Public Service Company of New Mexico
Person Generating Station
Groundwater Treatment System

Treatment Effectiveness Report
Second Quarter 1998

August 6, 1998

Report Prepared Pursuant to Requirements Contained in:

The Person Generating Station Corrective Action Directive (NMT 360010342)
and
The New Mexico Environment Department Discharge Plan, DP-1006

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Executive Summary

Contour maps for PCE, DCE, and TCA for the most recent sampling event are shown in figures 7, 8, and 9, respectively. These figures indicate a continued reduction in the size of the contaminant plume as well as a decrease in the concentrations of these contaminants in the groundwater over the operational period of the GTS.

The increased sulfate concentration shown in the April 1998 analytical data is thought to be due to the addition of chemicals during extraction well redevelopment activities conducted in late March 1998. Sulfate concentrations have since returned to typical levels.

No significant operational problems have occurred this quarter.

I. Introduction

This report is prepared pursuant to requirements contained in the Person Generating Station Corrective Action Directive (NMT360010342) issued by the New Mexico Environment Department (NMED) Hazardous and Radioactive Materials Bureau, and requirements contained in Discharge Plan DP-1006 issued by the NMED Groundwater Protection and Remediation Bureau.

This report contains information on sampling results and operational activities at the Person Generating Station Groundwater Treatment System (GTS). The GTS is designed to extract volatile organic compound contaminated groundwater, treat through an air stripper and granular activated carbon filter, and discharge the treated water to an irrigation pond at the UNM Championship Golf Course.

Figure 1 is a site map of the Person Generating Station vicinity and shows well locations and the location of the pipeline system.

E 382000
E 383000
E 384000
E 385000
E 386000
N 1468000
N 1467000
N 1466000
N 1465000
BROADWAY
RAILROAD TRACK
SOUTH DIVERSION CHANNEL
SCHWARTZMAN TRUST
INTERSTATE 25
TREATED WATER DISCHARGE TO POND
CHAMPIONSHIP GOLF COURSE
UNM PROPERTY
PARKING
UNIVERSITY BLVD
PSMW-14
APPROX. PIPE ALIGNMENTS
PSMW-23
PSMW-28
PSMW-36
PSMW-7
PSMW-8R
PSMW-6
S4 SECTION CORNER
PSPW-2
PSMW-9
PSMW-18
PSMW-20
PSPW-4
PSMW-35
PSMW-37
PSMW-3
PSMW-3B
PSMW-12B
PSMW-12A
VEW/DW WELL
PSMW-2
PSMW-1B
PSMW-1R
PSMW-8B
PSMW-8A
PNM
N.M. STATE HIGHWAY DEPT. (R.O.W.)
EXISTING CULVERT
PSMW-25
ETHICON PROPERTY
PSMW-32
APPROXIMATE LOCATION OF VAPOR EXTRACTION SYSTEM
EW-1
PSMW-10
PSMW-13S
PSMW-13A
PSMW-16
PSMW-22
PSMW-27
PSMW-24
PSPW-6
CAPITAL LUMBER CO.
PERSON GENERATING STATION
PSMW-15B
PSMW-11
PSMW-17
POWER OPERATIONS BUILDING
PSMW-4
PSPW-1
PSMW-5
PSPW-5
PSMW-19
PSPW-3
PSMW-26
PSMW-21
PSMW-31
PSMW-29
RCRA FACILITY BOUNDARY
PNM
S.D. BEAL'S BLVD.

200 100 0 200 400
SCALE: 1" = 400'

LEGEND
- GROUNDWATER PUMPING WELL
- MONITORING WELL
- PRODUCTION WELL (SEALED)
- ROADS
- PROPERTY LINES

SITE MAP

Public Service Company of New Mexico
Person Generating Station
Albuquerque, New Mexico

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado

II. Operational History

The GTS was started on Friday, January 27, 1995, with treated effluent being sent to the UNM Championship Golf Course.

During 1995, the GTS encountered periodic minor problems as well as a more serious problem with mineralization of the system components downstream from the air stripper. The GTS was kept off-line for most of the first quarter of 1996 while the mineralization problem was studied. After evaluation of various treatment methods, an acid treatment system was selected as the most feasible solution to the mineralization problem.

Installation of the acid treatment system began in early May 1996. In early April, construction activities were initiated to convert monitor wells PSMW-24, PSMW-25, and PSMW-26 to extraction wells. The GTS resumed regular operation in mid-June 1996.

The Person Generating Station Discharge Plan, DP-1006, was amended and approved by the Groundwater Protection and Remediation Bureau in mid-June 1997. As part of the amended plan, the existing plan requirement for the sulfuric acid treatment system was replaced. Previously, acid addition to the effluent was restricted to 35 mg/l. The new requirement specifies adjustment of the acid treatment system to maintain an effluent pH range of 6.0 to 9.0. A pH probe and chart recorder were installed on the effluent discharge tank for daily monitoring of pH, and effluent samples are collected monthly for total sulfate analysis.

The GTS has operated satisfactorily during the second quarter of 1998.

III. Groundwater Treatment Effectiveness

Figures 2, 3, and 4 show graphs of concentration of total chlorinated VOC's as measured at wells PSMW-16, VEW, and EW-1 over the operational period of the GTS. Figure 5 shows a graph of concentration of total chlorinated VOC's in the combined influent from wells PSMW-24, PSMW-25, and PSMW-26 over the operational period of the GTS. More detailed data for these wells are shown in Tables 1, 2, 3, and 4.

During the first quarter of 1998, total chlorinated VOC's increased slightly at EW-1. Total chlorinated VOC's fluctuated during the first quarter in the combined influent from wells PSMW-24, PSMW-25, and PSMW-26. During March 1998, PSMW-16 and VEW were redeveloped. Therefore, no samples were collected from these wells in March. Prior to redevelopment activities total chlorinated VOC's had been relatively constant at these wells.

Beginning in January 1998, EPA Method 8021 (Halo) replaced EPA Method 8010. Therefore, all first quarter groundwater samples were analyzed with the 8021 (Halo) method.

During the second quarter of 1998, total chlorinated VOC's increased slightly at the VEW. In April, a decrease in total chlorinated VOC's was noted at PSMW-16 and in the combined influent from PSMW-24, 25, and 26. However, for the remainder of this quarter, total chlorinated VOC's have fluctuated at these wells. EW-1 showed a decrease in total chlorinated VOC's this quarter.

Laboratory reports for this quarter are contained in appendix A.

Figure 2
Total VOCs at PSMW-16

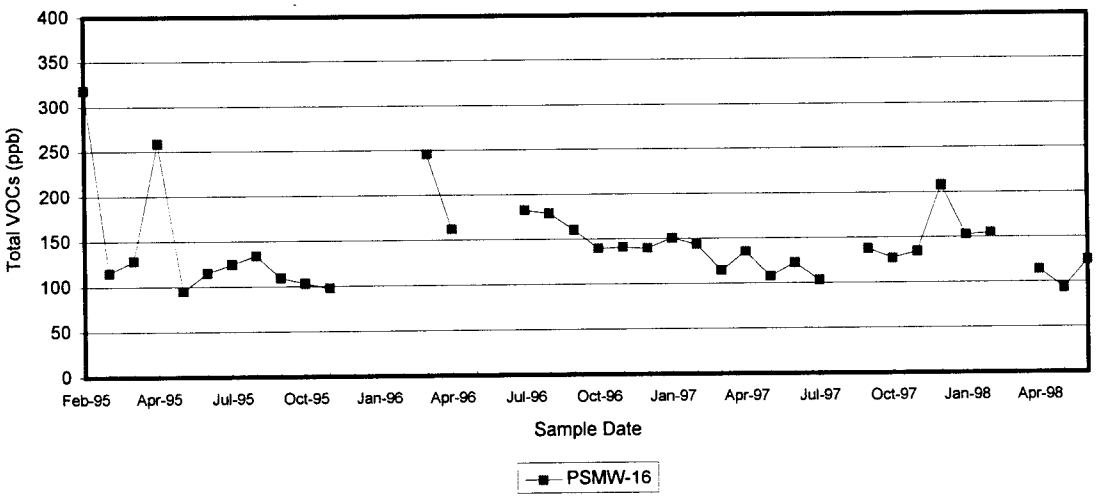

Figure 3
Total VOCs at the VEW

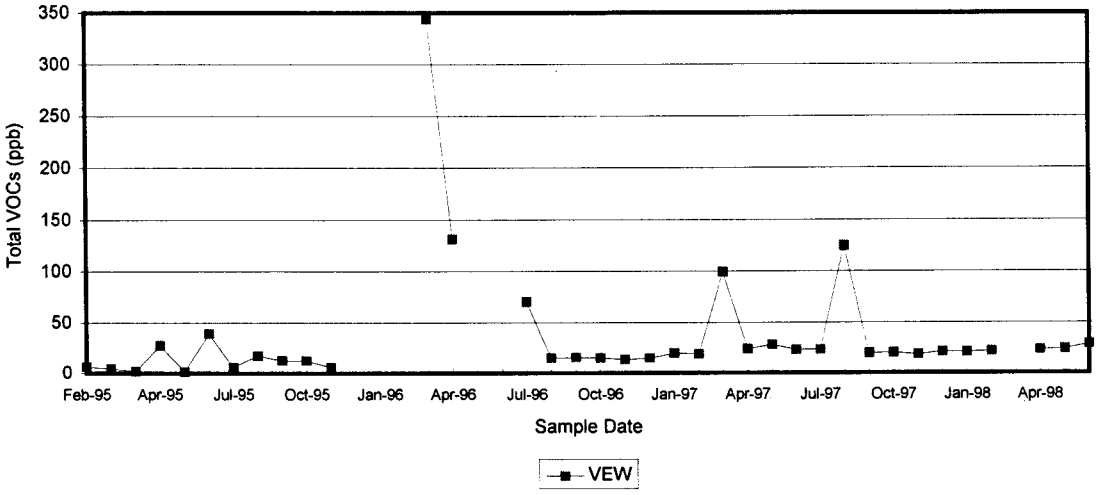

Figure 4
Total VOCs at EW-1

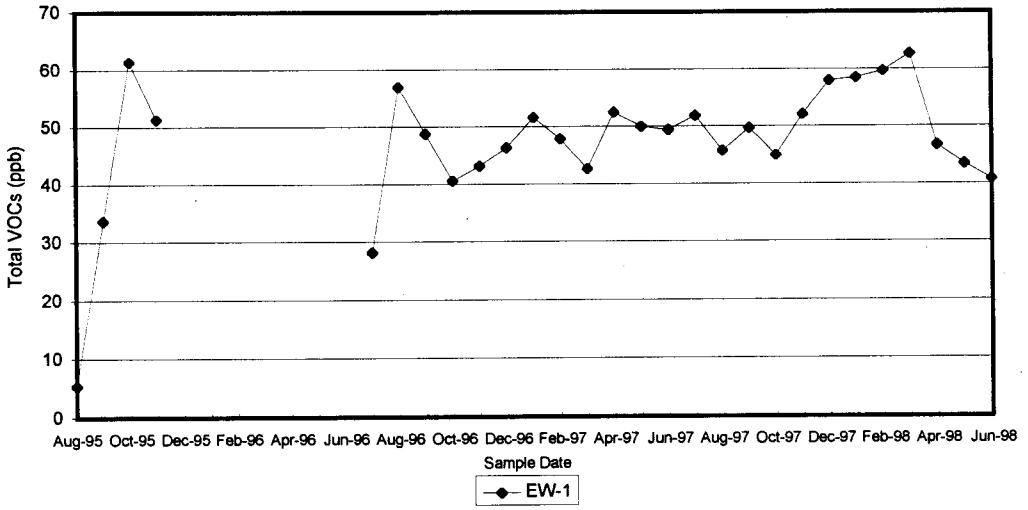

Figure 5
Total VOCs at PSMW-24,25,26

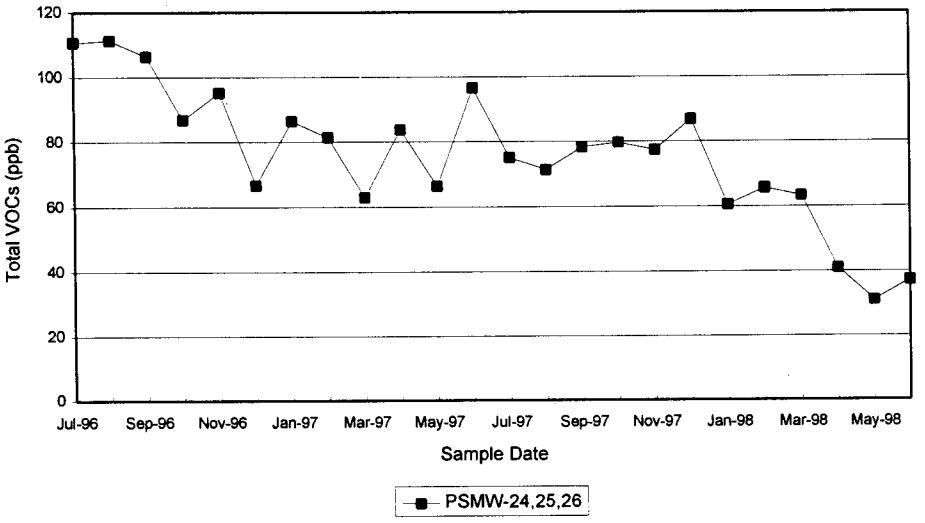

Table 1
Influent Concentrations at PSMW-16

Date	Laboratory Report No.	PCE (ppb)	DCE (ppb)	Total VOC's (ppb)
2/1/95	502304	200	110	31604
2/15/95	502376	69	39	115.0
3/8/95	503317	78	46	128.3
4/10/95	504341	170	81	258.6
5/18/95	505371	62	30	94.6
6/21/95	506396	76	36	114.8
7/12/95	507327	75	41	124.3
8/17/95	508405	83	45	134.0
9/13/95	509339	69	35	109.2
10/11/95	510335	66	32	102.8
11/22/95	511367	58	35	97.5
3/20/96	603347	180	63	245.3
4/17/96	604367	110	46	162.5
7/18/96	607334	120	54	182.9
8/15/96	608331	120	51	179.1
9/18/96	609338	110	43	160.9
10/16/96	610361	97	37	140.0
11/19/96	611331	94	42	141.0
12/17/96	612331	96	39	140.0
1/16/97	701336	99	46	150.7
2/13/97	702332	100	40	143.7
3/19/97	703344	88	23	114.6
4/17/97	704355	93	38	135.8
5/15/97	705347	71	32	107.6
6/18/97	706353	83	36	122.6
7/23/97	707360	67	34	103.1
9/15/97	709332	100	34	137.9
10/15/97	710358	92	31	127.2
11/19/97	711335	95	34	134.5
12/16/97	712318	140	68	208
1/15/98	801334	110	37	153.1
2/11/98	802336	110	38	155.3
3/11/98	NA	NA	NA	NA
4/8/98	804337	78	30	114.4
5/20/98	805379	67	23	93.4
6/16/98	806353	89	30	124.6

Table 2
Influent Concentrations at VEW

Date	Laboratory Report No.	PCE (ppb)	DCE (ppb)	Total VOC's (ppb)
2/1/95	502304	5.3	0.8	6.1
2/15/95	502376	4	0.5	4.5
3/8/95	503317	1.5	0.3	1.8
4/10/95	504341	21	5.8	28.1
5/18/95	505371	1.4	<0.2	1.4
6/21/95	506396	25	9.4	39.8
7/12/95	507327	3.5	1.0	5.8
8/17/95	508405	6.4	1.1	17.7
9/13/95	509405	9.7	1.9	12.9
10/11/95	510335	9.3	1.8	12.5
11/22/95	511367	4.6	1.1	6.0
3/20/96	603347	270	72	344.3
4/17/96	604367	94	24	131.2
7/18/96	607334	47	14	70.6
8/15/96	608331	5.0	2.1	15.2
9/18/96	609338	3.1	2.1	15.8
10/16/96	610361	3.2	2.1	15.3
11/19/96	611331	0.8	1.8	13.6
12/17/96	612331	<0.5	2.0	15.0
1/16/97	701336	0.9	3.2	20.2
2/13/97	702332	1.0	2.4	19.2
3/19/97	703344	68	17	99.5
4/17/97	704355	2.8	3.4	24.4
5/15/97	705347	6.1	5.3	28.5
6/18/97	706353	3.8	4.2	23.5
7/23/97	707360	2.9	4.0	23.6
8/13/97	708339	57	50	124.8
9/15/97	709332	1.7	3.4	19.8
10/15/97	710358	3.2	3.1	20.5
11/19/97	711335	1.3	3.2	18.7
12/16/97	712318	1	4.8	21.7
1/15/98	801334	2.5	3.6	21.3
2/11/98	802336	2.9	3.7	22
3/11/98	NA	NA	NA	NA
4/8/98	804337	6.4	5.0	23.7
5/20/98	805379	8.4	5.4	24.3
6/16/98	806353	11	6.2	29.1

Table 3
Influent Concentrations at EW-1

Date	Laboratory Report No.	PCE (ppb)	DCE(ppb)	Total VOC's (ppb)
8/17/95	508405	3.5	0.9	5.4
9/13/95	509339	25	6.1	33.6
10/11/95	510335	49	8.8	61.4
11/22/95	511367	38	9.5	51.3
7/18/96	607334	20	5.7	28.2
8/15/96	608331	45	8.4	57.0
9/18/96	609338	37	7.8	48.8
10/16/96	610361	29	7.3	40.6
11/19/96	611331	32	7.0	43.2
12/17/96	612331	33	7.7	46.4
1/16/97	701336	36	9.2	51.6
2/13/97	702332	32	7.7	47.9
3/19/97	703344	29	5.7	42.7
4/17/97	704355	31	8.4	52.5
5/15/97	705347	27	9.7	50
6/18/97	706353	23	8.6	49.4
7/23/97	707360	25	9.5	51.9
8/13/97	708339	20	6.8	45.8
9/15/97	709332	21	8.5	49.7
10/15/97	710358	18	6.5	45
11/19/97	711335	20	9.7	52.1
12/16/97	712318	21	12	58
1/15/98	801334	20	11	58.5
2/11/98	802336	21	11	59.7
3/11/98	803324	20	16	62.7
4/8/98	804337	16	9.7	46.8
5/20/98	805379	16	9	43.5
6/16/98	806353	13	7.9	40.8

Table 4
Combined Influent Concentrations at PSMW-24, 25, and 26

Date	Laboratory Report No.	PCE (ppb)	DCE(ppb)	Total VOC's (ppb)
7/18/96	607334	49	55	110.6
8/15/96	608331	47	50	111.3
9/18/96	609338	58	44	106.3
10/16/96	610361	41	40	86.8
11/19/96	611331	46	44	95.2
12/17/96	612331	33	30	66.7
1/16/97	701336	41	41	86.5
2/13/97	702332	41	37	81.5
3/19/97	703344	37	23	63.0
4/17/97	704355	42	37	83.8
5/15/97	705347	33	30	66.4
6/18/97	706353	39	55	96.6
7/23/97	707360	37	36	75.2
8/13/97	708339	39	30	71.5
9/15/97	709332	42	34	78.4
10/15/97	710358	48	29	79.8
11/19/97	711335	41	34	77.5
12/16/97	712318	40	47	87
1/15/98	801334	33	25	60.6
2/11/98	802336	36	27	65.7
3/11/98	803324	30	31	63.4
4/8/98	804337	21	18	41
5/20/98	805379	18	12	31.1
6/16/98	806353	21	15	37.3

IV. Operational Activities

Flow rates at PSMW-16, PSMW-25, and VEW have remained steady after redevelopment activities were completed last March. No significant operational activities occurred during this quarter.

V. Influent and Effluent Flow Volumes

Flow totalizing meters are present on each influent well line and on the effluent flow line. Table 5 below details flow volumes from each influent well and the effluent line. Differences between total influent and total effluent may be attributed to water loss (evaporation) out the stack in the air stripper system and to differences, inaccuracies, and operational problems with the flow meters.

Table 5
Influent and Effluent Flow Volumes

Source	Meter Number	Start Reading	End Reading	Volume (Gallons)
Flow Volumes for April 1998:				
Influent (VEW)	Badger Meter No. 94976130	3,330,775	3,404,812	74,037
Influent (PSMW-16)	Hayes Meter No. 29408700	4,581,328	4,843,928	262,600
Influent (EW-1)	Hayes Meter No. 29408732	3,759,616	3,935,776	176,160
Influent (PSMW-24)	Fisher Porter Meter No. 960307112	3,697,510	3,873,020	175,510
Influent (PSMW-25)	Fisher Porter Meter No. 960307112	791,440	892,530	101,090
Influent (PSMW-26)	Fisher Porter Meter No. 960307112	1,775,440	1,861,970	85,530
Monitor Well Sample Purge	NA	NA	NA	1,380
Effluent (to Golf Course)	Fisher Porter Meter No. 960307112	12,594,741	13,454,665	859,924
Flow Volumes for May 1998:				
Influent (VEW)	Badger Meter No. 94976130	3,404,812	3,467,934	63,122
Influent (PSMW-16)	Hayes Meter No. 29408700	4,843,928	5,088,292	244,364
Influent (EW-1)	Hayes Meter No. 29408732	3,935,776	4,083,898	148,122
Influent (PSMW-24)	Fisher Porter Meter No. 960307112	3,873,020	4,012,900	139,880
Influent (PSMW-25)	Fisher Porter Meter No. 960307112	892,530	998,940	106,410
Influent (PSMW-26)	Fisher Porter Meter No. 960307112	1,861,970	1,947,710	85,740
Effluent (to Golf Course)	Fisher Porter Meter No. 960307112	13,454,665	14,230,410	775,745
Flow Volumes for June 1998:				
Influent (VEW)	Badger Meter No. 94976130	3,467,934	3,513,484	45,550
Influent (PSMW-16)	Hayes Meter No. 29408700	5,088,292	5,244,400	156,108
Influent (EW-1)	Hayes Meter No. 29408732	4,083,898	4,195,924	112,026
Influent (PSMW-24)	Fisher Porter Meter No. 960307112	4,012,900	4,113,660	100,760
Influent (PSMW-25)	Fisher Porter Meter No. 960307112	998,940	1,078,750	79,810
Influent (PSMW-26)	Fisher Porter Meter No. 960307112	1,947,710	2,008,750	61,040
Effluent (to Golf Course)	Fisher Porter Meter No.960307112	14,230,410	14,777,841	547,431
Quarterly Total for Influent (VEW+PSMW-16+EW-1+PSMW-24+PSMW-25+PSMW-26 +Monitor Well Sample Purge)				2,219,239
Quarterly Total for Effluent:				2,183,100
Annual Totals				
Annual Cumulative Influent Total for 1998:				4,299,898
Annual Cumulative Effluent Total for 1998:				4,231,943

VI. Laboratory Analysis

A. Influent and Effluent Sampling for Chlorinated VOC's (8010 Analysis)

During the second quarter, influent and effluent sampling was conducted pursuant to the routine schedule outlined in DP-1006, i.e., once each month. Chlorinated VOC analysis of the GTS influent and effluent (after GAC units) is shown graphically in figure 6. More detailed data are shown in table 6 below. Laboratory analytical data reports are contained in appendix A. All influent/effluent sampling results indicate that the GTS has consistently removed chlorinated VOC contaminants in the 50 to 200 ppb range to levels below laboratory detection limits in the effluent sent to the golf course. Laboratory analysis of the water at a point after the air stripper and before the granular activated carbon treatment also show that at these influent concentrations and a flow rate of approximately 20 to 25 gpm, the air stripper alone is capable of treating the groundwater to concentrations consistently below or near laboratory detection limits for chlorinated VOC's.

Figure 6
Total VOCs GTS Influent vs. Effluent

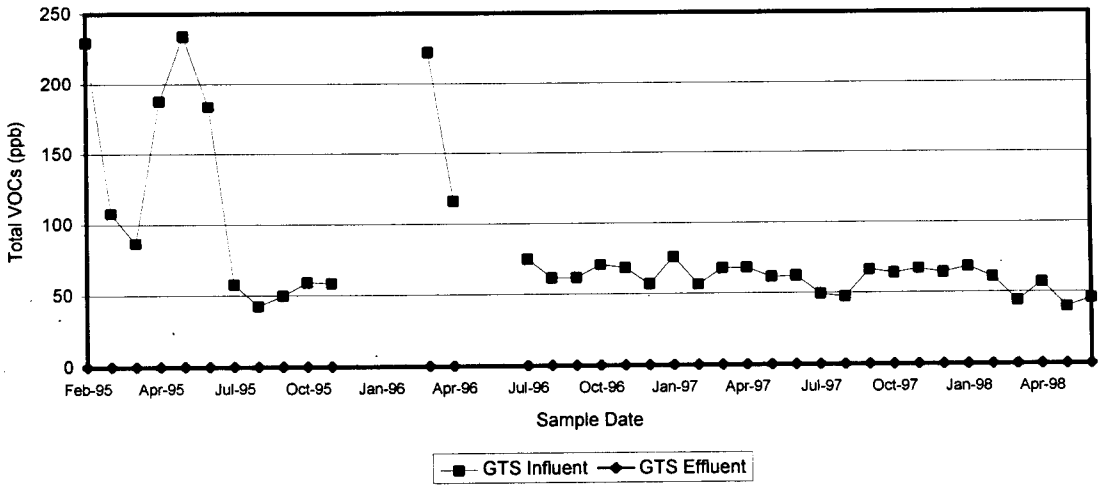

Table 6
Influent and Effluent VOC Concentrations

Sampling Date: 4/8/98	Lab Report Number: 804337		
VOC Compound	Influent (ppb)	Effluent After Air Stripper (ppb)	Effluent After GAC Unit (ppb)
Chloroform	1.4	< 0.5	< 0.5
1,1-Dichloroethane	2.1	< 0.3	< 0.3
1,1-Dichloroethene	16	< 0.2	< 0.2
Tetrachloroethene	33	< 0.5	< 0.5
1,1,1-Trichloroethane	4.5	< 1.0	< 1.0
TOTAL VOC'S	57.0	BDL	BDL

Sampling Date: 5/20/98	Lab Report Number: 805379		
VOC Compound	Influent (ppb)	Effluent After Air Stripper (ppb)	Effluent After GAC Unit (ppb)
Chloroform	0.7	< 0.5	< 0.5
1,1-Dichloroethane	1.3	< 0.3	< 0.3
1,1-Dichloroethene	12	< 0.2	< 0.2
Tetrachloroethene	23	< 0.5	< 0.5
1,1,1-Trichloroethane	3	< 1.0	< 1.0
TOTAL VOC'S	40.0	BDL	BDL

Sampling Date: 6/16/98	Lab Report Number: 806353		
VOC Compound	Influent (ppb)	Effluent After Air Stripper (ppb)	Effluent After GAC Unit (ppb)
Chloroform	1.1	< 0.5	< 0.5
1,1-Dichloroethane	1.6	< 0.3	< 0.3
1,1-Dichloroethene	11	< 0.2	< 0.2
Tetrachloroethene	29	< 0.5	< 0.5
1,1,1-Trichloroethane	3.3	< 1.0	< 1.0
TOTAL VOC'S	46	BDL	BDL

B. Effluent Sulfate Analysis and pH Monitoring

The June 1997 amendment to DP-1006 requires monthly sulfate analysis and daily pH monitoring of the GTS effluent. Table 7 presents the results of the second quarter sulfate analysis using EPA Method 375.4. The monthly minimum, maximum, and average pH readings for this quarter are shown in table 8.

Analytical results from the April 8 sampling event indicated an abnormally high sulfate concentration. The increase in sulfate is thought to be due to the addition of chemicals as part of the extraction well redevelopment activities in late March. In particular, relatively large quantities of sulfamic acid were added to the wells. The degradation of sulfamic acid may have caused the sulfate concentration to increase.

As shown in table 7, sulfate concentrations had returned to normal levels in May and June.

Table 7
GTS Effluent Sulfate Concentrations

Date	Lab Report Number	Sulfate (mg/l)
4/8/98	804337	880
5/20/98	805379	380
6/16/98	806353	440

Table 8
Monthly pH Readings

Date	Minimum pH	Maximum pH	Average pH
4/98	6.8	7.0	6.9
5/98	6.9	7.4	7.0
6/98	6.9	7.4	7.1

C. Golf Course Pond Sampling

DP-1006 requires monthly sampling of the east and west ponds for 8010 analysis during each month of operation. During the second quarter, the ponds were sampled three times pursuant to this requirement. No EPA Method 8021 (Halo) parameters were detected in the samples. Copies of the laboratory reports are contained in appendix A.

VII. Groundwater Sampling

Under the RCRA permit, a network of groundwater monitoring wells are sampled on a twice per year schedule (normally in the spring and fall). Once sampling is complete and analytical results have been received, contour maps showing the distribution of the contaminants in the groundwater are prepared. Contour maps for PCE, DCE, and TCA for the most recent sampling event are shown in Figures 7, 8, and 9.