

Annual Groundwater Monitoring Report Closed Snipes Mountail Landfill

2021 Monitoring Year

April 1, 2022

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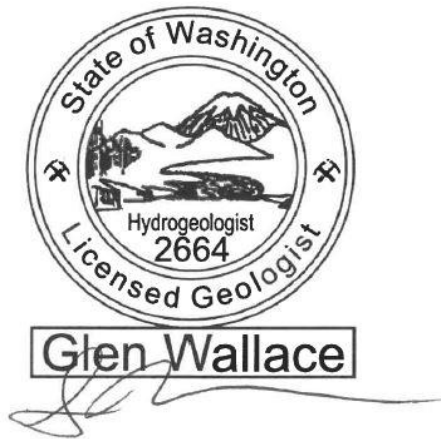
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This report, and Pacific Groundwater Group's work contributing to this report, were reviewed by the undersigned and approved for release.



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1 Introduction

This is the 2021 annual groundwater report for the closed Snipes Mountain Landfill. The landfill is currently the site of the Lower Valley Transfer Station. This report includes all data collected to date. This report is written to fulfill reporting requirements stipulated in Chapter 173-304-490 WAC (Minimum Functional Standards or MFS) as discussed with the Yakima County Health Department and Central Regional Office of the Department of Ecology on February 14, 1992.

1.1 2021 Monitoring Activities

The following wells were sampled in 2021:

- 2021 Q2: June 4, 2021, SMW-1, SMW-2, SMW-4, SMW-5s
- 2021 Q4: December 8, 2021, SMW-1, SMW-2, SMW-4, SMW-5s

Water levels were measured at all wells concurrent with the 2021 Q2 and 2020 Q4 sampling events. Analytical data is included in Table 2.

A newly installed replacement pump at SMW-5d failed at Snipes preventing sample collection. The pump is currently awaiting a replacement part. The compressor failed during sampling at SMW-4 in December 2021 preventing collection of a sample.

1.2 Landfill History

Snipes Mountain Landfill has been closed since March 30, 1994. Municipal solid waste was disposed in accordance with the Development and Closure Plan until the landfill was closed under WAC 173-304. It is not regulated under the new solid waste regulations, WAC 173-351, except for the final cover, which was established in 1994. Unlined septage ponds at the landfill were pumped out and closed in 1991. The major reference for detailed site information is the Development and Closure Plan (DCP), which includes a hydrogeologic assessment and description of sampling procedures (Parametrix, 1990). Additional hydrogeologic information obtained from the installation of three monitoring wells in 1993 was incorporated into the third annual report (Pacific Groundwater Group, 1994).

In August 1998, a variance was granted allowing monitoring at the landfill to be conducted on a semi-annual basis as opposed to a quarterly basis (Ecology and Dept. of Health, 1998). The first semi-annual sampling round was conducted in December 1998. On March 14, 2007 the Yakima Health District approved reducing sampling at SMW-3 to only water level measurements (Yakima Health, 2007). Declining water levels at SMW-3 have prevented collection of samples with the current pump configuration.

Groundwater samples were collected quarterly from September 1989 until June 1998. As of December 1998, sampling events were conducted on a semi-annual basis. All wells are sampled during each event, except SMW-3 or when water levels drop below the pumps in SMW-1, SMW-4, or SMW-5s. In September 1989, analytical parameters included the MFS suite, priority pollutant metals, pesticides, and volatile organic compounds (VOCs). Based on those results, sampling was continued for the MFS suite in all wells with additional VOC sampling in SMW-1. The current sampling plan requires analysis of MFS parameters; however, VOC analyses are performed for all sampled wells.

2 Water Levels and Groundwater Flow Directions

2.1 Water Level Trends

Table 1 presents well survey and water level data for the monitoring wells. The data presented in Table 1 are plotted in Figure 1 as hydrographs. Changes in monitoring well water levels reflect influences of regional and local groundwater withdrawals for irrigation. Water levels in wells SMW-1, SMW-2, SMW-4, and SMW-5d have historically declined during the irrigation season and recovered when irrigation wells are not pumping. This effect is less evident in recent data because the semi-annual measurements are not sufficient to fully document the highs and lows. SMW-1, SMW-2, SMW-4, SMW-5d, DNR, and the Newhouse well are all screened in the Tem aquifer.

In contrast to water levels in the irrigation-influenced wells, water levels in SMW-3 and SMW-5s remain nearly constant. The lack of response in these wells is attributed to their completion intervals, which are stratigraphically below (SMW-3) and (SMW-5s) above the Tem aquifer.

Although water levels at SMW-3 are not highly seasonal, they have declined approximately 4 feet from 2000 levels (Table 1). Water levels in SMW-3 have been too low for sampling since 2005. In 2007 Yakima County Health District approved reducing sampling at SMW-3 to monitoring water levels with the contingency that if site conditions change significantly, sampling at SMW-3 may be required (Yakima Health, 2007). Similar, but less pronounced declining trends are observed at SMW-1, SMW-4, SMW-5s and SW-5d. In contrast, water levels at SMW-2 have risen approximately 4 feet since 2000.

2.2 Interpretation of Groundwater Flow Directions

Groundwater flow direction is estimated from wells screened in the Tertiary Elephant Mountain member of the Columbia River Basalt Group (Tem) aquifer including SMW-1, SMW-4 and SMW-5d. As seen in the hydrographs in Figure 1, the pumping of the irrigation wells changes water levels in the Tem aquifer, which also influences groundwater flow direction and gradient. When the irrigation wells are pumping, the hydraulic gradient in the Tem aquifer is towards the northeast in the north limb of the anticline. The hydraulic gradient in the Tem aquifer has historically shifted to a more southerly flow direction during the December water level measurement when the irrigation wells are not pumping.

Water levels were measured at wells SMW-1, SMW-4 and SMW-5D during 2021 Q2 and 2020 Q4, groundwater elevation and structural contour maps were generated (Figure 2a and 2b). Historically the hydraulic gradient between SMW-1, SMW-4 and SMW-5D frequently changes between approximately 0.0158 in June and 0.004 in December. This year the gradient was approximately 0.004 in both June and December, though the seasonal change in groundwater flow direction was observed (Figures 2a and b).

3 Water Quality Sampling

This section describes water quality sampling conducted at Snipes, geochemical results, and quality assurance reviews.

3.1 Analysis of Water Quality Data

Data analysis was completed by visual inspection of time series plots of selected analytical parameters with knowledge of site hydrogeology. Figures 3 through 11 present time series plots of various parameters. Parameters with numerous non-detects were not plotted. Where non-detects are plotted, they are shown as being equal to the detection limit. Table 2 shows the statistical summary of MFS parameters and selected organics for each of the wells and Table 3 presents the analytical results for samples collected in 2021.

Similar to previous years, groundwater quality data collected in 2021 indicate that most parameters are within expected ambient ranges, but that wells SMW-1, SMW-4 and SMW-5S appear to be contaminated with organic and inorganic contaminants. Historically, septage was disposed into unlined ponds at the landfill, which is the most likely source and transport mechanism for the contaminants. The last septage pond to be used was the western-most pond. Disposal of septage ceased prior to the pond being pumped out in May 1991.

3.2 MFS Conventional Parameters

The analytical results for these parameters indicate that the concentrations in the samples are generally in the range of expected ambient values. Time series plots of conventional parameters are presented in Figures 3 through 6.

Concentrations of MFS parameters within the Tem aquifer are generally greater in SMW-1 than concentrations in SMW-4 and SMW-5d, which are frequently similar. Concentrations within the Tem aquifer vary widely over the short distances between wells SMW-1, SMW-4 and SMW-5d. MFS concentrations are relatively stable at wells SMW-2, SMW-4, and SMW-5D, and have historically been stable at SMW-3.

- Chloride increased from 1989 through 2004 at SMW-1, followed by stabilization from 2006 through 2021 (Figure 4). Chloride concentrations increased in SMW-5s from 2000 through 2012, stabilizing with variability from 2012 through 2021. Overall chloride concentrations in all wells remain well below the GWCL.
- Sulfate concentrations in SMW-5s increased from 2006 through 2013, followed by stabilization with variability from 2013 through 2021. Available data indicate that sulfate concentrations remain consistent with prior values in 2021.
- Nitrate concentrations at SMW-5s increased from near 0.2 mg/L to over 3 mg/L between approximately 2001 and 2015 and have been stable to decreasing through 2021 (Figure 6). Nitrate concentrations at SMW-1 have been variable but relatively stable through 2020.

The increasing trends in chloride, nitrate, sulfate and specific conductance at SMW-5S through 2014 followed by declines over the last year are consistent with the arrival of a groundwater plume with a decreasing source. This is qualitatively consistent with the site conceptual model of a set of releases at the site that stopped concurrent with landfill closure. These trends will continue to be monitored in future sampling events.

3.3 MFS Metals

Concentrations of MFS metals concentrations were generally consistent with previously detected concentrations or trends. There were no MFS metals exceedances of the GWCL in 2021. MFS trends include:

- Dissolved iron did not exceed the GWCL (0.3 mg/l) during 2021 (Figure 7).
- Dissolved manganese did not exceed the GWCL (0.05 mg/l) during 2020 (Figure 8). Dissolved manganese concentrations in SMW-5d had a long-term decreasing trend followed by stabilization from 2013 through 2016, but were not available in 2021 due to pump failure. Continued monitoring in 2022 will evaluate the continued trends at SMW-5d. All other concentrations were within expected ranges.
- Dissolved zinc concentrations were below the reporting limit in 2021 (Figure 9).

Differences in iron and manganese concentrations in the Tem wells (SMW-1, SMW-4, and SMW-5d) are likely caused by differing redox conditions in the aquifer. No other dominant trends were observed.

3.4 Volatile Organic Compounds

Volatile organic compounds (VOCs) have been consistently detected in wells SMW-1 and SMW-4 since monitoring began in 1989 and 1994, and at SMW-5s since 2010. Reporting limits for VOC analyses were lowered 2013 to conform to current laboratory standards of practice. Several constituents are now detected at concentrations below the previous standard reporting limits. VOC detections in 2021 included:

- Tetrachloroethene (PCE), was detected in both the June and December 2021 sampling events at SMW-1 (17 and 14.1 ug/L), in the June 2021 sampling event at SMW-4 (3.11 ug/L), and June and December 2020 sampling events at SMW-5S (1.16 and 1.73 ug/l). These values are consistent with previous detections and trends in these wells.
- Trichloroethene (TCE) was detected in both the June and December 2021 events at SMW-1 (0.89 and 0.72 ug/L), and June 2021 sampling event at SMW-4 (0.23 ug/L). These values are consistent with previous detections and trends in these wells.
- Trichlorofluoromethane (CFC 11) was detected at SMW-1 in June and December 2020 (0.35 and 0.29 ug/L). CFC11 is intermittently detected near the reporting limit at Snipes monitoring wells that have other VOC detections, and is a common VOC contaminant at landfill sites.
- Cis-1,2 dichloroethene was detected in the June 2021 event at SMW-1 (0.24 ug/l).
- Carbon disulfide was detected at SMW-5S in June 2021 (0.25 ug/l).

VOCs detections are consistent with septage disposal into the landfill prior to 1991. PCE is a common solvent used in dry cleaning, chemical manufacturing, as a parts cleaner, and is readily available to the general public. TCE is either a degradation product of PCE, or was a primary organic contaminant, likely in the septage. 1,1 DCE is a common degradation product of TCE and indicates that biodegradation of chlorinated ethenes is occurring along the transport pathway. CFC-11 is a common landfill VOC constituent.

PCE is the primary VOC contaminant at the site. Key PCE results include:

- PCE has been detected in SMW-1 every sample collected since 1989 (Figure 10). Concentrations in SMW-1 have decreased substantially since 1989, and appear to have roughly stabilized into a concentration range between 5 and 15 ug/L, with the exception of the second quarter of 1999, when the PCE concentration at SMW-1 spiked to 350 ug/L.

- PCE has also been consistently detected in SMW-4 since the well was installed in 1994. Concentrations in SMW-4 slowly increased between 1994 and 2000 and are generally stable to decreasing through 2021.
- PCE detection frequency and concentrations at SMW-5s increased beginning in 2010. Concentrations increased through 2012 and appear to have stabilized at between 2 and 4 ug/L (Figure 10).

Seasonal higher water levels (Figure 1) in SMW-4 have historically corresponded to slightly lower concentrations of PCE. The historic variations in concentration with water level are consistent with the conceptual model of a plume originating from the closed septage ponds, or leaching effects from the septage, and moving with the seasonally variable groundwater flow directions described above. Available PCE data at SMW-5s indicate a similar seasonal variation in concentration with changes in groundwater flow due to pumping.

3.5 Quality Assurance / Quality Control

Each semi-annual report includes the results of a quality assurance review of the analytical data. Quality assurance reviews of the 2021 analytical data generally indicate that the data are representative of the quality of samples submitted for analysis.

4 References

Department of Ecology, 1998. Letter dated August 6, 1998 to Art McEwen Re: Snipes Mountain Landfill Semiannual Groundwater Monitoring Variance Request.

Parametrix, Inc. 1991. Snipes Mountain Landfill Development and Closure Plan. March 1991.

Yakima Health District, 1998. Letter to Ron Pepper dated August 20, 1998 Re: Variance Request for Snipes Mountain Landfill Groundwater Monitoring.

Table 1. Well Survey and Water Level Data

	SMW-1		SMW-2		SMW-3		SMW-4		SMW-5s (Shallow)		SMW-5d (Deep)		30E1 (DNR)		31D1 (Newhouse)	
Northing	9290.69		7612.63		7808.01		9312.34		10052.6		10052.6					
Easting	11227		11415.2		11415.2		11717.3		11256.3		11256.3					
Ground Elevation, ft	999		895		1035		1000		951		951		819		791	
Measuring Point	TOSM		TOSM		TOSM		TOSM		TOSM		TOSM		TOSM		TOSM	
Measuring Pt Elevation, ft	1001.23		896.8		1037.03		1002.8		953.57		953.57		820.15		793.54	
Top of Tem Basalt Elev, ft	781		749		1028		710		522		-429		53		683	
DATE	DTW	PSE	DTW	PSE	DTW	PSE	DTW	PSE	DTW	PSE	DTW	PSE	DTW	PSE	DTW	PSE
01-Mar-88													37.16	782.99		
01-Nov-88													49.08	771.07		
30-Mar-89													36.79	783.36		
18-Oct-89	227.94	773.29	220.64	676.16	275.15	761.88										
24-Oct-89													43.58	776.57		
05-Dec-89	224.54	776.69	231.67	665.13	276.46	760.57										
27-Feb-90													36.83	783.32		
27-Mar-90	221.16	780.07	221.62	675.18	276.07	760.96										
29-Jun-90	230.69	770.54	221.09	675.71	275.12	761.91										
05-Oct-90	235.00	766.23	226.43	670.37	276.09	760.94										
13-Feb-91	222.00	779.23	222.31	674.49	275.85	761.18										
13-Mar-91													37.17	782.98		
29-Mar-91	220.21	781.02	221.71	675.09	275.83	761.20										
12-Apr-91	220.72	780.51	220.56	676.24	274.66	762.37										
13-Apr-91															75.00	718.54
18-Apr-91															163.58	629.96
26-Apr-91	222.67	778.56	221.43	675.37	274.18	762.85								75.15	718.39	
10-May-91	225.80	775.43	222.75	674.05	274.39	762.64								75.49	718.05	
13-May-91	226.38	774.85	221.99	674.81	274.16	762.87										
16-May-91	226.38	774.85	221.99	674.81	274.16	762.87										
24-May-91	227.23	774.00	221.91	674.89	274.23	762.80								76.49	717.05	
07-Jun-91	227.62	773.61	223.25	673.55	274.33	762.70								77.97	715.57	
21-Jun-91	229.75	771.48	223.80	673.00	274.28	762.75								78.35	715.19	
05-Jul-91	230.91	770.32	226.07	670.73	274.13	762.90								163.00	630.54	
19-Jul-91	233.13	768.10	225.54	671.26	274.83	762.20								81.88	711.66	
02-Aug-91	231.99	769.24	227.99	668.81	274.25	762.78						48.84	771.31	162.79	630.75	
15-Aug-91	234.44	766.79	228.41	668.39	274.28	762.75								163.01	630.53	
28-Aug-91	236.18	765.05														
04-Sep-91	236.84	764.39	229.24	667.56	274.37	762.66								163.31	630.23	
20-Sep-91	238.25	762.98	229.79	667.01	274.25	762.78								163.03	630.51	
08-Oct-91	236.68	764.55	230.18	666.62	274.61	762.42								163.00	630.54	
17-Oct-91	235.48	765.75	230.73	666.07	274.66	762.37								163.00	630.54	
04-Nov-91	233.38	767.85	229.89	666.91	274.69	762.34						48.25	771.90	80.17	713.37	
20-Nov-91	230.80	770.43	226.85	669.95	274.48	762.55						45.93	774.22	78.37	715.17	
04-Dec-91	228.67	772.56	225.62	671.18	274.38	762.65						44.08	776.07	77.50	716.04	
23-Dec-91	226.56	774.67	224.95	671.85	274.62	762.41						42.29	777.86	77.13	716.41	
06-Jan-92	225.14	776.09	224.30	672.50	274.15	762.88						41.07	779.08	76.13	717.41	
21-Jan-92	223.94	777.29	223.78	673.02	274.54	762.49						40.06	780.09	76.58	716.96	
04-Feb-92	222.89	778.34	223.51	673.29	274.49	762.54								76.11	717.43	
18-Feb-92	221.84	779.39	223.03	673.77	274.06	762.97						40.67	779.48	75.95	717.59	
26-Feb-92	221.75	779.48	223.24	673.56	274.87	762.16										
03-Mar-92	221.10	780.13	222.56	674.24	274.12	762.91						38.59	781.56	75.56	717.98	
17-Mar-92	220.91	780.32	222.46	674.34	274.19	762.84						33.91	786.24	75.56	717.98	
30-Mar-92	220.51	780.72	222.31	674.49	274.35	762.68						37.29	782.86	76.10	717.44	
13-Apr-92	223.26	777.97	223.27	673.53	274.12	762.91						40.67	779.48	78.98	714.56	
27-Apr-92	223.05	778.18	223.51	673.29	274.30	762.73						78.79	741.36	163.27	630.27	
11-May-92	224.35	776.88	225.85	670.95	274.37	762.66						40.67	779.48	163.27	630.27	
19-May-92	225.37	775.86	226.33	670.47	273.97	763.06										
26-May-92	226.15	775.08	226.64	670.16	274.11	762.92						44.14	776.01	163.00	630.54	
08-Jun-92	228.18	773.05	227.16	669.64	274.05	762.98						79.36	740.79	163.04	630.50	
01-Sep-92	239.71	761.52	230.78	666.02	274.49	762.54										
22-Dec-92	228.64	772.59	225.15	671.65												
11-Mar-93	222.96	778.27	223.39	673.41	275.27	761.76										
27-May-93	223.17	778.06	226.61	670.19	274.88	762.15										
25-Aug-93	236.21	765.02	228.97	667.83	275.30	761.73										
21-Dec-93	228.71	772.52	224.71	672.09	275.57	761.46	228.25	774.55	179.07	774.50	179.15	774.42				
30-Mar-94	225.08	776.15	223.50	673.30	276.56	760.47	226.35	776.45	179.30	774.27	176.16	777.41				
15-Jun-94	232.45	768.78	226.16	670.64	275.63	761.40	237.51	765.29	179.61	773.96	189.64	763.93				
22-Sep-94			228.61	668.19	276.29	760.74	250.37	752.43	180.78	772.79	205.49	748.08				
13-Dec-94	236.71	764.52	225.08	671.72	276.66	760.37	236.40	766.40	180.44	773.13	186.06	767.51				
27-Mar-95	229.22	772.01	223.92	672.88	277.33	759.70	232.37	770.43	180.12	773.45	186.05	767.52				
08-Jun-95	231.92	769.31			276.96	760.07	236.31	766.49	180.28	773.29	189.35	764.22				
15-Jun-95			225.39	671.41												
21-Aug-95	242.69	758.54	227.12	669.68	277.12	759.91	249.47	753.33	180.62	772.95	204.27	749.30				
19-Dec-95	231.60	769.63	224.08	672.72	277.70	759.33	231.60	771.20	179.97	773.60	181.60	771.97				
13-Mar-96	226.22	775.01	222.14	674.66	277.55	759.48	226.78	776.02	179.56	774.01	177.05	776.52				
29-May-96	230.34	770.89	223.47	673.33	277.18	759.85	234.60	768.20	179.98	773.59	187.67	765.90				
01-Aug-96	241.40	759.83	225.27	671.53	277.09	759.94	249.81	752.99	180.49	773.08	205.35	748.22				
17-Dec-96	233.29	767.94	224.13	672.67	278.60	758.43	233.31	769.49	180.09	773.48	183.28	770.29				
25-Feb-97	227.24	773.99	221.94	674.86	277.64	759.39	227.86	774.94	179.04	774.53	178.13	775.44				
15-May-97	231.34	769.89	223.19	673.61	277.20	759.83	238.41	764.39	179.53	774.04	194.74	758.83				
08-Jul-97	237.55	763.68	224.70	672.10	277.11	759.92	244.93	757.87	179.83	773.74	200.49	753.08				

Table 1. Well Survey and Water Level Data

	SMW-1		SMW-2		SMW-3		SMW-4		SMW-5s (Shallow)		SMW-5d (Deep)		30E1 (DNR)		31D1 (Newhouse)	
04-Dec-97	233.62	767.61	223.10	673.70	277.66	759.37	233.73	769.07	180.77	772.80	183.43	770.14				
25-Feb-98	226.68	774.55	221.53	675.27	277.18	759.85	227.24	775.56	179.31	774.26	177.44	776.13				
03-Jun-98	229.65	771.58	221.56	675.24	276.83	760.20	231.53	771.27	179.78	773.79	181.97	771.60				
09-Dec-98	236.03	765.20	224.04	672.76	278.20	758.83	235.86	766.94	180.54	773.03	185.45	768.12				
27-May-99	231.53	769.70	223.91	672.89	277.32	759.71	237.29	765.51	180.23	773.34	192.67	760.90				
28-Sep-99	245.32	755.91	225.64	671.16	278.08	758.95	248.41	754.39	180.88	772.69	199.8	753.77				
15-Dec-99	234.04	767.19	223.26	673.54	277.62	759.41	233.83	768.97	183.51	770.06	180.3	773.27				
14-Jun-00	231.99	769.24	222.18	674.62	277.65	759.38	236.57	766.23	179.62	773.95	190.69	762.88				
6-Dec-00	234.41	766.82	220.72	676.08	277.55	759.48	234.89	767.91	180.15	773.42	184.18	769.39				
6-Jun-01	233.51	767.72	220.11	676.69	277.38	759.65	237.07	765.73	180.49	773.08	187.13	766.44				
11-Dec-01	235.60	765.63	220.25	676.55	278.42	758.61	236.08	766.72	180.83	772.74	185.79	767.78				
3-Jul-02	234.40	766.83	219.35	677.45	278.15	758.88	240.90	761.90	181.00	772.57	196.65	756.92				
11-Dec-02	234.35	766.88	219.62	677.18	278.74	758.29	234.80	768.00	180.72	772.85	184.57	769.00				
18-Jul-03	241.70	759.53	220.00	676.80	280.00	757.03	245.55	757.25	182.00	771.57	195.15	758.42				
11-Dec-03	239.95	761.28	219.75	677.05	280.71	756.32	239.25	763.55	181.96	771.61	188.39	765.18				
23-Jun-04	234.75	766.48	219.15	677.65	280.71	756.32	240.59	762.21	181.52	772.05	196.73	756.84				
14-Dec-04	234.38	766.85	219.15	677.65	281.75	755.28	234.41	768.39	181.62	771.95	184.00	769.57				
15-Jun-05	236.71	764.52	221.57	675.23	281.40	755.63	243.41	759.39	181.38	772.19	200.40	753.17				
12-Jan-06	234.94	766.29	219.47	677.33	282.65	754.38	235.16	767.64	181.84	771.73	184.83	768.74				
29-Jun-06	239.10	762.13	219.58	677.22	283.09	753.94	246.60	756.20	181.67	771.90	198.69	754.88				
13-Dec-06	232.74	768.49	219.28	677.52	283.35	753.68	237.61	765.19	181.37	772.20	186.85	766.72				
27-Jun-07	238.97	762.26	219.36	677.44	283.20	753.83	253.30	749.50	181.08	772.49	198.49	755.08				
11-Dec-07	237.57	763.66	219.63	677.17	284.01	753.02	237.78	765.02	181.18	772.39	187.10	766.47				
25-Jun-08	237.70	763.53	220.35	676.45	283.73	753.30	243.63	759.17	181.29	772.28	201.15	752.42				
9-Dec-08	237.03	764.20	220.45	676.35	284.21	752.82	237.30	765.50	181.50	772.07	186.83	766.74				
17-Jun-09	236.18	765.05	219.11	677.69	283.14	753.89	242.67	760.13	181.12	772.45	200.01	753.56				
15-Sep-09									181.74	771.83						
1-Dec-09	237.49	763.74	220.44	676.36	283.68	753.35	242.30	760.50	181.47	772.10	193.14	760.43				
22-Jun-10	233.88	767.35	219.50	677.30	283.92	753.11	237.05	765.75	180.88	772.69	187.66	765.91				
26-Jul-10									181.12	772.45						
7-Dec-10	234.79	766.44	219.02	677.78	283.09	753.94	235.14	767.66	180.92	772.65	184.58	768.99				
29-Jun-11	233.62	767.61	218.86	677.94	282.08	754.95	238.58	764.22	180.75	772.82	192.69	760.88				
13-Dec-11	233.03	768.20	218.50	715.30	282.50	754.53	233.63	769.17	180.98	772.59	183.12	770.45				
13-Jun-12	233.16	768.07	219.22	677.58	282.05	754.98	239.15	763.65	180.85	772.72	195.55	758.02				
5-Dec-12	234.45	766.78	219.52	677.28	282.56	754.47	234.52	768.28	181.12	772.45	183.68	769.89				
12-Jun-13	232.00	769.23	219.50	677.30	282.10	754.93	237.90	764.90	180.85	772.72	190.00	763.57				
2-Dec-13	234.62	766.61	219.22	677.58	282.18	754.85	235.02	767.78	181.12	772.45	184.43	769.14				
17-Jun-14	235.64	765.59	219.52	677.28	281.56	755.47	239.17	763.63	181.26	772.31	212.91	740.66				
17-Jul-14	240.67	760.56					247.50	755.30	181.43	772.14	204.90	748.67				
10-Nov-14	238.00	763.23					238.32	764.48	182.29	771.28	187.31	766.26				
2-Dec-14	235.13	766.10	219.49	677.31	282.10	754.93	235.43	767.37	182.15	771.42	184.94	768.63				
23-Jun-15	240.42	760.81	219.52	677.28	281.74	755.29			182.60	770.97	199.83	753.74				
1-Dec-15	240.20	761.03	220.00	676.80	282.65	754.38			183.87	769.70	189.46	764.11				
30-Mar-16	230.14	771.09														
15-Jun-16	239.27	761.96	219.59	677.21	282.51	754.52			182.62	770.95	197.24	756.33				
7-Sep-16	245.00	756.23					250.09	752.71	183.69	769.88	198.17	755.40				
14-Dec-16	234.66	766.57	220.00	676.80	283.32	753.71			182.61	770.96	184.23	769.34				
6-Jun-17	230.60	770.63	219.22	677.58	282.63	754.40			181.32	772.25	182.71	770.86				
5-Dec-17	232.76	768.47	219.69	677.11	283.02	754.01	233.03	769.77	182.35	771.22	182.62	770.95				
26-Jun-18	244.04	757.19	219.43	677.37	282.13	754.90	238.64	764.16	181.66	771.91	191.24	762.33				
12-Dec-18	234.64	766.59	219.22	677.58	282.52	754.51	233.05	769.75	181.79	771.78	182.44	771.13				
12-Jun-19	230.60	770.63	219.73	677.07	292.84	744.19	234.35	768.45	181.09	772.48	194.72	758.85				
12-Dec-19	231.87	769.36	218.86	677.94	282.09	754.94	232.48	770.32	182.15	771.42	181.45	772.12				
9-Jun-20	233.91	767.32	219.82	676.98	282.52	754.51	237.12	765.68	182.30	771.27	187.47	766.10				
29-Dec-20	233.48	767.75	219.70	677.10	281.99	755.04	233.23	769.57	182.64	770.93	183.74	769.83				
2-Jun-21	233.12	768.11	219.80	677.00	281.70	755.33	238.58	764.22	182.18	771.39	195.04	758.53				
8-Dec-21	235.42	765.81	219.09	677.71	282.56	754.47	235.03	767.77	181.51	772.06	184.60	768.97				

TOSM = Top of Steel Casing Monument.

DTW = Depth to Water.

PSE = Potentiometric Surface Elevation (MSL).

NT = Not Taken.

**Table 2 - Statistical Summary of MFS Parameters and Selected Organics,
Through December 2021, Snipes Mountain Landfill**

Constituent	Analyses	Detections	Mean	Standard Deviation	Maximum	Minimum
<i>SMW-1</i>						
2-Butanone (MEK)	69	0	--	--	--	--
Acetone	69	4	7.23	4.00	2.30	11.00
Ammonia, Total	69	29	0.02	0.02	0.01	0.08
Carbon Tetrachloride	69	14	1.81	1.22	0.60	5.50
Carbon, Total Organic	69	13	1.28	0.86	0.39	3.30
Chemical Oxygen Demand (COD)	69	13	6.80	1.54	5.00	9.90
Chloride	70	70	15.00	2.56	10.10	20.40
Coliform, Total	21	0	--	--	--	--
Iron, Dissolved	69	59	0.09	0.10	0.02	0.57
Manganese, Dissolved	69	68	0.02	0.03	0.00	0.24
Nitrate	69	69	2.71	1.06	0.08	7.00
Nitrate + Nitrite (NO ₂ + NO ₃)	51	51	2.80	1.16	1.24	7.00
Nitrite	69	16	0.02	0.01	0.00	0.05
Sulfate	68	68	118.13	32.20	36.10	193.70
Tetrachloroethene (PCE)	69	69	18.82	41.40	3.50	350.00
Trichloroethene (TCE)	69	29	0.80	0.37	0.30	1.60
Zinc, Dissolved	69	43	0.02	0.01	0.01	0.06
<i>SMW-2</i>						
2-Butanone (MEK)	47	0	--	--	--	--
Acetone	47	1	11		11	11
Ammonia, Total	82	31	0	0	0	0
Carbon Tetrachloride	47	0	--	--	--	--
Carbon, Total Organic	82	16	1	1	0	2
Chemical Oxygen Demand (COD)	81	13	8	3	5	14
Chloride	81	81	5	1	3	10
Coliform, Total	27	1	8	--	8	8
Iron, Dissolved	82	35	0	0	0	0
Manganese, Dissolved	82	76	0	0	0	0
Nitrate	82	82	0	0	0	0
Nitrate + Nitrite (NO ₂ + NO ₃)	60	60	0	0	0	0
Nitrite	82	14	0	0	0	0
Sulfate	80	80	65	10	17	83
Tetrachloroethene (PCE)	47	0	--	--	--	--
Trichloroethene (TCE)	47	0	--	--	--	--
Zinc, Dissolved	82	41	0	0	0	0

**Table 2, continued - Statistical Summary of MFS Parameters and Selected Organics,
Through December 2021, Snipes Mountain Landfill**

Constituent	Analyses	Detections	Mean	Standard Deviation	Maximum	Minimum
<u>SMW-3 *</u>						
2-Butanone (MEK)	15	0	0.00	0.00	0	0
Acetone	15	0	0.00	0.00	0	0
Ammonia, Total	48	19	0.05	0.13	0.01	0.595
Carbon Tetrachloride	15	0	0.00	0.00	0	0
Carbon, Total Organic	48	12	0.99	0.80	0.12	2.6
Chemical Oxygen Demand (COD)	47	8	5.80	0.89	5	7.2
Chloride	48	48	3.20	0.50	2.1	5
Coliform, Total	25	0	0.00	0.00	0	0
Iron, Dissolved	48	29	0.02	0.02	0.007	0.086
Manganese, Dissolved	48	47	0.01	0.01	0.002	0.049
Nitrate	48	47	0.21	0.02	0.16	0.26
Nitrate + Nitrite (NO ₂ + NO ₃)	28	27	0.21	0.01	0.185	0.24
Nitrite	48	9	0.01	0.00	0.004	0.015
Sulfate	48	48	17.31	8.01	8.6	68.4
Tetrachloroethene (PCE)	15	0	0.00	0.00	0	0
Trichloroethene (TCE)	15	0	0.00	0.00	0	0
Zinc, Dissolved	48	38	0.03	0.04	0.004	0.241
<u>SMW-4*</u>						
2-Butanone (MEK)	53	6	38.18	23.67	6.1	66
Acetone	53	5	12.22	10.61	3	30
Ammonia, Total	52	29	0.02	0.02	0.01	0.075
Carbon Tetrachloride	53	0	--	--	--	--
Carbon, Total Organic	52	12	1.42	0.48	0.58	2.2
Chemical Oxygen Demand (COD)	52	9	5.54	0.80	5	7.4
Chloride	52	52	5.65	0.89	3.3	7.6
Coliform, Total	11	2	24.50	31.82	2	47
Iron, Dissolved	52	4	0.03	0.04	0.006	0.0994
Manganese, Dissolved	52	19	0.01	0.01	0.001	0.026
Nitrate	52	39	0.33	0.27	0.01	0.99
Nitrate + Nitrite (NO ₂ + NO ₃)	47	36	0.32	0.25	0.01	0.743
Nitrite	52	7	0.01	0.01	0.01	0.027
Sulfate	52	52	32.24	4.01	18	40.9
Tetrachloroethene (PCE)	53	52	6.77	2.11	1.16	11
Trichloroethene (TCE)	53	9	0.50	0.12	0.38	0.73
Zinc, Dissolved	52	1	0.01	--	0.006	0.006

* SMW-3 was last sampled in 2009, SMW-4 was not sampled in 2018.

**Table 2, continued - Statistical Summary of MFS Parameters and Selected Organics,
Through December 2021, Snipes Mountain Landfill**

Constituent	Analyses	Detections	Mean	Standard Deviation	Maximum	Minimum
<i>SMW-5g</i>						
2-Butanone (MEK)	67	7	23.96	38.37	5	110
Acetone	67	3	15.87	8.33	8.7	25
Ammonia, Total	65	27	0.04	0.03	0.01	0.102
Carbon Tetrachloride	67	0	--	--	--	--
Carbon, Total Organic	65	22	1.48	0.58	0.29	3.36
Chemical Oxygen Demand (COD)	65	15	7.92	4.00	5	18.3
Chloride	65	64	17.39	11.98	4.1	38.4
Coliform, Total	12	0	--	--	--	--
Iron, Dissolved	64	17	0.09	0.15	0.01	0.645
Manganese, Dissolved	64	16	0.01	0.02	0.001	0.083
Nitrate	65	64	4.90	27.59	0.16	222
Nitrate + Nitrite (NO ₂ + NO ₃)	59	59	5.26	28.73	0.012	222
Nitrite	65	26	0.02	0.02	0.01	0.109
Sulfate	63	63	53.76	25.70	26.8	141
Tetrachloroethene (PCE)	67	27	3.86	4.84	1	26
Trichloroethene (TCE)	67	14	0.30	0.23	0.2	1.1
Zinc, Dissolved	64	1	0.01		0.009	0.009
<i>SMW-5d</i>						
2-Butanone (MEK)	59	5	21.04	12.72	8.1	34
Acetone	59	3	10.67	1.53	9	12
Ammonia, Total	57	40	0.03	0.02	0.01	0.102
Carbon Tetrachloride	59	0	--	--	--	--
Carbon, Total Organic	57	7	1.52	0.45	0.78	2.35
Chemical Oxygen Demand (COD)	57	13	6.52	2.30	5	13
Chloride	56	56	5.14	0.61	4.1	6.33
Coliform, Total	13	0	--	--	--	--
Iron, Dissolved	57	48	0.14	0.06	0.05	0.25
Manganese, Dissolved	57	57	0.10	0.06	0.007	0.189
Nitrate	57	13	0.02	0.01	0.01	0.04
Nitrate + Nitrite (NO ₂ + NO ₃)	51	11	0.02	0.01	0.01	0.04
Nitrite	57	7	0.01	0.00	0.01	0.01
Sulfate	56	56	32.43	2.73	25.4	39.5
Tetrachloroethene (PCE)	59	0	--	--	--	--
Trichloroethene (TCE)	59	0	--	--	--	--
Zinc, Dissolved	57	2	0.01	0.00	0.005	0.007

Sample Name		SMW-1	SMW-2	SMW-3	SMW-4	SMW-5s	SMW-5d
Constituent	GWCL						
Field Parameters							
Depth to water, Ft.		233.12	219.88	281.7	238.58	182.18	195.04
pH, Field, std. units		7.7	7.83		6.71	7.66	
Specific Conductance @ 25C, Field, umhos/cm	700	563.3	392.7		364.2	584.9	
Temperature, C		17.3	17.3		25	17.8	
Inorganics							
Ammonia, Total, mg/L as N		0.04U	0.04U			0.04U	
Carbon, Total Organic, mg/L		0.5U	0.5U			1.08	
Chemical Oxygen Demand (COD), mg/L		10U	10U			10U	
Chloride, mg/L	250	15.9	4.75			28.2D	
Nitrate, mg/L as N	10	1.69	0.301			1.86	
Nitrate + Nitrite (NO2 + NO3), mg-N/L	10	1.69D	0.314			1.86D	
Nitrite, mg/L as N	1	0.01U	0.013			0.01U	
Sulfate, mg/L	250	95.5D	75D			87.5D	
Metals							
Iron, Dissolved, mg/L	0.3	0.25U	0.25U			0.25U	
Manganese, Dissolved, mg/L	0.05	0.02U	0.02U			0.02U	
Zinc, Dissolved, mg/L	5	0.1U	0.1U			0.1U	
VOC							
1,1,1,2-Tetrachloroethane, ug/L		0.2U	0.2U		0.2U	0.2U	
1,1,1-Trichloroethane (TCA), ug/L	200	0.2U	0.2U		0.2U	0.2U	
1,1,2,2-Tetrachloroethane, ug/L		0.2U	0.2U		0.2U	0.2U	
1,1,2-Trichloro-1,2,2-trifluoroetha, ug/l		0.2U	0.2U		0.2U	0.2U	
1,1,2-Trichloroethane, ug/L		0.2U	0.2U		0.2U	0.2U	
1,1-Dichloroethane, ug/L	1	0.2U	0.2U		0.2U	0.2U	
1,1-Dichloroethene, ug/L		0.2U	0.2U		0.2U	0.2U	
1,1-Dichloropropene, ug/L		0.2U	0.2U		0.2U	0.2U	
1,2,3-Trichlorobenzene, ug/L		0.5U	0.5U		0.5U	0.5U	
1,2,3-Trichloropropane, ug/L		0.5U	0.5U		0.5U	0.5U	
1,2,4-Trichlorobenzene, ug/L	70	0.5U	0.5U		0.5U	0.5U	
1,2,4-Trimethylbenzene, ug/L		0.2U	0.2U		0.2U	0.2U	
1,2-Dibromo-3-chloropropane (DBCP), ug/L		0.5U	0.5U		0.5U	0.5U	
1,2-Dibromoethane (EDB), ug/L		0.2U	0.2U		0.2U	0.2U	
1,2-Dichlorobenzene, ug/L		0.2U	0.2U		0.2U	0.2U	
1,2-Dichloroethane (EDC), ug/L	0.5	0.2U	0.2U		0.2U	0.2U	
1,2-Dichloropropane, ug/L	0.6	0.2U	0.2U		0.2U	0.2U	
1,3,5-Trimethylbenzene, ug/L		0.2U	0.2U		0.2U	0.2U	
1,3-Dichlorobenzene, ug/L		0.2U	0.2U		0.2U	0.2U	
1,3-Dichloropropane, ug/L		0.2U	0.2U		0.2U	0.2U	
1,4-Dichlorobenzene, ug/L	4	0.2U	0.2U		0.2U	0.2U	
2,2-Dichloropropane, ug/L		0.2U	0.2U		0.2U	0.2U	
2-Butanone (MEK), ug/L		5U	5U		5U	5U	

* CONF = Confluent growth on all dilutions, no coliforms. ** Indicates detected in the trip blank but not qualified.

J - Estimated value. B - Compound found in blank. M - Estimated value - low spectral match parameters.

No result indicates analyte not analyzed for. Q - Indicates quarter of the year (ie: Q1 = first quarter).

U - Not detected above indicated detection limit. Y - Not detected at raised detection limit.

GWCL - Groundwater Contaminant Level as outlined in WAC 173-200, Appendix A. These values are the most stringent levels derived from WAC 173-200 (10/1990) and WAC 246-290 (7/2004).

The Groundwater Quality Criteria for pH is 6.5 to 8.5.

Sample Name		SMW-1	SMW-2	SMW-3	SMW-4	SMW-5s	SMW-5d
Constituent	GWCL						
2-Chloroethyl Vinyl Ether, ug/L		1U	1U		1U	1U	
2-Chlorotoluene, ug/L		0.2U	0.2U		0.2U	0.2U	
2-Hexanone, ug/L		5U	5U		5U	5U	
4-Chlorotoluene, ug/L		0.2U	0.2U		0.2U	0.2U	
4-Isopropyltoluene, ug/L		0.2U	0.2U		0.2U	0.2U	
4-Methyl-2-Pentanone (MIBK), ug/L		5U	5U		5U	5U	
Acetone, ug/L		5U	5U		5U	5U	
Acrolein, ug/L		5U	5U		5U	5U	
Acrylonitrile, ug/L	0.07	1U	1U		1U	1U	
Benzene, ug/L	1	0.2U	0.2U		0.2U	0.2U	
Bromobenzene, ug/L		0.2U	0.2U		0.2U	0.2U	
Bromochloromethane, ug/L		0.2U	0.2U		0.2U	0.2U	
Bromodichloromethane, ug/L	0.3	0.2U	0.2U		0.2U	0.2U	
Bromoform, ug/L	5	0.2U	0.2U		0.2U	0.2U	
Bromomethane, ug/L		1U	1U		1U	1U	
Carbon Disulfide, ug/L		0.2U	0.2U		0.2U	0.25	
Carbon Tetrachloride, ug/L	0.3	0.2U	0.2U		0.2U	0.2U	
Chlorobenzene, ug/L	100	0.2U	0.2U		0.2U	0.2U	
Chloroethane, ug/L		0.2U	0.2U		0.29	0.29	
Chloroform, ug/L	7	0.2U	0.2U		0.2U	0.2U	
Chloromethane, ug/L		0.5U	0.5U		0.5U	0.5U	
cis-1,2-Dichloroethene, ug/L		0.24	0.2U		0.2U	0.2U	
cis-1,3-Dichloropropene, ug/L		0.2U	0.2U		0.2U	0.2U	
Dibromochloromethane, ug/L		0.2U	0.2U		0.2U	0.2U	
Dibromomethane, ug/L		0.2U	0.2U		0.2U	0.2U	
Dichloromethane(Methylene Chloride), ug/L	5	1U	1U		1U	1U	
Ethylbenzene, ug/L	700	0.2U	0.2U		0.2U	0.2U	
Hexachlorobutadiene, ug/L		0.5U	0.5U		0.5U	0.5U	
Iodomethane, ug/L		1U	1U		1U	1U	
Isopropylbenzene (Cumene), ug/L		0.2U	0.2U		0.2U	0.2U	
m,p-Xylene, ug/L		0.4U	0.4U		0.4U	0.4U	
Naphthalene, ug/L		0.5U	0.5U		0.5U	0.5U	
n-Butylbenzene, ug/L		0.2U	0.2U		0.2U	0.2U	
n-Propylbenzene, ug/L		0.2U	0.2U		0.2U	0.2U	
o-Xylene, ug/L		0.2U	0.2U		0.2U	0.2U	
sec-Butylbenzene, ug/L		0.2U	0.2U		0.2U	0.2U	
Styrene, ug/L	100	0.2U	0.2U		0.2U	0.2U	
tert-Butylbenzene, ug/L		0.2U	0.2U		0.2U	0.2U	
Tetrachloroethene (PCE), ug/L	0.8	17	0.2U		1.16	3.11	
Toluene, ug/L	1000	0.2U	0.2U		0.2U	0.2U	
Total Xylenes, ug/L	10000	0.6U	0.6U		0.6U	0.6U	
trans-1,2-Dichloroethene, ug/L	100	0.2U	0.2U		0.2U	0.2U	
trans-1,3-Dichloropropene, ug/L		0.2U	0.2U		0.2U	0.2U	
trans-1,4-Dichloro-2-butene, ug/L		1U	1U		1U	1U	
Trichloroethene (TCE), ug/L	3	0.89	0.2U		0.2U	0.23	

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GWCL - Groundwater Contaminant Level as outlined in WAC 173-200, Appendix A. These values are the most stringent levels derived from WAC 173-200 (10/1990) and WAC 246-290 (7/2004).

The Groundwater Quality Criteria for pH is 6.5 to 8.5.

Sample Name		SMW-1	SMW-2	SMW-3	SMW-4	SMW-5s	SMW-5d
Constituent	GWCL						
Trichlorofluoromethane (CFC 11), ug/L		0.35	0.2U		0.2U	0.2U	
Vinyl Acetate, ug/L		0.2U	0.2U		0.2U	0.2U	
Vinyl Chloride, ug/L	0.02	0.2U	0.2U		0.2U	0.2U	

* CONF = Confluent growth on all dilutions, no coliforms.

** Indicates detected in the trip blank but not qualified.

J - Estimated value. B - Compound found in blank.

M - Estimated value - low spectral match parameters.

No result indicates analyte not analyzed for.

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The Groundwater Quality Criteria for pH is 6.5 to 8.5.

Sample Name		SMW-1	SMW-2	SMW-3	SMW-4	SMW-5s	SMW-5d
Constituent	GWCL						
Field Parameters							
Depth to Water, Ft.		235.42	219.09	282.56	235.03	181.51	184.6
Oxidation Reduction Potential, mV		-90	37		41.6	17.3	
pH, Field, std. units		7.33	7.7		7.61	7.42	
Specific Conductance @ 25C, Field, umhos/cm	700	522	402		367	589	
Temperature, C		16.4	16.75		9.95	17.69	
Inorganics							
Ammonia, Total, mg/L as N		0.04U	0.04U			0.04U	
Carbon, Total Organic, mg/L		0.66	0.5			1.6	
Chemical Oxygen Demand (COD), mg/L		10U	10U			50U	
Chloride, mg/L	250	17.9D	4.68			25.2D	
Nitrate, mg/L as N	10	2.29H	0.323H			1.76H	
Nitrate + Nitrite (NO2 + NO3), mg-N/L	10	2.31D	0.338			1.77D	
Nitrite, mg/L as N	1	0.014H	0.015H			0.011H	
Sulfate, mg/L	250	79.2D	83.2D			83.4D	
Metals							
Iron, Dissolved, mg/L	0.3	0.108	0.05U				
Manganese, Dissolved, mg/L	0.05	0.0125	0.004U				
Zinc, Dissolved, mg/L	5	0.02U	0.02U				
VOC							
1,1,1,2-Tetrachloroethane, ug/L		0.2U	0.2U			0.2U	
1,1,1-Trichloroethane (TCA), ug/L	200	0.2U	0.2U			0.2U	
1,1,2,2-Tetrachloroethane, ug/L		0.2U	0.2U			0.2U	
1,1,2-Trichloro-1,2,2-trifluoroetha, ug/l		0.2U	0.2U			0.2U	
1,1,2-Trichloroethane, ug/L		0.2U	0.2U			0.2U	
1,1-Dichloroethane, ug/L	1	0.2U	0.2U			0.2U	
1,1-Dichloroethene, ug/L		0.36	0.2U			0.2U	
1,1-Dichloropropene, ug/L		0.2U	0.2U			0.2U	
1,2,3-Trichlorobenzene, ug/L		0.5U	0.5U			0.5U	
1,2,3-Trichloropropane, ug/L		0.5U	0.5U			0.5U	
1,2,4-Trichlorobenzene, ug/L	70	0.5U	0.5U			0.5U	
1,2,4-Trimethylbenzene, ug/L		0.2U	0.2U			0.2U	
1,2-Dibromo-3-chloropropane (DBCP), ug/L		0.5U	0.5U			0.5U	
1,2-Dibromoethane (EDB), ug/L		0.2U	0.2U			0.2U	
1,2-Dichlorobenzene, ug/L		0.2U	0.2U			0.2U	
1,2-Dichloroethane (EDC), ug/L	0.5	0.2U	0.2U			0.2U	
1,2-Dichloropropane, ug/L	0.6	0.2U	0.2U			0.2U	
1,3,5-Trimethylbenzene, ug/L		0.2U	0.2U			0.2U	
1,3-Dichlorobenzene, ug/L		0.2U	0.2U			0.2U	
1,3-Dichloropropane, ug/L		0.2U	0.2U			0.2U	
1,4-Dichlorobenzene, ug/L	4	0.2U	0.2U			0.2U	
2,2-Dichloropropane, ug/L		0.2U	0.2U			0.2U	

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The Groundwater Quality Criteria for pH is 6.5 to 8.5.

Table 3b. Groundwater Monitoring Data, Snipes Mountain Landfill

2021 Q4

Sample Name		SMW-1	SMW-2	SMW-3	SMW-4	SMW-5s	SMW-5d
Constituent	GWCL						
2-Butanone (MEK), ug/L		5U	5U			5U	
2-Chloroethyl Vinyl Ether, ug/L		1U	1U			1U	
2-Chlorotoluene, ug/L		0.2U	0.2U			0.2U	
2-Hexanone, ug/L		5U	5U			5U	
4-Chlorotoluene, ug/L		0.2U	0.2U			0.2U	
4-Isopropyltoluene, ug/L		0.2U	0.2U			0.2U	
4-Methyl-2-Pentanone (MIBK), ug/L		5U	5U			5U	
Acetone, ug/L		5U	5U			5U	
Acrolein, ug/L		5U	5U			5U	
Acrylonitrile, ug/L	0.07	1U	1U			1U	
Benzene, ug/L	1	0.2U	0.2U			0.2U	
Bromobenzene, ug/L		0.2U	0.2U			0.2U	
Bromochloromethane, ug/L		0.2U	0.2U			0.2U	
Bromodichloromethane, ug/L	0.3	0.2U	0.2U			0.2U	
Bromoform, ug/L	5	0.2U	0.2U			0.2U	
Bromomethane, ug/L		1U	1U			1U	
Carbon Disulfide, ug/L		0.2U	0.2U			0.2U	
Carbon Tetrachloride, ug/L	0.3	0.2U	0.2U			0.2U	
Chlorobenzene, ug/L	100	0.2U	0.2U			0.2U	
Chloroethane, ug/L		0.2U	0.2U			0.2U	
Chloroform, ug/L	7	0.2U	0.2U			0.2U	
Chloromethane, ug/L		0.5U	0.5U			0.5U	
cis-1,2-Dichloroethene, ug/L		0.2U	0.2U			0.2U	
cis-1,3-Dichloropropene, ug/L		0.2U	0.2U			0.2U	
Dibromochloromethane, ug/L		0.2U	0.2U			0.2U	
Dibromomethane, ug/L		0.2U	0.2U			0.2U	
Dichloromethane(Methylene Chloride), ug/L	5	1U	1U			1U	
Ethylbenzene, ug/L	700	0.2U	0.2U			0.2U	
Hexachlorobutadiene, ug/L		2U	2U			2U	
Iodomethane, ug/L		1U	1U			1U	
Isopropylbenzene (Cumene), ug/L		0.2U	0.2U			0.2U	
m,p-Xylene, ug/L		0.4U	0.4U			0.4U	
Naphthalene, ug/L		0.5U	0.5U			0.5U	
n-Butylbenzene, ug/L		0.2U	0.2U			0.2U	
n-Propylbenzene, ug/L		0.2U	0.2U			0.2U	
o-Xylene, ug/L		0.2U	0.2U			0.2U	
sec-Butylbenzene, ug/L		0.2U	0.2U			0.2U	
Styrene, ug/L	100	0.2U	0.2U			0.2U	
tert-Butylbenzene, ug/L		0.2U	0.2U			0.2U	
Tetrachloroethene (PCE), ug/L	0.8	14.1	0.2U			1.73	
Toluene, ug/L	1000	0.2U	0.2U			0.2U	
Total Xylenes, ug/L	10000	0.6U	0.6U			0.6U	
trans-1,2-Dichloroethene, ug/L	100	0.2U	0.2U			0.2U	
trans-1,3-Dichloropropene, ug/L		0.2U	0.2U			0.2U	
trans-1,4-Dichloro-2-butene, ug/L		1U	1U			1U	

* CONF = Confluent growth on all dilutions, no coliforms. ** Indicates detected in the trip blank but not qualified.

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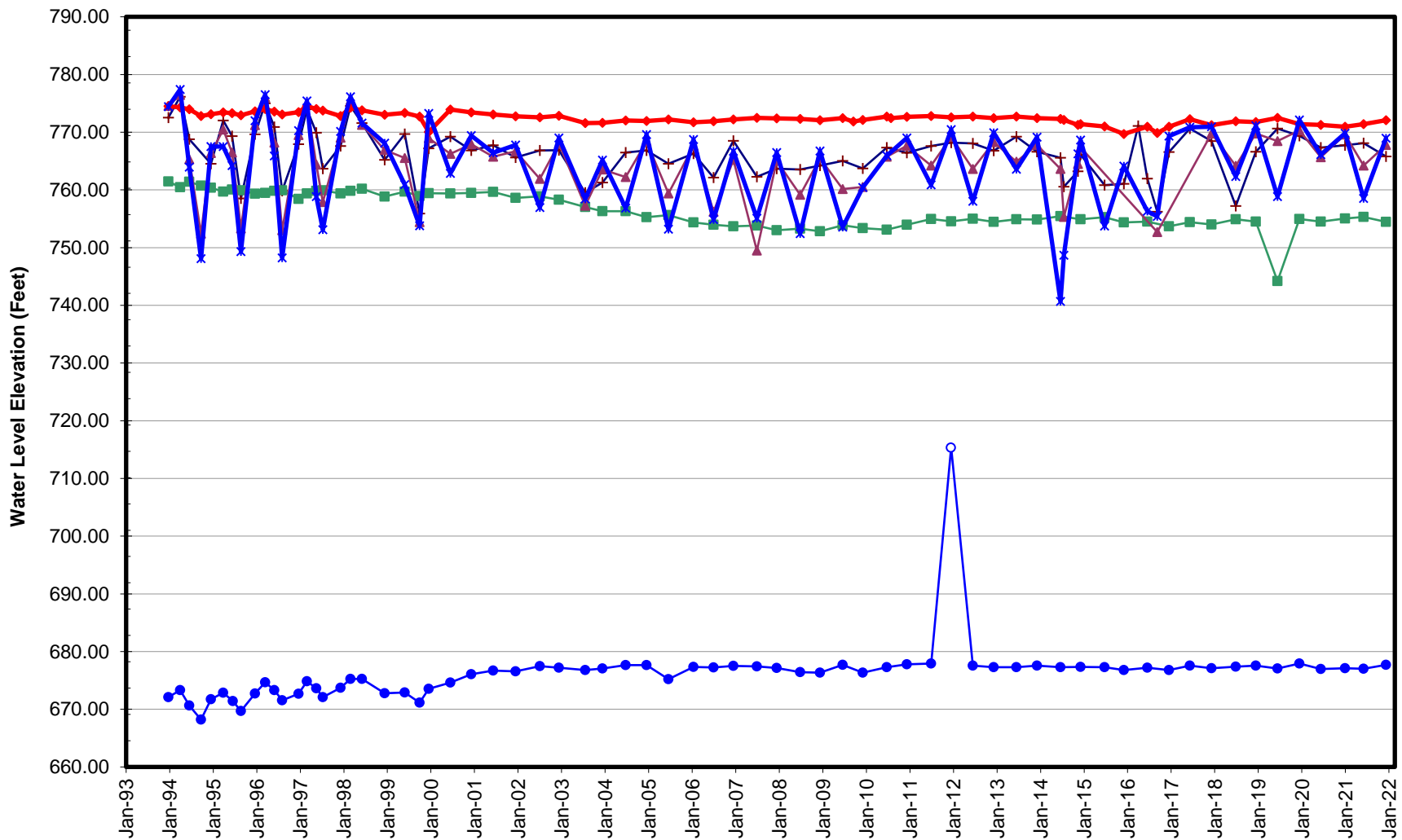
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The Groundwater Quality Criteria for pH is 6.5 to 8.5.

Sample Name		SMW-1	SMW-2	SMW-3	SMW-4	SMW-5s	SMW-5d
Constituent	GWCL						
Trichloroethene (TCE), ug/L	3	0.72	0.2U			0.2U	
Trichlorofluoromethane (CFC 11), ug/L		0.29	0.2U			0.2U	
Vinyl Acetate, ug/L		0.2U	0.2U			0.2U	
Vinyl Chloride, ug/L	0.02	0.2U	0.2U			0.2U	

* CONF = Confluent growth on all dilutions, no coliforms. ** Indicates detected in the trip blank but not qualified.
 J - Estimated value. B - Compound found in blank. M - Estimated value - low spectral match parameters.
 No result indicates analyte not analyzed for. Q - Indicates quarter of the year (ie: Q1 = first quarter).
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 GWCL - Groundwater Contaminant Level as outlined in WAC 173-200, Appendix A. These values are the most stringent levels derived from WAC 173-200 (10/1990) and WAC 246-290 (7/2004).
 The Groundwater Quality Criteria for pH is 6.5 to 8.5.



+ SMW-1 ● SMW-2 ■ SMW-3
 ▲ SMW-4 ◆ SMW-5s * SMW-5d
 Hollow data points indicate suspect measurements.

Figure 1. Hydrographs
Snipes Mountain Landfill (LVTS)



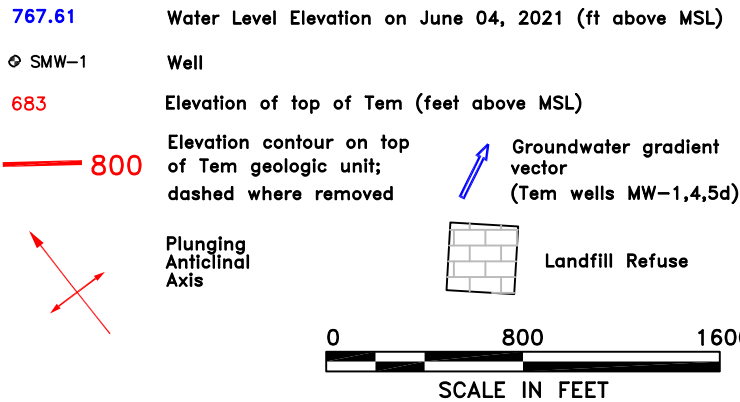
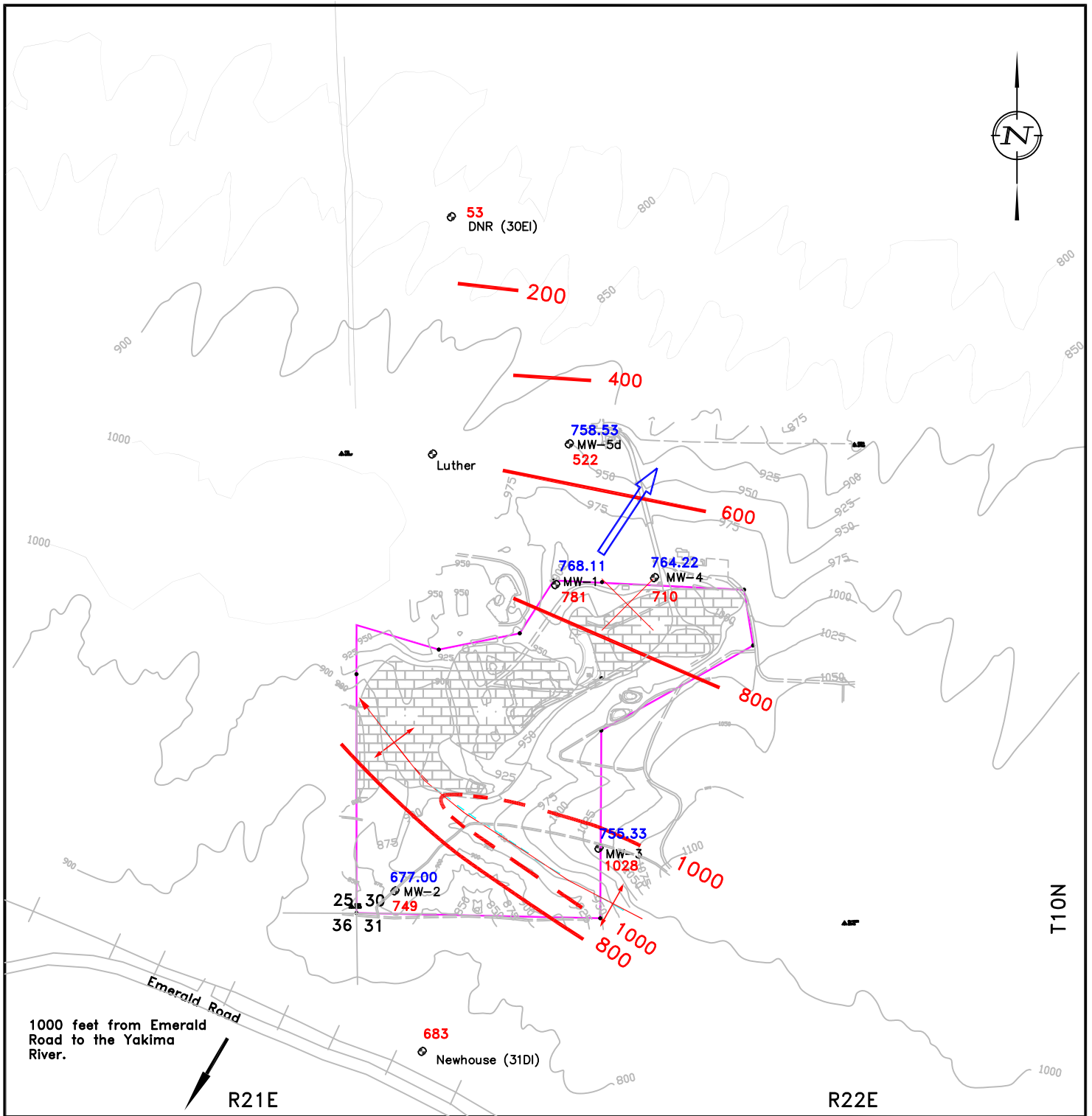
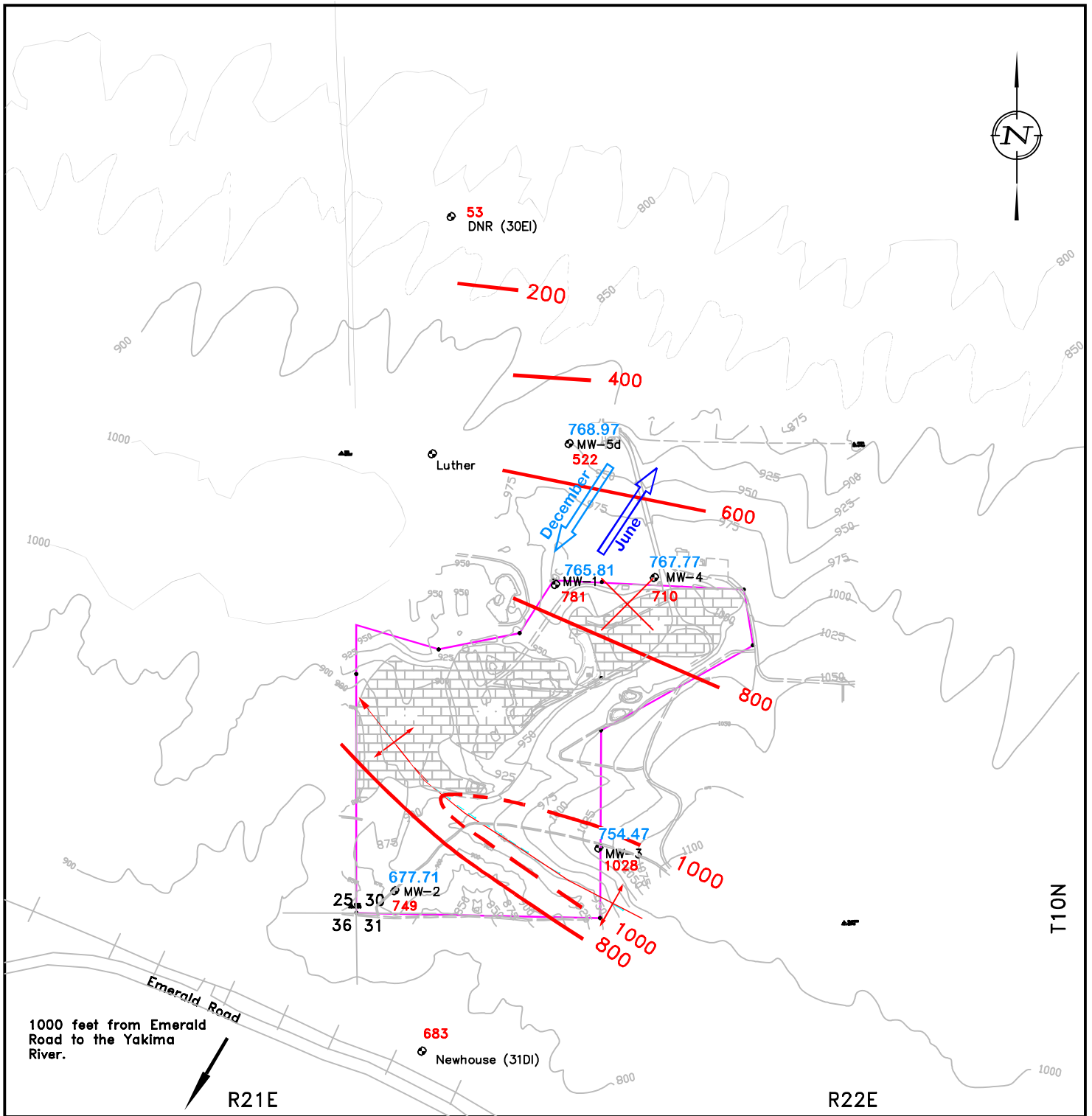


Figure 2a
 GROUNDWATER ELEVATION AND
 STRUCTURAL CONTOUR MAP
 June 04, 2020
 SNIPES MOUNTAIN LANDFILL





765.34

SMW-1

Water Level December 2021

Well

683

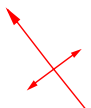
Elevation of top of Tem (feet above MSL)

800

Elevation contour on top of Tem geologic unit; dashed where removed



Groundwater gradient vector (Tem wells MW-1,4,5d)



Plunging Anticlinal Axis



Landfill Refuse

0 800 1600

SCALE IN FEET

Figure 2b

GROUNDWATER ELEVATION AND STRUCTURAL CONTOUR MAP

SNIPES MOUNTAIN LANDFILL

PG&E

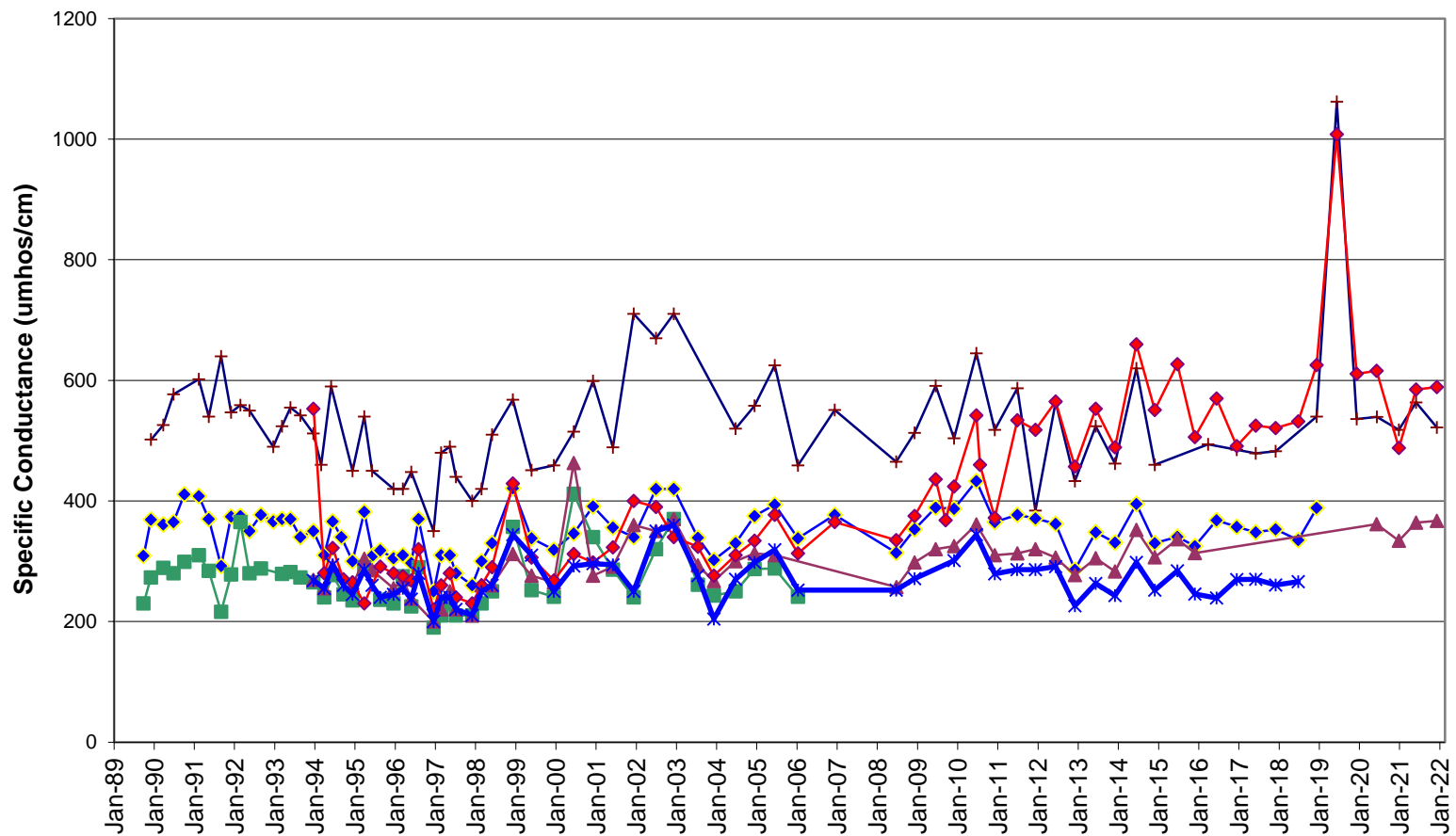


Figure 3. Specific Conductance Time Series Plot
Snipes Mountain Landfill (LVTS)

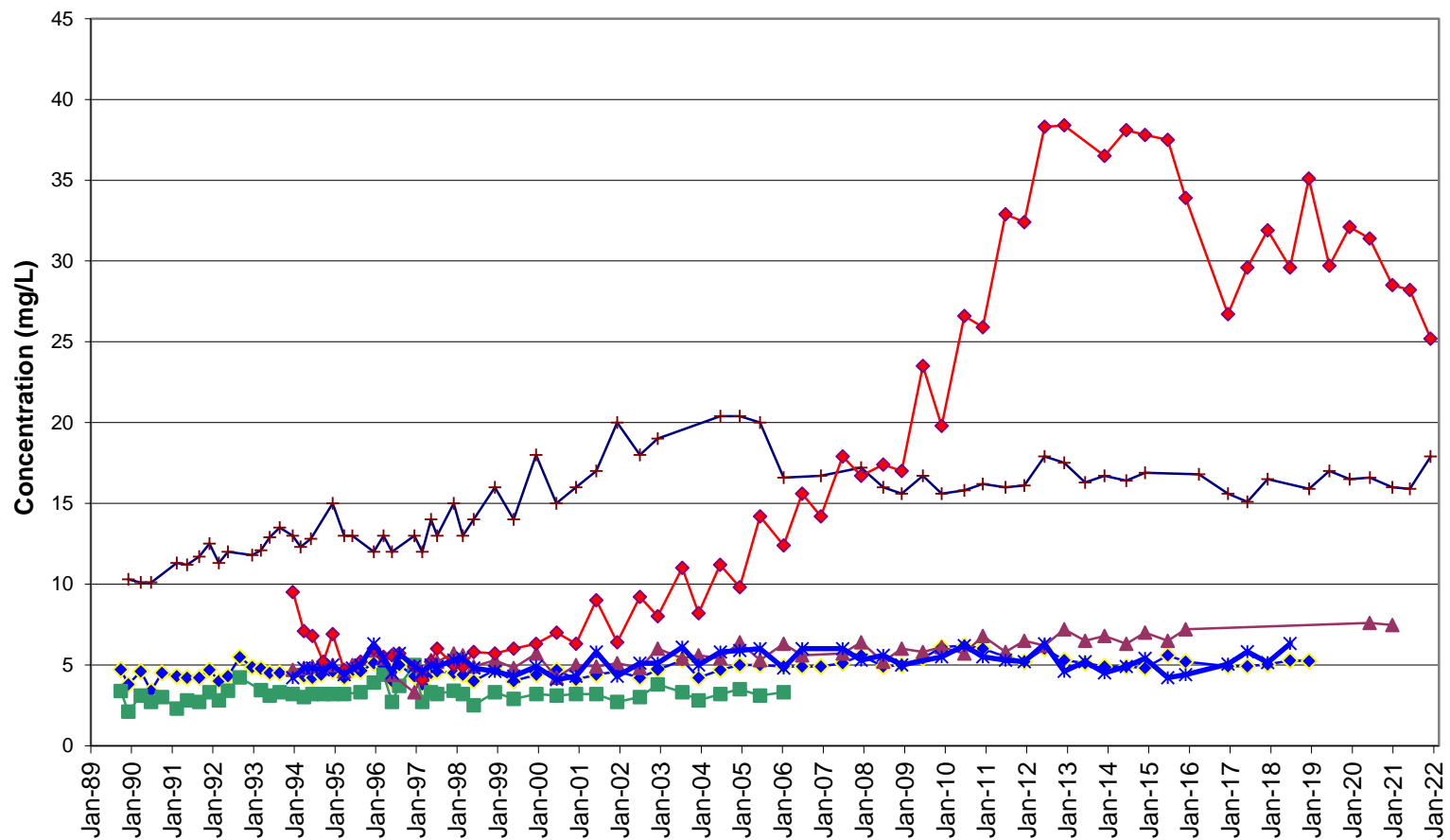


Figure 4. Chloride Time Series Plot
Snipes Mountain Landfill (LVTS)

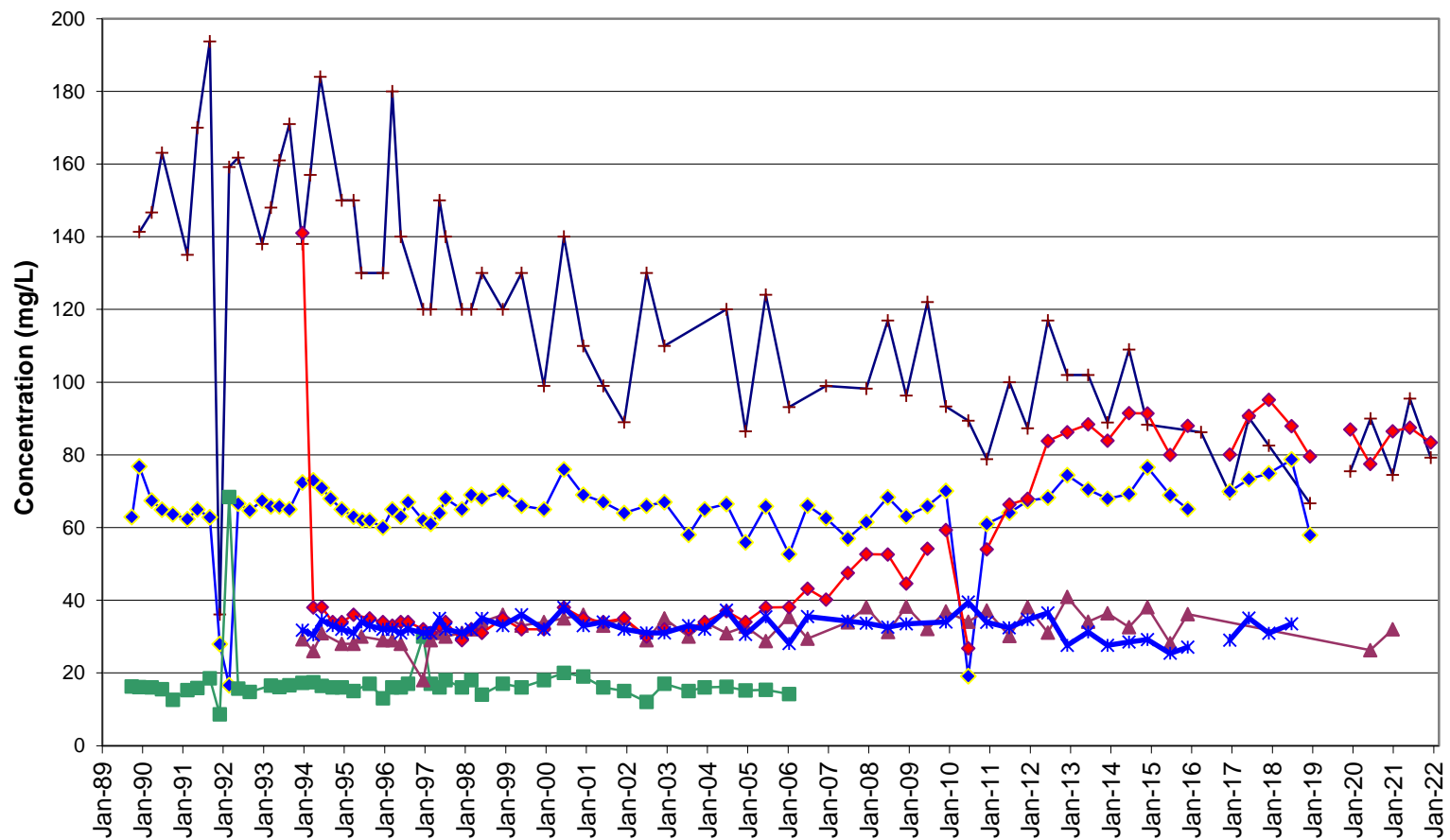
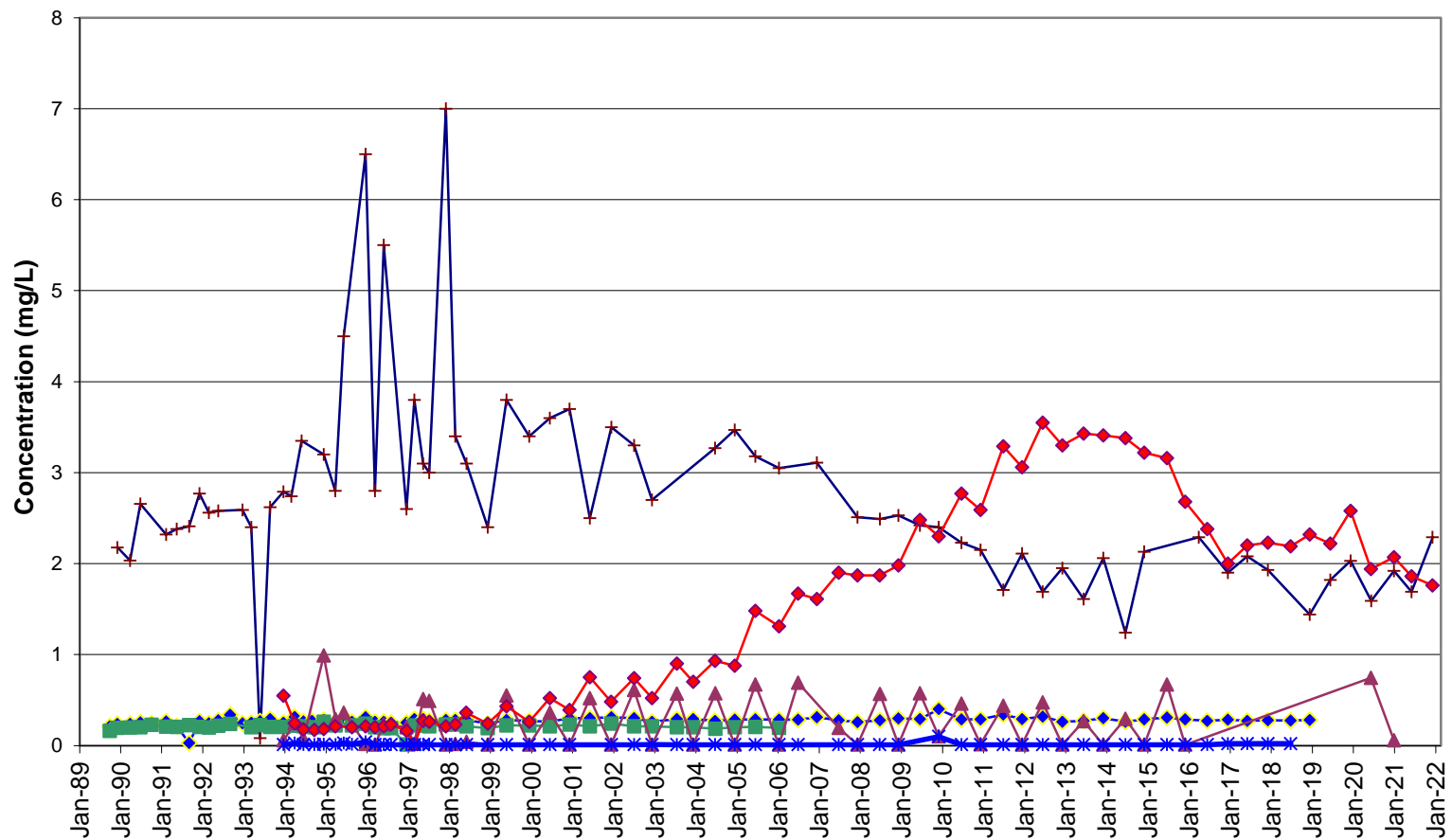


Figure 5. Sulfate Time Series Plot
Snipes Mountain Landfill (LVTS)

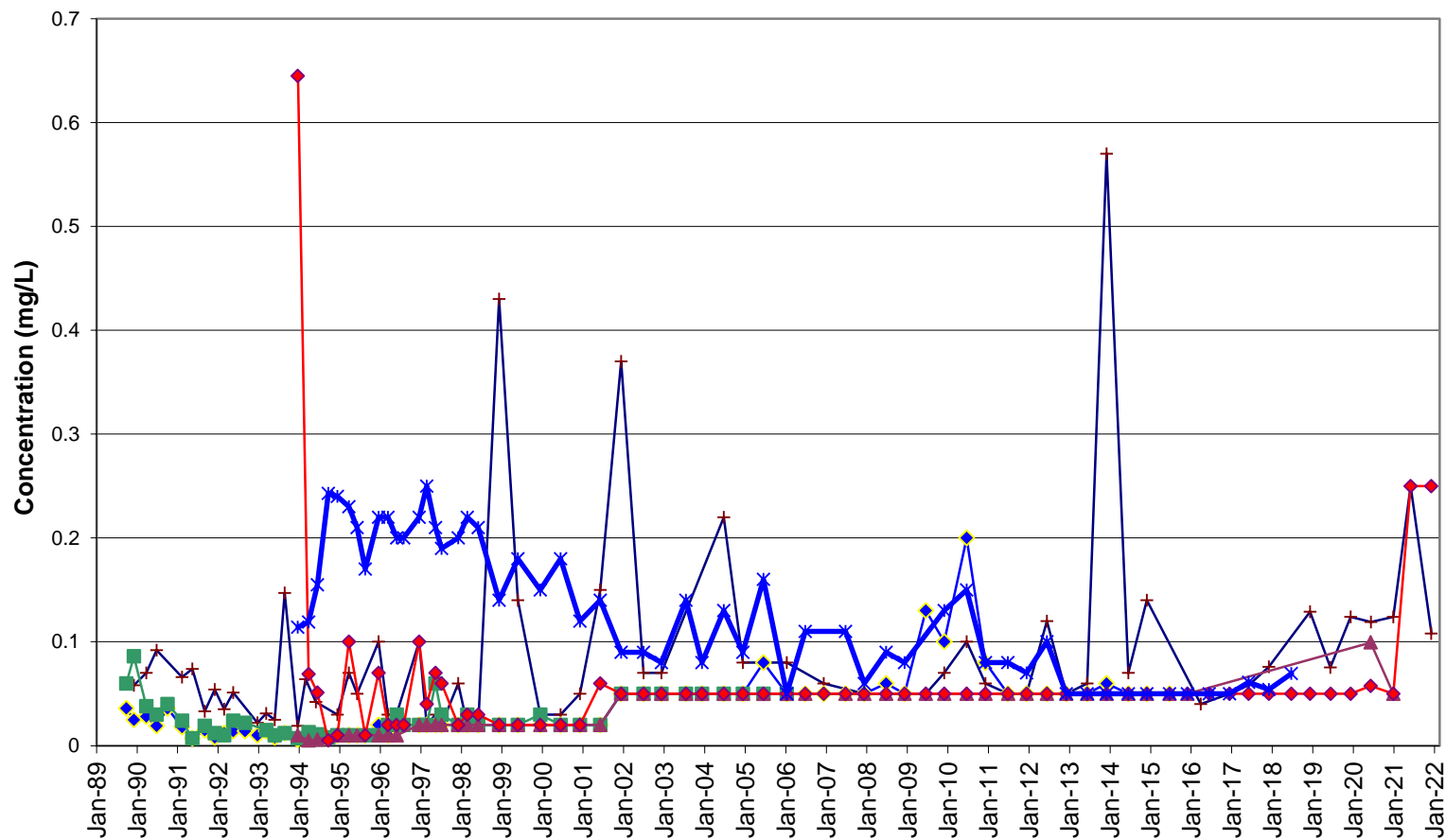


- +— SMW-1 —♦— SMW-2 —■— SMW-3
- ▲— SMW-4 —◆— SMW-5S —*— SMW-5D

Non-detects plotted at reporting limit

Figure 6. Nitrate Time Series Plot
Snipes Mountain Landfill (LVTS)



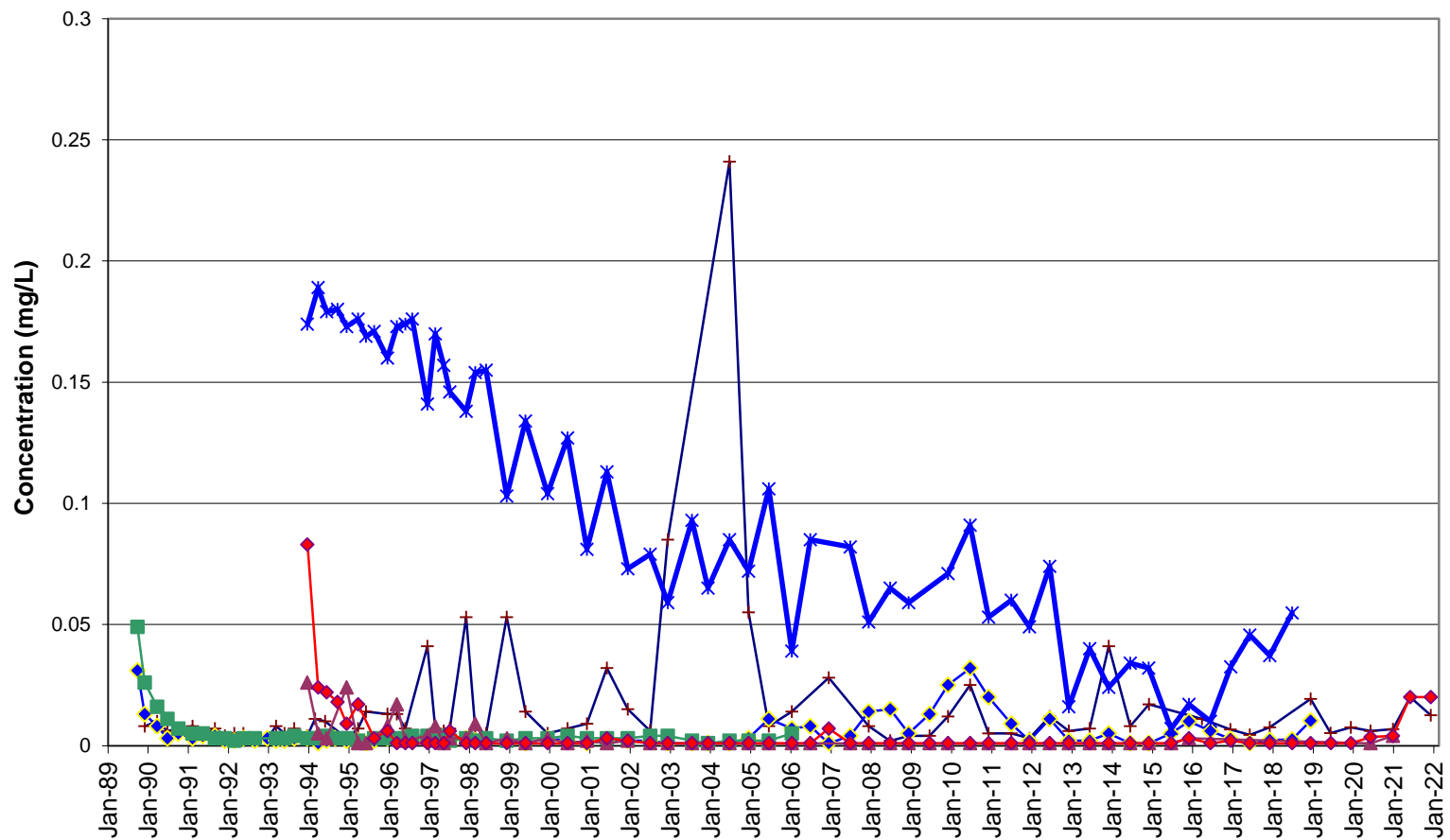


SMW-1 SMW-2 SMW-3
 SMW-4 SMW-5S SMW-5D

Non-detects plotted at reporting limit

Figure 7. Dissolved Iron Time Series Plot
Snipes Mountain Landfill (LVTS)



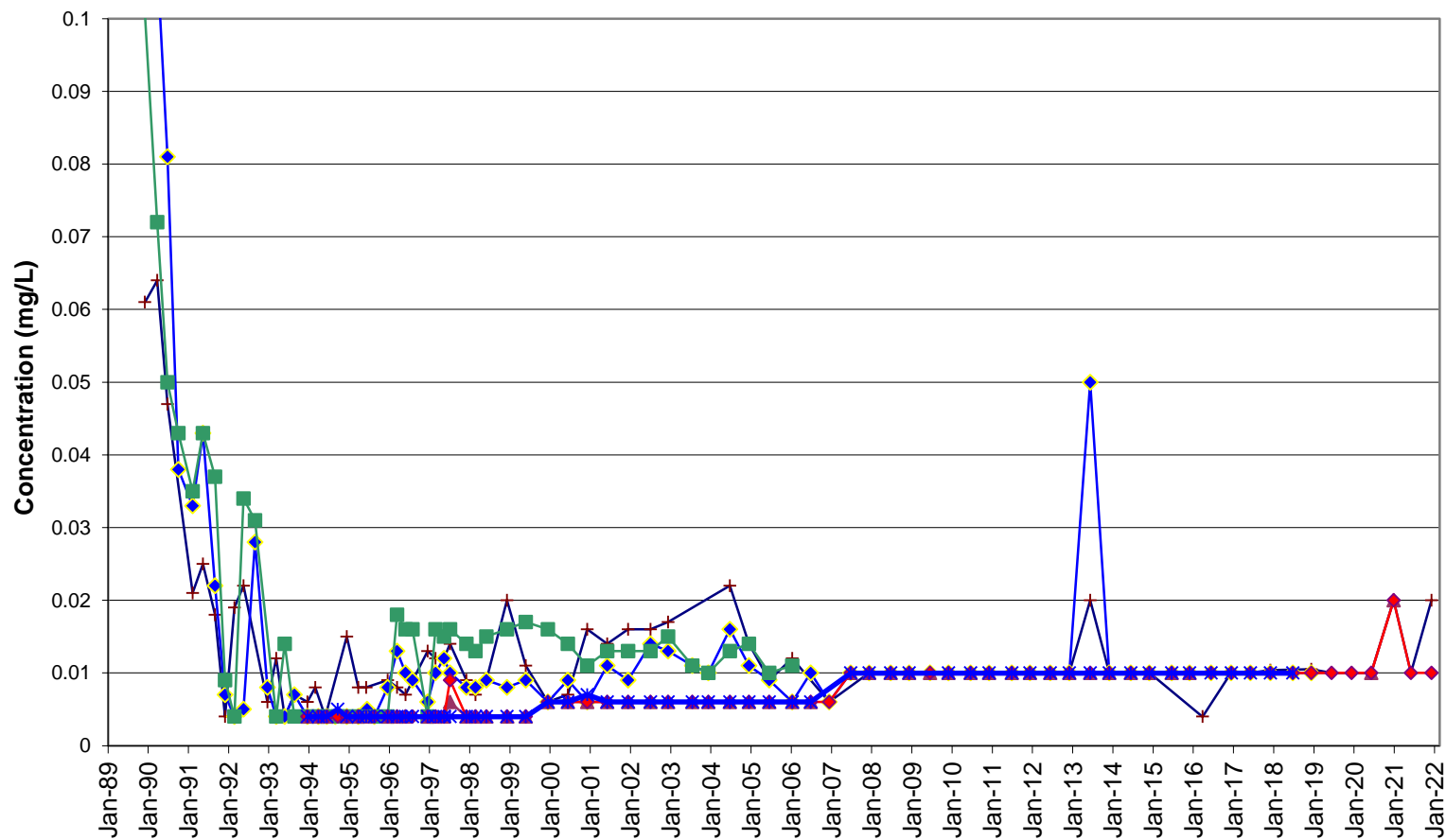


+ SMW-1 * SMW-2 ■ SMW-3
 ▲ SMW-4 ◆ SMW-5S * SMW-5D

Non-detects plotted at reporting limit

Figure 8. Dissolved Manganese Time Series Plot
Snipes Mountain Landfill (LVTS)



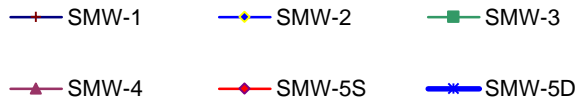
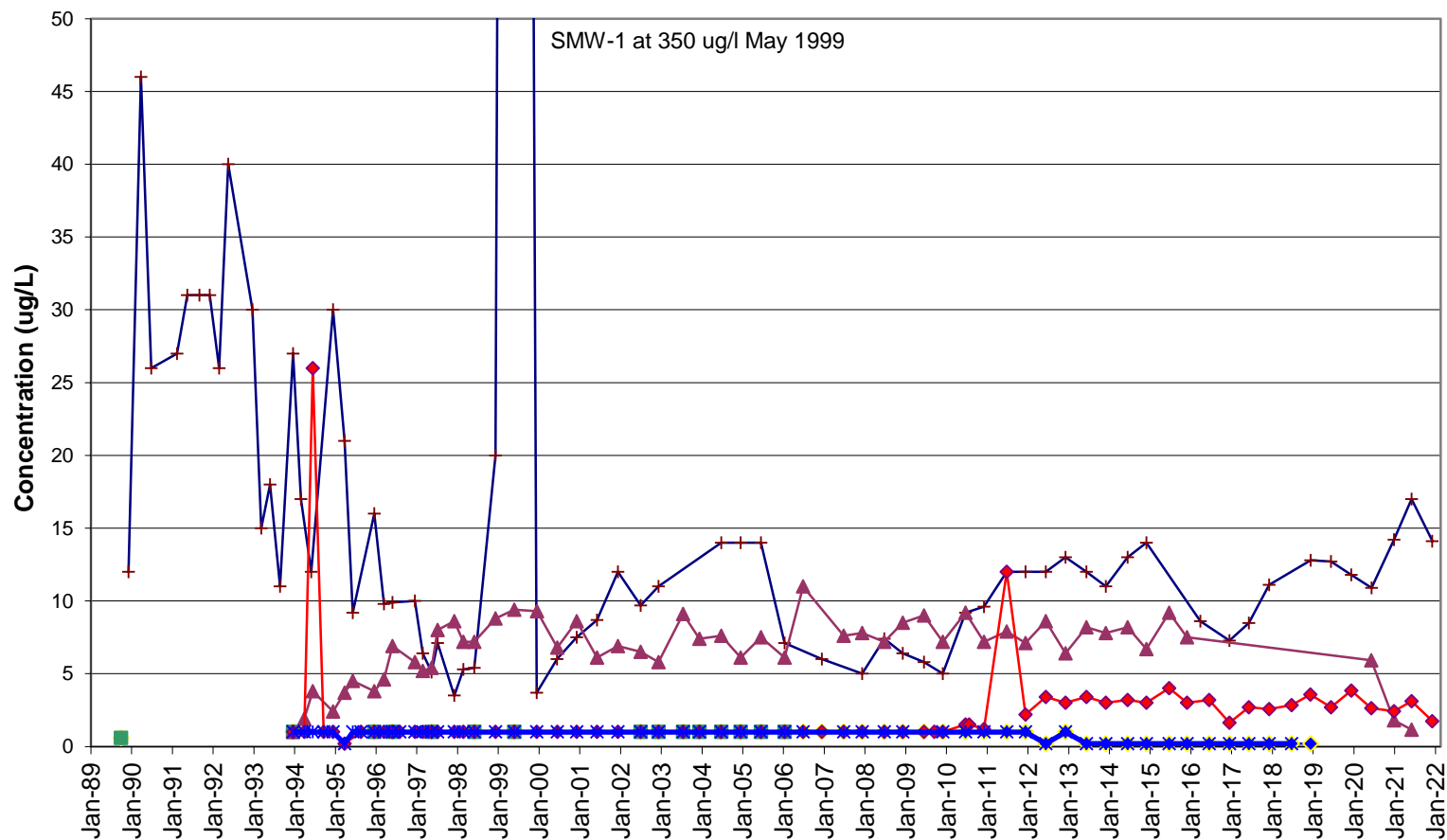


+ SMW-1 ◆ SMW-2 ■ SMW-3
 ▲ SMW-4 ◆ SMW-5S ◆ SMW-5D

Non-detects plotted at reporting limit

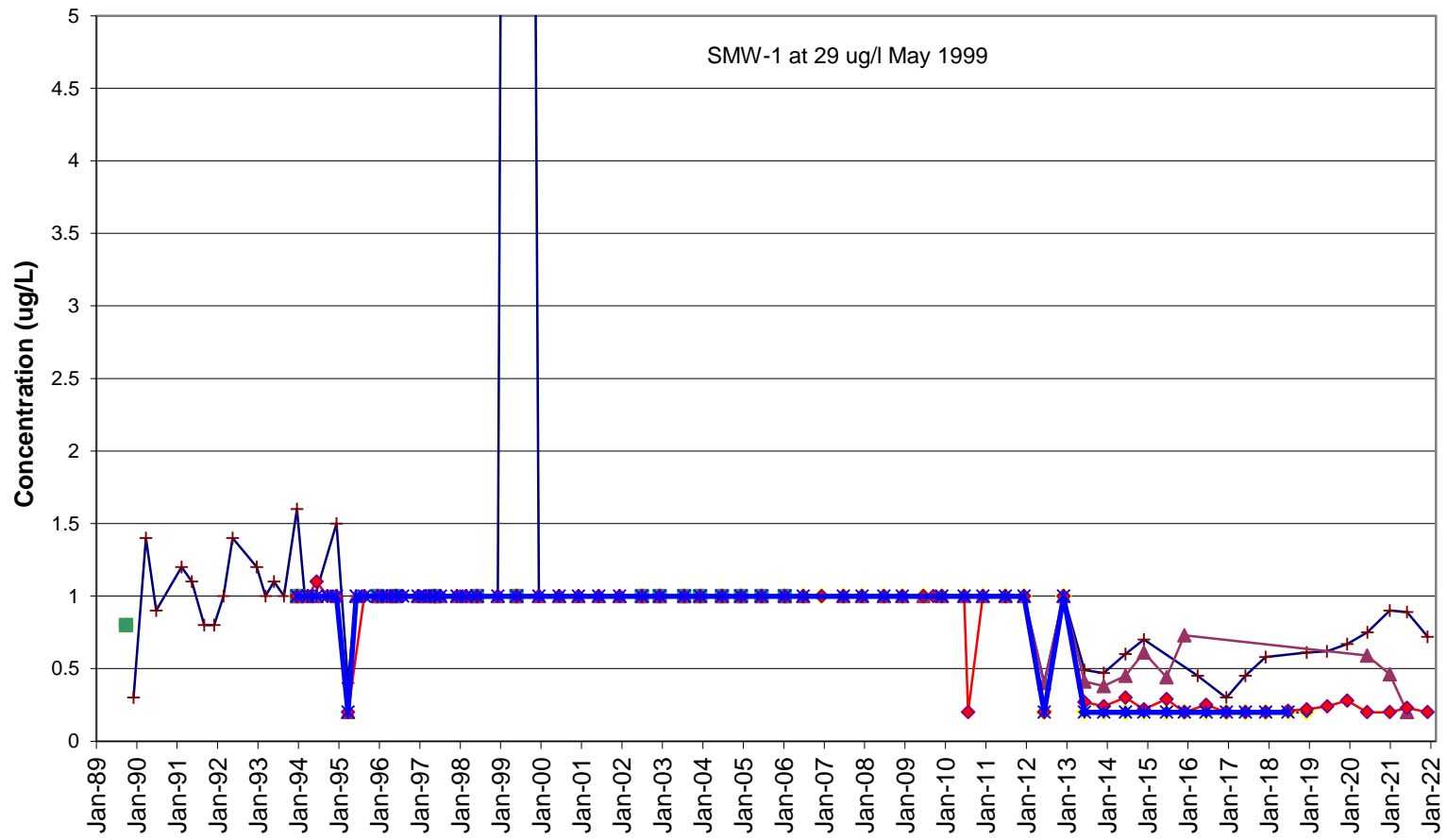
Figure 9. Dissolved Zinc Time Series Plot
Snipes Mountain Landfill (LVTS)





Non-detects plotted at reporting limit

Figure 10. Tetrachloroethene (PCE) Time Series Plot
Snipes Mountain Landfill (LVTS)



- +— SMW-1 —●— SMW-2 —■— SMW-3
- ▲— SMW-4 —◆— SMW-5S —*— SMW-5D

Non-detects plotted at reporting limit

Figure 11. Trichloroethene (TCE) Time Series Plot
Snipes Mountain Landfill (LVTS)



