GROUNDWATER MONITORING DATA ANNUAL REPORT

2009

Volume I

Person Generating Station
(NMT 360010342)

Prepared by
Public Service Company of New Mexico

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PNM®

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1.0 INTRODUCTION

The RCRA permit for this facility became effective on August 31, 1988 (NMT360010342). A permit renewal application was submitted to the New Mexico Environment Department (NMED) in March 1998, and a new permit was subsequently issued on August 17, 2000. The facility is currently operating under this permit.

This report summarizes routine groundwater monitoring data collected at the Public Service Company of New Mexico (PNM) Person Generating Station facility during 2009. It contains a summary description of the location and construction specifications of the Person Generating Station monitor wells and extraction wells, well sampling data forms for all sampled wells, groundwater level measurement data, laboratory analytical reports, and groundwater contaminant data graphs for selected monitor wells.

1.1 Original Groundwater Monitoring Requirements (Detection Monitoring)

The RCRA permit, as originally issued, required PNM to sample designated monitor wells semi-annually for tetrachloroethene (PCE), 1,1-dichloroethene (DCE), and 1,1,1-trichloroethane (TCA). Designated monitor wells were PSMW-1, PSMW-3B, PSMW-6, PSMW-8A, and PSMW-8B. Additionally, once each year during the regularly scheduled semi-annual sampling events, monitor wells PSMW-3B, PSMW-5, PSMW-6, PSMW-8A, and PSMW-8B were sampled for volatile and semi-volatile organic compounds.

The RCRA permit established Maximum Concentration Limits (MCLs) for each parameter by monitor well. Under the permit, as long as groundwater monitoring continued to yield analytical results below MCLs, no corrective action would be required for the existing groundwater contamination.

1.2 Compliance Monitoring

Routine groundwater sampling conducted in October 1989 showed levels of PCE and DCE above the established RCRA permit MCLs at PSMW-8A. Confirmation sampling was conducted in February 1990. The repeat sampling confirmed the October 1989 results and also showed levels of TCA above its respective MCL at PSMW-8A.

Pursuant to permit requirements at Module II.J.4, PNM and the NMED established monitoring guidelines for a quarterly compliance monitoring period that began in April 1990. PNM was required to sample PSMW-1, PSMW-3B, PSMW-5, PSMW-6, PSMW-7, PSMW-8A, and PSMW-8B on a quarterly basis. During the first two quarterly sampling events (April 1990 and July 1990), each well was sampled for the complete 40 CFR 264 Appendix IX list of parameters.

After two Appendix IX scans were conducted, the NMED and PNM agreed to a subset sampling scheme to be conducted in subsequent sampling events. The subset sampling scheme consisted

of an EPA Method 601/8010 chlorinated volatile organic screen at all wells with the additional requirement to measure total chromium and total lead at PSMW-8A. In addition, Appendix IX scans were conducted once each year for each well noted above during the compliance monitoring period.

In 1998, EPA Method 8021 replaced EPA Method 8010. A subset of EPA Method 8021 denoted by the "Halo" suffix has been in been in use since 1998. This subset lists the same chlorinated volatile organic compounds that were previously reported with EPA Method 8010.

Beginning with the October 2008 sampling event, a different analytical laboratory was utilized for analyses of the groundwater samples. The new laboratory uses EPA Method 8260 rather than EPA Method 8021 Halo. EPA Method 8260 has a similar detection limit, but is more reliable and can detect a larger number of compounds.

1.3 Corrective Action Directive

Groundwater sampling during the compliance monitoring phase continued to show values in excess of MCLs at PSMW-8A. Pursuant to Module III.F.6 of the Person Generating Station Permit, the NMED issued a Corrective Action Directive (CAD) on September 18, 1991. The CAD required PNM to submit a groundwater assessment plan to investigate the extent of the off-site contamination plume, and to propose and implement a Corrective Action Program (CAP) for the off-site contamination.

In late 1991, PNM submitted a groundwater assessment plan, which was subsequently approved by the NMED. PNM began implementation of the groundwater assessment plan on January 29, 1992.

During 1992 and 1993, PNM installed 32 additional monitor wells pursuant to the CAD. Analytical data from these monitor wells enabled PNM to delineate the extent of the shallow groundwater contamination plume. CAD monitor wells were sampled approximately semi-annually during the assessment phase of the CAD. At completion of the assessment, PNM proposed the implementation of corrective measures for the shallow groundwater plume. The proposal included the continued sampling of CAD monitor wells to assess the progress of remedial activities.

A permit modification was required to facilitate implementation of corrective action at the RCRA unit. This was submitted to the NMED in October 1993. The modification included a request to change the designated monitor wells used to determine permit compliance and a request to again establish semi-annual sampling for these monitor wells. The permit modification was subsequently approved and PSMW-1R, PSMW-3B, PSMW-6R, PSMW-7, PSMW-8A, PSMW-8B, and PSMW-11 became the designated monitor wells under the permit. PSMW-1R and PSMW-6R were replacement wells because PSMW-1 and PSMW-6 had become hydrologically stranded above the water table. PSMW-11 was installed during the CAD and was offered as a substitution for PSMW-5, which had also become hydrologically stranded. PSMW-1, PSMW-5, and PSMW-6 were abandoned in June 1996. Abandonment consisted of removal of

the dedicated bladder pump, plugging of the well with a 5% bentonite cement, and removal of the wellhead, pad, and guard posts. Similarly, monitor wells PSMW-12A, PSMW-12B, and PSMW-15B were also abandoned in 1996 in order to minimize interference with future site construction activities.

In August 1998, a permit modification was again required to replace permit monitor well PSMW-7, which was expected to become hydrologically stranded within a year. In October 1998, the replacement well PSMW-7R was completed and PSMW-7 was plugged and abandoned.

Under the requirements of the current permit (issued in August 2000), PNM is required to conduct the following groundwater monitoring schedule. All permit designated monitor wells are to be sampled semi-annually and analyzed using EPA Method 8021 Halo. Additionally, PSMW-7R is to be analyzed once each year for 40 CFR 264 Appendix IX constituents. Table 1 summarizes shallow groundwater monitor well information and current monitoring requirements.

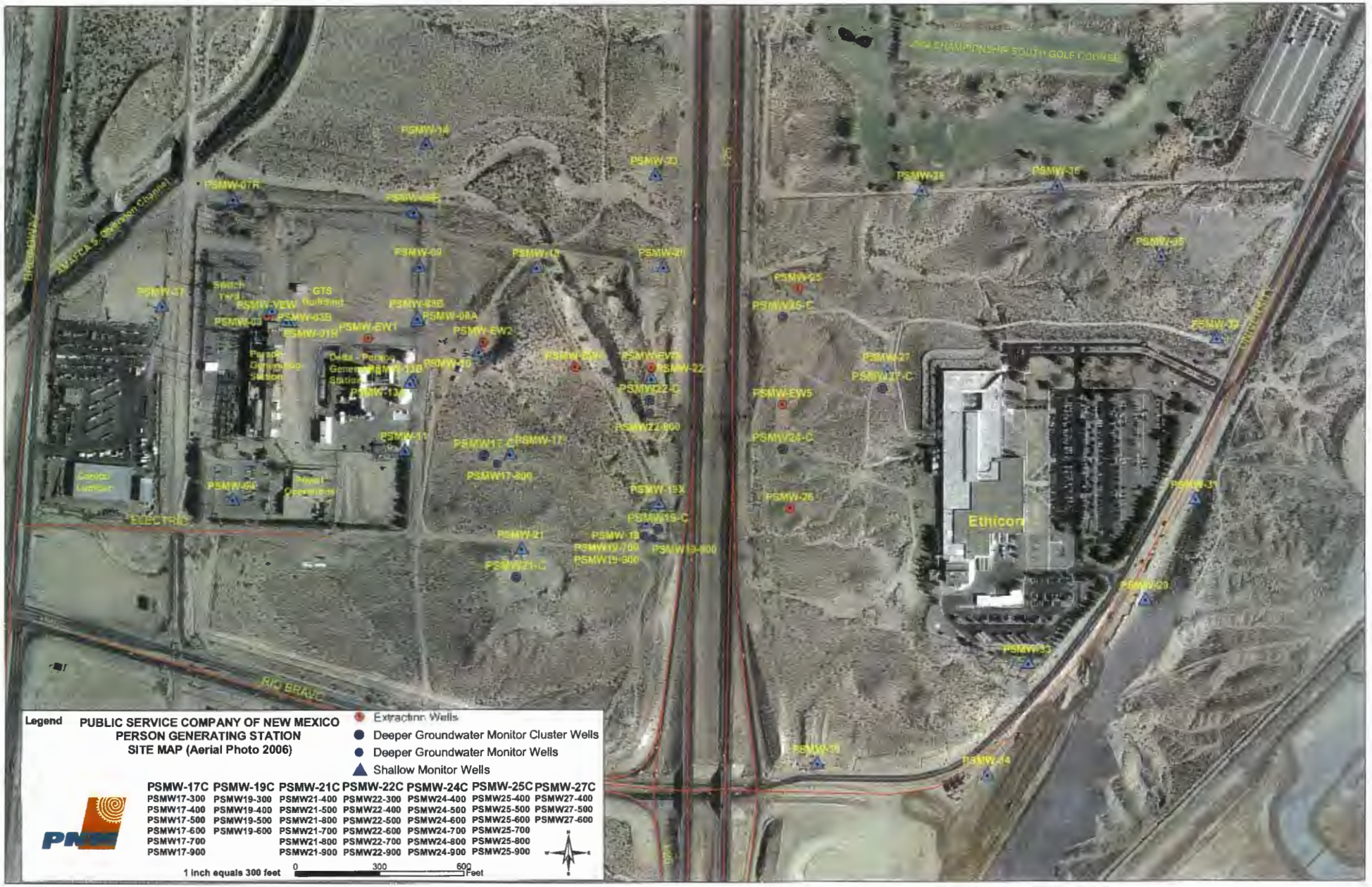
In June 2007, PNM submitted an early post-closure care permit renewal application to the NMED (the current permit is scheduled to expire in 2010). In the application, PNM proposed to remove a significant number of the monitor wells and extraction wells from the monitoring program because many of them have shown minimal or no evidence of groundwater contamination over the past several years. PNM is still awaiting a response from the NMED as to when the new permit may be issued.

Figure 1 is a map showing the Person Generating Station vicinity, prominent landmarks, and monitor well locations.

Table 1

Shallow Groundwater Monitoring Requirements

Well ID	Type	Function	Sampling Requirement
PSMW-1			NA, Abandoned and Replaced with PSMW-1R
PSMW-1R	Point of compliance	Source	8260 Semi-Annually
PSMW-1B	Plume	Vertical Boundary	8260 Semi-Annually
PSMW-2			Water Levels Only
PSMW-3			Water Levels Only
PSMW-3B	Plume	Vertical Boundary	8260 Semi-Annually
PSMW-4		Horizontal Boundary	Water Levels Only
PSMW-5			NA, Abandoned and Substituted with PSMW-11
PSMW-6			NA, Abandoned and Replaced with PSMW-6R
PSMW-6R	Plume	Horizontal Boundary	8260 Semi-Annually
PSMW-7			NA, Abandoned and Replaced with PSMW-7R
PSMW-7R	Permit	Background	8260 Semi-Annually, Appendix IX 1/yr
PSMW-8A	Plume	Horizontal Boundary	8260 Semi-Annually
PSMW-8B	Plume	Vertical Boundary	8260 Semi-Annually
PSMW-9			Water Levels Only
PSMW-10	Plume	Plume Centerline	8260 Semi-Annually
PSMW-11	Plume	Horizontal Boundary	8260 Semi-Annually
PSMW-12A			NA, Abandoned
PSMW-12B			NA, Abandoned
PSMW-13A	Plume	Horizontal Boundary	8260 Semi-Annually
PSMW-13B	Plume	Vertical Boundary	8260 Semi-Annually
PSMW-14	Sentry	Horizontal Boundary	8260 Semi-Annually
PSMW-15B			NA, Abandoned
PSMW-16			NA, Abandoned and Replaced with EW-4
PSMW-17	Plume	Horizontal Boundary	8260 Semi-Annually
PSMW-18	Plume	Horizontal Boundary	8260 Semi-Annually
PSMW-19	Sentry	Horizontal Boundary	8260 Semi-Annually
PSMW-19X			Water Levels Only
PSMW-20	Plume	Horizontal Boundary	8260 Semi-Annually
PSMW-21	Sentry	Horizontal Boundary	8260 Semi-Annually
PSMW-22	Plume	Plume Centerline	8260 Semi-Annually
PSMW-23	Sentry	Horizontal Boundary	8260 Semi-Annually
PSMW-24			NA, Abandoned and Replaced with EW-5
PSMW-25	Plume and Extraction Well	Horizontal Boundary and Extraction Well	8260 Semi-Annually
PSMW-26	Plume and Extraction Well	Horizontal Boundary and Extraction Well	8260 Semi-Annually
PSMW-27	Plume	Plume Centerline	8260 Semi-Annually
PSMW-28	Sentry	Horizontal Boundary	8260 Semi-Annually
PSMW-29	Sentry	Horizontal Boundary	8260 Semi-Annually
PSMW-30	Sentry	Horizontal Boundary	8260 Semi-Annually
PSMW-31	Sentry	Horizontal Boundary	8260 Semi-Annually
PSMW-32	Sentry	Horizontal Boundary	8260 Semi-Annually
PSMW-33	Sentry	Horizontal Boundary	8260 Semi-Annually
PSMW-34	Sentry	Horizontal Boundary	8260 Semi-Annually
PSMW-35	Sentry	Horizontal Boundary	8260 Semi-Annually
PSMW-36	Sentry	Horizontal Boundary	8260 Semi-Annually
PSMW-37	Sentry	Upgradient	8260Semi-Annually
VEW	Extraction Well	Extraction Well	8260 Semi-Annually
EW-1	Extraction Well	Extraction Well	8260 Semi-Annually
EW-2	Extraction Well	Extraction Well	8260 Semi-Annually
EW-3	Extraction Well	Extraction Well	8260 Semi-Annually
EW-4	Plume and Extraction Well	Plume Centerline and Extraction Well	8260 Semi-Annually
EW-5	Plume and Extraction Well	Plume Centerline and Extraction Well	8260 Semi-Annually



Legend

PUBLIC SERVICE COMPANY OF NEW MEXICO
PERSON GENERATING STATION
SITE MAP (Aerial Photo 2006)

- Extraction Wells
- Deeper Groundwater Monitor Cluster Wells
- Deeper Groundwater Monitor Wells
- Shallow Monitor Wells

PSMW-17C	PSMW-19C	PSMW-21C	PSMW-22C	PSMW-24C	PSMW-25C	PSMW-27C
PSMW17-300	PSMW19-300	PSMW21-400	PSMW22-300	PSMW24-400	PSMW25-400	PSMW27-400
PSMW17-400	PSMW19-400	PSMW21-500	PSMW22-400	PSMW24-500	PSMW25-500	PSMW27-500
PSMW17-500	PSMW19-500	PSMW21-800	PSMW22-500	PSMW24-600	PSMW25-600	PSMW27-600
PSMW17-600	PSMW19-600	PSMW21-700	PSMW22-600	PSMW24-700	PSMW25-700	
PSMW17-700		PSMW21-800	PSMW22-700	PSMW24-800	PSMW25-800	
PSMW17-900		PSMW21-900	PSMW22-900	PSMW24-900	PSMW25-900	

1 inch equals 300 feet

0 300 600 Feet

1.4 Corrective Action Program

Operation of a Corrective Action Program (CAP) is in progress pursuant to an NMED approved Corrective Measures Proposal. The CAP includes a soil vapor extraction well located in the source area and a groundwater pump and treat system (GTS). The GTS treats groundwater from the extraction wells by pumping the influent through two in-series granular activated carbon (GAC) filters. The treated groundwater is then discharged to an irrigation pond located at the UNM Championship Golf Course.

In an effort to enhance the GTS effectiveness by increasing system pumping rates, two new extraction wells were completed in October 1999. These wells are designated EW-2 and EW-3.

During May and June 2001, construction activities were initiated for the drilling of two new extraction wells to replace PSMW-16 and PSMW-24, which had been taken out of service. The new wells are designated EW-4 and EW-5. EW-4 and EW-5 were brought on line in September 2001.

Due to the locally declining groundwater table, extraction well PSMW-16 had become hydrologically stranded and was taken out of service permanently in 2000. Extraction well PSMW-24 had also been taken out of service in 2000 due to a damaged pump. An inspection of PSMW-24 indicated that the casing had developed a hole, allowing material from the surrounding formation to move into the well permanently damaging the pump.

Groundwater extraction wells now include VEW, EW-1, EW-2, EW-3, EW-4, EW-5, PSMW-25, and PSMW-26.

In July 2001, construction activities began on the installation of a pilot-scale treatment system that used two in-series GAC units as an alternative to the existing air stripper/acid addition/GAC system.

Over the past several quarters, the existing system had experienced frequent operational problems, thus requiring extensive maintenance in order to remain in service. The pilot-scale system configuration was a much simpler system and was expected to significantly reduce operational problems and maintenance requirements of the GTS.

The pilot-scale system consisted of two in-series GAC units. The influent was pumped into a large holding tank, then to the first stage GAC unit, and then to the final GAC unit. As in the original system configuration, the treated effluent was then pumped to the golf course irrigation pond for reuse.

The pilot-scale treatment system was put into limited service in September 2001. Analytical data indicated that the GTS was meeting the required treatment effectiveness. Consequently, in May 2002, PNM submitted a request to the NMED to amend the existing discharge permit and permanently modify the GTS.

In July 2002, the NMED approved the discharge permit amendment request. The full-scale system was completed and put into service in December 2002.

1.5 Deeper Groundwater Investigation

Under the CAD investigation, PNM also identified the existence of a deeper groundwater contaminant plume. Assessment activity on the deeper groundwater contamination was reported to the NMED on December 18, 1995. Included in the RCRA permit renewal application submitted to the NMED in March 1998, was a biannual sampling schedule for the deeper groundwater monitor wells. This schedule was approved in the new RCRA permit issued by the NMED in August 2000.

Table 2 summarizes the deeper groundwater monitor well information and sampling plan.

Table 2

Deeper Groundwater Monitoring Requirements

Well ID	Type	Function	Sampling Requirement
17-300		No Associated Groundwater Plume	Water Levels Only
17-400		No Associated Groundwater Plume	Water Levels Only
17-500		No Associated Groundwater Plume	Water Levels Only
17-600		No Associated Groundwater Plume	Water Levels Only
17-700		No Associated Groundwater Plume	Water Levels Only
17-800	Background	Background, 800 ft Plume, Source at PSPW-6	Method 8260 Semi-Annually
17-900		No Associated Groundwater Plume	Water Levels Only
19-300		No Associated Groundwater Plume	Water Levels Only
19-400		No Associated Groundwater Plume	Water Levels Only
19-500	Plume	Source Area, 500 ft Plume, PSPW-3	Method 8260 Semi-Annually
19-600		No Associated Groundwater Plume	Water Levels Only
19-700		No Associated Groundwater Plume	Water Levels Only
19-800	Plume	Source Area, 800 ft Plume, PSPW-3	Method 8260 Semi-Annually
19-900		No Associated Groundwater Plume	Water Levels Only
21-400		No Associated Groundwater Plume	Water Levels Only
21-500	Background	Background, 500 ft Plume, Source at PSPW-3	Method 8260 Semi-Annually
21-600		No Associated Groundwater Plume	Water Levels Only
21-700		No Associated Groundwater Plume	Water Levels Only
21-800	Background	Background, 800 ft Plume, Source at PSPW-3	Method 8260 Semi-Annually
21-900		No Associated Groundwater Plume	Water Levels Only
22-300		No Associated Groundwater Plume	Water Levels Only
22-400		No Associated Groundwater Plume	Water Levels Only
22-500		No Associated Groundwater Plume	Water Levels Only
22-600		No Associated Groundwater Plume	Water Levels Only
22-700		No Associated Groundwater Plume	Water Levels Only
22-800	Plume	Source Area, 800 ft Plume, PSPW-6	Method 8260 Semi-Annually
22-900		No Associated Groundwater Plume	Water Levels Only
24-400	Sentry	Vertical Boundary, 500 ft Plume, Source at PSPW-3	Method 8260 Semi-Annually
24-500	Plume	Centerline, 500 ft Plume, Source at PSPW-3	Method 8260 Semi-Annually
24-600	Sentry	Vertical Boundary, 500 ft Plume, Source at PSPW-3	Method 8260 Semi-Annually
24-700		No Associated Groundwater Plume	Water Levels Only
24-800	Plume	Centerline, 800 ft Plume, Source at PSPW-3	Method 8260 Semi-Annually
24-900		No Associated Groundwater Plume	Water Levels Only
25-400		No Associated Groundwater Plume	Water Levels Only
25-500	Sentry	Horizontal Boundary, 500 ft Plume Source at PSPW-3	Method 8260 Semi-Annually
25-600		No Associated Groundwater Plume	Water Levels Only
25-700		No Associated Groundwater Plume	Water Levels Only
25-800	Plume	Horizontal Boundary, 800 ft Plume, Source at PSPW-3 Horizontal Boundary, 800 ft Plume, Source at PSPW-6	Method 8260 Semi-Annually
25-900		No Associated Groundwater Plume	Water Levels Only
27-400	Sentry	Vertical Boundary, 500 ft Plume, Source at PSPW-3	Method 8260 Semi-Annually
27-500	Sentry	Horizontal boundary, 500 ft Plume, Source at PSPW-3	Method 8260 Semi-Annually
27-600	Sentry	Vertical boundary, 500 ft Plume, Source at PSPW-3	Method 8260 Semi-Annually

2.0 WATER LEVEL MEASUREMENTS

Water levels in all monitor wells were measured twice during 2009. A description of the current monitor wells and extraction wells are contained in Table 3.

Water table contour maps for the shallow groundwater and deeper groundwater monitor wells are contained in Appendix A. Water level measurements for the shallow groundwater and deeper groundwater monitor wells are included in the well sampling data forms found in Appendix D.

The shallow groundwater generally flows slightly south of east. During 2009, the gradient varied from 0.0030 ft/ft to 0.0091 ft/ft, depending on season and location. Potentiometric data indicates that the deeper groundwater flow varies with depth, location, and season, but generally flows south of east to slightly north of east. During 2009, the gradient varied from 0.0010 ft/ft to 0.0057 ft/ft. Potentiometric data for the shallow groundwater and deeper groundwater also indicates that the groundwater levels are generally lower in the fall and higher in the spring.

Table 4 contains calculations of a range of groundwater flow rates derived from water level readings made in 2009. The flow rates were calculated using the formula:

$$V = \frac{K \times (dh / dl)}{N}$$

where:

- V is the groundwater flow rate
- dh/dl is the measured flow gradient
- N is the effective porosity (estimated at 0.30 for a silty sand matrix)
- K is the hydraulic conductivity for which a range of values is used.

The range of K values were taken from Table 3.2.3.2.B of the CAD Assessment Summary Report (July 1993). The groundwater flow rates shown in Table 4 represent a range of possible flow rates within the groundwater affected by the Person Generating Station contaminant plume.

Table 3
Monitor Well Data Table

Well ID	Description	Install Date	Casing Size (in.)	Total Depth of Well (ft)	Casing Head Elevation (MSL)
PSMW-01B	North: 1465668.13 East: 382432.62	10-Dec-92	4	160.0	5029.84
PSMW-01R	North: 1465669.97 East: 382417.57	13-Jan-93	2	137.0	5029.66
PSMW-02	North: 1465676.98 East: 382306.80	7-Feb-84	2	126.8	5024.27
PSMW-03	North: 1465712.24 East: 382357.25	8-Feb-84	2	127.4	5025.48
PSMW-03B	North: 1465711.06 East: 382367.11	5-Dec-84	2	150.7	5026.60
PSMW-04	North: 1465042.47 East: 382226.00	23-Mar-84	2	127.0	5022.07
PSMW-06R	North: 1466055.87 East: 382875.06	18-Apr-94	2	153.0	5040.50
PSMW-07R	North: 1466101.92 East: 382229.51	9-Oct-98	2	133.0	5008.37
PSMW-08A	North: 1465671.41 East: 382886.00	14-Nov-84	2	155.8	5046.29
PSMW-08B	North: 1465680.93 East: 382886.98	30-Nov-84	2	169.0	5045.64
PSMW-09	North: 1465863.41 East: 382893.96	28-Feb-92	2	150.05	5041.10

PSMW-10	North: 1465562.45 East: 383103.27	13-Mar-92	2	171.0	5058.15
PSMW-11	North: 1465214.47 East: 382842.09	13-Feb-92	2	165.0	5055.48
PSMW-13A	North: 1465461.53 East: 382870.84	27-Feb-92	2	164.3	5052.14
PSMW-13B	North: 1465450.25 East: 382859.21	13-Apr-92	4	185	5051.39
PSMW-14	North: 1466294.18 East: 382917.40	11-Mar-92	2	156.0	5046.06
PSMW-17	North: 1465200.32 East: 383216.06	21-Apr-92	4	191.0	5077.75
PSMW-18	North: 1465860.38 East: 383310.74	23-Apr-92	4	185.0	5071.26
PSMW-19	North: 1464957.18 East: 383701.89	28-Apr-92	4	233.0	5116.12
PSMW-19X	North: 1465026.39 East: 383745.71	2-Dec-94	4	230.0	5109.20
PSMW-20	North: 1465859.71 East: 383762.28	7-May-92	4	226.0	5110.30
PSMW-21	North: 1464868.66 East: 383256.59	5-May-92	4	221.0	5107.36
PSMW-22	North: 1465463.27 East: 383719.47	13-May-92	4	227.0	5111.25
PSMW-23	North: 1466182.74 East: 383733.96	16-Jul-92	4	205.0	5087.65
PSMW-25	North: 1465778.83 East: 384246.00	19-Nov-92	4	242.0	5121.78

PSMW-26	North: 1465004.51 East: 384217.60	25-Nov-92	4	264.0	5145.28
PSMW-27	North: 1465488.12 East: 384562.08	3-Dec-92	4	269.0	5150.54
PSMW-28	North: 1466128.46 East: 384685.06	18-Feb-93	4	280.0	5162.48
PSMW-29	North: 1464681.01 East: 385481.45	11-Feb-93	4	342.0	5223.28
PSMW-30	North: 1464102.09 East: 384311.10	25-Feb-93	4	262.0	5144.70
PSMW-31	North: 1465037.51 East: 385659.95	4-Mar-93	4	349.0	5230.24
PSMW-32	North: 1465603.06 East: 385734.38	10-Mar-93	4	348.0	5228.70
PSMW-33	North: 1464455.25 East: 385063.32	16-Mar-93	4	336.0	5217.01
PSMW-34	North: 1464060.34 East: 384918.32	22-Mar-93	4	304.0	5185.46
PSMW-35	North: 1465894.87 East: 385537.44	22-Apr-93	4	351.0	5231.66
PSMW-36	North: 1466144.37 East: 385167.37	28-Apr-93	4	315.0	5195.50
PSMW-37	North: 1465725.35 East: 381976.56	17-May-93	2	111.0	5005.15
PSMW-EW1	North: 1465606.16 East: 382713.71	12-May-95	4	158.0	5038.03
PSMW-EW2	North: 1465591.19 East: 383122.90	15-May-19	4	197	5058.04

PSMW-EW3	North: 1465499.75 East: 383722.37	1-Oct-19	4	253	5111.18
PSMW-EW4	North: 1465502.10 East: 383450.05	Jun-01	4	231	5090.35
PSMW-EW5	North: 1465367.78 East: 384190.81	Jun-01	4	285	5134.86
PSMW-VEW	North: 1465684.88 East: 382351.66	1-Aug-95	4	135	5029.55
PSMW17-300	North: 1465193.85 East: 383126.38	3-Jun-94	2	257	5074.17
PSMW17-400	North: 1465193.85 East: 383126.38	3-Jun-94	2	342	5074.17
PSMW17-500	North: 1465193.85 East: 383126.38	3-Jun-94	2	472	5074.17
PSMW17-600	North: 1465193.85 East: 383126.38	3-Jun-94	2	552	5074.17
PSMW17-700	North: 1465193.85 East: 383126.38	3-Jun-94	2	647	5074.17
PSMW17-800	North: 1465164.85 East: 383172.90	10-Aug-93	4	755	5075.87
PSMW17-900	North: 1465193.85 East: 383126.38	3-Jun-94	2	852	5074.17
PSMW19-300	North: 1464931.39 East: 383746.78	9-Nov-93	2	291	5117.60
PSMW19-400	North: 1464931.39 East: 383746.78	9-Nov-93	2	401	5117.60
PSMW19-500	North: 1464931.39 East: 383746.78	9-Nov-93	2	553	5117.60

PSMW19-600	North: 1464931.39 East: 383746.78	9-Nov-93	2	663	5117.60
PSMW19-700	North: 1464909.88 East: 383698.27	14-Jan-94	2	729	5118.62
PSMW19-800	North: 1464900.30 East: 383727.87	25-Mar-93	4	800	5118.29
PSMW19-900	North: 1464909.88 East: 383698.27	14-Jan-94	2	919	5118.62
PSMW21-400	North: 1464763.80 East: 383239.12	25-Mar-95	2	372	5108.18
PSMW21-500	North: 1464763.80 East: 383239.12	25-Mar-95	2	507	5108.18
PSMW21-600	North: 1464763.80 East: 383239.12	25-Mar-95	2	582	5108.18
PSMW21-700	North: 1464763.80 East: 383239.12	25-Mar-95	2	682	5108.18
PSMW21-800	North: 1464763.80 East: 383239.12	25-Mar-95	2	772	5108.18
PSMW21-900	North: 1464763.80 East: 383239.12	25-Mar-95	2	872	5108.18
PSMW22-300	North: 1465384.94 East: 383717.33	3-Mar-94	2	307	5109.48
PSMW22-400	North: 1465384.94 East: 383717.33	3-Mar-94	2	412	5109.48
PSMW22-500	North: 1465384.94 East: 383717.33	3-Mar-94	2	527	5109.48
PSMW22-600	North: 1465384.94 East: 383717.33	3-Mar-94	2	612	5109.48

PSMW22-700	North: 1465384.94 East: 383717.33	3-Mar-94	2	712	5109.48
PSMW22-800	North: 1465339.52 East: 383716.85	4-Mar-93	4	800	5108.19
PSMW22-900	North: 1465384.94 East: 383717.33	3-Mar-94	2	917	5109.48
PSMW24-400	North: 1465212.84 East: 384192.60	10-Nov-94	2	447	5138.57
PSMW24-500	North: 1465212.84 East: 384192.60	10-Nov-94	2	577	5138.57
PSMW24-600	North: 1465212.84 East: 384192.60	10-Nov-94	2	707	5138.57
PSMW24-700	North: 1465212.84 East: 384192.60	10-Nov-94	2	762	5138.57
PSMW24-800	North: 1465212.84 East: 384192.60	10-Nov-94	2	842	5138.57
PSMW24-900	North: 1465212.84 East: 384192.60	10-Nov-94	2	947	5138.57
PSMW25-400	North: 1465677.90 East: 384193.64	9-Jan-95	2	432	5124.39
PSMW25-500	North: 1465677.90 East: 384193.64	9-Jan-95	2	567	5124.39
PSMW25-600	North: 1465677.90 East: 384193.64	9-Jan-95	2	647	5124.39
PSMW25-700	North: 1465677.90 East: 384193.64	9-Jan-95	2	722	5124.39
PSMW25-800	North: 1465677.90 East: 384193.64	9-Jan-95	2	827	5124.39

PSMW25-900	North: 1465677.90 East: 384193.64	9-Jan-95	2	942	5124.39
PSMW27-400	North: 1465425.49 East: 384547.86	1-Sep-95	2	457	5153.58
PSMW27-500	North: 1465425.49 East: 384547.86	1-Sep-95	2	592	5153.58
PSMW27-600	North: 1465425.49 East: 384547.86	1-Sep-95	2	717	5153.58

Table 4
Calculated Groundwater Flow Rates

		April 2009		October 2009	
Well ID	**Hydraulic Conductivity (ft/day)**	**Flow Gradient (ft/ft)**	**Flow Rate (ft/year)**	**Flow Gradient (ft/ft)**	**Flow Rate (ft/year)**
PSMW-1R	0.80	0.0091	9	0.0030	3
PSMW-8A	10.8	0.0091	120	0.0030	39
PSMW-16	240.0	0.0091	3212	0.0030	876

Note: the flow rate is calculated using the below formula:

$V = (K * dh/dl)(365\ d/1\ yr)/N$

Where: V = groundwater flow rate, ft/yr
K = hydraulic conductivity, ft/d
dh/dl = flow gradient, ft/ft
N = porosity (0.30 for a silty sand matrix

3.0 GROUNDWATER CHEMISTRY

3.1 Groundwater Monitor Wells

Permit groundwater monitor wells are designated in the RCRA permit and are currently required to be sampled on a semi-annual basis. Permit wells are intended to monitor compliance with groundwater standards near the RCRA unit (source), the property boundary, and serve as sentry wells or background wells. Currently there are 34 shallow groundwater wells and 15 deeper groundwater wells that are required to be sampled biannually. Table 1 and Table 2 summarize the monitor well functions and sampling requirements for the shallow groundwater wells and the deeper groundwater wells, respectively.

All groundwater monitor well and extraction well samples were analyzed for chlorinated volatile organics using EPA Method 8260 during the spring and fall sampling events. Additionally, PSMW-7R was sampled for Appendix IX constituents during the spring sampling event.

3.2 Extraction Wells

Extraction wells currently include VEW, EW-1, EW-2, EW-3, EW-4, EW-5, PSMW-25, and PSMW-26. The extraction wells are sampled biannually along with the permit-specified monitor wells.

3.3 Sampling Results

Table 5 below lists the relevant standards for the three constituents of concern (as identified in the post-closure care permit dated August 2000), 1,1,1-TCA, 1,1-DCE, and PCE. Table 6 lists the detected compounds for all sampled wells.

The 2009 sampling results indicate that all monitor wells and extraction wells are below the target groundwater concentration limits for the three constituents of concern.

The well sampling data forms found in Appendix D summarize pH, temperature, and conductivity measurements for the shallow groundwater and deeper groundwater monitor well sampling events. Laboratory analytical reports are included in Appendix E.

Table 5
Target Groundwater Concentration Limits

Constituent of Concern	EPA SDWA MCL (ug/L)	NMWQCC Groundwater Protection Standard (ug/L)	Target Concentration Limit (ug/L)
1,1-Dichloroethene (1,1-DCE)	7	5	5
1,1,1-Trichloroethane (1,1,1-TCA)	200	60	60
Tetrachloroethylene (PCE)	5	20	5

Table 6

Detected Compounds - 2009

Well ID	Chemical Name	Sampling Date	Analysis Result	Units	Lab Number	EPA Method	Storet Code
PSMW-01R	Tetrachloroethene	10/15/09	3.4	ug/L	0910287	EPA 8260	34475
PSMW-01R	Tetrachloroethene	4/14/09	3.7	ug/L	0904204	EPA 8260	34475
PSMW-07R	Arsenic	4/21/09	3.67	ug/L	0904290	EPA 6020	007784-42-1
PSMW-07R	Barium	4/21/09	39.9	ug/L	0904290	EPA 6020	01005
PSMW-07R	Vanadium	4/21/09	5.66	ug/L	0904290	EPA 6020	007440-62-2
PSMW-07R	Zinc	4/21/09	1.56	ug/L	0904290	EPA 6020	007440-66-6
PSMW-08A	1,1-Dichloroethene	10/15/09	1.3	ug/L	0910287	EPA 8260	34496
PSMW-08A	Tetrachloroethene	10/15/09	3.6	ug/L	0910287	EPA 8260	34475
PSMW-08A	1,1-Dichloroethene	4/2/09	1.3	ug/L	0904054	EPA 8260	34496
PSMW-08A	Tetrachloroethene	4/2/09	3.5	ug/L	0904054	EPA 8260	34475
PSMW-10	1,1-Dichloroethene	10/23/09	1.7	ug/L	0910443	EPA 8260	34501
PSMW-10	Tetrachloroethene	10/23/09	3.0	ug/L	0910443	EPA 8260	34475
PSMW-10	Tetrachloroethene	4/6/09	2.4	ug/L	0904093	EPS 8260	34475
PSMW-13A	Chloroform	10/20/09	1.5	ug/L	0910375	EPA 8260	32106
PSMW-13A	1,1-Dichloroethene	10/20/09	2.2	ug/L	0910375	EPA 8260	34501
PSMW-13A	Tetrachloroethene	10/20/09	4.4	ug/L	0910375	EPA 8260	34475
PSMW-13A	Chloroform	4/2/09	1.2	ug/L	0904054	EPA 8260	32106
PSMW-13A	1,1-Dichloroethene	4/2/09	1.9	ug/L	0904054	EPA 8260	34501
PSMW-13A	Tetrachloroethene	4/2/09	3.6	ug/L	0904054	EPA 8260	34475
PSMW-18	1,1-Dichloroethene	10/5/09	1.2	ug/L	0910086	EPA 8260	34501
PSMW-18	Tetrachloroethene	10/5/09	3.0	ug/L	0910086	EPA 8260	34475
PSMW-18	1,1-Dichloroethene	4/2/09	1.8	ug/L	0904054	EPA 8260	34501
PSMW-18	Tetrachloroethene	4/2/09	3.3	ug/L	0904054	EPA 8260	34475
PSMW-22	1,1-Dichloroethene	10/8/09	2.0	ug/L	0910177	EPA 8260	34501
PSMW-22	Tetrachloroethene	10/8/09	2.3	ug/L	0910177	EPA 8260	34475
PSMW-22	1,1-Dichloroethene	4/2/09	1.2	ug/L	0904054	EPA 8260	34501
PSMW-22	Tetrachloroethene	4/2/09	1.0	ug/L	0904054	EPA 8260	34475
PSMW21-500	Chloroform	10/5/09	1.2	ug/L	0910087	EPA 8260	32106
PSMW21-500	Chloroform	4/13/09	1.3	ug/L	0904183	EPA 8260	32106
PSMW24-500	Chloroform	10/26/09	3.1	ug/L	0910474	EPA 8260	32106
PSMW24-500	1,1-Dichloroethene	10/26/09	2.0	ug/L	0910474	EPA 8260	34501
PSMW24-500	Tetrachloroethene	10/26/09	1.3	ug/L	0910474	EPA 8260	34475
PSMW24-500	Chloroform	4/20/09	2.2	ug/L	0904297	EPA 8260	32106
PSMW24-500	1,1-Dichloroethene	4/20/09	1.3	ug/L	0904297	EPA 8260	34501
PSMW24-500	Tetrachloroethene	4/20/09	1.3	ug/L	0904297	EPA 8260	34475
PSMW25-500	Chloroform	10/23/09	2.1	ug/L	0910442	EPA 8260	32106
PSMW25-500	Chloroform	4/20/09	1.6	ug/L	0904297	EPA 8260	32106
PSMW27-600	Chloroform	10/27/09	1.0	ug/L	0910497	EPA 8260	32106
PSMW27-600	1,1-Dichloroethene	10/7/08	1.2	ug/L		EPA 8260	34501
PSMW27-600	Chloroform	4/21/09	1.5	ug/L	0904336	EPA 8260	32106
PSMW27-600	1,1-Dichloroethene	4/21/09	1.3	ug/L	0904336	EPA 8260	34501
PSMW27-600	Tetrachloroethene	4/21/09	1.2	ug/l	0904336	EPA 8260	34475

PSMW-EW3	1,1-Dichloroethene	10/27/09	1.5	ug/L	0910498	EPA 8260	34501
PSMW-EW3	Tetrachloroethene	10/27/09	1.8	ug/L	0910498	EPA 8260	34475
PSMW-EW3	1,1-Dichloroethene	4/21/09	1.2	ug/L	0904338	EPA 8260	34501
PSMW-EW3	Tetrachloroethene	4/21/09	1.6	ug/L	0904338	EPA 8260	34475
PSMW-EW4	1,1-Dichloroethene	10/27/09	1.9	ug/L	0910498	EPA 8260	34501
PSMW-EW4	Tetrachloroethene	10/27/09	2.7	ug/L	0910498	EPA 8260	34475

During 1998, analytical data indicated an increase in the concentrations of certain chlorinated volatile organic compounds in the "B" wells. These monitor wells, which had previously shown no evidence of contamination or very low contaminant concentrations, were originally installed with the screens starting below the upper 20 feet of the shallow aquifer. The presence of contaminants in this zone is believed to be a result of the general overall lowering of the water table since the installation of the "B" wells, and may also have been influenced by the operation of the GTS.

2009 analytical data for the "B" wells indicates that the concentrations of EPA Method 8260 analytes are all below the laboratory detection limits (non-detect).

The concentrations of PCE, TCA, and DCE for selected permit monitor wells are shown on graphs contained in Appendix B. The graphs depict the variation with time of the concentrations of each contaminant.

Duplicate samples are collected at select monitor wells to provide an assessment of the laboratory's analytical precision. To date, results have shown an acceptable level of agreement between the primary samples and their respective duplicates for all measured analytes. These results are summarized in Appendix C.

3.4 Groundwater Plume Monitoring

Historically, contour maps indicating the areal extent of the groundwater plume and the associated contaminant concentrations within the plume were prepared for the three constituents of concern biannually using monitoring data from the spring and fall sampling events. The contour maps were prepared using the groundwater target concentration limit of 5 ppb (see Table 5) as the lower contour map limit. As of October 2008 and continuing through 2009, concentrations of DCE, PCE, and TCA were below the target concentration limit/lower limit of 5 ppb. Consequently, no plume maps for DCE, PCE, or TCA were prepared for the 2009 report.

3.5 Well Sampling Data Forms

Appendix D contains completed well sampling data forms for the 2009 sampling events.

APPENDIX A

Water Table Contour Maps – 2009