC	10.0	0.003	
Heptachlor	8.0	0.022	
Aldrin	8.0	0.018	
Heptachlor Epoxide	9.0	0.009	
4,4-DDE	20.0	0.005	
Methoxychlor	18.0	0.007	
Metals	**mg/L**	**mg/L**	**mg/L**
Antimony	0.1	0.009	< 0.009
Boron	4.00	0.012	0.594
Chromium	5.33	0.005	< 0.005
Cyanide(T)	2.0	0.005	< 0.005
Other	**mg/L**	**mg/L**	**mg/L**
Total Phenolics	NA	0.005	< 0.005
TSS	300	4.000	4.400

Legend:
(1) Permit limit @ 662 GPD with maximum daily discharged @ 2500 GPD
(20 Discontinue per April 14, 1997 Letter from F. Narrone to PRP Group
(a) Detected in blank
NA Not applicable
* Regular monthly sample taken on May 7, 1998; VOC sample taken on May 18, 1998.

WASTE STREAM TECHNOLOGY, INC.
302 Grote Street
Buffalo, NY 14207
(716) 876-5290

Analytical Data Report
Report Date : 05/22/98
Group Number : 9801-600

Prepared For :
Mr. John Burns
Olin Corporation
P.O. Box 248
1186 Lower River Road NW
Charleston, TN 37310

Site : Frontier Chemical

Field and Laboratory Information

Client Id	WST Lab #	Matrix	Date Sampled	Date Received	Time
GAC II	WS42416	Aqueous	5/7/98	5/8/98	1200
Sample Status Upon Receipt : No irregularities.					

Analytical Services

Analytical Parameters	Number of Samples	Turnaround Time
TSS	1	Standard
Phenol	1	Standard
Cyanide	1	Standard
Total Metals	1	Standard
Phenol	1	Standard
Total Suspended Solids	1	Standard

Report Released By : Daniel W. Vollmer
Daniel Vollmer, Laboratory QA/QC Officer

ENVIRONMENTAL LABORATORY ACCREDITATION CERTIFICATION NUMBERS
NYSDOH ELAP #11179 NJDEPE #73977 CDHS ELAP #2189

WASTE STREAM TECHNOLOGY

METHODOLOGIES

The specific methodologies employed in obtaining the analytical data reported are indicated on each of the result forms. The method numbers shown refer to the following U.S. Environmental Protection Agency Reference:

Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020, March 1979, Revised 1983, U.S. Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

Federal Register, 40 CFR Part 136: Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. Revised July 1992.

Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. Third Edition, Revised December 1996, U.S. EPA SW-846.

Annual Book of ASTM Standards, Volume II. ASTM, 100 Harbor Drive, West Conshohocken, PA 19428-2959.

Standard Methods for the Examination of Water and Wastewater. (18th Edition). American Public Health Association, 1105 18th Street, NW, Washington, D.C. 20036.

Waste Stream Technology, Inc.
Total Suspended Solids
EPA 160.2

Site: FRONTIER CHEMICAL
Date Sampled: 05/07/98
Date Received: 05/08/98

Group Number: 9801-600
Report Units: mg/L
Matrix: Aqueous

WST Lab ID	Client ID	Analysis Date	Detection Limit	Result
WS42416	GAC II	05/11/98	4.0	4.4

Waste Stream Technology, Inc.

Analysis Result Report

Site: FRONTIER CHEMICAL
Date Sampled: 05/07/98
Date Received: 05/08/98

Group Number: 9801-600
Report Units: mg/L
Matrix: Aqueous

	Lab ID Number:	WS42416			
	Client ID:	GAC II			
Analyte	**Detection Limit**	**Result**		**Date Analyzed**	**Analysis Method**
Total Recoverable Phenol	0.005	<	0.005	05/18/98	EPA 420.1
Cyanide in Water	0.005	<	0.005	05/14/98	EPA 335.2

Waste Stream Technology, Inc.
Metals Analysis Result Report

Site: FRONTIER CHEMICAL
Date Sampled: 05/07/98
Date Received: 05/08/98

Group Number: 9801-600
Report Units: mg/L
Matrix: Aqueous

Lab ID Number	WS42416	
Client ID	GAC II	
Date Digested	05/20/98	

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Antimony by GFAA	0.009	< 0.009	05/21/98	EPA 200.9
Boron by ICP	0.012	0.594	05/21/98	EPA 200.7
Chromium by ICP	0.005	< 0.005	05/21/98	EPA 200.7

Waste Stream Technology, Inc.

Metals Method Blank Analysis Result Report

Site: FRONTIER CHEMICAL
Date Sampled: NA
Date Received: NA

Group Number: 9801-600
Report Units: PPM

Lab ID Number	MB052098-HP-2
Client ID	NA
Date Digested	05/20/98

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Boron by ICP Method Blank	0.012	0.047	05/21/98	EPA 200.7
Cr water Method Blank	0.005	< 0.005	05/21/98	EPA 200.7
Sb Method Blank	0.009	< 0.009	05/21/98	EPA 200.9

MB denotes Method Blank
NA denotes Not Applicable

WASTE STREAM TECHNOLOGY

302 GROTE STREET
BUFFALO, NY 14207
(716) 876-5290

9801-600

CHAIN OF CUSTODY RECORD

PROJECT NO: MAY 98

SITE NAME: Frontier Pendleton

SAMPLERS (SIGNATURE): James Reed

SAMPLE NO.	DATE	TIME	COMP	GRAB	MATRIX	SAMPLE LOCATION	SIZE & NO. OF CONTAINERS	Phenolics	Br, Cr, +56	CN	TSS				PRESERVATIVES	REMARKS
8E 07591	5/7/98	10Am	✓		H_2O	GAC II	1-1L amber	✓							H_2SO_4	
8E 07592			✓		"	"	1-1L		✓						HNO_3	WS424116
8E 07593			✓		"	"	1-500ml			✓					NaOH	
8E 07594			✓		"	"	1-500ml				✓				Ø	

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
James Reed	5/8/98 11:20			5/8/98 12:00	
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

SPECIAL INSTRUCTIONS:

TURNAROUND TIME 10BD

LAB U' REFRIGERATOR #_____ SHELF #_____ GROUP #_____ DUE DATE_____

WASTE STREAM TECHNOLOGY, INC.
302 Grote Street
Buffalo, NY 14207
(716) 876-5290

Analytical Data Report
Report Date : 06/03/98
Group Number : 9801-665

Prepared For :
Mr. John Burns
Olin Corporation
P.O. Box 248
1186 Lower River Road NW
Charleston, TN 37310

Site : Frontier Chemical

Field and Laboratory Information

Client Id	WST Lab #	Matrix	Date Sampled	Date Received	Time
GAC II	WS42607	Aqueous	5/18/98	5/19/98	1200
Sample Status Upon Receipt : No irregularities.					

Analytical Parameters	Analytical Services Number of Samples	Turnaround Time
624	1	Standard

I CERTIFY THIS PAYMENT REQUEST IS FOR A CORRECT AND PROPER CHARGE TO OLIN CORP. Date_____
P.O.#_____
ACCT.#_____
REQUESTED:_____
APPROVED:_____

Report Released By : Daniel W. Vollmer
Daniel Vollmer, Laboratory QA/QC Officer

ENVIRONMENTAL LABORATORY ACCREDITATION CERTIFICATION NUMBERS
NYSDOH ELAP #11179 NJDEPE #73977 CDHS ELAP #2189

WASTE STREAM TECHNOLOGY

METHODOLOGIES

The specific methodologies employed in obtaining the analytical data reported are indicated on each of the result forms. The method numbers shown refer to the following U.S. Environmental Protection Agency Reference:

Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020, March 1979, Revised 1983, U.S. Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

Federal Register, 40 CFR Part 136: Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. Revised July 1992.

Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. Third Edition, Revised December 1996, U.S. EPA SW-846.

Annual Book of ASTM Standards, Volume II. ASTM, 100 Harbor Drive, West Conshohocken, PA 19428-2959.

Standard Methods for the Examination of Water and Wastewater. (18th Edition). American Public Health Association, 1105 18th Street, NW, Washington, D.C. 20036.

Waste Stream Technology, Inc.
40 CFR Part 136 Method 624
EPA 624

Site: FRONTIER CHEMICAL
Date Sampled: 05/18/98
Date Received: 05/19/98

Group Number: 9801-665
Report Units: ug/L
Matrix: Aqueous

Lab ID Number	WS42607	
Client ID	GAC II	
Date Extracted	NA	
Date Analyzed	05/29/98	

Compound	Detection Limit/ QC Limits (%)	Result	Q
chloromethane	2.0	2.0	U
vinyl chloride	2.0	2.0	U
bromomethane	2.0	2.0	U
chloroethane	2.0	2.0	U
Trichlorofluoromethane	2.0	2.0	U
1,1-dichloroethene	1.0	1.0	U
methylene chloride	2.8	2.8	U
trans-1,2-dichloroethene	1.0	1.0	U
1,1-dichloroethane	1.0	1.0	U
chloroform	1.0	1.0	U
1,1,1-trichloroethane	1.0	1.0	U
carbon tetrachloride	1.0	1.0	U
benzene	1.0	1.0	U
1,2-dichloroethane	1.0	1.0	U
trichloroethene	1.0	1.0	U
1,2-dichloropropane	1.0	1.0	U
bromodichloromethane	1.0	1.0	U
2-chloroethylvinyl ether	2.0	2.0	U
cis-1,3-dichloropropene	1.0	1.0	U
toluene	1.0	1.0	U
trans-1,3-dichloropropene	1.0	1.0	U
1,1,2-trichloroethane	1.0	1.0	U
tetrachloroethene	1.2	1.2	U
dibromochloromethane	1.0	1.0	U
chlorobenzene	1.0	1.0	U
ethylbenzene	1.0	1.0	U
bromoform	1.0	1.0	U
1,1,2,2-tetrachloroethane	1.0	1.0	U
1,3-dichlorobenzene	1.0	1.0	U
1,4-dichlorobenzene	1.0	1.0	U
1,2-dichlorobenzene	1.0	1.0	U
1,2-Dichloroethane-d4 (%)	76-114	101.0	
Toluene-d8 (%)	88-110	103.0	
Bromofluorobenzene (%)	86-115	103.0	

Dilution Factor 1

Waste Stream Technology, Inc.
Method 624 Method Blank Results
EPA 624

Site: FRONTIER CHEMICAL
Date Sampled: NA
Date Received: NA

Group Number: 9801-665
Report Units: PPB

Lab ID Number	IB052998
Client ID	NA
Date Extracted	NA
Date Analyzed	05/29/98

Compound	Detection Limit/ QC Limits (%)	Result	Q
chloromethane	2.0	2.0	U
vinyl chloride	2.0	2.0	U
bromomethane	2.0	2.0	U
chloroethane	2.0	2.0	U
trichlorofluoromethane	2.0	2.0	U
1,1-dichloroethene	1.0	1.0	U
methylene chloride	2.8	2.8	U
trans-1,2-dichloroethene	1.0	1.0	U
1,1-dichloroethane	1.0	1.0	U
chloroform	1.0	1.0	U
1,1,1,-trichloroethane	1.0	1.0	U
carbon tetrachloride	1.0	1.0	U
benzene	1.0	1.0	U
1,2-dichloroethane	1.0	1.0	U
trichloroethene	1.0	1.0	U
1,2-dichloropropane	1.0	1.0	U
bromodichloromethane	1.0	1.0	U
2-chloroethylvinyl ether	2.0	2.0	U
cis-1,3-dichloropropene	1.0	1.0	U
toluene	1.0	1.0	U
trans-1,3-dichloropropene	1.0	1.0	U
1,1,2-trichloroethane	1.0	1.0	U
tetrachloroethene	1.2	1.2	U
dibromochloromethane	1.0	1.0	U
chlorobenzene	1.0	1.0	U
ethylbenzene	1.0	1.0	U
bromoform	1.0	1.0	U
1,1,2,2-tetrachloroethane	1.0	1.0	U
1,3-dichlorobenzene	1.0	1.0	U
1,4-dichlorobenzene	1.0	1.0	U
1,2-dichlorobenzene	1.0	1.0	U
Bromofluorobenzene (%)	86-115	97.0	
1,2-Dichloroethane-d4 (%)	76-114	102.0	
Toluene-d8 (%)	88-110	100.0	

Dilution Factor 1
IB Denotes Instrument Blank
NA Denotes Not Applicable

WASTE STREAM TECHNOLOGY

302 GROTE STREET
BUFFALO, NY 14207
(716) 876-5290

9801-1665

CHAIN OF CUSTODY RECORD

PROJECT NO: SITE NAME: Pendleton - Frontier Site

SAMPLERS (SIGNATURE): James Read

SAMPLE NO.	DATE	TIME	COMP	GRAB	MATRIX	SAMPLE LOCATION	SIZE & NO. OF CONTAINERS	VOA	PRESERVATIVES	REMARKS
8E 18595	5/18/98	10:30 Am		V		GAC II	2-40ml	1	HCL	Semi Annual GW54

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
James Read	5/19 8:11 AM			5-19 11:00	
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

SPECIAL INSTRUCTIONS:

TURNAROUND TIME 10 BD

LAB I REFRIGERATOR #_____ SHELF #_____ GROUP #_____ DUE DATE_____

PLEASE TYPE OR PRINT

FOR SHIPMENTS WITHIN U.S. ONLY

1A1 1B1 1D1

1 FROM (Company)

OLIN CHEMICAL

Street Address

1136 LOWER RIVER RD

City | State | ZIP CODE (Required)

CHARLESTON | TN | 37310

Sent by (Name/Dept) | Phone Number

John M. Burns | 423-336-4000

2 TO (Company)

Niagara County Sewer District #1

Street Address

7346 Liberty Drive

City | State | ZIP CODE (Required)

Niagara Falls | NY | 14304

Attention: (Name/Dept) | Phone Number (Important)

Frank Nerone, Chief Operator

Description

Pendleton Site
Analytical Sampling Results

3 *THANK YOU FOR SHIPPING WITH AIRBORNE EXPRESS*

Sender's Signature ▶ Date 6/12/98

Airborne Signature | Route No. | Date | Time

001 (01/97) M-05

http://www.airborne-express.com

Preprint Format No. 33041903 | Origin CHA | Airbill Number 4731953586

4 Method of Payment *Assumed sender unless otherwise noted*

- [X] Bill Sender ▶ 10960759 *Airborne Sender account no*
- [ ] Bill Receiver ▶ *Airborne Receiver account no*
- [ ] Bill 3rd Party ▶ *Airborne Customer account no*
- [ ] Paid in Advance *Check No.* *Amount* $

Billing Reference *will appear on invoice*

5060010.R.Y36.1008.1321

6 NO. OF PKGS: 1 | **7** WEIGHT (LBS.) *SUBJECT TO CORRECTION* | **8** CHECK IF: [X] LETTER EXPRESS [ ] EXPRESS PACK

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- [ ] Hold at Airborne
- [ ] Lab Pack
- [ ]

Declared Value [ ] or Full Insurance [ ] $ Shipment Valuation .

Received At [ ] Drop Box # [ ] Airborne Terminal

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1-800-247-2676

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Distribution:

Frank Nerrone Original Copy of all documents; express mailed for next day delivery.
Dan Commer Copy of all information; include with Frank Nerrone Copy.
PRP Group from Distribution labels; copy of cover letter, daily flow data and analytical summary; send regular mail

FILE COPY

July 6, 1998

Mr. Frank Nerone
Chief Operator
Niagara County Sewer District #1
7346 Liberty Drive
Niagara Falls, NY 14304

Subject: Analytical Sampling Results (6/11/98 Samples)
Groundwater Discharge Through Pre-Treatment System
Pendleton (Frontier Chemical) Site

Dear Mr. Nerone:

Enclosed for your review are analytical results from the June 11, 1998, monthly sampling event for discharge of collected groundwater from the pre-treatment system at the Pendleton Site. Analytical results for these sampling events are compared against the Permit (#96-11) requirements on the attached Analytical Summary and Daily Flow sheets.

A review of the analytical and flow data shows that all permit parameters are significantly below the stated permit requirements.

This data is being provided for your review and concurrence that all permit parameters are well within their limits. If, following review of the enclosed information, you are not in agreement with the above stated conclusion, please contact me at 423-336-4057 as soon as possible so we may discuss any future monitoring requirements.

Sincerely,

John M. Burns
for the Frontier Chemical - Pendleton Site PRP Group

Enclosures: as stated
cc: D. Kummer
Pendleton Site Technical Committee

WASTE STREAM TECHNOLOGY, INC.
302 Grote Street
Buffalo, NY 14207
(716) 876-5290

Analytical Data Report
Report Date : 06/25/98
Group Number : 9801-774

Prepared For :
Mr. John Burns
Olin Corporation
P.O. Box 248
1186 Lower River Road NW
Charleston, TN 37310

Site : Frontier, Pendelton

Field and Laboratory Information

Client Id	WST Lab #	Matrix	Date Sampled	Date Received	Time
GAC II	WS43090	Aqueous	06/11/98	06/12/98	1100
Sample Status Upon Receipt : No irregularities.					

Analytical Services

Analytical Parameters	Number of Samples	Turnaround Time
Total Metals	1	Standard
Cyanide	1	Standard
Phenol	1	Standard
Total Suspended Solids	1	Standard

Report Released By : Daniel W. Vollmer
Daniel Vollmer, Laboratory QA/QC Officer

ENVIRONMENTAL LABORATORY ACCREDITATION CERTIFICATION NUMBERS
NYSDOH ELAP #11179 NJDEPE #73977 CDHS ELAP #2189

WASTE STREAM TECHNOLOGY

METHODOLOGIES

The specific methodologies employed in obtaining the analytical data reported are indicated on each of the result forms. The method numbers shown refer to the following U.S. Environmental Protection Agency Reference:

Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020, March 1979, Revised 1983, U.S. Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

Federal Register, 40 CFR Part 136: Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. Revised July 1992.

Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. Third Edition, Revised December 1996, U.S. EPA SW-846.

Annual Book of ASTM Standards, Volume II. ASTM, 100 Harbor Drive, West Conshohocken, PA 19428-2959.

Standard Methods for the Examination of Water and Wastewater. (18th Edition). American Public Health Association, 1105 18th Street, NW, Washington, D.C. 20036.

Waste Stream Technology, Inc.
Metals Analysis Result Report

Site: FRONTIER, PENDELTON
Date Sampled: 06/11/98
Date Received: 06/12/98

Group Number: 9801-774
Report Units: mg/L
Matrix: Aqueous

	Lab ID Number	WS43090		
	Client ID	GAC II		
	Date Digested	06/15/98		
Analyte	**Detection Limit**	**Result**	**Date Analyzed**	**Analysis Method**
Antimony by GFAA	0.009	< 0.009	06/16/98	EPA 200.9
Boron by ICP	0.012	0.672	06/17/98	EPA 200.7
Chromium by ICP	0.005	< 0.005	06/17/98	EPA 200.7

Waste Stream Technology, Inc.
Cyanide in Water
EPA 335.2

Site: FRONTIER, PENDELTON
Date Sampled: 06/11/98
Date Received: 06/12/98

Group Number: 9801-774
Report Units: mg/L
Matrix: Aqueous

WST Lab ID	Client ID	Analysis Date	Detection Limit	Result
WS43090	GAC II	06/24/98	0.005	< 0.005

Waste Stream Technology, Inc.
Total Recoverable Phenol
EPA 420.1

Site: FRONTIER, PENDELTON
Date Sampled: 06/11/98
Date Received: 06/12/98

Group Number: 9801-774
Report Units: mg/L
Matrix: Aqueous

WST Lab ID	Client ID	Analysis Date	Detection Limit	Result
WS43090	GAC II	06/23/98	0.005	< 0.005

Waste Stream Technology, Inc.
Total Suspended Solids
EPA 160.2

Site: FRONTIER, PENDELTON
Date Sampled: 06/11/98
Date Received: 06/12/98

Group Number: 9801-774
Report Units: mg/L
Matrix: Aqueous

WST Lab ID	Client ID	Analysis Date	Detection Limit	Result
WS43090	GAC II	06/15/98	4.0	< 4.0

WASTE STREAM TECHNOLOGY

302 GROTE STREET
BUFFALO, NY 14207
(716) 876-5290

9801-774

CHAIN OF CUSTODY RECORD

PROJECT NO:

SITE NAME: Frontier-Pendelton

SAMPLERS (SIGNATURE): James Reed

SAMPLE NO.	DATE	TIME	COMP	GRAB	MATRIX	SAMPLE LOCATION	SIZE & NO. OF CON-TAINERS	Phenol	Br, Cr+Sb	CN	T.S.S.	PRESERVATIVES	REMARKS
8F 11596	6/11/98	9 am	✓		H_2O	GAC II	amber 1-L	✓				H_2SO_4	WS43090
8F 11597	"	"	✓		"	"	1-L		✓			HNO_3	
8F 11598	"	"	✓		"	"	1-500ml			✓		NaOH	
8F 11599	"	"	✓		"	"	1-500ml				✓	Ø	

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
James Reed	6/12/98 10:30 am	C. Fanborg [illegible]	C. Fanborg [illegible]	6/12/98 11:00	[signature]
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

SPECIAL INSTRUCTIONS:

TURNAROUND TIME 10BD

LAB USE: REFRIGERATOR # ______ SHELF # ______ GROUP # ______ DUE DATE ______

DAILY FLOW DATA - PENDLETON SITE
JUNE 1998

DATE	TOTALIZER READING	DAILY FLOW	
6/1/98	276235	161	
6/2/98	276396	159	
6/3/98	276555	166	
6/4/98	276721	166	
6/5/98	276887	215	
6/6/98	277102	106	
6/7/98	277208	168	
6/8/98	277376	159	
6/9/98	277535	143	avg.
6/10/98		143	avg.
6/11/98	277821	159	
6/12/98	277980	160	avg.
6/13/98		160	avg.
6/14/98	278300	159	
6/15/98	278459	161	
6/16/98	278620	158	
6/17/98	278778	157	
6/18/98	278935	157	
6/19/98	279092	213	
6/20/98	279305	157	
6/21/98	279462	104	
6/22/98	279566	157	
6/23/98	279723	164	
6/24/98	279887	186	
6/25/98	280073	189	
6/26/98	280262	217	
6/27/98	280479	215	
6/28/98	280694	160	
6/29/98	280854	217	
6/30/98	281071		
AVERAGE DAILY FLOW IN GALLONS		167	

	= DRY VAULT GROUNDWATER RELIEF		
			gallons
			gallons
			gallons
			gallons
	TOTAL GALLONS	0	

avg =flow between data points divided by days of missing data
avg =(277821-277535)/2 or 142 gallons per day for data between 6/9/98 and 6/11/98

Frontier Chemical - Pendleton Site
Analytical Summary for WS 001
Permit # 96-11
Groundwater Discharge Point: D 002

271,138 Gallons Discharged Prior To 5/7/98
6,683 Gallons Since Last Report
191 Average Daily Flow Based on 35 days Between Samples

Parameters Treatment System Discharge	Permit Limit GPD	Detection Limits	6/11/98 Sample Results GPD
Discharge Rate(1)	662		
624 Analytes	ug/L	ug/L	ug/L*
Toluene	10.0	1.0	
1,2-Dichloroethane	10.0	1.0	
4-Methyl-2-Pentanone	10.0	5.0	
Vinyl Chloride	10.0	2.0	
Methylene Chloride	10.0	2.8	
trans-1,2-Dichloroethene	10.0	1.0	
1,1,1-Trichloroethane	10.0	1.0	
Trichloroethene	10.0	1.0	
Benzene	10.0	1.0	
Chloromethane		2.0	
Bromomethane		2.0	
Chloroethane		2.0	
Chloroform		1.0	
Carbon Tetrachloride		1.0	
1,1-Dichloroethene		1.0	
Trichlorofluoromethane		2.0	
1,1-Dichloroethane		1.0	
1,2-Dichloropropane		1.0	
Bromodichloromethane		1.0	
2-Chloroethylvinyl ether		2.0	
cis-1,3-Dichloropropene		1.0	
trans-1,3-Dichloropropene		1.0	
1,1,2-Trichloroethane		1.0	
Tetrachloroethene		1.2	
Dibromochloromethane		1.0	
Chlorobenzene		1.0	
Ethylbenezene		1.0	
Bromoform		1.0	
1,1,2,2-Tetrachloroethane		1.0	
1,3-Dichlorobenzene		1.0	
1,4-Dichlorobezene		1.0	
1,2-Dichlorobenzene		1.0	
Sum of 624 Analytes		100.0	0.0
608 Pesticides(2)	ug/L	ug/L	ug/L
alpha BHC	10.0	0.003	
beta BHC	20.0	0.006	
delta BHC	10.0	0.010	
gamme BHC	10.0	0.003	
Heptachlor	8.0	0.022	
Aldrin	8.0	0.018	
Heptachlor Epoxide	9.0	0.009	
4,4-DDE	20.0	0.005	
Methoxychlor	18.0	0.007	
Metals	mg/L	mg/L	mg/L
Antimony	0.1	0.009	< 0.009
Boron	4.00	0.012	0.672
Chromium	5.33	0.005	< 0.005
Cyanide(T)	2.0	0.005	< 0.005
Other	mg/L	mg/L	mg/L
Total Phenolics	NA	0.005	< 0.005
TSS	300	4.000	< 4.000

Legend:
(1) Permit limit @ 662 GPD with maximum daily discharged @ 2500 GPD
(20 Discontinue per April 14, 1997 Letter from F. Narrone to PRP Group.
(a) Detected in blank
NA Not applicable
* Regular monthly sample taken on May 7, 1998: VOC sample taken on May 18, 1998.

FILE COPY

August 3, 1998

Mr. Frank Nerone
Chief Operator
Niagara County Sewer District #1
7346 Liberty Drive
Niagara Falls, NY 14304

Subject: Analytical Sampling Results (7/2/98 Samples)
Groundwater Discharge Through Pre-Treatment System
Pendleton (Frontier Chemical) Site

Dear Mr. Nerone:

Enclosed for your review are analytical results from the July 2, 1998, monthly sampling event for discharge of collected groundwater from the pre-treatment system at the Pendleton Site. Analytical results for these sampling events are compared against the Permit (#96-11) requirements on the attached Analytical Summary and Daily Flow sheets.

A review of the analytical and flow data shows that all permit parameters are significantly below the stated permit requirements.

This data is being provided for your review and concurrence that all permit parameters are well within their limits. If, following review of the enclosed information, you are not in agreement with the above stated conclusion, please contact me at 423-336-4057 as soon as possible so we may discuss any future monitoring requirements.

Sincerely,

John M. Burns

John M. Burns
for the Frontier Chemical - Pendleton Site PRP Group

Enclosures: as stated
cc: D. Kummer
Pendleton Site Technical Committee

DAILY FLOW DATA - PENDLETON SITE
JULY 1998

DATE	TOTALIZER READING	DAILY FLOW	
7/1/98		213	
7/2/98	281496	213	
7/3/98	281709	155	
7/4/98	281864	390	
7/5/98	282254	214	
7/6/98	282468	218	
7/7/98	282686	321	
7/8/98	283007	375	
7/9/98	283382	237	
7/10/98	283619	169	
7/11/98	283788	158	
7/12/98	283946	173	
7/13/98		173	
7/14/98		173	
7/15/98		173	
7/16/98	284637	159	
7/17/98	284796	157	
7/18/98	284953	159	
7/19/98	285112	208	
7/20/98	285320	158	
7/21/98	285478	160	
7/22/98	285638	151	
7/23/98	285789	155	
7/24/98	285944	157	
7/25/98	286101	108	
7/26/98	286209	157	
7/27/98	286366	154	
7/28/98	286520	158	
7/29/98	286678	174	
7/30/98	286852	108	
7/31/98	286960		
AVERAGE DAILY FLOW IN GALLONS		189	

	= DRY VAULT GROUNDWATER RELIEF		
			gallons
			gallons
			gallons
			gallons
	TOTAL GALLONS	0	

avg =flow between data points divided by days of missing data
avg =(281496-281071)/3 or 213 gallons per day for data between 6/30/98 and 7/2/98

Frontier Chemical - Pendleton Site
Analytical Summary for WS 001
Permit # 96-11
Groundwater Discharge Point: D 002

277,821 Gallons Discharged Prior To 6/11/98
3,675 Gallons Since Last Report
175 Average Daily Flow Based on 21 days Between Samples

Parameters Treatment System Discharge	Permit Limit GPD	Detection Limits	7/2/98 Sample Results GPD
Discharge Rate(1)	662		
624 Analytes	**ug/L**	**ug/L**	**ug/L***
Toluene	10.0	1.0	
1,2-Dichloroethane	10.0	1.0	
4-Methyl-2-Pentanone	10.0	5.0	
Vinyl Chloride	10.0	2.0	
Methylene Chloride	10.0	2.8	
trans-1,2-Dichloroethene	10.0	1.0	
1,1,1-Trichloroethane	10.0	1.0	
Trichloroethene	10.0	1.0	
Benzene	10.0	1.0	
Chloromethane		2.0	
Bromomethane		2.0	
Chloroethane		2.0	
Chloroform		1.0	
Carbon Tetrachloride		1.0	
1,1-Dichloroethene		1.0	
Trichlorofluoromethane		2.0	
1,1-Dichloroethane		1.0	
1,2-Dichloropropane		1.0	
Bromodichloromethane		1.0	
2-Chloroethylvinyl ether		2.0	
cis-1,3-Dichloropropene		1.0	
trans-1,3-Dichloropropene		1.0	
1,1,2-Trichloroethane		1.0	
Tetrachloroethene		1.2	
Dibromochloromethane		1.0	
Chlorobenzene		1.0	
Ethylbenezene		1.0	
Bromoform		1.0	
1,1,2,2-Tetrachloroethane		1.0	
1,3-Dichlorobenzene		1.0	
1,4-Dichlorobezene		1.0	
1,2-Dichlorobenzene		1.0	
Sum of 624 Analytes		100.0	0.0
608 Pesticides(2)	**ug/L**	**ug/L**	**ug/L**
alpha BHC	10.0	0.003	
beta BHC	20.0	0.006	
delta BHC	10.0	0.010	
gamme BHC	10.0	0.003	
Heptachlor	8.0	0.022	
Aldrin	8.0	0.018	
Heptachlor Epoxide	9.0	0.009	
4,4-DDE	20.0	0.005	
Methoxychlor	18.0	0.007	
Metals	**mg/L**	**mg/L**	**mg/L**
Antimony	0.1	0.009	< 0.009
Boron	4.00	0.012	0.727
Chromium	5.33	0.005	< 0.005
Cyanide(T)	2.0	0.005	< 0.005
Other	**mg/L**	**mg/L**	**mg/L**
Total Phenolics	NA	0.005	< 0.005
TSS	300	4.000	< 4.000

Legend:
(1) Permit limit @ 662 GPD with maximum daily discharged @ 2500 GPD
(2) Discontinue per April 14, 1997 Letter from F. Narrone to PRP Group.
(a) Detected in blank
NA Not applicable

WASTE STREAM TECHNOLOGY, INC.
302 Grote Street
Buffalo, NY 14207
(716) 876-5290

Analytical Data Report
Report Date : 07/16/98
Group Number : 9801-861

Prepared For :
Mr. John Burns
Olin Corporation
P.O. Box 248
1186 Lower River Road NW
Charleston, TN 37310

Site : Frontier Chemical

Field and Laboratory Information

Client Id	WST Lab #	Matrix	Date Sampled	Date Received	Time
GAC 2	WS43625	Aqueous	7/2/98	7/3/98	1145
Sample Status Upon Receipt : No irregularities.					

Analytical Services

Analytical Parameters	Number of Samples	Turnaround Time
Total Metals	1	Standard
Cyanide	1	Standard
Phenol	1	Standard
Total Suspended Solids	1	Standard

Report Released By : Daniel W. Vollmer
Daniel Vollmer, Laboratory QA/QC Officer

ENVIRONMENTAL LABORATORY ACCREDITATION CERTIFICATION NUMBERS
NYSDOH ELAP #11179 NJDEPE #73977 CDHS ELAP #2189

WASTE STREAM TECHNOLOGY

METHODOLOGIES

The specific methodologies employed in obtaining the analytical data reported are indicated on each of the result forms. The method numbers shown refer to the following U.S. Environmental Protection Agency Reference:

Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020, March 1979, Revised 1983, U.S. Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

Federal Register, 40 CFR Part 136: Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. Revised July 1992.

Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. Third Edition, Revised December 1996, U.S. EPA SW-846.

Annual Book of ASTM Standards, Volume II. ASTM, 100 Harbor Drive, West Conshohocken, PA 19428-2959.

Standard Methods for the Examination of Water and Wastewater. (18th Edition). American Public Health Association, 1105 18th Street, NW, Washington, D.C. 20036.

Waste Stream Technology, Inc.
Total Suspended Solids
EPA 160.2

Site: FRONTIER CHEMICAL
Date Sampled: 07/02/98
Date Received: 07/03/98

Group Number: 9801-861
Report Units: mg/L
Matrix: Aqueous

WST Lab ID	Client ID	Analysis Date	Detection Limit	Result
WS43625	GAC 2	07/07/98	4.0	< 4.0

Waste Stream Technology, Inc.

Analysis Result Report

Site: FRONTIER CHEMICAL
Date Sampled: 07/02/98
Date Received: 07/03/98

Group Number: 9801-861
Report Units: mg/L
Matrix: Aqueous

	Lab ID Number:	WS43625			
	Client ID:	GAC 2			
Analyte	**Detection Limit**	**Result**		**Date Analyzed**	**Analysis Method**
Total Recoverable Phenol	0.005	<	0.005	07/10/98	EPA 420.1
Cyanide in Water	0.005	<	0.005	07/08/98	EPA 335.2

Waste Stream Technology, Inc.
Metals Analysis Result Report

Site: FRONTIER CHEMICAL
Date Sampled: 07/02/98
Date Received: 07/03/98

Group Number: 9801-861
Report Units: mg/L
Matrix: Aqueous

	Lab ID Number Client ID Date Digested	WS43625 GAC 2 07/06/98		
Analyte	**Detection Limit**	**Result**	**Date Analyzed**	**Analysis Method**
Antimony by GFAA	0.009	< 0.009	07/15/98	EPA 200.9
Boron by ICP	0.012	0.727	07/07/98	EPA 200.7
Chromium by ICP	0.005	< 0.005	07/07/98	EPA 200.7

WASTE STREAM TECHNOLOGY

302 GROTE STREET
BUFFALO, NY 14207
(716) 876-5290

9801-861

CHAIN OF CUSTODY RECORD

PROJECT NO: SITE NAME: Frontier Pendelton

SAMPLERS (SIGNATURE):

SAMPLE NO.	DATE	TIME	COMP	GRAB	MATRIX	SAMPLE LOCATION	SIZE & NO. OF CONTAINERS	Phenol	Br, Cr + Sb	GN	T.S.S.	PRESERVATIVES	REMARKS
8G 02600	7/2 98	10A	✓		H_2O	GAC 2	1-L	✓				H_2SO_4	WS43625
8G 02601	7/2 98		✓		✓	✓	1-L		✓			HNO_3	
8G 02602	7/2 98		✓		✓	✓	1-~~500~~ L			✓		NaOH	
8G 02603	7/2 98		✓		✓	✓	1-500ml				✓	Ø	

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
	7/3/98 11:00			7/3/98 11:45	
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

SPECIAL INSTRUCTIONS:

TURNAROUND TIME _____

LAB U REFRIGERATOR # _____ SHELF # _____ GROUP # _____ DUE DATE _____

FILE COPY

September 9, 1998

Mr. Frank Nerone
Chief Operator
Niagara County Sewer District #1
7346 Liberty Drive
Niagara Falls, NY 14304

Subject: Analytical Sampling Results (8/6/98 Samples)
Groundwater Discharge Through Pre-Treatment System
Pendleton (Frontier Chemical) Site

Dear Mr. Nerone:

Enclosed for your review are analytical results from the August 6, 1998, monthly sampling event for discharge of collected groundwater from the pre-treatment system at the Pendleton Site. Analytical results for these sampling events are compared against the Permit (#96-11) requirements on the attached Analytical Summary and Daily Flow sheets.

A review of the analytical and flow data shows that all permit parameters are significantly below the stated permit requirements.

This data is being provided for your review and concurrence that all permit parameters are well within their limits. If, following review of the enclosed information, you are not in agreement with the above stated conclusion, please contact me at 423-336-4057 as soon as possible so we may discuss any future monitoring requirements.

Sincerely,

John M. Burns

John M. Burns
for the Frontier Chemical - Pendleton Site PRP Group

Enclosures: as stated
cc: D. Kummer
Pendleton Site Technical Committee

DAILY FLOW DATA - PENDLETON SITE
AUGUST 1998

DATE	TOTALIZER READING	DAILY FLOW	
8/1/98	287034	105	
8/2/98	287139	156	
8/3/98	287295	102	
8/4/98	287397	160	avg.
8/5/98		160	avg.
8/6/98	287717	104	
8/7/98	287821	155	
8/8/98	287976	153	
8/9/98	288129	101	
8/10/98	288230	154	
8/11/98	288384	156	
8/12/98	288540	158	
8/13/98	288698	121	
8/14/98	288819	154	
8/15/98	288973	152	
8/16/98	289125	102	
8/17/98	289227	102	
8/18/98	289329	156	
8/19/98	289485	104	
8/20/98	289589	156	
8/21/98	289745	102	
8/22/98	289847	157	
8/23/98	290004	154	
8/24/98	290158	168	
8/25/98	290326	216	
8/26/98	290542	102	
8/27/98	290644	157	
8/28/98	290801	101	
8/29/98	290902	156	
8/30/98	291058	103	
8/31/98	291161		
AVERAGE DAILY FLOW IN GALLONS		138	

	= DRY VAULT GROUNDWATER RELIEF		
			gallons
			gallons
			gallons
			gallons
	TOTAL GALLONS	0	

avg =flow between data points divided by days of missing data
avg =(287717-287397)/2 or 160 gallons per day for data between 8/4/98 and 8/6/98

Frontier Chemical - Pendleton Site
Analytical Summary for WS 001
Permit # 96-11
Groundwater Discharge Point: D 002

281,496 Gallons Discharged Prior To 7/2/98
6,221 Gallons Since Last Report
183 Average Daily Flow Based on 34 days Between Samples

Parameters / Treatment System Discharge	Permit Limit GPD	Detection Limits	8/5/98 Sample Results GPD
Discharge Rate(1)	662		
624 Analytes	ug/L	ug/L	ug/L*
Toluene	10.0	1.0	
1,2-Dichloroethane	10.0	1.0	
4-Methyl-2-Pentanone	10.0	5.0	
Vinyl Chloride	10.0	2.0	
Methylene Chloride	10.0	2.8	
trans-1,2-Dichloroethene	10.0	1.0	
1,1,1-Trichloroethane	10.0	1.0	
Trichloroethene	10.0	1.0	
Benzene	10.0	1.0	
Chloromethane		2.0	
Bromomethane		2.0	
Chloroethane		2.0	
Chloroform		1.0	
Carbon Tetrachloride		1.0	
1,1-Dichloroethene		1.0	
Trichlorofluoromethane		2.0	
1,1-Dichloroethane		1.0	
1,2-Dichloropropane		1.0	
Bromodichloromethane		1.0	
2-Chloroethylvinyl ether		2.0	
cis-1,3-Dichloropropene		1.0	
trans-1,3-Dichloropropene		1.0	
1,1,2-Trichloroethane		1.0	
Tetrachloroethene		1.2	
Dibromochloromethane		1.0	
Chlorobenzene		1.0	
Ethylbenezene		1.0	
Bromoform		1.0	
1,1,2,2-Tetrachloroethane		1.0	
1,3-Dichlorobenzene		1.0	
1,4-Dichlorobezene		1.0	
1,2-Dichlorobenzene		1.0	
Sum of 624 Analytes		100.0	0.0
608 Pesticides(2)	ug/L	ug/L	ug/L
alpha BHC	10.0	0.003	
beta BHC	20.0	0.006	
delta BHC	10.0	0.010	
gamme BHC	10.0	0.003	
Heptachlor	8.0	0.022	
Aldrin	8.0	0.018	
Heptachlor Epoxide	9.0	0.009	
4,4-DDE	20.0	0.005	
Methoxychlor	18.0	0.007	
Metals	mg/L	mg/L	mg/L
Antimony	0.1	0.009	< 0.009
Boron	4.00	0.012	0.838
Chromium	5.33	0.005	< 0.005
Cyanide(T)	2.0	0.005	< 0.005
Other	mg/L	mg/L	mg/L
Total Phenolics	NA	0.005	0.006
TSS	300	10.000	< 10.000

Legend:
(1) Permit limit @ 662 GPD with maximum daily discharged @ 2500 GPD
(2) Discontinue per April 14, 1997 Letter from F. Narrone to PRP Group.
(a) Detected in blank
NA Not applicable

WASTE STREAM TECHNOLOGY, INC.

302 Grote Street
Buffalo, NY 14207
(716) 876-5290

Analytical Data Report
Report Date : 08/21/98
Group Number : 9801-1060

Prepared For :
Mr. John Burns
Olin Corporation
P.O. Box 248
1186 Lower River Road NW
Charleston, TN 37310

Site : Frontier - Pendelton

Field and Laboratory Information

Client Id	WST Lab #	Matrix	Date Sampled	Date Received	Time
GAC 2	WS44523	Aqueous	8/6/98	8/7/98	1300
Sample Status Upon Receipt : No irregularities.					

Analytical Services

Analytical Parameters	Number of Samples	Turnaround Time
Metals	1	Standard
Cyanide	1	Standard
Phenol	1	Standard
Total Suspended Solids	1	Standard

Report Released By : Daniel W. Vollmer
Daniel Vollmer, Laboratory QA/QC Officer

ENVIRONMENTAL LABORATORY ACCREDITATION CERTIFICATION NUMBERS
NYSDOH ELAP #11179 NJDEPE #73977 CDHS ELAP #2189

WASTE STREAM TECHNOLOGY

METHODOLOGIES

The specific methodologies employed in obtaining the analytical data reported are indicated on each of the result forms. The method numbers shown refer to the following U.S. Environmental Protection Agency Reference:

Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020, March 1979, Revised 1983, U.S. Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

Federal Register, 40 CFR Part 136: Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. Revised July 1992.

Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. Third Edition, Revised December 1996, U.S. EPA SW-846.

Annual Book of ASTM Standards, Volume II. ASTM, 100 Harbor Drive, West Conshohocken, PA 19428-2959.

Standard Methods for the Examination of Water and Wastewater. (18th Edition). American Public Health Association, 1105 18th Street, NW, Washington, D.C. 20036.

Waste Stream Technology, Inc.
Total Suspended Solids
EPA 160.2

Site: FRONTIER - PENDELTON
Date Sampled: 08/06/98
Date Received: 08/07/98

Group Number: 9801-1060
Report Units: mg/L
Matrix: Aqueous

WST Lab ID	Client ID	Analysis Date	Detection Limit	Result
WS44523	GAC 2	08/11/98	10	< 10

Waste Stream Technology, Inc.

Analysis Result Report

Site: FRONTIER - PENDELTON
Date Sampled: 08/06/98
Date Received: 08/07/98

Group Number: 9801-1060
Report Units: mg/L
Matrix: Aqueous

	Lab ID Number:	WS44523		
	Client ID:	GAC 2		
Analyte	**Detection Limit**	**Result**	**Date Analyzed**	**Analysis Method**
Total Recoverable Phenol	0.005	0.006	08/12/98	EPA 420.1
Cyanide in Water	0.005	< 0.005	08/20/98	EPA 335.2

Waste Stream Technology, Inc.
Metals Analysis Result Report

Site: FRONTIER - PENDELTON
Date Sampled: 08/06/98
Date Received: 08/07/98

Group Number: 9801-1060
Report Units: mg/L
Matrix: Aqueous

	Lab ID Number	WS44523		
	Client ID	GAC 2		
	Date Digested	08/10/98		
Analyte	**Detection Limit**	**Result**	**Date Analyzed**	**Analysis Method**
Antimony by GFAA	0.009	< 0.009	08/19/98	EPA 200.9
Boron by ICP	0.012	0.838	08/19/98	EPA 200.7
Chromium by ICP	0.005	< 0.005	08/19/98	EPA 200.7

Waste Stream Technology, Inc.

Metals Method Blank Analysis Result Report

Site: FRONTIER - PENDELTON
Date Sampled: NA
Date Received: NA

Group Number: 9801-1060
Report Units: PPM

Lab ID Number	MB081098-HP1
Client ID	NA
Date Digested	08/10/98

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Cr Method Blank	0.005	< 0.005	08/19/98	EPA 200.7
B Method Blank	0.012	< 0.012	08/19/98	EPA 200.7
Sb Method Blank	0.009	< 0.009	08/19/98	EPA 200.9

MB denotes Method Blank
NA denotes Not Applicable

WASTE STREAM TECHNOLOGY

302 GROTE STREET
BUFFALO, NY 14207
(716) 876-5290

9801-1060

CHAIN OF CUSTODY RECORD

PROJECT NO:

SITE NAME: FRONTIER - PENDELTON

SAMPLERS (SIGNATURE):

SAMPLE NO.	DATE	TIME	COMP	GRAB	MATRIX	SAMPLE LOCATION	SIZE & NO. OF CONTAINERS	Phenol	BCG + SB	CN	TSS				PRESERVATIVES	REMARKS
8H 06604	8/6/98	10AM	✓		H_2O	GAC 2	Amber 1-L	✓							H_2SO_4	WS44523
8H 06605			✓				1-L		✓						HNO_3	
8H 06606			✓				1-L			✓					NaOH	
8H 06607			✓				1-50ml				✓				Ø	

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
	8/6/98 1700			8/7/98 1350	
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

SPECIAL INSTRUCTIONS:

TURNAROUND TIME IDEM

LAB : REFRIGERATOR # _____ SHELF # _____ GROUP # _____ DUE DATE _____

Distribution:

Frank Nerrone Original Copy of all documents; express mailed for next day delivery.
Dan Commer Copy of all information; include with Frank Nerrone Copy.
PRP Group from Distribution labels; copy of cover letter, daily flow data and analytical summary; send regular mail

2 Operation, Maintenance and Monitoring Activities

Table B-2
Frontier Chemical – Pendleton Site
Operation, Maintenance, and Monitoring Activities for Report #3

Date	Event	Response
March 5, 1998	NCSD Monthly Sampling	Completed.
March 19, 1998	Site Inspection	No items to report.
April 23, 1998	Pressure high on bag filters	Changed filter bags.
April 27, 1998	Maintenance work items	Planted wetlands, applied topsoil and seeded to barren areas, new concrete pads around wells 9I and 9D, stoned areas of site where needed, repaired fence, installed new well caps on P4 and P7 and resurveyed elevations. Conducted Site Inspection.
May 7, 1998	NCSD Monthly Sampling	Completed. Pulled and cleaned relief value on GAC #2.
May 14, 1998	pH measurement of effluent	6.5
May 18, 1998	Sampled for VOC's	Original sampling omitted VOC's
May 28, 1998	Lost power at site	NIMO working to repair.
June 11, 1998	NCSD Monthly Sampling	Completed.
July 2, 1998	NCSD Monthly Sampling	Completed. Checked effluent discharge line for cause of pressure increase on system.
July 9, 1998	High pressure on system	Changed filter bags.
July 30, 1998	Looking for build up in lines	Changed out section of piping; no signs of buildup.
August 6, 1998	NCSD Monthly Sampling	Completed.
August 14, 1998	Leaking relief valve on GAC #2	Replaced.
August 25, 1998	High pressure on system	Changed filter bags.

Attachment C – Ground Water Data, O'Brien & Gere

1 Frontier Chemical – Pendleton Site
Fourth Quarterly Piezometer/Monitoring Well Monitoring
O'Brien & Gere
April 1998

2 Frontier Chemical – Pendleton Site
Semi-Annual Ground Water
O'Brien & Gere
September 1998

1 Frontier Chemical – Pendleton Site
Fourth Quarterly Piezometer/Monitoring Well Monitoring
O'Brien & Gere
April 1998

O'BRIEN & GERE
ENGINEERS, INC.

June 10, 1998

Mr. John M. Burns
Technical Committee Chair
P.O. Box 248
1186 Lower River Road
Charleston, Tennessee 37310

Re: Frontier Chemical - Pendleton Site

File: 5829.003 #2

Dear Mr. Burns:

This letter presents the results of the fourth quarterly (April 1998) piezometer/monitoring well inspection and ground water elevation monitoring completed at the Frontier Chemical - Pendleton Site located on Town Line Road in the Town of Pendleton, Niagara County, New York. This report is prepared based on the New York State Department of Environmental Conservation (NYSDEC)-approved Operation & Maintenance (O&M) Manual for the site (O'Brien & Gere Engineers, 1997), which addresses long-term ground water monitoring at the site. This fourth quarterly report presents a discussion of the following:

- Piezometer/monitoring well inspection
- Hydraulic evaluation of the capped area and collection trench.

These items are described in the following sections.

Piezometer/monitoring well inspection

The piezometer/monitoring well inspection was conducted on April 28, 1998, and included the piezometers (P-1 through P-8), standpipe (SP-1), and ground water monitoring wells (85-5R, URS-5D, 85-7R, URS-7D, URS-9I, URS-9D, 88-12C, 88-12D, URS-14I, and URS-14D) identified as the site monitoring network in the O&M Manual for the site.

Results of the inspection indicated that each piezometer and monitoring well was in an acceptable condition for collecting water elevation measurements. Prior to measuring ground water elevations, two maintenance issues that had been identified in the November 1997 (O'Brien & Gere Engineers, 1997) and March 1998 (O'Brien & Gere Engineers, 1998) monitoring reports were addressed by the Pendleton Site PRP Group (Group):

- The tops of the 2-inch PVC risers of piezometers P-4 and P-7 were lowered by approximately 1.375 in and 0.875 in, respectively. The risers were lowered to allow clearance to install locking expansion plugs beneath the flush-mounted covers of the piezometers.

- New concrete pads were installed around monitoring wells URS-9I and URS-9D to replace those that had deteriorated.

Similar maintenance issues to those identified in previous inspection reports were noted at the site:

- Piezometer P-6 is currently angled 20 to 30 degrees from vertical.

- Monitoring wells URS-14I and URS-14D should have fill material installed around the concrete pads.

It should be noted that these issues are aesthetic in nature and at this time are not affecting the integrity of the piezometers or monitoring wells. April 1998 inspection forms are included in Attachment A.

Hydraulic evaluation of the capped area and collection trench

In accordance with the O&M Manual, a complete round of static ground water elevations was collected from the piezometers (P-1 through P-8), standpipe (SP-1), and ground water monitoring wells (85-5R, URS-5D, 85-7R, URS-7D, URS-9I, URS-9D, 88-12C, 88-12D, URS-14I, and URS-14D). The ground water elevation measurements were collected on April 28, 1998. The surface water elevation of Quarry Lake was measured on April 30, 1998, by Glynn Geotechnical Engineering, Inc. The ground water elevations measured in the piezometers and standpipe, and in the monitoring wells, are summarized on Tables 1 and 2, respectively. Quarry Lake surface water elevations are summarized on Table 3. As shown on Table 3, Quarry Lake has filled slightly above the design elevation of 578.0 ft.

The water level measurements collected on April 28 and April 30, 1998 are illustrated on Figure 1. These measurements are the fourth round collected since remedial construction was substantially completed in August 1996. The water elevation data was used to evaluate the following:

- Whether an inward hydraulic gradient exists at the site by comparing water level measurements within the capped area (P-2, P-3, P-4, P-6, P-7) to those measured outside the capped area (P-1, P-5, P-8, SP-1, and Quarry Lake).

- The ground water flow potential inside the capped area.

- Whether the ground water collection trench is effectively controlling ground water migration away from the capped area.

The data indicates that ground water elevations from the piezometers installed within the capped area (P-2, P-4, P-6, and P-7) are lower than ground water elevations of the piezometers installed outside the capped area (P-1, P-5, and P-8), with the exception of piezometer P-3, installed in the center of the capped area. The data from piezometer P-3 indicates that a slight ground water mound exists in the center of the capped area, since the elevation at P-3 is greater than the other piezometers installed within the capped area. This likely reflects the greater thickness of material under the cap in this area. In addition, the ground water elevation from the standpipe (SP-1) in the ground water collection trench is less than the surface water elevation of Quarry Lake. This data indicates that an inward hydraulic gradient has been established around the capped area. The ground water elevations in the piezometers installed within the capped area (P-2, P-3, P-4, P-6, and P-7) indicate that the overall hydraulic gradient is to the west toward the ground water collection trench.

Ground water elevations of piezometers installed within the capped area along the northern (P-7), western (P-4), and southern (P-6) portions of the Site are higher than the invert elevations (bottom) of the ground water collection trench. The invert elevations of the ground water collection trench vary from 568.80 ft to 563.37 ft. This information indicates that shallow ground water emanating from beneath the capped area is discharging to the collection trench. In summary, the data indicates that the ground water collection trench is effectively capturing shallow ground water emanating from beneath the capped area.

As discussed in the March 1998 monitoring report (O'Brien & Gere Engineers, 1998), based on an average daily flow rate to the ground water collection trench of 170 gallons/day and a hydraulic conductivity adjacent to the ground water collection trench of 3.3×10^{-6} cm/sec, it is estimated that approximately 110 years will be required to dewater the containment area. However, the amount of water present within the capped area and the time to dewater beneath the capped area has minimal impact on the effectiveness of the containment, since an inward hydraulic gradient has been established adjacent to the capped area and ground water beneath the capped area is migrating towards the ground water collection trench.

Conclusion

Based on the data contained in this fourth quarter report, the following conclusions are presented:

- An inward hydraulic gradient has been established around the capped area.
- The elevation data indicates that ground water within the capped area is migrating to the west toward the ground water collection trench.
- The elevation data indicates that the ground water collection trench is effectively capturing shallow ground water emanating from beneath the capped area.

The next quarterly sampling event has tentatively been scheduled for August 1998. During this event, ground water elevations will be measured in the piezometers, standpipe, ground water monitoring wells, and Quarry Lake. Ground water samples will also be collected from the ten monitoring wells specified in the O&M Manual.

If you have any questions or comments, please do not hesitate to contact me at your convenience.

Very truly yours,

O'BRIEN & GERE ENGINEERS, INC.

Stephen W. Anagnost, P.E.
Managing Engineer

i:\div71\5829003\5\4qtr.wpd

Table 1

Frontier Chemical - Pendleton Site

Piezometer Ground Water Elevation Summary Table

Piezometer		Location	Top of Riser Elev. (ft)	Top of Cover Elev. (ft)	Depth (ft below riser)	Screened Elev. (ft)	Ground water elevation (ft)			
							6/24/97	9/30/97	2/23/98	4/28/98
P-1	(O)	East portion of	583.21	583.30	16.4	576.8 - 566.8	579.54	577.09	579.25	579.60
P-2	(I)	capped area	582.90	583.20	15.7	577.2 - 567.2	579.60	579.24	578.20	578.37
P-3	(I)	Center of capped area	606.33	606.64	39.7	586.6 - 566.6	580.36	580.38	580.06	579.94
P-4	(I)	Adjacent to	582.31	583.85	17.0	575.3 - 565.3	575.78	576.06	576.70	575.11
SP-1	(T)	Quarry Lake	579.86	580.07	15.0	bop = 564.9	<564.9	<564.9	<564.9	<564.9
P-5	(O)	Southern portion	583.05	583.55	15.5	577.6 - 567.6	576.87	577.25	578.57	579.31
P-6	(I)	of capped area	584.45	584.60	16.2	578.3 - 568.3	578.77	579.17	578.14	578.20
P-7	(I)	Northern portion	580.97	582.00	16.8	574.2 - 564.2	577.46	577.75	576.45	576.17
P-8	(O)	of capped area	582.83	583.00	17.3	575.5 - 565.5	577.76	578.87	578.75	579.61

Notes:

1. Elevation based on USGS Datum.
2. bop = bottom of pipe.
3. O = piezometer located outside of capped area.
4. I = piezometer located inside capped area.
5. T = standpipe located within the ground water collection trench.
6. The top of riser of piezometer P-4 was modified on 4/28/98 from 583.68 ft to 582.31 ft to allow clearance for the installation of a locking expansion plug beneath the flush-mounted cover.
7. The top of riser of piezometer P-7 was modified on 4/28/98 from 581.84 ft to 580.97 ft to allow clearance for the installation of a locking expansion plug beneath the flush-mounted cover.

Table 2
Frontier Chemical - Pendleton Site
Monitoring Well Ground Water Elevation Summary Table

Monitoring Well	Location	Top of Riser Elev. (ft)	Ground Elev. (ft)	Depth (ft below riser)	Screened Elev. (ft)	Ground water elevation (ft)			
						6/24/97	9/30/97	2/23/98	4/28/98
URS-14I	Upgradient well nest	581.14	580.84	31.0	550.1 - 555.1	577.15	578.77	580.24	580.14
URS-14D	in church parking lot	580.71	580.85	41.5	539.2 - 544.2	575.50	574.28	575.87	576.05
URS-9I	Southern well nest	581.68	579.90	46.0	535.6 - 540.6	575.38	574.22	575.69	575.91
URS-9D	along Town Line Road	580.80	579.00	46.5	534.3 - 539.3	575.36	574.21	575.68	575.89
85-5R	Middle well nest	580.84	578.70	40.0	540.9 - 542.9	574.70	573.97	575.39	575.70
URS-5D	along Town Line Road	580.60	578.00	49.9	530.8 - 535.8	574.73	574.02	575.42	575.74
85-7R	North well nest	577.90	576.60	27.8	550.2 - 552.2	575.09	574.21	575.53	575.87
URS-7D	along Town Line Road	579.35	576.50	39.9	539.5 - 544.5	575.15	574.35	575.60	575.99
88-12C	Well nest outside northeast	583.12	583.70	31.3	551.8 - 553.8	576.60	574.03	576.53	577.06
88-12D	portion of capped area	582.87	583.28	54.5	528.4 - 533.4	575.72	574.54	576.17	576.33

Notes:

1. Elevation based on USGS Datum.

Table 3

Frontier Chemical - Pendleton Site

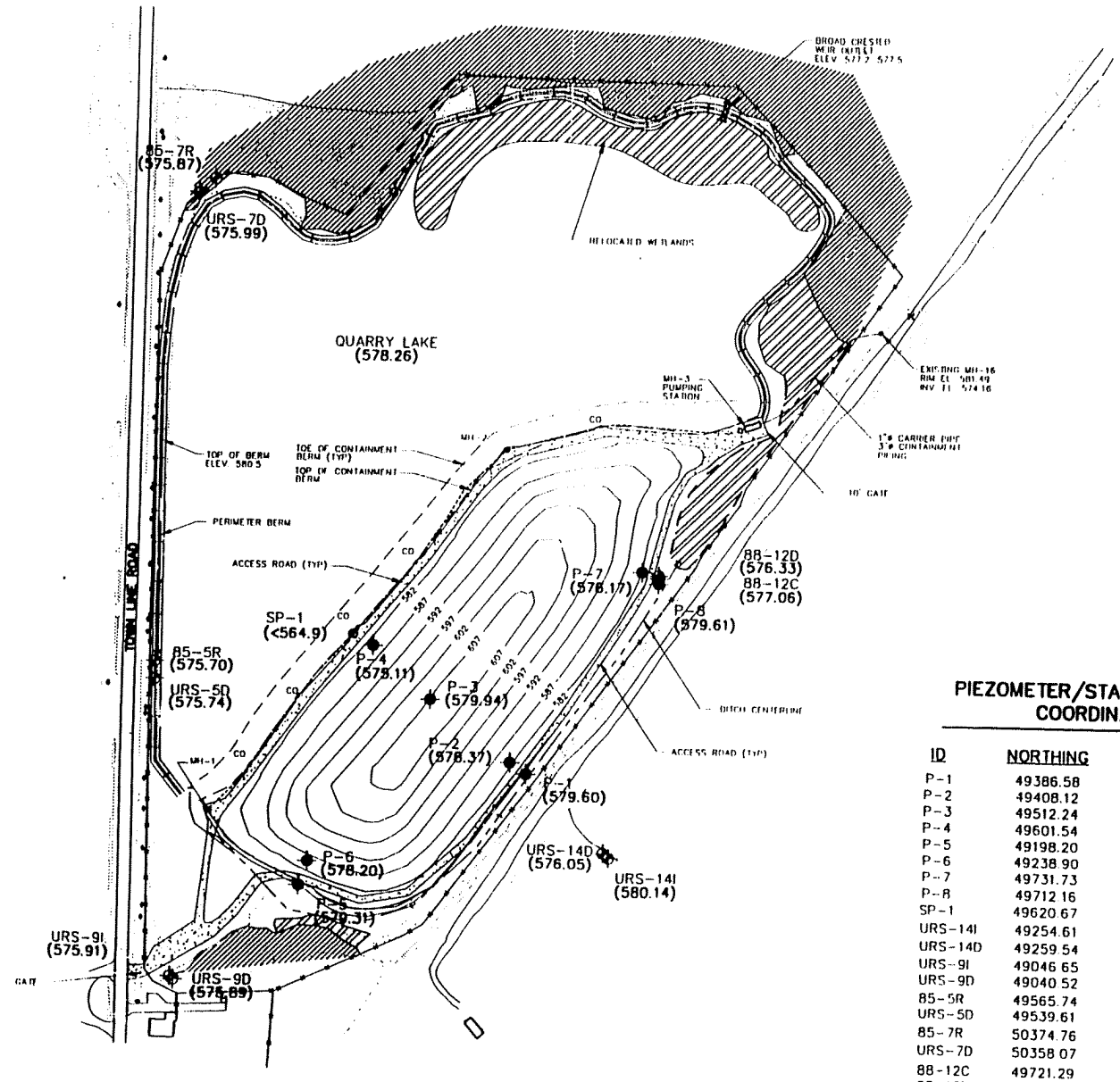
Quarry Lake Surface Water Elevation Summary Table

Date	Quarry Lake Surface Water Elevation (ft)
9/8/97	572.3
2/23/98	578.0
4/30/98	578.26

Notes:

1. Elevation based on USGS Datum.

FIGURE 1



PIEZOMETER/STANDPIPE AND MONITORING WELL COORDINATES AND ELEVATIONS

ID	NORTHING	EASTING	RISER	COVER
P-1	49386.58	100656.87	583.21	583.30
P-2	49408.12	100630.30	582.90	583.20
P-3	49512.24	100496.39	606.33	606.64
P-4	49601.54	100399.33	582.31•	583.85
P-5	49198.20	100282.65	583.05	583.55
P-6	49238.90	100296.52	584.45	584.60
P-7	49731.73	100842.30	580.97•	582.00
P-8	49712.16	100869.82	582.83	583.00
SP-1	49620.67	100365.59	579.86	580.07
URS-14I	49254.61	100794.43	581.14	580.84
URS-14D	49259.54	100789.09	580.71	580.85
URS-9I	49046.65	100075.10	581.68	579.90
URS-9D	49040.52	100076.81	580.80	579.00
85-5R	49565.74	100036.14	580.84	578.70
URS-5D	49539.61	100035.69	580.60	578.00
85-7R	50374.76	100115.55	577.90	576.60
URS-7D	50358.07	100095.40	579.35	576.50
88-12C	49721.29	100870.45	583.12	583.70
88-12D	49726.43	100869.13	582.87	583.28

NOTE: • = MODIFIED 4/28/98

REV DATE 6/10/98

LEGEND

- URS-7D — MONITORING WELL
- P-1 — PIEZOMETER
- (579.61) — WATER ELEVATION
- WETLAND AREA
- 6' HIGH CHAIN LINK FENCE
- 580 — GRADE ELEVATION CONTOUR
- CO — GROUND WATER COLLECTION TRENCH & CLEAN OUT
- STANDPIPE
- UTILITY POLE

FRONTIER CHEMICAL PENDLETON SITE
TOWN OF PENDLETON, NIAGARA COUNTY, NY

HYDRAULIC POTENTIAL MAP (APRIL 28, 1998)

0 200 400

SCALE IN FEET

DATE: JUNE 1998

FILE NO. 5829.003.002

O'BRIEN & GERE

Attachment A

Piezometer/monitoring well inspection forms

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site Well Identification : P-1

Personnel : TPP Date : 4/28/98

WELL SPECIFICATIONS

Protective Casing	(Above Ground)	Flush Mounted
Well Construction	(PVC)	Stainless Steel
Well Diameter	(2-inch)	4-inch
Depth to Ground Water :	3.61	
Well Depth:	—	

WELL INTEGRITY

1. Well identification clearly marked ?	(yes)	no
2. Well covers and locks in good condition and secure ?	(yes)	no
3. Is the well stand pipe vertically aligned and secure ?	(yes)	no
4. Is the concrete pad and surface seal in good condition ?	(yes)	no
5. Are soils surrounding the well pad eroded ?	yes	(no)
6. Is the well casing in good condition ?	(yes)	no
7. Is the measuring point on casing well marked ?	(yes)	no
8. Is there standing water in the annular space ?	yes	(no)
9. Is the stand pipe vented at the base to allow drainage ?	(yes)	no

COMMENTS:

MONITORING WELL INTEGRITY CHECKLIST

Site Name: FRONTIER CHEMICAL Pendleton Site Well Identification : P-2

Personnel : TPP Date : 4/28/98

WELL SPECIFICATIONS

Protective Casing	Above Ground	(Flush Mounted)
Well Construction	(PVC)	Stainless Steel
Well Diameter	(2-inch)	4-inch
Depth to Ground Water :	4.53	
Well Depth:	? -	

WELL INTEGRITY

1. Well identification clearly marked ?	(yes)	no	
2. Well covers and locks in good condition and secure ?	(yes)	no	
3. Is the well stand pipe vertically aligned and secure ?	(yes)	no	
4. Is the concrete pad and surface seal in good condition ?	(yes)	no	
5. Are soils surrounding the well pad eroded ?	yes	(no)	
6. Is the well casing in good condition ?	(yes)	no	
7. Is the measuring point on casing well marked ?	(yes)	no	
8. Is there standing water in the annular space ?	yes	(no)	
9. Is the stand pipe vented at the base to allow drainage ?	yes	no	N/A

COMMENTS:

MONITORING WELL INTEGRITY CHECKLIST

Site Name: FRONTIER Chemical Pendleton Site Well Identification : P-3

Personnel : TPP Date : 4/28/98

WELL SPECIFICATIONS

Protective Casing	Above Ground	(Flush Mounted)
Well Construction	(PVC)	Stainless Steel
Well Diameter	(2-inch)	4-inch
Depth to Ground Water :	26.39	
Well Depth:	—	

WELL INTEGRITY

1. Well identification clearly marked ?	(yes)	no
2. Well covers and locks in good condition and secure ?	(yes)	no
3. Is the well stand pipe vertically aligned and secure ?	(yes)	no
4. Is the concrete pad and surface seal in good condition ?	(yes)	no
5. Are soils surrounding the well pad eroded ?	yes	(no)
6. Is the well casing in good condition ?	(yes)	no
7. Is the measuring point on casing well marked ?	(yes)	no
8. Is there standing water in the annular space ?	yes	(no)
9. Is the stand pipe vented at the base to allow drainage ?	yes	no N/A.

COMMENTS:

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site Well Identification : P-4

Personnel : TPP Date : 4/28/98

WELL SPECIFICATIONS

Protective Casing	Above Ground	~~Flush Mounted~~
Well Construction	~~PVC~~	Stainless Steel
Well Diameter	~~2-inch~~	4-inch
Depth to Ground Water :	7.20	
Well Depth:	—	

WELL INTEGRITY

1. Well identification clearly marked ?	~~yes~~	no	
2. Well covers and locks in good condition and secure ?	~~yes~~	no	
3. Is the well stand pipe vertically aligned and secure ?	~~yes~~	no	
4. Is the concrete pad and surface seal in good condition ?	~~yes~~	no	
5. Are soils surrounding the well pad eroded ?	yes	~~no~~	
6. Is the well casing in good condition ?	~~yes~~	no	
7. Is the measuring point on casing well marked ?	~~yes~~	~~no~~	*
8. Is there standing water in the annular space ?	yes	~~no~~	
9. Is the stand pipe vented at the base to allow drainage ?	~~yes~~	~~no~~	N/A.

COMMENTS:

* PVC LOWERED 1 3/8" ± in order to install Lid w/ ease

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site

Well Identification : P-5

Personnel : TPP

Date : 4/28/98

WELL SPECIFICATIONS

Protective Casing	~~Above Ground~~	Flush Mounted
Well Construction	PVC	Stainless Steel
Well Diameter	~~2-inch~~	4-inch
Depth to Ground Water :	3.74	
Well Depth:	—	

WELL INTEGRITY

1. Well identification clearly marked ?	yes	no
2. Well covers and locks in good condition and secure ?	yes	no
3. Is the well stand pipe vertically aligned and secure ?	yes	no
4. Is the concrete pad and surface seal in good condition ?	yes	no
5. Are soils surrounding the well pad eroded ?	yes	no
6. Is the well casing in good condition ?	yes	no
7. Is the measuring point on casing well marked ?	yes	no
8. Is there standing water in the annular space ?	yes	no
9. Is the stand pipe vented at the base to allow drainage ?	yes	no

COMMENTS:

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site Well Identification : P-6

Personnel : TPP Date : 4/28/98

WELL SPECIFICATIONS

Protective Casing	Above Ground	~~Flush Mounted~~
Well Construction	~~PVC~~	Stainless Steel
Well Diameter	~~2-inch~~	4-inch
Depth to Ground Water :	6.25	
Well Depth:	—	

WELL INTEGRITY

1. Well identification clearly marked ?	~~yes~~	no
2. Well covers and locks in good condition and secure ?	~~yes~~	no
3. Is the well stand pipe vertically aligned and secure ?	yes	~~no~~ *
4. Is the concrete pad and surface seal in good condition ?	~~yes~~	no
5. Are soils surrounding the well pad eroded ?	yes	~~no~~
6. Is the well casing in good condition ?	~~yes~~	no
7. Is the measuring point on casing well marked ?	~~yes~~	no
8. Is there standing water in the annular space ?	yes	~~no~~
9. Is the stand pipe vented at the base to allow drainage ?	~~yes~~	~~no~~ N/A

COMMENTS:

* Stand pipe @ Surface is leaning 20 - 25°

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site Well Identification : P-7

Personnel : TPP Date : 4/28/98

WELL SPECIFICATIONS

Protective Casing	Above Ground	~~Flush Mounted~~
Well Construction	~~PVC~~	Stainless Steel
Well Diameter	~~2-inch~~	4-inch
Depth to Ground Water :	4.80	
Well Depth:	—	

WELL INTEGRITY

1. Well identification clearly marked ?	yes	no	
2. Well covers and locks in good condition and secure ?	~~yes~~	no	
3. Is the well stand pipe vertically aligned and secure ?	~~yes~~	no	
4. Is the concrete pad and surface seal in good condition ?	~~yes~~	no	
5. Are soils surrounding the well pad eroded ?	yes	no	
6. Is the well casing in good condition ?	~~yes~~	no	
7. Is the measuring point on casing well marked ?	~~yes~~	~~no~~	*
8. Is there standing water in the annular space ?	yes	no	
9. Is the stand pipe vented at the base to allow drainage ?	~~yes~~	~~no~~	N/A.

COMMENTS:

* PVC RISER lowered 3/4"± to insert plug and lock

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site Well Identification : P-8

Personnel : TPP Date : 4/28/98

WELL SPECIFICATIONS

Protective Casing	(Above Ground)	Flush Mounted
Well Construction	(PVC)	Stainless Steel
Well Diameter	(2-inch)	4-inch
Depth to Ground Water :	3.22	
Well Depth:	—	

WELL INTEGRITY

1. Well identification clearly marked ?	(yes)	no
2. Well covers and locks in good condition and secure ?	(yes)	no
3. Is the well stand pipe vertically aligned and secure ?	(yes)	no
4. Is the concrete pad and surface seal in good condition ?	(yes)	no
5. Are soils surrounding the well pad eroded ?	yes	(no)
6. Is the well casing in good condition ?	(yes)	no
7. Is the measuring point on casing well marked ?	(yes)	no
8. Is there standing water in the annular space ?	yes	(no)
9. Is the stand pipe vented at the base to allow drainage ?	(yes)	no

COMMENTS:

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Well Identification : SP-1

Personnel : TPP Date : 4/28/98

WELL SPECIFICATIONS

Protective Casing	Above Ground	(Flush Mounted)
Well Construction	~~PVC~~ HDPE	~~Stainless Steel~~
Well Diameter	~~2-inch~~	~~4-inch~~ 6"
Depth to Ground Water :	Dry	
Well Depth:	—	

WELL INTEGRITY

1. Well identification clearly marked ?	(~~yes~~)	no
2. Well covers and locks in good condition and secure ?	(~~yes~~)	no
3. Is the well stand pipe vertically aligned and secure ?	~~yes~~	no
4. Is the concrete pad and surface seal in good condition ?	~~yes~~	no
5. Are soils surrounding the well pad eroded ?	yes	(~~no~~)
6. Is the well casing in good condition ?	~~yes~~	no
7. Is the measuring point on casing well marked ?	~~yes~~	no
8. Is there standing water in the annular space ?	yes	(~~no~~)
9. Is the stand pipe vented at the base to allow drainage ?	~~yes~~	~~no~~ N/A.

COMMENTS:

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site Well Identification : 85-5R

Personnel : TPP Date : 4/28/98

WELL SPECIFICATIONS

Protective Casing	Above Ground	Flush Mounted
Well Construction	PVC	Stainless Steel
Well Diameter	2-inch	4-inch

Depth to Ground Water : 5.14

Well Depth: 38.06

WELL INTEGRITY

1. Well identification clearly marked ?	yes	no
2. Well covers and locks in good condition and secure ?	yes	no
3. Is the well stand pipe vertically aligned and secure ?	yes	no
4. Is the concrete pad and surface seal in good condition ?	yes	no
5. Are soils surrounding the well pad eroded ?	yes	no
6. Is the well casing in good condition ?	yes	no
7. Is the measuring point on casing well marked ?	yes	no
8. Is there standing water in the annular space ?	yes	no
9. Is the stand pipe vented at the base to allow drainage ?	yes	no

COMMENTS:

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site Well Identification : URS - 5D

Personnel : TPP Date : 4/28/98

WELL SPECIFICATIONS

Protective Casing	(Above Ground)	Flush Mounted
Well Construction	(PVC)	Stainless Steel
Well Diameter	(2-inch)	4-inch
Depth to Ground Water :	4.26	
Well Depth:	49.92	

WELL INTEGRITY

1. Well identification clearly marked ?	(yes)	no
2. Well covers and locks in good condition and secure ?	(yes)	no
3. Is the well stand pipe vertically aligned and secure ?	(yes)	no
4. Is the concrete pad and surface seal in good condition ?	(yes)	no
5. Are soils surrounding the well pad eroded ?	yes	(no)
6. Is the well casing in good condition ?	(yes)	no
7. Is the measuring point on casing well marked ?	(yes)	no
8. Is there standing water in the annular space ?	yes	(no)
9. Is the stand pipe vented at the base to allow drainage ?	(yes)	no

COMMENTS:

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton site Well Identification : 85-7R

Personnel : TPP Date : 4/28/98

WELL SPECIFICATIONS

Protective Casing	(Above Ground)	Flush Mounted
Well Construction	(PVC)	Stainless Steel
Well Diameter	(2-inch)	4-inch
Depth to Ground Water :	2.03	
Well Depth:	27.77	

WELL INTEGRITY

1. Well identification clearly marked ?	(yes)	no
2. Well covers and locks in good condition and secure ?	(yes)	no
3. Is the well stand pipe vertically aligned and secure ?	(yes)	no
4. Is the concrete pad and surface seal in good condition ?	(yes)	no
5. Are soils surrounding the well pad eroded ?	yes	(no)
6. Is the well casing in good condition ?	(yes)	no
7. Is the measuring point on casing well marked ?	(yes)	no
8. Is there standing water in the annular space ?	yes	(no)
9. Is the stand pipe vented at the base to allow drainage ?	(yes)	no

COMMENTS:

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site Well Identification : URS-7D

Personnel : TPP Date : 4/28/98

WELL SPECIFICATIONS

Protective Casing	~~Above Ground~~	Flush Mounted
Well Construction	PVC	~~Stainless Steel~~
Well Diameter	~~2-inch~~	4-inch
Depth to Ground Water :	3.36	
Well Depth:	39.89	

WELL INTEGRITY

1. Well identification clearly marked ?	yes	no
2. Well covers and locks in good condition and secure ?	yes	no
3. Is the well stand pipe vertically aligned and secure ?	yes	no
4. Is the concrete pad and surface seal in good condition ?	yes	no
5. Are soils surrounding the well pad eroded ?	yes	no
6. Is the well casing in good condition ?	yes	no
7. Is the measuring point on casing well marked ?	yes	no
8. Is there standing water in the annular space ?	yes	no
9. Is the stand pipe vented at the base to allow drainage ?	yes	no

COMMENTS:

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site Well Identification : URS-9 I

Personnel : TPP Date : 4/28/98

WELL SPECIFICATIONS

Protective Casing	Above Ground	Flush Mounted
Well Construction	PVC	Stainless Steel
Well Diameter	2-inch	4-inch
Depth to Ground Water :	5.77	
Well Depth:	46.49	

WELL INTEGRITY

1. Well identification clearly marked ?	yes	no
2. Well covers and locks in good condition and secure ?	yes	no
3. Is the well stand pipe vertically aligned and secure ?	yes	no
4. Is the concrete pad and surface seal in good condition ?	yes	no
5. Are soils surrounding the well pad eroded ?	yes	no
6. Is the well casing in good condition ?	yes	no
7. Is the measuring point on casing well marked ?	yes	no
8. Is there standing water in the annular space ?	yes	no
9. Is the stand pipe vented at the base to allow drainage ?	yes	no

COMMENTS:

* new concrete Pad Installed

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site

Well Identification : URS-9D

Personnel : TPP

Date : 4/28/98

WELL SPECIFICATIONS

Protective Casing	~~Above Ground~~	Flush Mounted
Well Construction	PVC	~~Stainless Steel~~
Well Diameter	2-inch	4-inch
Depth to Ground Water :	4.91	
Well Depth:	51.01	

WELL INTEGRITY

1. Well identification clearly marked ?	~~yes~~	no
2. Well covers and locks in good condition and secure ?	~~yes~~	no
3. Is the well stand pipe vertically aligned and secure ?	~~yes~~	no
4. Is the concrete pad and surface seal in good condition ?	~~yes~~	no
5. Are soils surrounding the well pad eroded ?	yes	~~no~~
6. Is the well casing in good condition ?	~~yes~~	no
7. Is the measuring point on casing well marked ?	~~yes~~	no
8. Is there standing water in the annular space ?	yes	~~no~~
9. Is the stand pipe vented at the base to allow drainage ?	~~yes~~	no

COMMENTS:

* new concrete pad installed

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site

Well Identification : 88-12C

Personnel : TPP

Date : 4/28/98

WELL SPECIFICATIONS

Protective Casing	~~Above Ground~~	Flush Mounted
Well Construction	PVC	~~Stainless~~ Steel
Well Diameter	~~2-inch~~	4-inch
Depth to Ground Water :	6.06	
Well Depth:	31.36	

WELL INTEGRITY

1. Well identification clearly marked ?	~~yes~~	no
2. Well covers and locks in good condition and secure ?	~~yes~~	no
3. Is the well stand pipe vertically aligned and secure ?	~~yes~~	no
4. Is the concrete pad and surface seal in good condition ?	~~yes~~	no
5. Are soils surrounding the well pad eroded ?	yes	~~no~~
6. Is the well casing in good condition ?	~~yes~~	no
7. Is the measuring point on casing well marked ?	~~yes~~	no
8. Is there standing water in the annular space ?	yes	~~no~~
9. Is the stand pipe vented at the base to allow drainage ?	~~yes~~	no

COMMENTS: * Concrete Pad under Gravel

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site Well Identification : 88-12D

Personnel : TPP Date : 4/28/98

WELL SPECIFICATIONS

Protective Casing	~~Above Ground~~	Flush Mounted
Well Construction	PVC	~~Stainless Steel~~
Well Diameter	~~2-inch~~	4-inch
Depth to Ground Water :	6.54	
Well Depth:	53.50	

WELL INTEGRITY

1. Well identification clearly marked ?	yes	no
2. Well covers and locks in good condition and secure ?	yes	no
3. Is the well stand pipe vertically aligned and secure ?	yes	no
4. Is the concrete pad and surface seal in good condition ?	yes	no
5. Are soils surrounding the well pad eroded ?	yes	no
6. Is the well casing in good condition ?	yes	no
7. Is the measuring point on casing well marked ?	yes	no
8. Is there standing water in the annular space ?	yes	no
9. Is the stand pipe vented at the base to allow drainage ?	yes	no

COMMENTS:

* Concrete Pad under Gravel

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site Well Identification : URS - 14I

Personnel : TPP Date : 4/28/98

WELL SPECIFICATIONS

Protective Casing	Above Ground	(Flush Mounted)
Well Construction	PVC	(Stainless Steel)
Well Diameter	(2-inch)	4-inch
Depth to Ground Water :	1.00	
Well Depth:	31.15	

WELL INTEGRITY

1. Well identification clearly marked ?	(yes)	no
2. Well covers and locks in good condition and secure ?	(yes)	no
3. Is the well stand pipe vertically aligned and secure ?	(yes)	no
4. Is the concrete pad and surface seal in good condition ?	(yes)	no
5. Are soils surrounding the well pad eroded ?	yes	(no)
6. Is the well casing in good condition ?	(yes)	no
7. Is the measuring point on casing well marked ?	(yes)	no
8. Is there standing water in the annular space ?	(yes)	no
9. Is the stand pipe vented at the base to allow drainage ?	~~yes~~	~~no~~ N/A

COMMENTS:

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site Well Identification : UES-14D

Personnel : TPP Date : 4/28/98

WELL SPECIFICATIONS

Protective Casing	Above Ground	~~Flush Mounted~~
Well Construction	PVC	~~Stainless Steel~~
Well Diameter	~~2-inch~~	4-inch
Depth to Ground Water :	4.66	
Well Depth:	41.67	

WELL INTEGRITY

1. Well identification clearly marked ?	~~yes~~	no
2. Well covers and locks in good condition and secure ?	~~yes~~	no
3. Is the well stand pipe vertically aligned and secure ?	~~yes~~	no
4. Is the concrete pad and surface seal in good condition ?	~~yes~~	no
5. Are soils surrounding the well pad eroded ?	yes	~~no~~
6. Is the well casing in good condition ?	~~yes~~	no
7. Is the measuring point on casing well marked ?	~~yes~~	no
8. Is there standing water in the annular space ?	yes	~~no~~
9. Is the stand pipe vented at the base to allow drainage ?	~~yes~~	~~no~~ N/A

COMMENTS:

2 Frontier Chemical – Pendleton Site
Semi-Annual Ground Water
O'Brien & Gere
September 1998

REPORT

Frontier Chemical - Pendleton Site Semi-Annual Ground Water Monitoring Report

Pendleton Site PRP Group

September 1998

5829/22038

REPORT

Frontier Chemical - Pendleton Site Semi-Annual Ground Water Monitoring Report

Pendleton Site PRP Group

James R. Heckathorne, P.E.
Vice President

September 1998

O'BRIEN & GERE ENGINEERS, INC.

5000 Brittonfield Parkway
Syracuse, NY 13221

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1. Introduction

This document is the first 1998/1999 Semi-Annual Ground Water Monitoring Report for the Frontier Chemical - Pendleton Site (Site), located on Town Line Road in the Town of Pendleton, Niagara County, New York. This report is prepared based on the New York State Department of Environmental Conservation (NYSDEC)-approved Operation & Maintenance (O&M) Manual for the Site (O'Brien & Gere Engineers, 1997), which addresses long-term ground water monitoring at the Site. This Semi-Annual Ground Water Monitoring Report presents a discussion of the following:

- Piezometer/monitoring well inspection
- Hydraulic evaluation of the capped area and collection trench
- Evaluation of ground water chemistry in the intermediate and deep ground water zones.

These items are described in the following sections.

1.1. Piezometer/monitoring well inspection

The piezometer/monitoring well inspection was conducted on September 17, 1998, and included the piezometers (P-1 through P-8), standpipe (SP-1), and ground water monitoring wells (85-5R, URS-5D, 85-7R, URS-7D, URS-9I, URS-9D, 88-12C, 88-12D, URS-14I, and URS-14D) identified as the Site monitoring network in the O&M Manual for the Site.

Results of the inspection indicated that each piezometer and monitoring well was in an acceptable condition for collecting water elevation measurements and sampling. Similar maintenance issues to those identified in previous inspection reports were noted at the Site:

- Piezometer P-6 is currently angled 20 to 30 degrees from vertical.
- Monitoring wells URS-14I and URS-14D should have fill material installed around the concrete pads.

It should be noted that these issues are aesthetic in nature and at this time are not affecting the integrity of the piezometers or monitoring wells. September 1998 inspection forms are included in Appendix A.

1.2. Hydraulic evaluation of capped area and collection trench

In accordance with the O&M Manual, a complete round of static ground water elevations was collected from the piezometers (P-1 through P-8), standpipe (SP-1), and ground water monitoring wells (85-5R, URS-5D, 85-7R, URS-7D, URS-9I, URS-9D, 88-12C, 88-12D, URS-14I, and URS-14D). The ground water elevation measurements were collected on September 17, 1998. The surface water elevation of Quarry Lake was measured on September 21, 1998, by Glynn Geotechnical Engineering, Inc. The ground water elevations measured in the piezometers and standpipe, and in the monitoring wells, are summarized on Tables 1 and 2, respectively. Quarry Lake surface water elevations are summarized on Table 3. As shown on Table 3, Quarry Lake is slightly below the outlet weir elevation of 578.0 ft.

The water level measurements collected on September 17, 1998 are illustrated on Figure 1. These measurements are the fifth round collected since remedial construction was substantially completed in August 1996. The water elevation data was used to evaluate the following:

- Whether an inward hydraulic gradient exists at the site by comparing water level measurements within the capped area (P-2, P-3, P-4, P-6, and P-7) to those measured outside the capped area (P-1, P-5, P-8, SP-1, and Quarry Lake)
- The ground water flow potential inside the capped area
- Whether the ground water collection trench is effectively controlling ground water migration away from the capped area.

The data indicates that ground water elevations in the piezometers installed within the capped area (P-2, P-3, P-4, P-6, and P-7) are slightly higher than ground water elevations in the piezometers installed outside the capped area (P-1, P-5, and P-8). Although the data indicates a slight increase in water elevations from the April 1998 monitoring event in the piezometers installed within the capped area, the water levels within the capped area are lower than originally measured in June 1997. The slight fluctuations in water elevations within the capped area may be attributed to: barometric pressure changes during sampling events; the movement of water within the capped area; or the low-permeability of the materials. In addition, the difference in hydraulic gradient from the inside to the outside of the capped area is likely due to seasonal variations in water elevations in the piezometers located outside the capped area. The water elevations measured in the piezometers outside the capped area in September 1998 were lower than have been previously measured.

The ground water elevation in the standpipe (SP-1) in the ground water collection trench is less than the surface water elevation of Quarry Lake. The ground water elevations in the piezometers installed within the capped area (P-2, P-3, P-4, P-6, and P-7) indicate that the overall hydraulic gradient is to the west toward the ground water collection trench.

Ground water elevations of piezometers installed within the capped area along the northern (P-7), western (P-4), eastern (P-2), and southern (P-6) portions of the Site are higher than the invert elevations (bottom) of the ground water collection trench. The invert elevations of the ground water collection trench vary from 568.80 ft to 563.37 ft. This information indicates that shallow ground water emanating from beneath the capped area is discharging to the collection trench. In summary, the data indicates that the ground water collection trench is effectively capturing shallow ground water emanating from beneath the capped area.

As discussed in the March 1998 monitoring report (O'Brien & Gere Engineers, 1998), based on an average daily flow rate to the ground water collection trench of 170 gallons/day and a hydraulic conductivity adjacent to the ground water collection trench of 3.3×10^{-6} cm/sec, it is estimated that approximately 110 years will be required to dewater the containment area. However, the amount of water present within the capped area and the time to dewater beneath the capped area has minimal impact on the effectiveness of the containment, since an inward hydraulic gradient has been established adjacent to the capped area and ground water beneath the capped area is migrating towards the ground water collection trench.

1.3. Ground water sampling and chemistry

Between September 17 and 18, 1998, the third round of post-closure ground water samples was collected in accordance with the protocols presented in the O&M Manual. Ground water samples were obtained from the ten ground water monitoring wells identified for sampling in the O&M Manual (85-5R, URS-5D, 85-7R, URS-7D, URS-9I, URS-9D, 88-12C, 88-12D, URS-14I, and URS-14D).

Following sample collection, the ground water samples were submitted to O'Brien & Gere Laboratories, Inc., for analysis of the following parameters.

Parameter	Method
VOCs	USEPA Method 8260
Inorganics	USEPA Series 6010/7470/7841
Cyanide	USEPA Method 9010

Ground water sampling logs and chain of custody forms are included in Appendix C.

In accordance with the O&M Manual and as approved by the NYSDEC, sampling and analysis for target compound list (TCL) semi-volatile organic compounds (SVOCs) and polychlorinated biphenyls (PCBs)/pesticides were discontinued for the second through fifth years of monitoring. Sampling will be continued semi-annually for TCL volatile organic compounds (VOCs) and target analyte list (TAL) metals during the second through fifth years of monitoring. In accordance with the NYSDEC-approved O&M Manual, the required sampling frequency will be re-evaluated after the fifth year of monitoring.

Purge water generated during sampling was contained, passed through a 25-micron bag filter, and discharged to manhole MH-3. The water in manhole MH-3 was conveyed through the pre-treatment system prior to discharge to the Niagara County Sewer District (NCSD) interceptor system at manhole MH-16.

The laboratory analytical data is currently being validated by Data Validation Services of North Creek, New York. The validation is being performed in accordance with guidance from the most current editions of the United States Environmental Protection Agency (USEPA) Contract Laboratory Procedures

(CLP) National Functional Guideline and Organic and Inorganic Data Review, and the USEPA Standard Operating Procedures (SOPs) HW-2 and HW-6. Preliminary analytical results are included in Table 4. Following data validation of the analytical results, Table 4 will be revised, if required, and reissued along with a copy of the validation report.

Results of the ground water analyses, along with a comparison of the results with New York State Class GA Standards, are summarized on Table 4. The New York State Class GA Standards presented on Table 4 have been revised to reflect revisions to the New York State water quality standards (NYSDEC, 1998). The data base will be updated with data from future sampling events, and ground water standards will be reviewed annually to evaluate whether standards have been revised.

As specified in the O&M Manual, statistical analyses of the ground water chemistry data have been completed. A preliminary exploratory data analysis, using univariate statistics in SAS®, was performed for normality; however, the results were not meaningful. The test for normality is most relevant when used to assess the appropriateness of parametric statistical analyses such as t-tests; thus, these analyses will be continued as sufficient data is obtained to assess the appropriateness of the t-test analysis. As stated in the O&M Manual, baseline data will be collected during the first two years of monitoring. The September 1998 data represents the results of the third baseline data collection effort. The t-test analysis will be initiated when an adequate database exists. The adequacy of the data set will be re-evaluated after each sampling event.

Ground water analytical data was compared with New York State Class GA Standards (NYSDEC, 1998). The results of this comparison are included in Table 4. Detected constituents exceeding New York State Class GA ground water standards included: iron at one location (88-12C); sodium at ten locations (85-5R, 85-5D, 85-7R, URS-7D, URS-9I, URS-9D, 88-12C, 88-12D, URS-14I, and URS-14D); and nickel at one location (URS-5D). It should be noted that sodium was detected above New York State Class GA ground water standards in the background wells URS-14I and URS-14D. Concentrations of iron and nickel were previously detected in those wells at similar concentrations. It is likely that the elevated concentrations of sodium are naturally occurring. This section will be revised, if required, based on the results of the data evaluation and data validation.

2. Conclusions

Based on the data contained in this semi-annual report, the following conclusions are presented:

- An inward hydraulic gradient has been established around the capped area.
- The elevation data indicates that ground water within the capped area is migrating to the west toward the ground water collection trench.
- The elevation data indicates that the ground water collection trench is effectively capturing shallow ground water emanating from beneath the capped area.
- The September 1998 ground water chemistry is similar to previous sampling events. However, given the limited data available, a statistical comparison cannot be completed at this time.
- Nickel and iron were each detected in one monitoring well at concentrations above New York State Class GA Standards. Concentrations of these elements were previously detected in the wells at similar concentrations.
- Sodium was detected at several monitoring wells at concentrations above New York State Class GA Standards. It is likely that this element is naturally occurring and is not related to previous site activities.

References

New York State Department of Environmental Conservation, 1998. *Final Express Terms, Appendix I to Final Combined Regulatory Impact and Environmental Impact Statement for Title 6, Chapter X, Part 703.5(f)*, March 1998.

O'Brien & Gere Engineers, 1997. *Operation and Maintenance Manual, Frontier Chemical - Pendleton Site, Town of Pendleton, Niagara County, New York,* Pendleton Site PRP Group, March 1997.

O'Brien & Gere Engineers, 1998. *Frontier Chemical - Pendleton Site, Semi-Annual Ground Water Monitoring Report*, Pendleton Site PRP Group, March 1998.

Table 1
Frontier Chemical - Pendleton Site
Piezometer Ground Water Elevation Summary Table

Piezometer		Location	Top of Riser Elev. (ft)	Top of Cover Elev. (ft)	Depth (ft below riser)	Screened Elev. (ft)	Ground water elevation (ft)				
							06/24/97	09/30/97	02/23/98	04/28/98	09/17/98
P-1	(O)	East portion of	583.21	583.30	16.4	576.8 - 566.8	579.54	577.09	579.25	579.60	575.62
P-2	(I)	capped area	582.90	583.20	15.7	577.2 - 567.2	579.60	579.24	578.20	578.37	578.76
P-3	(I)	Center of capped area	606.33	606.64	39.7	586.6 - 566.6	580.36	580.38	580.06	579.94	579.80
P-4	(I)	Adjacent to	582.31	583.85	15.6	576.7 - 566.7	577.15	577.43	576.70	575.11	575.96
SP-1	(T)	Quarry Lake	579.86	580.07	15.0	bop = 564.9	<564.9	<564.9	<564.9	<564.9	<564.9
P-5	(O)	Southern portion	583.05	583.55	15.5	577.6 - 567.6	576.87	577.25	578.57	579.31	576.13
P-6	(I)	of capped area	584.45	584.60	16.2	578.3 - 568.3	578.77	579.17	578.14	578.20	578.63
P-7	(I)	Northern portion	580.97	582.00	15.9	575.0 - 565.0	578.33	578.62	576.45	576.17	577.15
P-8	(O)	of capped area	582.83	583.00	17.3	575.5 - 565.5	577.76	578.87	578.75	579.61	576.90

Notes:

1. Elevation based on USGS Datum.
2. bop = bottom of pipe.
3. O = piezometer located outside of capped area.
4. I = piezometer located inside capped area.
5. T = standpipe located within the ground water collection trench.
6. The top of riser of piezometer P-4 was modified on 4/28/98 from 583.68 ft to 582.31 ft to allow clearance for the installation of a locking expansion plug beneath the flush-mounted cover.
7. The top of riser of piezometer P-7 was modified on 4/28/98 from 581.84 ft to 580.97 ft to allow clearance for the installation

Table 2

Frontier Chemical - Pendleton Site

Monitoring Well Ground Water Elevation Summary Table

Monitoring Well	Location	Top of Riser Elev. (ft)	Ground Elev. (ft)	Depth (ft below riser)	Screened Elev. (ft)	Ground water elevation (ft)				
						6/24/97	9/30/97	2/23/98	4/28/98	9/17/98
URS-14I	Upgradient well nest	581.14	580.84	31.0	550.1 - 555.1	577.15	578.77	580.24	580.14	574.76
URS-14D	in church parking lot	580.71	580.85	41.5	539.2 - 544.2	575.50	574.28	575.87	576.05	573.94
URS-9I	Southern well nest	581.68	579.90	46.0	535.6 - 540.6	575.38	574.22	575.69	575.91	573.76
URS-9D	along Town Line Road	580.80	579.00	46.5	534.3 - 539.3	575.36	574.21	575.68	575.89	573.64
85-5R	Middle well nest	580.84	578.70	40.0	540.9 - 542.9	574.70	573.97	575.39	575.70	574.98
URS-5D	along Town Line Road	580.60	578.00	49.9	530.8 - 535.8	574.73	574.02	575.42	575.74	573.80
85-7R	North well nest	577.90	576.60	27.8	550.2 - 552.2	575.09	574.21	575.53	575.87	573.74
URS-7D	along Town Line Road	579.35	576.50	39.9	539.5 - 544.5	575.15	574.35	575.60	575.99	573.75
88-12C	Well nest outside northeast	583.12	583.70	31.3	551.8 - 553.8	576.60	574.03	576.53	577.06	572.79
88-12D	portion of capped area	582.87	583.28	54.5	528.4 - 533.4	575.72	574.54	576.17	576.33	574.00

Notes:

1. Elevation based on USGS Datum.

Table 3

Frontier Chemical - Pendleton Site

Quarry Lake Surface Water Elevation Summary Table

Date	Quarry Lake Surface Water Elevation (ft)
9/8/97	572.3
2/23/98	578.0
4/30/98	578.26
9/21/98	577.42

Notes:

1. Elevation based on USGS Datum.

Table 4
Frontier Chemical-Pendleton Site
Summary of Ground Water Analytical Data
September 1998

	85-5R							URS-5D					
Parameter	7/86	8/90	2/91	10/92	6/97	2/98	9/98	8/90	2/91	10/92	6/97	2/98	9/98
VOCs (ppb)													
Acetone	NA	R	ND	ND	ND	ND		250	R	ND	ND	ND	
Benzene	ND	15	ND	ND	ND	0.34 J		ND	ND	1	ND	0.25 J	
2-Butanone	NA	ND	ND	ND	ND	ND		ND	R	ND	ND	ND	
Bromodichloromethane	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	
Carbon Disulfide	NA	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	
Chlorobenzene	ND	NA	NA	NA	ND	0.28 J		NA	NA	NA	ND	0.31 J	
Chloroform	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	
Dibromochloromethane	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	
1,2-Dichloroethene	NA	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	
Ethylbenzene	ND	ND	ND	ND	ND	0.24 J		ND	ND	ND	ND	0.32 J	
Methylene Chloride	ND	ND	ND	ND	ND	ND		ND	R	ND	ND	ND	
4-Methyl-2-Pentanone	NA	2J	ND	ND	ND	ND		ND	ND	ND	ND	ND	
1,1,2,2,-Tetrachloroethane	ND	2J	ND	ND	ND	ND		ND	ND	ND	ND	ND	
Toluene	ND	ND	ND	ND	ND	0.14 J		ND	1J	ND	ND	0.19 J	
Total Xylenes	NA	ND	ND	ND	ND	0.96		ND	0.5J	ND	ND	1.5	
Trichloroethene	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	
Vinyl Chloride	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	
Metals (ppb)													
Aluminum	1,060	214	37.8B	153	ND	300	ND	ND	ND	ND	ND	ND	ND
Antimony	NA	ND	42.4B	ND	ND	ND	ND	ND	31.5B	ND	ND	ND	ND
Arsenic	NA	1B	ND	ND	ND	ND	ND	1.3B	1B	ND	ND	ND	ND
Barium	20	73.5B	23.4B	15	40	80	50	224	71.7B	32	20	ND	ND
Beryllium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Calcium	380,000	355,000	378,000	321,000	270,000	220,000	220,000	378,000	407,000	387,000	440,000	300,000	490,000
Chromium	40	7.5B	ND	ND	ND	30	10	3B	ND	ND	ND	ND	ND
Cobalt	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	61	210
Copper	10	ND	ND	11	ND	ND	ND	ND	ND	8	ND	ND	ND
Cyanide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Iron	1,020	669	915	419	140	2,300	190	188	143	25	ND	120	ND
Lead	150	ND	1.2B	ND	ND	ND	ND	ND	1.3B	12	ND	ND	ND
Magnesium	179,000	106,000	170,000	139,000	130,000	85,000	110,000	33,300	2450B	570,000	100,000	24,000	87,000
Manganese	100	40	57.5	42	50	260	40	8.8B	3.5B	ND	50	10	70
Nickel	10	48.1	ND	ND	ND	ND	ND	11.4B	ND	ND	90	ND	180
Potassium	9,500	60,700	6,280	6,400	ND	ND	ND	22,700	16,900	8,500	ND	ND	ND
Selenium	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sodium	126,000	132,000	120,000	100,000	93,000 J	58,000	87,000	192,000	194,000	114,000	88,000	93,000	94,000
Thallium	NA	ND	ND	ND	ND	8	ND	ND	ND	ND	ND	ND	ND
Vanadium	35	4B	ND	ND	ND	ND	ND	3.8B	ND	ND	ND	ND	ND
Zinc	75	12.9B	17.6B	ND	ND	ND	ND	19.9B	14.7B	ND	ND	10	ND

Notes:

1. R = Indicates compound rejected due to blank contamination.
2. J = Indicates result is less than sample quantitation limit but greater than zero.
3. I = Inorganics indicates estimated value.
4. B = Indicates compound is less than quantitation limits but greater than or equal to instrument detection limits.
5. Sample data presented for 6/97 and 2/98 sampling events is for cis-1,2-dichloroethylene.
6. NA = Not analyzed; ND = Not detected; N = Presumptives present
7. Data validation is pending. Data validation will be performed in accordance with USEPA CLP National Functional Guidelines and Organic and Inorganic Data Review, and the USEPA SOPs HW-2 and HW-6.

Table 4
Frontier Chemical-Pendleton Site
Summary of Ground Water Analytical Data
September 1998

	85-7R							URS-7D					
Parameter	7/86	8/90	2/91	10/92	6/97	2/98	9/98	8/90	2/91	10/92	6/97	2/98	9/98
VOCs (ppb)													
Acetone	NA	ND	R	ND	ND	ND		120	R	ND	ND	ND	
Benzene	ND	6	ND	ND	ND	ND		ND	ND	ND	ND	0.11 J	
2-Butanone	NA	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	
Bromodichloromethane	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	
Carbon Disulfide	71	ND	ND	ND	ND	ND		0.5J	ND	ND	ND	ND	
Chlorobenzene	ND	NA	NA	NA	ND	ND		NA	NA	NA	ND	ND	
Chloroform	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	
Dibromochloromethane	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	
1,2-Dichloroethene	NA	ND	ND	ND	0.14J	0.19 J		ND	ND	ND	ND	ND	
Ethylbenzene	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	
Methylene Chloride	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	
4-Methyl-2-Pentanone	NA	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	
1,1,2,2,-Tetrachloroethane	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	
Toluene	ND	ND	1J	ND	ND	ND		ND	ND	ND	ND	ND	
Total Xylenes	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND	0.37 J	
Trichloroethene	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	
Vinyl Chloride	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	
Metals (ppb)													
Aluminum	1,200	277	265	249	ND	ND	ND	167B	52.5B	ND	ND	ND	ND
Antimony	NA	28.3B	ND	ND	ND	ND	ND	20.5B	36.3B	ND	ND	ND	ND
Arsenic	NA	1.4B	1.7B	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Barium	30	91B	143B	106	100	80	50	20.3B	47.2B	29	30	40	ND
Beryllium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Calcium	490,000	354,000	298,000	389,000	350,000	350,000	420,000	277,000	333,000	403,000	360,000	300,000	480,000
Chromium	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10
Cobalt	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper	10	ND	ND	8	ND	ND	ND	ND	ND	8	ND	ND	ND
Cyanide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Iron	920	586	820	435	190	310	270	387	283	63	ND	70	ND
Lead	120	ND	2.6B	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Magnesium	131,000	119,000	42,600	124,000	120,000	120,000	140,000	96,200	115,000	140,000	120,000	89,000	140,000
Manganese	110	40.5	31.5	30	70	80	90	71.2	140	86	40	30	40
Nickel	ND	7.4B	ND	ND	ND	ND	ND	23.5B	ND	ND	ND	ND	ND
Potassium	28,000	5,540	5,770	6,700	5,000	5,000	6,000	5,990	8,550	8,300	5,000	ND	6,000
Selenium	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sodium	107,000	67,900	38,900	73,100	66,000 J	67,000	75,000	82,700	68,900	78,900	66,000 J	54,000	79,000
Thallium	NA	ND	ND	ND	ND	6	ND	ND	ND	ND	ND	ND	ND
Vanadium	35	ND	ND	ND	ND	ND	ND	4.2B	6.7B	ND	ND	ND	ND
Zinc	65	ND	21.5	ND	ND	ND	ND	5.6B	12.2B	ND	ND	ND	ND

Notes:

1. R = Indicates compound rejected due to blank contamination.
2. J = Indicates result is less than sample quantitation limit but greater than zero.
3. I = Inorganics indicates estimated value.
4. B = Indicates compound is less than quantitation limits but greater than or equal to instrument detection limits.
5. Sample data presented for 6/97 and 2/98 sampling events is for cis-1,2-dichloroethylene.
6. NA = Not analyzed; ND = Not detected; N = Presumptives present
7. Data validation is pending. Data validation will be performed in accordance with USEPA CLP National Functional Guidelines and Organic and Inorganic Data Review, and the USEPA SOPs HW-2 and HW-6.

Table 4
Frontier Chemical-Pendleton Site
Summary of Ground Water Analytical Data
September 1998

Parameter	URS-9I						URS-9D					
	8/90	2/91	10/92	6/97	2/98	9/98	8/90	2/91	10/92	6/97	2/98	9/98
VOCs (ppb)												
Acetone	R	R	ND	ND	ND		R	R	ND	ND	ND	
Benzene	ND	ND	ND	0.12J	0.29 J		ND	ND	ND	ND	1.9	
2-Butanone	ND	2J	ND	ND	ND		ND	6J	ND	ND	ND	
Bromodichloromethane	ND	ND	ND	ND	ND		4J	ND	ND	ND	ND	
Carbon Disulfide	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	
Chlorobenzene	NA	NA	NA	ND	0.20 J		NA	NA	NA	ND	0.79	
Chloroform	ND	ND	ND	ND	ND		8	ND	ND	ND	ND	
Dibromochloromethane	ND	ND	ND	ND	ND		1J	ND	ND	ND	ND	
1,1-Dichloroethane	ND	ND	ND	ND	ND		ND	ND	0.7	0.37J	0.34 J	
1,2-Dichloroethene	ND	ND	ND	ND	ND		ND	ND	1	0.66	0.59	
Ethylbenzene	ND	ND	ND	ND	0.14 J		ND	ND	ND	ND	0.44 J	
Methylene Chloride	ND	ND	ND	ND	ND		ND	ND	2	ND	ND	
4-Methyl-2-Pentanone	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	
1,1,2,2,-Tetrachloroethane	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	
Toluene	0.7J	ND	ND	ND	0.11 J		0.6J	ND	ND	ND	0.51	
Total Xylenes	ND	ND	ND	0.29J	0.54		ND	ND	ND	ND	1.8	
Trichloroethene	ND	ND	ND	ND	ND		ND	ND	0.6	0.36J	0.24 J	
Vinyl Chloride	ND	ND	ND	ND	ND		ND	ND	ND	0.26J	0.44 J	
Metals (ppb)												
Aluminum	221	197	110	ND	ND	ND	128	64.2B	ND	ND	ND	ND
Antimony	ND	ND	ND	ND	ND	ND	ND	28B	ND	ND	ND	ND
Arsenic	1.7B	ND	ND	ND	ND	ND	1.6B	ND	ND	ND	ND	ND
Barium	30.1B	22.8B	14	30	ND	ND	110B	38.2B	23	ND	ND	ND
Beryllium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Calcium	106,000	143,000	123	170,000	150,000	160,000	56,500	146,000	120,000	200,000	190,000	190,000
Chromium	8.6B	10.1	ND	ND	ND	10	ND	ND	ND	ND	ND	10
Cobalt	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper	12.7B	ND	ND	ND	ND	ND	5.2B	ND	ND	ND	ND	ND
Cyanide	ND	ND	ND	ND	ND	ND	ND	11.1B	ND	ND	ND	ND
Iron	1,020	1,170	808	460	440	290	127	506	252	ND	70	80
Lead	ND	1B	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Magnesium	54,500	71,300	63,500	70,000	69,000	77,000	29,900	70,200	60,000	58,000	73,000	71,000
Manganese	67.5	80	75	50	30	40	20.1	25.5	9	ND	ND	10
Nickel	7.6B	ND	ND	ND	ND	ND	15.3B	ND	ND	ND	ND	ND
Potassium	3,910B	4,250B	2,900	ND	ND	ND	9,880	4,170B	3,600	ND	ND	ND
Selenium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sodium	34,500	54,000	52,400	43,000 J	45,000	49,000	27,400	37,000	42,800	48,000 J	52,000	41,000
Thallium	ND	ND	ND	ND	11	ND	ND	ND	ND	ND	14	ND
Vanadium	ND	9.6B	ND	ND	ND	ND	10.7B	ND	ND	ND	ND	ND
Zinc	19.3B	34.6	ND	ND	ND	20	50.5	16.7B	ND	ND	ND	ND

Notes:

1. R = Indicates compound rejected due to blank contamination.
2. J = Indicates result is less than sample quantitation limit but greater than zero.
3. I = Inorganics indicates estimated value.
4. B = Indicates compound is less than quantitation limits but greater than or equal to instrument detection limits.
5. Sample data presented for 6/97 and 2/98 sampling events is for cis-1,2-dichloroethylene.
6. NA = Not analyzed; ND = Not detected; N = Presumptives present
7. Data validation is pending. Data validation will be performed in accordance with USEPA CLP National Functional Guidelines and Organic and Inorganic Data Review, and the USEPA SOPs HW-2 and HW-6.

Table 4
Frontier Chemical-Pendleton Site
Summary of Ground Water Analytical Data
September 1998

	88-12C						88-12D				
Parameter	8/90	2/91	10/92	6/97	2/98	9/98	8/90	2/91	6/97	2/98	9/98
VOCs (ppb)											
Acetone	ND	ND	ND	ND	ND		ND	ND	ND	ND	
Benzene	ND	ND	ND	ND	ND		1J	0.9J	ND	0.13 J	
2-Butanone	ND	ND	ND	ND	ND		ND	ND	ND	ND	
Bromodichloromethane	ND	ND	ND	ND	ND		ND	ND	ND	ND	
Carbon Disulfide	ND	ND	ND	ND	ND		ND	6	ND	ND	
Chlorobenzene	NA	NA	NA	ND	ND		ND	ND	ND	ND	
Chloroform	ND	ND	ND	ND	ND		ND	ND	ND	ND	
Dibromochloromethane	ND	ND	ND	ND	ND		ND	ND	ND	ND	
1,1-Dichloroethane	ND	ND	ND	ND	ND		ND	ND	ND	ND	
1,2-Dichloroethene	ND	ND	ND	ND	ND		ND	2J	ND	ND	
Ethylbenzene	ND	ND	ND	ND	ND		ND	ND	ND	0.11 J	
Methylene Chloride	ND	ND	ND	ND	ND		ND	ND	ND	ND	
4-Methyl-2-Pentanone	ND	ND	ND	ND	ND		ND	ND	ND	ND	
1,1,2,2,-Tetrachloroethane	ND	ND	ND	ND	ND		ND	ND	ND	ND	
Toluene	ND	ND	ND	ND	ND		R	13	ND	ND	
Total Xylenes	ND	ND	ND	ND	ND		ND	ND	ND	0.48 J	
Trichloroethene	ND	ND	ND	ND	ND		ND	6	ND	ND	
Vinyl Chloride	ND	ND	ND	ND	ND		ND	ND	ND	ND	
Metals (ppb)											
Aluminum	481	187B	453	ND	900	ND	ND	172B	ND	ND	ND
Antimony	19.2B	28B	ND	ND	ND	ND	50.7B	56.1B	ND	ND	ND
Arsenic	10	12.3B	14	9	7	10	ND	1.3BW	ND	ND	ND
Barium	11.4B	17.3	14	ND	ND	ND	2.9B	7.9B	ND	ND	ND
Beryllium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Calcium	62,600	68,500	68,900	73,000	70,000	71,000	464,000	623,000E	490,000	480,000	630,000
Chromium	21	4.6B	ND	ND	10	10	7.6B	27.8E	10	30	30
Cobalt	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper	4.2B	ND	5	ND	ND	ND	ND	ND	ND	ND	ND
Cyanide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Iron	1,530	1,040	1,560	ND	2,200	330	168	250	180	480	110
Lead	1.5B	1.2B	ND	ND	ND	ND	ND	1.8BW	ND	ND	ND
Magnesium	88,500	103,000	92,500	110,000	98,000	110,000	109,000	199,000E	130,000	110,000	180,000
Manganese	45.4	37.8	54	10	70	10	33.9	696	90	60	40
Nickel	14.6B	ND	ND	ND	ND	ND	11.5B	25.5B	ND	ND	ND
Potassium	2,520B	3,200B	3,000	ND	ND	ND	5,310	12,000E	600	6,000	10,000
Selenium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6
Silver	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sodium	34,600	41,100	41,300	47,000 J	43,000	40,000	66,400	474,000	140,000 J	100,000	330,000
Thallium	ND	ND	ND	ND	13	ND	ND	ND	ND	ND	ND
Vanadium	22.1B	10B	ND	ND	ND	ND	51.6	2.4B	ND	ND	ND
Zinc	10.1B	15.7B	ND	20	20	ND	7.9B	ND	ND	10	ND

Notes:

1. R = Indicates compound rejected due to blank contamination.
2. J = Indicates result is less than sample quantitation limit but greater than zero.
3. I = Inorganics indicates estimated value.
4. B = Indicates compound is less than quantitation limits but greater than or equal to instrument detection limits.
5. Sample data presented for 6/97 and 2/98 sampling events is for cis-1,2-dichloroethylene.
6. NA = Not analyzed; ND = Not detected; N = Presumptives present
7. Data validation is pending. Data validation will be performed in accordance with USEPA CLP National Functional Guidelines and Organic and Inorganic Data Review, and the USEPA SOPs HW-2 and HW-6.

Table 4
Frontier Chemical-Pendleton Site
Summary of Ground Water Analytical Data
September 1998

Parameter	URS-14I					URS-14D					Standard
	2/91	10/92	6/97	2/98	9/98	2/91	10/92	6/97	2/98	9/98	ug/L (ppb)
VOCs (ppb)											
Acetone	ND	ND	ND	ND		ND	ND	ND	ND		---
Benzene	ND	ND	ND	1		ND	ND	ND	ND		1
2-Butanone	ND	ND	ND	ND		ND	ND	ND	ND		---
Bromodichloromethane	ND	ND	ND	ND		ND	ND	ND	ND		---
Carbon Disulfide	ND	ND	ND	ND		ND	ND	ND	ND		---
Chlorobenzene	NA	NA	ND	0.81		NA	NA	ND	ND		5
Chloroform	ND	ND	ND	ND		ND	ND	ND	ND		7
Dibromochloromethane	ND	ND	ND	ND		ND	ND	ND	ND		---
1,1-Dichloroethane	ND	ND	ND	ND		ND	ND	ND	ND		5
1,2-Dichloroethene	ND	ND	ND	ND		ND	ND	ND	ND		5
Ethylbenzene	ND	ND	ND	0.13 J		ND	ND	ND	ND		5
Methylene Chloride	ND	ND	ND	ND		R	ND	ND	ND		5
4-Methyl-2-Pentanone	ND	ND	ND	ND		ND	ND	ND	ND		---
1,1,2,2,-Tetrachloroethane	ND	ND	ND	ND		ND	ND	ND	ND		5
Toluene	ND	ND	ND	0.15 J		ND	ND	ND	ND		5
Total Xylenes	ND	ND	ND	ND		ND	ND	0.11J	0.21 J		5
Trichloroethene	ND	ND	ND	ND		ND	ND	ND	ND		5
Vinyl Chloride	ND	ND	ND	ND		ND	ND	ND	ND		2
Metals (ppb)											
Aluminum	7,140	1,170	1300	400	ND	99.8	ND	ND	ND	ND	---
Antimony	ND	ND	ND	ND	ND	32.1B	ND	ND	ND	ND	3
Arsenic	7.2B	ND	ND	ND	ND	2B	ND	ND	ND	ND	25
Barium	115B	47	50	40	40	25.5B	23	20	ND	ND	1000
Beryllium	1.2B	ND	ND	ND	ND	ND	ND	ND	ND	ND	---
Cadmium	ND	ND	ND	1	ND	ND	ND	ND	ND	ND	5
Calcium	73,900	35,200	28,000 J	21,000	23,000	255,000	292,000	210,000	250,000	310,000	---
Chromium	30.9	ND	ND	160	ND	10.3	7	ND	ND	10	50
Cobalt	5.8B	ND	ND	ND	ND	ND	ND	ND	ND	ND	---
Copper	18.5B	8	ND	10	ND	ND	8	ND	ND	ND	200
Cyanide	ND	ND	ND	ND	ND	ND	ND	ND	10	10	200
Iron	10,400	2,060	1,800	2,300	ND	357	193	ND	ND	ND	300
Lead	7.5	ND	ND	ND	ND	1.1B	ND	ND	ND	ND	25
Magnesium	32,800	22,300	21,000	17,000	21,000	75,200	78,000	61,000	66,000	81,000	---
Manganese	484	145	70	60	ND	30.8	27	ND	ND	ND	300
Nickel	30.4B	ND	ND	170	ND	ND	ND	ND	ND	ND	100
Potassium	17,100	5,500	ND	25,000	8,000	4,250B	3,700	ND	ND	ND	---
Selenium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10
Silver	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	50
Sodium	44,700	42,500	58,000 J	48,000	48,000	40,700	38,700	52,000 J	49,000	50,000	20,000
Thallium	ND	ND	ND	6	ND	ND	ND	ND	ND	ND	---
Vanadium	16.1B	ND	ND	ND	ND	ND	ND	ND	ND	ND	---
Zinc	52.3	ND	10	30	ND	26.8	ND	ND	10	10	---

Notes:

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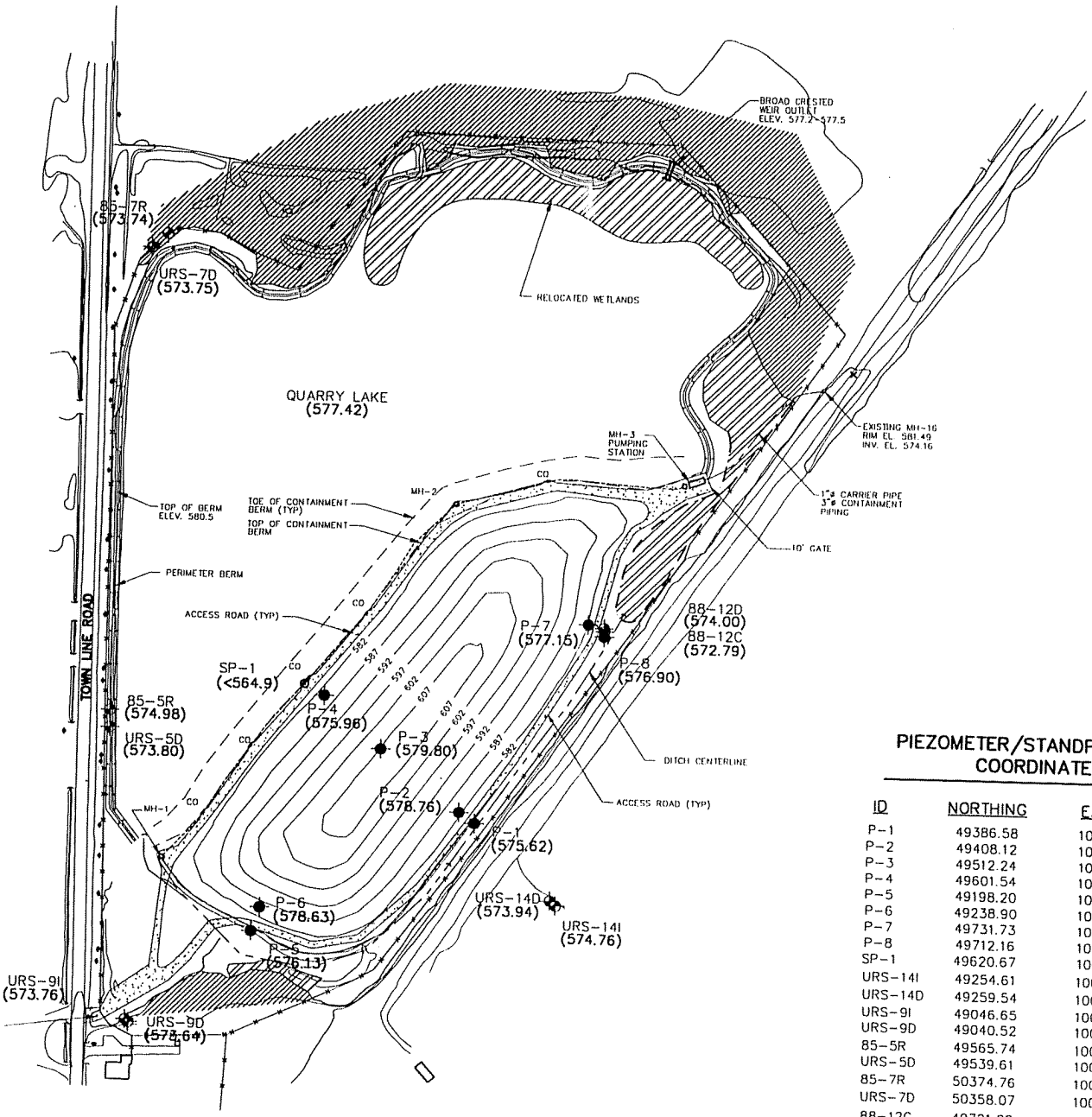
FIGURE 1



LEGEND

- URS-7D — MONITORING WELL
- P-1 — PIEZOMETER
- (579.61) — WATER ELEVATION
- WETLAND AREA
- 6' HIGH CHAIN LINK FENCE
- 580 — GRADE ELEVATION CONTOUR
- CO — GROUND WATER COLLECTION TRENCH & CLEAN OUT
- STANDPIPE
- UTILITY POLE

PIEZOMETER/STANDPIPE AND MONITORING WELL COORDINATES AND ELEVATIONS

ID	NORTHING	EASTING	RISER	COVER
P-1	49386.58	100656.87	583.21	583.30
P-2	49408.12	100630.30	582.90	583.20
P-3	49512.24	100496.39	606.33	606.64
P-4	49601.54	100399.33	582.31*	583.85
P-5	49198.20	100282.65	583.05	583.55
P-6	49238.90	100296.52	584.45	584.60
P-7	49731.73	100842.30	580.97*	582.00
P-8	49712.16	100869.82	582.83	583.00
SP-1	49620.67	100365.59	579.86	580.07
URS-14I	49254.61	100794.43	581.14	580.84
URS-14D	49259.54	100789.09	580.71	580.85
URS-9I	49046.65	100075.10	581.68	579.90
URS-9D	49040.52	100076.81	580.80	579.00
85-5R	49565.74	100036.14	580.84	578.70
URS-5D	49539.61	100035.69	580.60	578.00
85-7R	50374.76	100115.55	577.90	576.60
URS-7D	50358.07	100095.40	579.35	576.50
88-12C	49721.29	100870.45	583.12	583.70
88-12D	49726.43	100869.13	582.87	583.28

NOTE: * = MODIFIED 4/28/98

REV DATE: 9/29/98

FRONTIER CHEMICAL
PENDLETON SITE
TOWN OF PENDLETON,
NIAGARA COUNTY, NY

HYDRAULIC POTENTIAL MAP (SEPTEMBER 17, 1998)

0 200 400
SCALE IN FEET

DATE: SEPTEMBER 1998

FILE NO. 5829.003-002

O'BRIEN & GERE ENGINEERS INC

Appendix A

Piezometer/monitoring well inspection forms

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site
Well Identification: P-1
Personnel: T.Prawel/ E.Rahn
Date: 9/17/98

WELL SPECIFICATIONS

Protective Casing:	**(Above Ground)**	**Flush Mounted**
Well Construction:	**(PVC)**	**Stainless Steel**
Well Diameter:	**(2-inch)**	**4-inch**
Depth to Ground Water:	7.59	
Well Depth:	—	

WELL INTEGRITY

1. **Well identification clearly marked ?**	**(yes)**	**no**
2. **Well covers and locks in good condition and secure ?**	**(yes)**	**no**
3. **Is the well stand pipe vertically aligned and secure ?**	**(yes)**	**no**
4. **Is the concrete pad and surface seal in good condition ?**	**(yes)**	**no**
5. **Are soils surrounding the well pad eroded ?**	**yes**	**(no)**
6. **Is the well casing in good condition ?**	**(yes)**	**no**
7. **Is the measuring point on casing well marked ?**	**(yes)**	**no**
8. **Is there standing water in the annular space ?**	**yes**	**(no)**
9. **Is the stand pipe vented at the base to allow drainage ?**	**(yes)**	**no**

COMMENTS:

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site
Well Identification: P-2
Personnel: T.Prawel/ E.Rahn
Date: 9/17/98

WELL SPECIFICATIONS

Protective Casing:	**Above Ground**	**(Flush Mounted)**
Well Construction:	**(PVC)**	**Stainless Steel**
Well Diameter:	**(2-inch)**	**4-inch**
Depth to Ground Water:	4.14	
Well Depth:	—	

WELL INTEGRITY

1. Well identification clearly marked ?	(yes)	no
2. Well covers and locks in good condition and secure ?	(yes)	no
3. Is the well stand pipe vertically aligned and secure ?	(yes)	no
4. Is the concrete pad and surface seal in good condition ?	(yes)	no
5. Are soils surrounding the well pad eroded ?	yes	(no)
6. Is the well casing in good condition ?	(yes)	no
7. Is the measuring point on casing well marked ?	(yes)	no
8. Is there standing water in the annular space ?	yes	(no)
9. Is the stand pipe vented at the base to allow drainage ?	~~yes~~	~~no~~ NA

COMMENTS:

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site
Well Identification: P-3
Personnel: T.Prawel/ E.Rahn
Date: 9/17/98

WELL SPECIFICATIONS

Protective Casing:	**Above Ground**	**(Flush Mounted)**
Well Construction:	**(PVC)**	**Stainless Steel**
Well Diameter:	**(2-inch)**	**4-inch**
Depth to Ground Water:	26.53	
Well Depth:	—	

WELL INTEGRITY

1. Well identification clearly marked ?	(yes)	no
2. Well covers and locks in good condition and secure ?	(yes)	no
3. Is the well stand pipe vertically aligned and secure ?	(yes)	no
4. Is the concrete pad and surface seal in good condition ?	(yes)	no
5. Are soils surrounding the well pad eroded ?	yes	(no)
6. Is the well casing in good condition ?	(yes)	no
7. Is the measuring point on casing well marked ?	(yes)	no
8. Is there standing water in the annular space ?	yes	(no)
9. Is the stand pipe vented at the base to allow drainage ?	~~yes~~	~~no~~ NA

COMMENTS:

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site
Well Identification: P-4
Personnel: T.Prawel/ E.Rahn
Date: 9/17/98

WELL SPECIFICATIONS

Protective Casing:	**Above Ground**	**Flush Mounted**
Well Construction:	**PVC**	**Stainless Steel**
Well Diameter:	**2-inch**	**4-inch**
Depth to Ground Water:	6.35	
Well Depth:	–	

WELL INTEGRITY

1. Well identification clearly marked ?	**yes**	**no**
2. Well covers and locks in good condition and secure ?	**yes**	**no**
3. Is the well stand pipe vertically aligned and secure ?	**yes**	**no**
4. Is the concrete pad and surface seal in good condition ?	**yes**	**no**
5. Are soils surrounding the well pad eroded ?	**yes**	**no**
6. Is the well casing in good condition ?	**yes**	**no**
7. Is the measuring point on casing well marked ?	**yes**	**no**
8. Is there standing water in the annular space ?	~~yes~~	**no**
9. Is the stand pipe vented at the base to allow drainage ?	~~yes~~	~~no~~ NA

COMMENTS:

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site
Well Identification: P-5
Personnel: T.Prawel/ E.Rahn
Date: 9/17/98

WELL SPECIFICATIONS

Protective Casing:	**Above Ground**	**Flush Mounted**
Well Construction:	**PVC**	**Stainless Steel**
Well Diameter:	**2-inch**	**4-inch**
Depth to Ground Water:	6.92	
Well Depth:	—	

WELL INTEGRITY

1. Well identification clearly marked ?	**yes**	no
2. Well covers and locks in good condition and secure ?	**yes**	no
3. Is the well stand pipe vertically aligned and secure ?	**yes**	no
4. Is the concrete pad and surface seal in good condition ?	**yes**	no
5. Are soils surrounding the well pad eroded ?	yes	**no**
6. Is the well casing in good condition ?	**yes**	no
7. Is the measuring point on casing well marked ?	**yes**	no
8. Is there standing water in the annular space ?	yes	**no**
9. Is the stand pipe vented at the base to allow drainage ?	**yes**	no

COMMENTS:

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site
Well Identification: P-6
Personnel: T.Prawel/ E.Rahn
Date: 9//7/98

WELL SPECIFICATIONS

Protective Casing:	**Above Ground**	**(Flush Mounted)**
Well Construction:	**(PVC)**	**Stainless Steel**
Well Diameter:	**(2-inch)**	**4-inch**
Depth to Ground Water:	5.82	
Well Depth:	—	

WELL INTEGRITY

1. **Well identification clearly marked ?**	**(yes)**	**no**
2. **Well covers and locks in good condition and secure ?**	**(yes)**	**no**
3. **Is the well stand pipe vertically aligned and secure ?**	**yes**	**(no)**
4. **Is the concrete pad and surface seal in good condition ?**	**(yes)**	**no**
5. **Are soils surrounding the well pad eroded ?**	**yes**	**(no)**
6. **Is the well casing in good condition ?**	**(yes)**	**no**
7. **Is the measuring point on casing well marked ?**	**(yes)**	**no**
8. **Is there standing water in the annular space ?**	**yes**	**(no)**
9. **Is the stand pipe vented at the base to allow drainage ?**	~~yes~~	~~no~~ NA

COMMENTS:

* Standpipe at surface is leaning 20°-30°

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site
Well Identification: P-7
Personnel: T.Prawel/ E.Rahn
Date: 9//7/98

WELL SPECIFICATIONS

Protective Casing:	**Above Ground**	**(Flush Mounted)**
Well Construction:	**(PVC)**	**Stainless Steel**
Well Diameter:	**(2-inch)**	**4-inch**
Depth to Ground Water:	3.82	
Well Depth:	—	

WELL INTEGRITY

1. Well identification clearly marked ?	**(yes)**	**no**
2. Well covers and locks in good condition and secure ?	**(yes)**	**no**
3. Is the well stand pipe vertically aligned and secure ?	**(yes)**	**no**
4. Is the concrete pad and surface seal in good condition ?	**(yes)**	**no**
5. Are soils surrounding the well pad eroded ?	**yes**	**(no)**
6. Is the well casing in good condition ?	**(yes)**	**no**
7. Is the measuring point on casing well marked ?	**(yes)**	**no**
8. Is there standing water in the annular space ?	**yes**	**(no)**
9. Is the stand pipe vented at the base to allow drainage ?	~~yes~~	~~no~~ N/A

COMMENTS:

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site
Well Identification: P-8
Personnel: T.Prawel/ E.Rahn
Date: 9//7/98

WELL SPECIFICATIONS

Protective Casing:	**Above Ground**	**Flush Mounted**
Well Construction:	**PVC**	**Stainless Steel**
Well Diameter:	**2-inch**	**4-inch**
Depth to Ground Water:	5.93	
Well Depth:	~	

WELL INTEGRITY

1. Well identification clearly marked ?	**yes**	no
2. Well covers and locks in good condition and secure ?	**yes**	no
3. Is the well stand pipe vertically aligned and secure ?	**yes**	no
4. Is the concrete pad and surface seal in good condition ?	**yes**	no
5. Are soils surrounding the well pad eroded ?	yes	**no**
6. Is the well casing in good condition ?	**yes**	no
7. Is the measuring point on casing well marked ?	**yes**	no
8. Is there standing water in the annular space ?	yes	**no**
9. Is the stand pipe vented at the base to allow drainage ?	**yes**	no

COMMENTS:

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site
Well Identification: SP-1
Personnel: T.Prawel/ E.Rahn
Date: 9/17/98

WELL SPECIFICATIONS

Protective Casing:	**Above Ground**	**Flush Mounted**
Well Construction:	~~PVC~~ HDPE	**Stainless Steel**
Well Diameter:	**2-inch**	**4-inch** 6-inch
Depth to Ground Water:	DRY	
Well Depth:	—	

WELL INTEGRITY

1. **Well identification clearly marked ?**	**yes**	**no**
2. **Well covers and locks in good condition and secure ?**	**yes**	**no**
3. **Is the well stand pipe vertically aligned and secure ?**	**yes**	**no**
4. **Is the concrete pad and surface seal in good condition ?**	**yes**	**no**
5. **Are soils surrounding the well pad eroded ?**	**yes**	**no**
6. **Is the well casing in good condition ?**	**yes**	**no**
7. **Is the measuring point on casing well marked ?**	**yes**	**no**
8. **Is there standing water in the annular space ?**	**yes**	**no**
9. **Is the stand pipe vented at the base to allow drainage ?**	~~yes~~	~~no~~ NA

COMMENTS:

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site
Well Identification: 85-5R
Personnel: T.Prawel/ E.Rahn
Date: 9//7/98

WELL SPECIFICATIONS

Protective Casing:	**Above Ground**	**Flush Mounted**
Well Construction:	**PVC**	**Stainless Steel**
Well Diameter:	**2-inch**	**4-inch**
Depth to Ground Water:	5.86	
Well Depth:	37.97	

WELL INTEGRITY

1. Well identification clearly marked ?	**yes**	no
2. Well covers and locks in good condition and secure ?	**yes**	no
3. Is the well stand pipe vertically aligned and secure ?	**yes**	no
4. Is the concrete pad and surface seal in good condition ?	**yes**	no
5. Are soils surrounding the well pad eroded ?	yes	**no**
6. Is the well casing in good condition ?	**yes**	no
7. Is the measuring point on casing well marked ?	**yes**	no
8. Is there standing water in the annular space ?	yes	**no**
9. Is the stand pipe vented at the base to allow drainage ?	**yes**	no

COMMENTS:

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site
Well Identification: URS-5D
Personnel: T.Prawel/ E.Rahn
Date: 9/17/98

WELL SPECIFICATIONS

Protective Casing:	**Above Ground**	**Flush Mounted**
Well Construction:	**PVC**	**Stainless Steel**
Well Diameter:	**2-inch**	**4-inch**
Depth to Ground Water:	6.80	
Well Depth:	49.81	

WELL INTEGRITY

1. Well identification clearly marked ?	**yes**	no
2. Well covers and locks in good condition and secure ?	**yes**	no
3. Is the well stand pipe vertically aligned and secure ?	**yes**	no
4. Is the concrete pad and surface seal in good condition ?	**yes**	no
5. Are soils surrounding the well pad eroded ?	yes	**no**
6. Is the well casing in good condition ?	**yes**	no
7. Is the measuring point on casing well marked ?	**yes**	no
8. Is there standing water in the annular space ?	yes	**no**
9. Is the stand pipe vented at the base to allow drainage ?	**yes**	no

COMMENTS:

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site
Well Identification: 85-7R
Personnel: T.Prawel/ E.Rahn
Date: 9//7/98

WELL SPECIFICATIONS

Protective Casing:	**Above Ground**	**Flush Mounted**
Well Construction:	**PVC**	**Stainless Steel**
Well Diameter:	**2-inch**	**4-inch**
Depth to Ground Water:	4.16	
Well Depth:	27.70	

WELL INTEGRITY

1. Well identification clearly marked ?	**yes**	**no**
2. Well covers and locks in good condition and secure ?	**yes**	**no**
3. Is the well stand pipe vertically aligned and secure ?	**yes**	**no**
4. Is the concrete pad and surface seal in good condition ?	**yes**	**no**
5. Are soils surrounding the well pad eroded ?	**yes**	**no**
6. Is the well casing in good condition ?	**yes**	**no**
7. Is the measuring point on casing well marked ?	**yes**	**no**
8. Is there standing water in the annular space ?	**yes**	**no**
9. Is the stand pipe vented at the base to allow drainage ?	**yes**	**no**

COMMENTS:

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site
Well Identification: URS-7D
Personnel: T.Prawel/ E.Rahn
Date: 9/17/98

WELL SPECIFICATIONS

Protective Casing:	**Above Ground**	**Flush Mounted**
Well Construction:	**PVC**	**Stainless Steel**
Well Diameter:	**2-inch**	**4-inch**
Depth to Ground Water:	5.60	
Well Depth:	39.80	

WELL INTEGRITY

1. Well identification clearly marked ?	**yes**	**no**
2. Well covers and locks in good condition and secure ?	**yes**	**no**
3. Is the well stand pipe vertically aligned and secure ?	**yes**	**no**
4. Is the concrete pad and surface seal in good condition ?	**yes**	**no**
5. Are soils surrounding the well pad eroded ?	**yes**	**no**
6. Is the well casing in good condition ?	**yes**	**no**
7. Is the measuring point on casing well marked ?	**yes**	**no**
8. Is there standing water in the annular space ?	**yes**	**no**
9. Is the stand pipe vented at the base to allow drainage ?	**yes**	**no**

COMMENTS:

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site
Well Identification: URS-9I
Personnel: T.Prawel/ E.Rahn
Date: 9/17/98

WELL SPECIFICATIONS

Protective Casing:	**Above Ground**	**Flush Mounted**
Well Construction:	**PVC**	**Stainless Steel**
Well Diameter:	**2-inch**	**4-inch**
Depth to Ground Water:	7.92	
Well Depth:	46.33	

WELL INTEGRITY

1. Well identification clearly marked ?	**yes**	**no**
2. Well covers and locks in good condition and secure ?	**yes**	**no**
3. Is the well stand pipe vertically aligned and secure ?	**yes**	**no**
4. Is the concrete pad and surface seal in good condition ?	**yes**	**no**
5. Are soils surrounding the well pad eroded ?	**yes**	**no**
6. Is the well casing in good condition ?	**yes**	**no**
7. Is the measuring point on casing well marked ?	**yes**	**no**
8. Is there standing water in the annular space ?	**yes**	**no**
9. Is the stand pipe vented at the base to allow drainage ?	**yes**	**no**

COMMENTS:

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site
Well Identification: URS-9D
Personnel: T.Prawel/ E.Rahn
Date: 9/17/98

WELL SPECIFICATIONS

Protective Casing:	**Above Ground**	**Flush Mounted**
Well Construction:	**PVC**	**Stainless Steel**
Well Diameter:	**2-inch**	**4-inch**
Depth to Ground Water:	7.16	
Well Depth:	50.88	

WELL INTEGRITY

1. Well identification clearly marked ?	**yes**	**no**
2. Well covers and locks in good condition and secure ?	**yes**	**no**
3. Is the well stand pipe vertically aligned and secure ?	**yes**	**no**
4. Is the concrete pad and surface seal in good condition ?	**yes**	**no**
5. Are soils surrounding the well pad eroded ?	**yes**	**no**
6. Is the well casing in good condition ?	**yes**	**no**
7. Is the measuring point on casing well marked ?	**yes**	**no**
8. Is there standing water in the annular space ?	**yes**	**no**
9. Is the stand pipe vented at the base to allow drainage ?	**yes**	**no**

COMMENTS:

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site
Well Identification: 88-12C
Personnel: T.Prawel/ E.Rahn
Date: 9/17/98

WELL SPECIFICATIONS

Protective Casing:	**Above Ground**	**Flush Mounted**
Well Construction:	**PVC**	**Stainless Steel**
Well Diameter:	**2-inch**	**4-inch**
Depth to Ground Water:	10.33	
Well Depth:	31.29	

WELL INTEGRITY

1. Well identification clearly marked ?	**yes**	**no**
2. Well covers and locks in good condition and secure ?	**yes**	**no**
3. Is the well stand pipe vertically aligned and secure ?	**yes**	**no**
4. Is the concrete pad and surface seal in good condition ?	**yes**	**no**
5. Are soils surrounding the well pad eroded ?	**yes**	**no**
6. Is the well casing in good condition ?	**yes**	**no**
7. Is the measuring point on casing well marked ?	**yes**	**no**
8. Is there standing water in the annular space ?	**yes**	**no**
9. Is the stand pipe vented at the base to allow drainage ?	**yes**	**no**

COMMENTS:

Concrete Pad under gravel.

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site
Well Identification: 88-12 D
Personnel: T.Prawel/ E.Rahn
Date: 9//7/98

WELL SPECIFICATIONS

Protective Casing:	**Above Ground**	**Flush Mounted**
Well Construction:	**PVC**	**Stainless Steel**
Well Diameter:	**2-inch**	**4-inch**
Depth to Ground Water:	8.87	
Well Depth:	53.39	

WELL INTEGRITY

1. Well identification clearly marked ?	yes	no
2. Well covers and locks in good condition and secure ?	yes	no
3. Is the well stand pipe vertically aligned and secure ?	yes	no
4. Is the concrete pad and surface seal in good condition ?	yes	no
5. Are soils surrounding the well pad eroded ?	yes	no
6. Is the well casing in good condition ?	yes	no
7. Is the measuring point on casing well marked ?	yes	no
8. Is there standing water in the annular space ?	yes	no
9. Is the stand pipe vented at the base to allow drainage ?	yes	no

COMMENTS:

Concrete pad under gravel.

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site
Well Identification: URS -14I
Personnel: T.Prawel/ E.Rahn
Date: 9/17/98

WELL SPECIFICATIONS

Protective Casing:	**Above Ground**	**Flush Mounted**
Well Construction:	**PVC**	**Stainless Steel**
Well Diameter:	**2-inch**	**4-inch**
Depth to Ground Water:	6.38	
Well Depth:	31.07	

WELL INTEGRITY

1. Well identification clearly marked ?	yes	no
2. Well covers and locks in good condition and secure ?	yes	no
3. Is the well stand pipe vertically aligned and secure ?	yes	no
4. Is the concrete pad and surface seal in good condition ?	yes	no
5. Are soils surrounding the well pad eroded ?	yes	no
6. Is the well casing in good condition ?	yes	no
7. Is the measuring point on casing well marked ?	yes	no
8. Is there standing water in the annular space ?	yes	no
9. Is the stand pipe vented at the base to allow drainage ?	~~yes~~	~~no~~ NA

COMMENTS:

MONITORING WELL INTEGRITY CHECKLIST

Site Name: Frontier Chemical Pendleton Site
Well Identification: URS-14D
Personnel: T.Prawel/ E.Rahn
Date: 9/17/98

WELL SPECIFICATIONS

Protective Casing:	**Above Ground**	**(Flush Mounted)**
Well Construction:	**PVC**	**(Stainless Steel)**
Well Diameter:	**(2-inch)**	**4-inch**
Depth to Ground Water:	6.77	
Well Depth:	41.56	

WELL INTEGRITY

1. Well identification clearly marked ?	**(yes)**	**no**
2. Well covers and locks in good condition and secure ?	**(yes)**	**no**
3. Is the well stand pipe vertically aligned and secure ?	**(yes)**	**no**
4. Is the concrete pad and surface seal in good condition ?	**(yes)**	**no**
5. Are soils surrounding the well pad eroded ?	**yes**	**(no)**
6. Is the well casing in good condition ?	**(yes)**	**no**
7. Is the measuring point on casing well marked ?	**(yes)**	**no**
8. Is there standing water in the annular space ?	**yes**	**(no)**
9. Is the stand pipe vented at the base to allow drainage ?	~~yes~~	~~no~~ N/A

COMMENTS:

Appendix B

Ground water sampling logs

205-1165

O'Brien & Gere Engineers, Inc. — Standard Ground Water Sampling Log

Date 9/8/98
Site Name Frontier Chemical
Location Pendleton, NY
Project No 5829.003
Personnel T.Prawel / E.Rahn

Weather Sunny 75°F
Well # 85-5R
Evacuation Method S.S. Bailer
Sampling Method S.S. Bailer

Well Information:

Depth of Well *	37.97	ft.
Depth to Water *	5.86	ft.
Length of Water Column	32.11	ft.
Volume of Water in Well	5.23	gal.(s)
3X Volume of Water in Well	15.7	gal.(s)

Water Volume /ft. for:
- x 2" Diameter Well = 0.163 X LWC
- 4" Diameter Well = 0.653 X LWC
- 6" Diameter Well = 1.469 X LWC

Volume removed before sampling 15 gal.(s)
Did well go dry? No

* Measurements taken from [x] Well Casing [ ] Protective Casing [ ] (Other, Specify)

Instrument Calibration:

pH Buffer Readings		Conductivity Standard Readings	
4.0 Standard		84 S Standard	
7.0 Standard		1413 S Standard	
10.0 Standard			

Water parameters:

Gallons Removed	Temperature Readings	pH Readings	Conductivity Readings uS/cm
initial 0	initial 14.7	initial 12.06	initial 3270
5	13.2	9.48	1312
10	12.9	8.06	1630

Water Sample:
Time Collected 1455

Physical Appearance at Start		Physical Appearance at Sampling	
Color	Dk Gray	Color	
Odor	None	Odor	
Turbidity (> 100 NTU)	> 100	Turbidity (> 100 NTU)	
Sheen/Free Product	None	Sheen/Free Product	

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
40 ml (VOCs)	Glass	23	no	Yes - HCL	
1 liter (metals)	Plastic	1	yes	HNO3	
Quart (Cyanide)	Plastic	1	no	Na2So4	

Notes:
Dupe Bad's

JAM:ers/div76/admin/4_notes/stad9log

Apnl 25. 1997

* Collected Blind Dup.

O'Brien & Gere Engineers, Inc.

Standard Ground Water Sampling Log

Date 9/18/98
Site Name Frontier Chemical
Location Pendleton, NY
Project No 5829.003
Personnel T.Prawel / E.Rahn

Weather Sunny 75°±
Well # URS - 5D
Evacuation Method S.S. Bailer
Sampling Method S.S. Bailer

Well Information:

Depth of Well *	49.81	ft.
Depth to Water *	6.80	ft.
Length of Water Column	43.01	ft.
Volume of Water in Well	7.01	gal.(s)
3X Volume of Water in Well	21.0	gal.(s)

Water Volume /ft. for:
- x 2" Diameter Well = 0.163 X LWC
- 4" Diameter Well = 0.653 X LWC
- 6" Diameter Well = 1.469 X LWC

Volume removed before sampling 18 gal.(s)
Did well go dry? yes

* Measurements taken from [x] Well Casing [ ] Protective Casing [ ] (Other, Specify)

Instrument Calibration:

pH Buffer Readings		Conductivity Standard Readings	
4.0 Standard		84 S Standard	
7.0 Standard		1413 S Standard	
10.0 Standard			

Water parameters:

Gallons Removed	Temperature Readings	pH Readings	Conductivity Readings uS/cm
initial Ø	initial 21.4	initial 8.20	initial 1760
7	13.4	9.07	2●120
14	13.9	8.60	2460

Water Sample:
Time Collected 1430

Physical Appearance at Start		Physical Appearance at Sampling	
Color	Clear	Color	
Odor	None	Odor	
Turbidity (> 100 NTU)	>100	Turbidity (> 100 NTU)	
Sheen/Free Product	None	Sheen/Free Product	

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
40 ml (VOCs)	Glass	23	no	Yes - HCL	
1 liter (metals)	Plastic	1	yes	HNO3	
Quart (Cyanide)	Plastic	1	no	Na2So4	

Notes:
Dry @ 16 gal's

O'Brien & Gere Engineers, Inc. — **Standard Ground Water Sampling Log**

Date 9/18/98
Site Name Frontier Chemical
Location Pendleton, NY
Project No 5829.003
Personnel T.Prawel / E.Rahn

Weather sunny 80°
Well # 85-7R
Evacuation Method S.S. Bailer
Sampling Method S.S. Bailer

Well Information:

Depth of Well *	27.70	ft.
Depth to Water *	4.16	ft.
Length of Water Column	23.54	ft.
Volume of Water in Well	3.83	gal.(s)
3X Volume of Water in Well	11.5	gal.(s)

Water Volume /ft. for:
- x 2" Diameter Well = 0.163 X LWC
- 4" Diameter Well = 0.653 X LWC
- 6" Diameter Well = 1.469 X LWC

Volume removed before sampling 12 gal.(s)
Did well go dry? No

* Measurements taken from [x] Well Casing [ ] Protective Casing [ ] (Other, Specify)

Instrument Calibration:

pH Buffer Readings		Conductivity Standard Readings	
4.0 Standard		84 S Standard	
7.0 Standard		1413 S Standard	
10.0 Standard			

Water parameters:

Gallons Removed	Temperature Readings	pH Readings	Conductivity Readings uS/cm
initial 0	initial 15.2	initial 7.85	initial 18.70
4	13.0	7.73	1940
8	11.9	7.02	2240
12	11.9	7.00	2220

Water Sample:
Time Collected 1650

Physical Appearance at Start		Physical Appearance at Sampling	
Color	lt brown	Color	Clear
Odor	None	Odor	Slight Sulphur
Turbidity (> 100 NTU)	>100	Turbidity (> 100 NTU)	>100
Sheen/Free Product	None	Sheen/Free Product	None

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
40 ml (VOCs)	Glass	3	no	Yes - HCL	
1 liter (metals)	Plastic	1	yes	HNO3	
Quart (Cyanide)	Plastic	1	no	Na2So4	

Notes:

O'Brien & Gere Engineers, Inc.

Standard Ground Water Sampling Log

Date 9/18/98
Site Name Frontier Chemical
Location Pendleton, NY
Project No 5829.003
Personnel T.Prawel / E.Rahn

Weather Sunny 80°±
Well # UBS-7B
Evacuation Method S.S. Bailer
Sampling Method S.S. Bailer

Well Information:

Depth of Well *	39.80	ft.
Depth to Water *	5.60	ft.
Length of Water Column	34.2	ft.
Volume of Water in Well	5.57	gal.(s)
3X Volume of Water in Well	16.7	gal.(s)

Water Volume /ft. for:
- x 2" Diameter Well = 0.163 X LWC
- 4" Diameter Well = 0.653 X LWC
- 6" Diameter Well = 1.469 X LWC

Volume removed before sampling 17 gal.(s)
Did well go dry? No

* Measurements taken from [x] Well Casing [ ] Protective Casing [ ] (Other, Specify)

Instrument Calibration:

pH Buffer Readings		Conductivity Standard Readings	
4.0 Standard		84 S Standard	
7.0 Standard		1413 S Standard	
10.0 Standard			

Water parameters:

	Gallons Removed	Temperature Readings	pH Readings	Conductivity Readings uS/cm
initial	0	15.8	7.68	1649
	5.5	12.8	6.89	2620
	11	12.5	6.63	2500
	16.75	12.9	7.03	2540

Water Sample:
Time Collected 1630

Physical Appearance at Start		Physical Appearance at Sampling	
Color	Clear	Color	Clear
Odor	Sulfur	Odor	Sulfur
Turbidity (> 100 NTU)	>100	Turbidity (> 100 NTU)	2100
Sheen/Free Product	None	Sheen/Free Product	None

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
40 ml (VOCs)	Glass	2 3	no	Yes - HCL	
1 liter (metals)	Plastic	1	yes	HNO3	
Quart (Cyanide)	Plastic	1	no	Na2So4	

Notes:

O'Brien & Gere Engineers, Inc.

Standard Ground Water Sampling Log

Date 9/18/98
Site Name Frontier Chemical
Location Pendleton, NY
Project No 5829.003
Personnel T.Prawel / E.Rahn

Weather Sunny 65°F
Well # URS - ~~EG~~ 9I TP
Evacuation Method S.S. Bailer
Sampling Method S.S. Bailer

Well Information:

Depth of Well *	46.33	ft.
Depth to Water *	7.92	ft.
Length of Water Column	38.41	ft.
Volume of Water in Well	6.26	gal.(s)
3X Volume of Water in Well	18.8	gal.(s)

Water Volume /ft. for:
- x 2" Diameter Well = 0.163 X LWC
- 4" Diameter Well = 0.653 X LWC
- 6" Diameter Well = 1.469 X LWC

Volume removed before sampling 20 gal.(s)
Did well go dry? No

* Measurements taken from [x] Well Casing [ ] Protective Casing [ ] (Other, Specify)

Instrument Calibration:

pH Buffer Readings		Conductivity Standard Readings	
4.0 Standard		84 S Standard	
7.0 Standard		1413 S Standard	
10.0 Standard			

Water parameters:

Gallons Removed	Temperature Readings	pH Readings	Conductivity Readings uS/cm
initial 0	initial 11.8	initial 8.10	initial 1296
6	11.9	7.89	12.35
12	11.9	7.64	1214
19	11.8	7.32	1139

Water Sample:
Time Collected 1020

Physical Appearance at Start		Physical Appearance at Sampling	
Color	Dark Grey	Color	Lt Gray
Odor	None	Odor	Slight
Turbidity (> 100 NTU)	>100	Turbidity (> 100 NTU)	>100
Sheen/Free Product	None	Sheen/Free Product	None

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
40 ml (VOCs)	Glass	3	no	Yes - HCL	
1 liter (metals)	Plastic	1	yes	HNO3	
Quart (Cyanide)	Plastic	1	no	Na2So4	

Notes:

O'Brien & Gere Engineers, Inc.

Standard Ground Water Sampling Log

Date 9/1~~3~~98
Site Name Frontier Chemical
Location Pendleton, NY
Project No 5829.003
Personnel T.Prawel / E.Rahn

Weather Sunny 65°
Well # URS - ~~10D~~ 9D^R
Evacuation Method S.S. Bailer
Sampling Method S.S. Bailer

Well Information:

Depth of Well *	50.83	ft.
Depth to Water *	7.16	ft.
Length of Water Column	43.72	ft.
Volume of Water in Well	7.13	gal.(s)
3X Volume of Water in Well	21.4	gal.(s)

Water Volume /ft. for:
- x 2" Diameter Well = 0.163 X LWC
- 4" Diameter Well = 0.653 X LWC
- 6" Diameter Well = 1.469 X LWC

Volume removed before sampling 21 gal.(s)
Did well go dry? No

* Measurements taken from [x] Well Casing [ ] Protective Casing [ ] (Other, Specify)

Instrument Calibration:

pH Buffer Readings		Conductivity Standard Readings	
4.0 Standard		84 S Standard	
7.0 Standard		1413 S Standard	
10.0 Standard			

Water parameters:

Gallons Removed	Temperature Readings	pH Readings	Conductivity Readings uS/cm
initial 0	initial 13.8	initial 8.37	initial 142.8
7	11.8	7.76	1313
14	12.3	7.51	1305
21	11.6	7.17	1344

Water Sample:
Time Collected 1100

Physical Appearance at Start		Physical Appearance at Sampling	
Color	Clear	Color	Clear
Odor	None	Odor	None
Turbidity (> 100 NTU)	>100	Turbidity (> 100 NTU)	<~~>~~ 100
Sheen/Free Product	None	Sheen/Free Product	None

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
40 ml (VOCs)	Glass	~~2~~3	no	Yes - HCL	
1 liter (metals)	Plastic	1	yes	HNO3	
Quart (Cyanide)	Plastic	1	no	Na2So4	

Notes:
* Collected MS/MSD

O'Brien & Gere Engineers, Inc.

Standard Ground Water Sampling Log

Date 9/7/98
Site Name Frontier Chemical
Location Pendleton, NY
Project No 5829.003
Personnel T.Prawel / E.Rahn

Weather Sunny 75° ±
Well # 88-12C
Evacuation Method S.S. Bailer
Sampling Method S.S. Bailer

Well Information:

Depth of Well *	31.29 ~~53.39~~	ft.
Depth to Water *	10.33	ft.
Length of Water Column	20.96	ft.
Volume of Water in Well	3.41	gal.(s)
3X Volume of Water in Well	10.2	gal.(s)

Water Volume /ft. for:
- x 2" Diameter Well = 0.163 X LWC
- 4" Diameter Well = 0.653 X LWC
- 6" Diameter Well = 1.469 X LWC

Volume removed before sampling 10.2 gal.(s)
Did well go dry? NO

* Measurements taken from [x] Well Casing [ ] Protective Casing [ ] (Other, Specify)

Instrument Calibration:

pH Buffer Readings		Conductivity Standard Readings	
4.0 Standard		84 S Standard	
7.0 Standard		1413 S Standard	
10.0 Standard			

Water parameters:

Gallons Removed	Temperature Readings °C	pH Readings	Conductivity Readings uS/cm
initial 0	initial 13.8	initial 8.92	initial 846
3	13.3	8.72	948
7	12.7	8.16	1041
10.2	11.8	7.45	1098

Water Sample:
Time Collected 1800

Physical Appearance at Start		Physical Appearance at Sampling	
Color	Lt ~~Brown~~ Red Brown	Color	Lt Red Brown
Odor	None	Odor	Slight Sulphur
Turbidity (> 100 NTU)	>100	Turbidity (> 100 NTU)	7100
Sheen/Free Product	None	Sheen/Free Product	None

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
40 ml (VOCs)	Glass	~~2~~ 3	no	Yes - HCL	
1 liter (metals)	Plastic	1	yes	HNO3	
Quart (Cyanide)	Plastic	1	no	Na2So4	

Notes:

O'Brien & Gere Engineers, Inc.

Standard Ground Water Sampling Log

Date 9/17/98
Site Name Frontier Chemical
Location Pendleton, NY
Project No 5829.003
Personnel T.Prawel / E.Rahn

Weather Sunny 75° ±
Well # 88-12D
Evacuation Method S.S. Bailer
Sampling Method S.S. Bailer

Well Information:

Depth of Well *	53.39	ft.
Depth to Water *	8.87	ft.
Length of Water Column	44.52	ft.
Volume of Water in Well	7.3	gal.(s)
3X Volume of Water in Well	21.9	gal.(s)

Water Volume /ft. for:
- x 2" Diameter Well = 0.163 X LWC
- 4" Diameter Well = 0.653 X LWC
- 6" Diameter Well = 1.469 X LWC

Volume removed before sampling 21 gal.(s)
Did well go dry? No

* Measurements taken from [x] Well Casing [ ] Protective Casing [ ] (Other, Specify)

Instrument Calibration:

pH Buffer Readings		Conductivity Standard Readings	
4.0 Standard		84 S Standard	
7.0 Standard		1413 S Standard	
10.0 Standard			

Water parameters:

	Gallons Removed	Temperature Readings	pH Readings	Conductivity Readings uS/cm
initial	0	17.0 C	7.30	3180
	7	12.7	5.82	5730
	14	13.0	5.61	7530
	21	12.8	5.31	7620

Water Sample:
Time Collected 1910

Physical Appearance at Start		Physical Appearance at Sampling	
Color	Dk Brown	Color	Clear
Odor	None	Odor	Sulphur
Turbidity (> 100 NTU)	>100	Turbidity (> 100 NTU)	>100
Sheen/Free Product	None	Sheen/Free Product	None

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
40 ml (VOCs)	Glass	23	no	Yes - HCL	
1 liter (metals)	Plastic	1	yes	HNO3	
Quart (Cyanide)	Plastic	1	no	Na2So4	

Notes:

O'Brien & Gere Engineers, Inc.

Standard Ground Water Sampling Log

Date 9/17/98
Site Name Frontier Chemical
Location Pendleton, NY
Project No 5829.003
Personnel T.Prawel / E.Rahn

Weather Sunny 78°
Well # URS-14I
Evacuation Method S.S. Bailer
Sampling Method S.S. Bailer

Well Information:

Depth of Well *	31.07	ft.
Depth to Water *	6.38	ft.
Length of Water Column	24.69	ft.
Volume of Water in Well	4.02	gal.(s)
3X Volume of Water in Well	12.07	gal.(s)

Water Volume /ft. for:
- x 2" Diameter Well = 0.163 X LWC
- 4" Diameter Well = 0.653 X LWC
- 6" Diameter Well = 1.469 X LWC

Volume removed before sampling 8 gal.(s)
Did well go dry? yes

* Measurements taken from [x] Well Casing [ ] Protective Casing [ ] (Other, Specify)

Instrument Calibration:

pH Buffer Readings		Conductivity Standard Readings	
4.0 Standard		84 S Standard	
7.0 Standard		1413 S Standard	
10.0 Standard			

Water parameters:

Gallons Removed	Temperature Readings °C	pH Readings	Conductivity Readings uS/cm
initial 0	initial 15.4C	initial 9.38	initial 511
4	13.0	9.33	446
8	13.2	9.30	421

Water Sample:
Time Collected 1630

Physical Appearance at Start		Physical Appearance at Sampling	
Color	Clear	Color	Lt Brown
Odor	None	Odor	Slight Sulphur
Turbidity (> 100 NTU)	>100	Turbidity (> 100 NTU)	>100
Sheen/Free Product	None	Sheen/Free Product	None

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
40 ml (VOCs)	Glass	3	no	Yes - HCL	
1 liter (metals)	Plastic	1	yes	HNO3	
Quart (Cyanide)	Plastic	1	no	Na2So4	

Notes:

O'Brien & Gere Engineers, Inc. — **Standard Ground Water Sampling Log**

Date 9/17/98
Site Name Frontier Chemical
Location Pendleton, NY
Project No 5829.003
Personnel T.Prawel / E.Rahn

Weather Sunny 78°
Well # URS-14D
Evacuation Method S.S. Bailer
Sampling Method S.S. Bailer

Well Information:

Depth of Well *	41.56	ft.
Depth to Water *	6.77	ft.
Length of Water Column	34.79	ft.
Volume of Water in Well	5.67	gal.(s)
3X Volume of Water in Well	17.01	gal.(s)

Water Volume /ft. for:
- x 2" Diameter Well = 0.163 X LWC
- 4" Diameter Well = 0.653 X LWC
- 6" Diameter Well = 1.469 X LWC

Volume removed before sampling 17 gal.(s)
Did well go dry? No

* Measurements taken from [x] Well Casing [ ] Protective Casing [ ] (Other, Specify)

Instrument Calibration:

pH Buffer Readings		Conductivity Standard Readings	
4.0 Standard		84 S Standard	
7.0 Standard		1413 S Standard	
10.0 Standard			

Water parameters:

Gallons Removed	Temperature Readings °C	pH Readings	Conductivity Readings uS/cm
initial Ø	initial 15.3	initial 10.79	initial 590
5.00	14.8	8.77	706
11.	14.2	4.09	1680
17	14.4	4.67	1760

Water Sample:
Time Collected 1600

Physical Appearance at Start		Physical Appearance at Sampling	
Color	Clear	Color	Clear
Odor	None	Odor	Sulfur
Turbidity (> 100 NTU)	>100	Turbidity (> 100 NTU)	<100
Sheen/Free Product	None	Sheen/Free Product	None

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
40 ml (VOCs)	Glass	3	no	Yes - HCL	
1 liter (metals)	Plastic	1	yes	HNO3	
Quart (Cyanide)	Plastic	1	no	Na2So4	

Notes:

O'Brien & Gere Laboratories, Inc.

5000 Brittonfield Parkway
East Syracuse, New York 13057
(315) 437-0200

Chain of Custody

Client: FRONTIER CHEMICAL

Project: PENDLETON Site

Sampled by: T. PRAWEL, E. RAHN

Client Contact: Phone #

Sample Description

Sample Location	Date Collected	Time Collected	Sample Matrix	Comp. or Grab	No. of Containers	Analysis/Method: VOC's 8620	CN	Metals					Comments
BB-12C	9/17/98	1800	Water	Grab	5	3	1	1					
BB-12D	9/17/98	1910			5	3	1	1					
URS-14I	9/17/98	1630			5	3	1	1					
URS-14D	9/17/98	1600	Water	Grab	5	3	1	1					
Equipment Blank	9/18/98	0845	Water	Grab	5	3	1	1					Unfiltered Metals
URS-9I	9/18/98	1020			5	3	1	1					
URS-9D	9/18/98	1100			5	3	1	1					
BS-5R	9/18/98	1455			5	3	1	1					
URS-5D	9/18/98	1430			5	3	1	1					
BS-7R	9/18/98	1650			5	3	1	1					
URS-7D	9/18/98	1630	Water	Grab	5	3	1	1					

Relinquished by: Edwin B Rahn	Date: 9/18/98	Time: 2215	Received by:	Date: Time:
Relinquished by:	Date:	Time:	Received by:	Date: Time:
Relinquished by:	Date:	Time:	Received by Lab: Maria F. Jackson	Date: 9/20/98 Time: 09:30
Shipment Method:			Airbill Number:	

Turnaround Time Required:

Routine

Rush (Specify)

Cooler Temperature: 4°C

Comments: VOC's preserved w/ HCL
CN preserved w/ NaOH
Metals Filtered in field
Preserved w/ HNO_3

Original-Laboratory Copy-Client

O'Brien & Gere Laboratories, Inc.

5000 Brittonfield Parkway
East Syracuse, New York 13057
(315) 437-0200

Chain of Custody

Client: FRONTIER CHEMICAL

Project: PENDLETON

Sampled by: T. Prawl, E. Rahn

Client Contact: Phone #

Sample Description

Sample Location	Date Collected	Time Collected	Sample Matrix	Comp. or Grab	No. of Containers	Analysis/Method: VOC's 8620	CN	Metals					Comments
URS-9D MS/MSD	9/18/98	1100	water	Grab	15	9	3	3					
Trip Blanks	—	LTR	water		3	3							
Blind Dup	—	—	Water	Grab	5	3	1	1					

Relinquished by: Edwin B Rahn	Date: 9/18/98	Time: 2215	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Relinquished by:	Date:	Time:	Received by Lab: Maria F. Jackson	Date: 9/20/98	Time: 09:30
Shipment Method:			Airbill Number:		

Turnaround Time Required:

Routine_____

Rush (Specify)_____

Comments:

Cooler Temperature: 4°C

Original-Laboratory Copy-Client

Attachment D – Site Maintenance Work Items and Field Observation Reports

1 Site Maintenance Work Items

2 Field Observation Reports

1 Site Maintenance Work Items

- Correspondence dated June 4, 1998 from Glynn Geotechnical Engineering

GLYNN
GEOTECHNICAL
ENGINEERING
GEOTECHNICAL AND CIVIL ENGINEERING SERVICES

June 4, 1998

Pendleton PRP Group
P.O. Box 248
1186 Lower River Road
Charleston, Tennessee 37310

Attn: Mr. John Burns

Subject: Frontier Chemical - Pendleton Site
Wetlands Planting/Site Maintenance Work Items
GGE 94-1014-O

Dear Mr. Burns:

This letter report is forwarded to summarize and document work activities completed during April, 1998 at the Frontier Chemical - Pendleton Site. Completed work items included planting the engineered wetlands along the north side of Quarry Lake and various site maintenance items. The wetland's planting and site maintenance items were completed by Sevenson Environmental Services, Inc. (SES) and by an SES landscaping subcontractor, Wolf's Nursery. Glynn Geotechnical Engineering (GGE) performed periodic site visits on April 27 - April 30, 1998 to document the completed activities and prepare this summary report.

SES and Wolf's Nursery crews mobilized to the Pendleton Site on April 27, 1998. Work was completed early on April 30, 1998 and the contractor's crews and equipment were demobilized from the site. The PPRP notified the New York State Department of Environmental Conservation (NYSDEC) prior to commencing the site work and a NYSDEC representative visited the site on April 27, 1998 to observe the wetlands planting. PPRP representatives were also on site periodically to observe the work activities and request completion of additional maintenance items.

GGE has revised and is enclosing the O'Brien & Gere record drawings G-5 and G-7 to note the completed work items. Photographs (Exhibits A-F) for the respective work items are also attached. Specific work items completed during the above referenced activities are described following:

Wetlands Planting

Wolf's Nursery completed the wetlands planting along the north edge of Quarry Lake to complete the final contract item of the Site Remediation Contract between the PPRP and SES. The planting completed wetlands replacement in the submerged zones A-C as described on the O'Brien & Gere "Final Site Plan" design drawing G-7. The A-C wetland zones are located in areas with a water depth of 0-3'. The design wetland zones A-C had become inundated during the previous winter to allow for completion of the submerged planting. These areas were seeded previously in accordance with the zone D (seasonally flooded area) planting schedule at the completion of construction in 1996. The earlier seeding provided temporary vegetative cover and a substrate for the subsequent wetlands. The planted wetlands included an area along approximately 900 l.f. of the north lake edge. Planting zones were dictated by water depths as indicated on the O'B&G design drawing. The wetland planting fulfilled the area requirements of the Remedial Design and complies with the created wetland area noted in a March 7, 1995 O'B&G correspondence to the ACOE.

The wetlands planting was completed in general compliance with O'B&G's project design specifications (section 02296). Wolf's crew used a gage pole to determine water depth and location markers along the shoreline for planting spacings. Tubers, rootstock and seed were supplied by a NYS Department of Agriculture Registered Nursery, Southern Tier Consulting. Planting packets were prepared on site by Wolf. Seeds, tubers and rootstock were hand spread / planted by Wolf's crew.

Capped Area Repairs

SES and Wolf's Nursery crews placed additional topsoil at and reseeded areas of the cap that were noted to be depressed and/or were thinly vegetated. The repairs included placing and handraking topsoil over the repair area and broadcasting grass seed. Larger repair areas were also covered with straw matting after seed placement. The repair areas were primarily at the south end of the cap and near midslope along the lakeside of the cap. Two loads (approximately 16 c.y.) of topsoil were delivered to site to complete the cap repairs. Topsoil was provided by Wolf Nurseries from a source approved by the NYSDOT. NYSDOT topsoil item 713-01 complies with the project contract specifications (Section 02981).

Piezometers P-4, P-7

SES trimmed the tops of the PVC risers at piezometers P-4 and P-7. The piezometer risers were trimmed to allow for installation of the locking J-plugs beneath the flush-mount covers. The trimmage was measured and and drawing G-5 has been revised to note the new top of riser elevations.

URS Monitoring Wells 9S, 9I, and 9D

SES replaced the concrete surface pads at the URS #9 monitoring wells located south of the site entrance. The existing damaged concrete was removed and the soil was excavated to the top of the grout seal. Concrete was replaced to the surrounding surface grade and sloped away from the protective casing to provide an approximate 18" diameter pad. GGE has revised O'B&G drawing G-5 to note these repairs.

Gravel at Wells and Access Road

SES placed additional crushed stone to improve access to the URS monitoring well clusters #14 (behind the Church on Beach Ridge Road) and #9. Additional crushed stone was also placed along the site access road near the northeast corner of the cap to fill a low area along the road.

GGE also noted that the "stick-up" risers at the monitoring well #14 cluster wells have been replaced with flush-mount covers.

Trenches at Lakeside Cleanout Risers.

PPRP representatives requested SES to hand excavate small ditches around the cleanout riser surface-mount covers along the lakeside of the access road. The ditches were small (less than 4" deep) and were excavated around the concrete surface pads to direct runoff around the riser covers and prevent stormwater from entering the risers. This maintenance item has been noted on the revised drawing G-5.

Other Site Observations

Other items noted by GGE during site observations follows:

- Scheduling of these work items coincided with an O'Brien & Gere groundwater sampling / piezometer groundwater elevation observation event.

- GGE recorded the Quarry Lake water surface at elevation 578.26 via a level survey on April 30, 1998. The water surface was slightly above the overflow wier elevation and at the same elevation as standing water in the wetlands located north of the site perimeter fence.

- Groundwater pre-treatment system operation under a PPRP O&M site manager is ongoing.

This report is forwarded for record documentation of the completed work items at the Pendleton Site. Respective GGE Field Observation Reports are also attached Should you have any questions or require clarifications regarding the preceeding information or attached drawings or reports, please contact this office.

Sincerely,

GLYNN GEOTECHNICAL ENGINEERING

Jesse E. Grossman
On Site Supervisor

Mark W. Glynn, P.E.
Consulting Engineer

/jg

encl:

cc: Jim Reed - PPRP
Steve Anagnost, P.E. - O'Brien & Gere

2 Field Observation Reports

- Field Observation Report Dated 27-Apr-98
- Field Observation Report Dated 28-Apr-98
- Field Observation Report Dated 30-Apr-98
- Field Observation Report Dated 24-Sep-98

GLYNN GEOTECHNICAL ENGINEERING
GEOTECHNICAL AND CIVIL ENGINEERING SERVICES

FIELD OBSERVATION REPORT

PROJECT NO.:	94-1014-O	REPORT NO.:	98-02	DATE:	27-Apr-98
PAGE:	1	OF	1		
PROJECT:	Pendleton (Frontier Chemical) Site Remediation			DAY:	Monday
SUBJECT:	On Site Supervisor's Report			PROJECT TIME:	8:00 am - 3:30 pm
CLIENT:	Pendleton Site PRP Group			SITE TIME:	8:15 am - 3:15 pm
WEATHER:	Cool, Clear, Breezy (50° F)			PHOTOS:	YES X NO

- On site to document wetlands planting and maintenance items.
- With Jim Reed and SES representatives, walk capped area and note low subsidence areas requiring topsoil fill and reseeding. Note 5-6 locations on the north cap slope (lakeside) requiring fill. All locations are approximately 1/3 to 1/2 the way up the slope. Evidence of rodent damage noted at one location.
- Wolf nurseries delivers one load of topsoil to site which is not yet dumped.
- Observe monitoring wells URS-9I and 9D noted for concrete pad repair. With SES and Jim R., discuss repair to include removal of damaged concrete and casting a new pad, 6" deep pad contacting the grout seal using 18" dia. "Sonotube" forms.
- Observe piezometers P-4 and P-7. SES will trim top of PVC risers so that locking J-plug caps can be installed beneath the flush mount cover. Record dimension from flush mount casing to top of riser to determine the new top of rider elevation after rehabbing the risers.
- Note that lower 10-20' of the capped slope adjacent to the lakeside access road is wet - saturated and soft. The valve on the sump drain in the treatment vault is opened and the drain piping is noted to still be plugged.
- There is little evidence of groundwater seepage into the vault, however, there is some wetness due to a leaking vent at the top of GAC #2. Cumulative system discharge is 269,119 gal.
- Wolf nurseries crew is on site and begins planting the wetlands on the north side of the lake. Wolf crew completes planting the deeper zones (A & B) in accordance with the planting schedule on O'B&G drawing sheet G-7. The planted wetlands area is along approximately 900 l.f. of the lake edge with planting patches @ 50' o.c.
- Note that the lake water elevation is above the overflow wier due to the water level outside of the berm. Wetland planting is by water depth vs. elevation.
- Wolf nurseries crew and SES will return to site tomorrow to complete wetlands planting and other site maintenance items.

PERSONNEL ON SITE / CONTACTED:
Jim Reed - PPRP
Jerry Castiglione, Tony Certo - SES
Larry Wolf - Wolf nurseries
Kevin Glaser - NYSDEC

DISTRIBUTION:
John Burns - PPRP
Jim Reed - PPRP

Man-hours: 4.5 (intermittent site visits)

REPORTED BY: Jesse E. Grossman, Project Manager

REVIEWED BY: Mark W. Glynn, P.E. 5.11.98

DOCFILE:941014R802

6503 Campbell Blvd., Lockport, New York 14094 (716) 625-6933 / fax (716) 625-6983

GLYNN GEOTECHNICAL ENGINEERING
GEOTECHNICAL AND CIVIL ENGINEERING SERVICES

FIELD OBSERVATION REPORT

PROJECT NO.: 94-1014-O REPORT NO.: 98-03 DATE: 28-Apr-98 PAGE: 1 OF 1

PROJECT: Pendleton (Frontier Chemical) Site Remediation DAY: Tuesday

SUBJECT: On Site Supervisor's Report PROJECT TIME: 9:15 am - 3:30 pm

CLIENT: Pendleton Site PRP Group SITE TIME: 9:30 am - 3:15 pm

WEATHER: Mild, Clear, Breezy (60° F) PHOTOS: YES X NO

- Meet John Burns and Bill Witt (PPRP) on site in the am and observe capped area noting areas requiring topsoil fill and seeding. John B. and Bill W. note repair areas additional to those noted yesterday.
- Also discuss subcontractors progress re: wetlands planting and other maintenance issues. GGE to complete report documenting completed work items and noting cap repair locations.
- SES personnel have trimmed PVC risers @ P-4 and P-7 and measured trimmage to note new elevations.
- SES repairs concrete pads @ M.W.'s URS 9I, 9S, and 9D by digging down to grout seal around each protective casing (6-8") and placing concrete around casing to form an approx. 18" dia. pad.
- Wolf nurseries crew places topsoil on noted repair areas on the cap, seeds the areas with the seeding mix specified in the construction specifications and places straw matting over the repair areas. One load of topsoil (approx. 14 c.y.) is placed on the cap repair areas.
- Wolf nurseries crew plants zone C wetlands (0-1' depth) per the drawing G-7 planting schedule along the north edge of the lake. The wetland planting is complete to the contract specifications with the zone A-C planting over approximately 1.3 acres along the north edge of the lake.
- Return to site in the pm and note additional cap areas requiring topsoil and seeding per the PPRP's earlier site inspection. Notify John Scalfoni (SES) that additional topsoil is required to complete work. SES will return to site tomorrow to complete topsoil and seeding on the cap.

PERSONNEL ON SITE / CONTACTED:
John Burns, Bill Witt, Jim Reed - PPRP
John Scalfoni, Tony Certo - SES
Larry Wolf - Wolf nurseries

DISTRIBUTION:
John Burns - PPRP
Jim Reed - PPRP

Man-hours: 4.5 (intermittent site visits)

REPORTED BY: J.E.G.
Jesse E. Grossman, Project Manager

REVIEWED BY: Mark W. Glynn
Mark W. Glynn, P.E.
5-11-98

DOCFILE: 94101...

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GLYNN GEOTECHNICAL ENGINEERING
GEOTECHNICAL AND CIVIL ENGINEERING SERVICES

FIELD OBSERVATION REPORT

PROJECT NO.: 94-1014-O REPORT NO.: 98-04 DATE: 30-Apr-98 PAGE: 1 OF 1

PROJECT: Pendleton (Frontier Chemical) Site Remediation DAY: Thursday

SUBJECT: On Site Supervisor's Report PROJECT TIME: 10:30 am - 12:30 pm

CLIENT: Pendleton Site PRP Group SITE TIME: 10:45 am - 12:15 pm

WEATHER: Warm, Mostly Sunny (65° F) PHOTOS: YES X NO

- After telephone discussions with Jim Reed (PPRP) and Jerry Castiglione (SES) visit site to note completed work items.
- SES crew has completed work and left site prior to GGE arrival.
- Note trimmed PVC risers @ P-4 and P-7 and measure an elevation change for the top of the PVC riser of minus 0.10' at P-4 and minus 0.08' at P-7.
- SES crew has placed additional crushed stone from the front gate to the URS 9S, 9I, 9D monitoring well cluster and to the URS 14S, 14I, 14D well cluster (behind the church) to improve access to these sample sites. Note that protective casings at the URS-14 S,I,D cluster have been replaced with flush-mount covers and new pads.
- SES has also placed additional crushed stone at locations on the site perimeter access road.
- SES has dug small ditches (4" deep) around the cleanouts on the lakeside of the access road to direct runoff to the lake and prevent ponding around the cleanout covers.
- SES has filled the remaining low areas on the cap with topsoil and seeded these locations. Additional low areas noted previously have been repaired. Smaller repair areas were not covered with straw matting.
- Record Quarry Lake water elevation by level survey. The lake elevation is recorded at 578.26.
- Observe and map all of the completed repair areas on the cap, noting locations on a cap plan drawing.
- Leave and secure site at 12:15 pm.

PERSONNEL ON SITE / CONTACTED:

Via Telecon: Jerry Castiglione (SES)
Jim Reed (PPRP)

DISTRIBUTION:
John Burns - PPRP
Jim Reed - PPRP

Man-hours: 2.0

REPORTED BY: Jesse E. Grossman, Project Manager

REVIEWED BY: Mark W. Glynn, P.E. 5-11-98

DOCFILE:98for9804

6503 Campbell Blvd., Lockport, New York 14094 (716) 625-6933 / fax (716) 625-6983

GLYNN GEOTECHNICAL ENGINEERING
GEOTECHNICAL AND CIVIL ENGINEERING SERVICES

FIELD OBSERVATION REPORT

PROJECT NO.:	94-1014-O	REPORT NO.: 98-06	DATE: 24-Sep-98	PAGE : 1	OF 4
PROJECT :	Pendleton (Frontier Chemical) Site Remediation			DAY:	Thursday
SUBJECT:	Semi-annual Inspection			PROJECT TIME:	8:15 am - 11:00 am
CLIENT:	Pendleton Site PRP Group			SITE TIME:	8:30 am - 10:30 am
WEATHER:	Mild, Cloudy (60° F)			PHOTOS:	YES X NO

- Meet Jim Reed on site for semi-annual site inspection.
- Perform site inspection per inspection checklist (copies attached pages 2-4).
- Jim Reed (PPRP) collects "make up" sample from pre-treatment discharge for 9/98 sampling event. Cumulative discharge from pre-treatment system is 293,771 gal. Jim Reed notes that groundwater discharge rates remain at approx. 120 gpd and continue to be influenced by precipitation events.
- Generally, the site is in good condition and no problems requiring corrective actions are noted.
- Leave and secure site at 10:30 am.

PERSONNEL ON SITE / CONTACTED:

Jim Reed - PPRP

DISTRIBUTION:

John Burns - PPRP
Jim Reed - PPRP
Jen Smith - O'Brien & Gere

Man-hours: 2.5

REPORTED BY: Jesse E. Grossman, Project Manager

REVIEWED BY: Mark W. Glynn, P.E.

DOCFILE:98for9806

6503 Campbell Blvd., Lockport, New York 14094 (716) 625-6933 / fax (716) 625-6983

1 Site Maintenance Work Items

Attachment A – Site Inspection Reports and Quarry Lake Level Plot versus Time

1 Site Inspection Reports

- April 27-29, 1998
- September 21, 1998

2 Quarry Lake Level

- April 27-29, 1998
- September 21, 1998