

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

Treatment Effectiveness Report
Third Quarter 1996

November 11, 1996

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

Table of Contents

I. Introduction	1
II. Operational History	3
III. Groundwater Treatment Effectiveness	4
IV. Operational Dates	8
V. Influent / Effluent Flow Volumes	9
VI. Laboratory Analysis	11
A. Influent/Effluent Sampling for VOC's (8010 analysis)	11
B. Golf Course Pond Sampling	13
VII. Groundwater Sampling	14

Appendix A. Laboratory Reports

List of Figures

Figure 1. Person Generating Station Site Map	2
Figure 2. Total VOCs at PSMW-16	4
Figure 3. Total VOCs at the VEW	5
Figure 4. Total VOCs at EW-1	5
Figure 5. Total VOCs at PSMW-24, 25, 26	6
Figure 6. Total VOCs GTS Influent vs. Effluent	11
Figure 7. Concentration of PCE in Groundwater	15
Figure 8. Concentration of DCE in Groundwater	16
Figure 9. Concentration of TCA in Groundwater	17

List of Tables

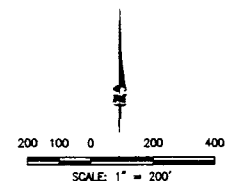
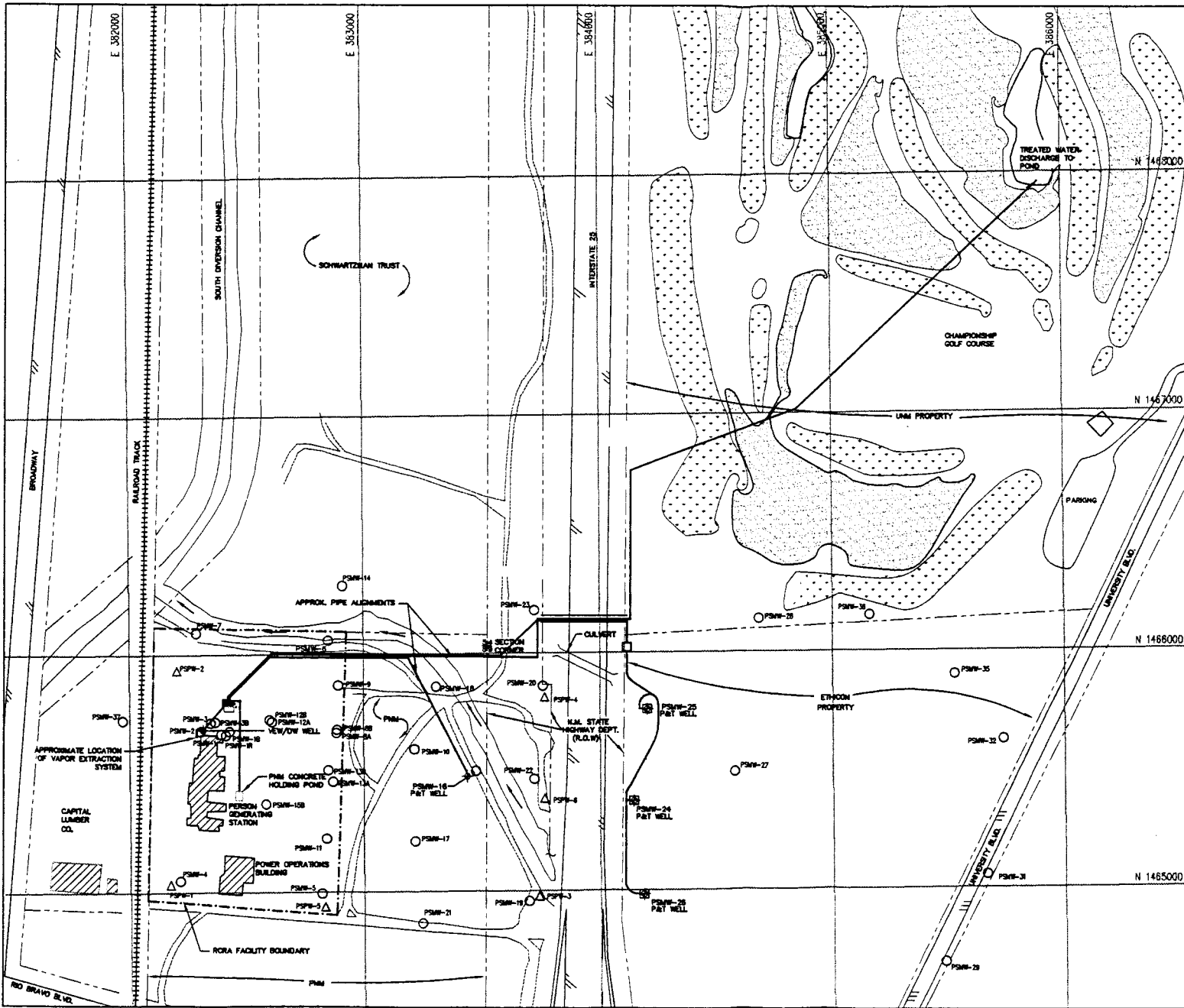
Table 1. Influent Concentrations at PSMW-16	6
Table 2. Influent Concentrations at VEW	7
Table 3. Influent Concentrations at EW-1	7
Table 4. Combined Influent Concentrations at PSMW-24, 25, and 26	7
Table 5. Significant Operational Activities	8
Table 6. Influent and Effluent Flow Volumes	10
Table 7. Influent and Effluent VOC Concentrations	12

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 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.



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 the first month of operation, a series of groundwater level measurements were taken at monitoring wells in the vicinity of PSMW-16 and the VEW in order to determine the radius of influence of each well on the surrounding aquifer. Results from that data indicate that PSMW-16 has a radius of influence of 600 feet when pumped at 13.3 gpm, and the VEW has a radius of influence of 80 feet when pumped at 5.6 gpm.

In August 1995, a third extraction well was added to the GTS. This well was designated EW-1 and was drilled and completed specifically for extraction purposes.

During 1995, the GTS encountered periodic minor problems as well as a more serious problem with mineralization of the system components down stream from the air stripper. PNM contractor Parsons-Engineering Science, Inc. was asked to evaluate potential solutions for this problem. In late November, the mineralization problem became so severe that the GTS was shut down pending resolution of the problem.

The GTS was kept down during most of the first quarter of 1996 while the mineralization problem was studied. Parsons-Engineering Science, Inc. evaluated several alternatives including chemical treatment by acid addition, chemical treatment by inhibitors, chemical treatment by water softening, and a mixed oxidant process. After discussing the various alternatives with the NMED Groundwater Bureau (as to the effect of treatment on the discharge plan) and the UNM Championship Golf Course superintendent, PNM selected the acid treatment system for implementation.

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. Consequently, the GTS was operated only sporadically during May and June. The GTS resumed regular operation in mid-June and has operated satisfactorily during the third quarter.

III. Groundwater Treatment Effectiveness

Figures 2, 3, and 4 show graphs of concentration of total VOC's as measured at wells PSMW-16, VEW, and EW-1 over the operation of the GTS. Figure 5 shows a graph of concentration of total VOC's in the combined influent from wells PSMW-24, PSMW-25, and PSMW-26 over the operation of the GTS for the third quarter. More detailed data for 1995 and 1996 are shown in Tables 1, 2, 3, and 4. From February 1, 1995, through March 8, 1995, the total Chlorinated VOC's dropped from 318.4 ppb to 128.3 ppb at PSMW-16. During the same period, total Chlorinated VOC's dropped from 6.1 ppb to 1.8 ppb at the VEW. As anticipated, concentrations rose again when the system was restarted in March.

During the remainder of 1995, concentrations have held relatively steady at PSMW-16 prior to GTS shutdown in November. Concentrations at VEW have fluctuated up and down. Concentrations at EW-1 have risen over the period of its operation. At GTS re-start in March 1996, total Chlorinated VOC's rose dramatically at both PSMW-16 and VEW (EW-1 was not re-started at this time and was not tested). In April 1996, prior to the installation of the acid treatment system, total Chlorinated VOC's had dropped at both PSMW-16 and VEW. Total Chlorinated VOC's increased slightly at PSMW-16 and in the combined influent from PSMW-24, PSMW-25, and PSMW-26 once the GTS resumed full operation in July 1996, but had dropped by the end of the third quarter. Total Chlorinated VOC's have continued to drop at VEW. EW-1 total Chlorinated VOC's increased dramatically once the system resumed full operation, but had dropped by the end of this quarter.

Laboratory reports for this quarter are contained in appendix A.

Figure 2
Total VOCs at PSMW-16

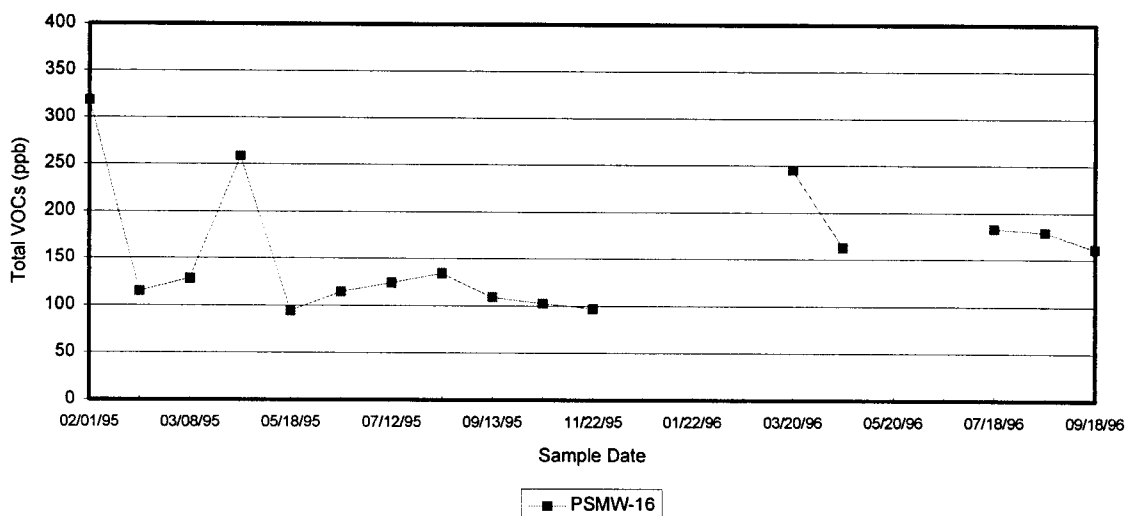


Figure 3
Total VOCs at the VEW

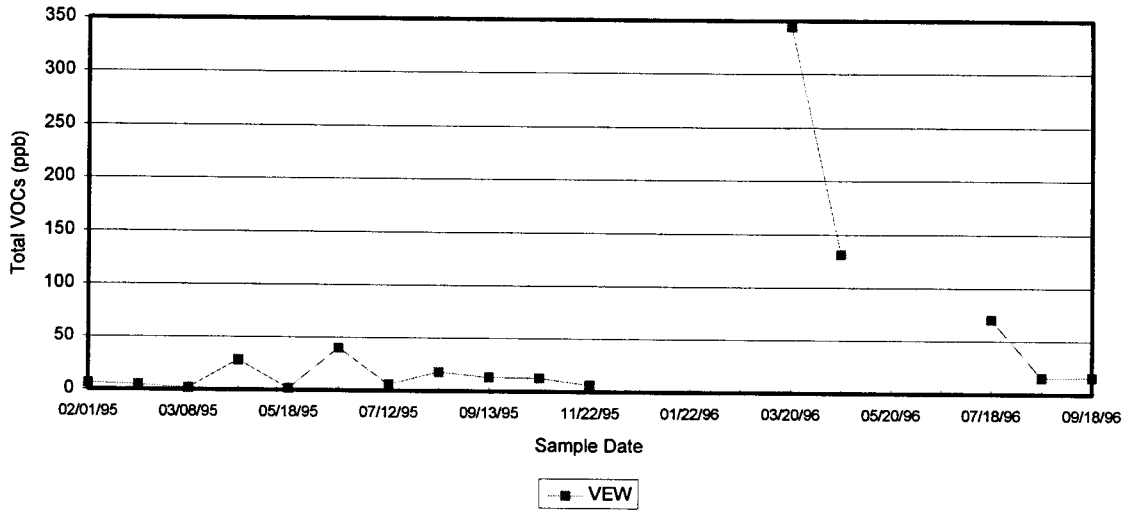


Figure 4
Total VOCs at EW-1

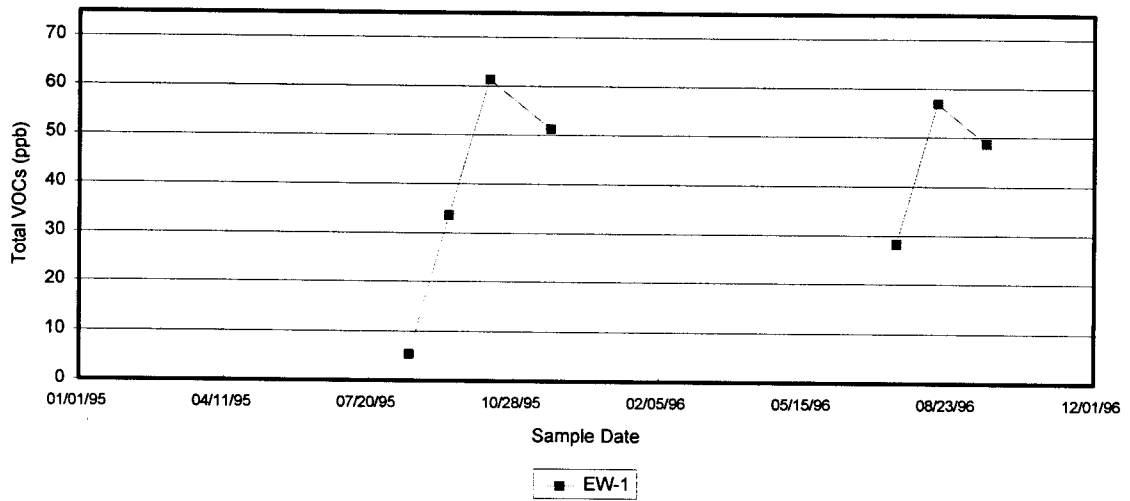


Figure 5
Total VOCs at PSMW-24,25,26

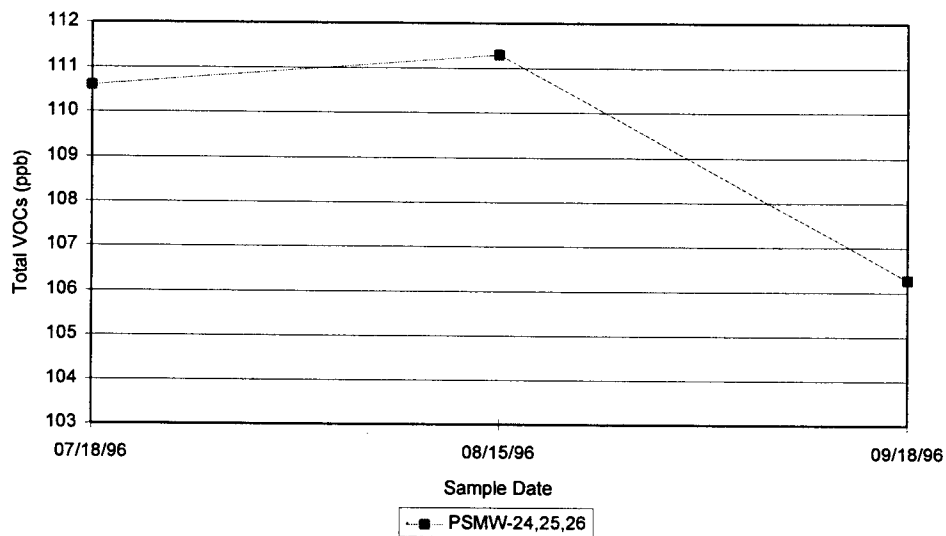


Table 1
Influent Concentrations at PSMW-16

Date	Laboratory Report No.	PCE (ppb)	DCE (ppb)	Total VOC's (ppb)
2/1/95	502304	200	110	318.4
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

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

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

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

IV. Operational Dates

The GTS was not operated from January 1, 1996, through March 19, 1996, due to mineralization problems as discussed above. The GTS was re-started on March 20, 1996. The acid treatment system was installed during the second quarter of 1996. Also during the second quarter, monitor wells PSMW-24, PSMW-25, and PSMW-26 were converted to extraction wells as part of Corrective Action Program Phase II implementation. The GTS resumed full operation in mid-June. The table below details significant operational activities for this quarter.

Table 5
Significant Operational Activities

Date	Activity
9/20/96	Installation of sulfuric acid totalizer.

V. Influent and Effluent Flow Volumes

Flow totalizing meters are present on each influent well line and on the effluent flow line. Table 6 below details flow volumes from each influent well and the effluent line. Differences between total effluent and total influent 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 6
Influent and Effluent Flow Volumes

Source	Meter Number	Start Reading	End Reading	Volume (Gallons)
Flow Volumes for July 1996:				
Influent (VEW)	Badger Meter No. 94976130	1,519,980	1,552,856	32,876
Influent (PSMW-16)	Hayes Meter No. 29408700	145,200	375,100	229,900
Influent (EW-1)	Hayes Meter No. 29408732	55,000	282,500	227,500
Influent (PSMW-24)	Fisher Porter Meter No. 960307112	4,883	187,160	182,277
Influent (PSMW-25)	Fisher Porter Meter No. 960307112	0	39,320	39,320
Influent (PSMW-26)	Fisher Porter Meter No. 960307112	10,620	101,070	90,450
Effluent (to Golf Course)	Badger Meter No. 94398834	3,870,100	4,659,800	789,700
Flow Volumes for August 1996:				
Influent (VEW)	Badger Meter No. 94976130	1,552,856	1,657,592	104,736
Influent (PSMW-16)	Hayes Meter No. 29408700	375,100	604,527	229,427
Influent (EW-1)	Hayes Meter No. 29408732	282,500	470,403	187,903
Influent (PSMW-24)	Fisher Porter Meter No. 960307112	187,160	354,970	167,810
Influent (PSMW-25)	Fisher Porter Meter No. 960307112	39,320	111,520	72,200
Influent (PSMW-26)	Fisher Porter Meter No. 960307112	101,070	195,200	94,130
Effluent (to Golf Course)	Badger Meter No. 94398834	4,659,800	5,525,100	865,300
Flow Volumes for September 1996:				
Influent (VEW)	Badger Meter No. 94976130	1,657,592	1,819,757	162,165
Influent (PSMW-16)	Hayes Meter No. 29408700	604,527	826,336	221,809
Influent (EW-1)	Hayes Meter No. 29408732	470,403	643,292	172,889
Influent (PSMW-24)	Fisher Porter Meter No. 960307112	354,970	536,480	181,510
Influent (PSMW-25)	Fisher Porter Meter No. 960307112	111,520	158,110	46,590
Influent (PSMW-26)	Fisher Porter Meter No. 960307112	195,200	273,720	78,520
Effluent (to Golf Course)	Badger Meter No. 94398834	5,525,100	6,431,040	905,940
Quarterly Total for Influent (VEW + PSMW-16 + EW-1 + PSMW-24 + PSMW-25 + PSMW-26)				2,522,012
Quarterly Total for Effluent:				2,560,940
Annual Totals				
Annual Cumulative Influent Total for 1996:				3,139,202
Annual Cumulative Effluent Total for 1996:				3,195,000

VI. Laboratory Analysis

A. Influent/Effluent Sampling for VOC's (8010 analysis)

During the third operational quarter of the GTS, influent and effluent sampling was conducted pursuant to the routine schedule outlined in the NMED approved discharge plan, i.e., once each month. (The GTS was not operational during January or February 1996, and was operated only sporadically during May and June 1996, thus no influent/effluent samples were collected.) Total VOC analysis of GTS Influent and Effluent (after GAC units) is shown graphically in Figure 6. More detailed data are shown in Table 7 below. Laboratory analytical data reports are contained in appendix A. All influent/effluent sampling results show 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 stream 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

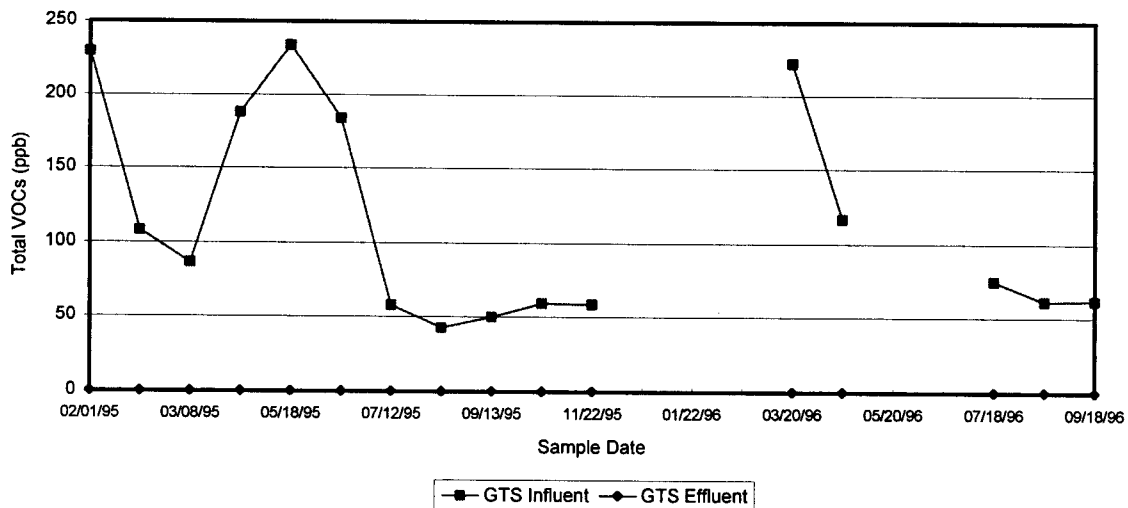


Table 7
Influent and Effluent VOC Concentrations

Sampling Date: 7/18/96		Lab Report Number: 607334	
VOC Compound	Influent (ppb)	Effluent After Air Stripper (ppb)	Effluent After GAC Unit (ppb)
Bromodichloromethane	0.2	< 0.2	< 0.2
Bromoform	0.8	< 0.5	< 0.5
Chloroform	2.6	< 0.5	< 0.5
1,1-Dichloroethane	0.6	< 0.3	< 0.3
1,1-Dichloroethene	25	< 0.2	< 0.2
Tetrachloroethene	44	< 0.5	< 0.5
1,1,1-Trichloroethane	1.4	< 1.0	< 1.0
TOTAL VOC'S	74.6	BDL	BDL

Sampling Date: 8/15/96		Lab Report Number: 608331	
VOC Compound	Influent (ppb)	Effluent After Air Stripper (ppb)	Effluent After GAC Unit (ppb)
Bromodichloromethane	0.2	< 0.2	< 0.2
Chloroform	2.1	< 0.5	< 0.5
1,2-Dibromomethane (EDB)	0.6	< 0.2	< 0.2
1,1-Dichloroethane	0.9	< 0.3	< 0.3
1,1-Dichloroethene	19	< 0.2	< 0.2
Tetrachloroethene	36	< 0.5	< 0.5
1,1,1-Trichloroethane	2.1	< 1.0	< 1.0
Trichloroethene	0.3	< 0.3	< 0.3
TOTAL VOC'S	61.2	BDL	BDL

Sampling Date: 9/18/96		Lab Report Number: 609338		
VOC Compound	Influent (ppb)	Effluent After Air Stripper (ppb)	Effluent After GAC Unit (ppb)	
Chloroform	1.0	< 0.5	< 0.5	
Chloromethane	< 1.0	1.1	< 1.0	
1,1-Dichloroethane	1.0	< 0.3	< 0.3	
1,1-Dichloroethene	17	< 0.2	< 0.2	
Tetrachloroethene	40	< 0.5	< 0.5	
1,1,1-Trichloroethane	2.6	< 1.0	< 1.0	
TOTAL VOC'S	61.6	1.1	BDL	

B. Golf Course Pond Sampling

The GTS NMED Discharge Plan (DP 1006) requires monthly sampling of the east and west ponds for 8010 analysis after the first month of operation, and during each subsequent month of operation. During the third quarter of 1996, the ponds were sampled three times pursuant to this requirement. No EPA Method 8010 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.