

Tank 5 Quarterly Release Response Report Red Hill Bulk Fuel Storage Facility JBPHH, Oahu, Hawaii

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Executive Summary

Navy Region Hawaii (NRH) prepared this Quarterly Release Response Report in accordance with the State of Hawaii Department of Health (DOH) Underground Storage Tank (UST) Technical Guidance Manual (DOH, 2000) and in response to the DOH release response letters dated February 12, 2014 and February 26, 2014 for the Red Hill Bulk Fuel Storage Facility (Facility). The objective of this report is to describe the actions taken by the Navy between April and June 2019 in response to the fuel reportedly released from Tank 5 in January 2014.

Soil vapor and groundwater samples continue to be collected from locations inside the Red Hill tunnel system. Groundwater samples are also collected from locations outside the Red Hill tunnel system.

The Navy continues to perform work to ensure the drinking water around the Facility remains safe. Future release response actions include determining the feasibility of alternatives for investigating and remediating releases from the Facility and continuing efforts to monitor and characterize the flow of groundwater around the Facility.

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1.0 Introduction

As required by Hawaii Administrative Rules 11-280.1-65.2, Release Response Reporting, this Quarterly Release Response Report presents the following information:

- 1) All release response actions taken pursuant to subchapter 6 after the last reported date;
- 2) A plan for future release response actions to be taken; and
- 3) Information required pursuant to section 11-280.1-65.1.

This report presents a summary of the release response activities performed April 1 through June 30, 2019 at the Red Hill Bulk Fuel Storage Facility (hereinafter referred to as “the Facility”) located at Joint Base Pearl Harbor-Hickam (JBPHH), Oahu, Hawaii.

1.1 Statement of Purpose

Release response actions were performed to address a fuel release observed in Tank 5.

1.2 Previous Reports

The following documents were previously submitted to DOH:

- Release confirmation information for Tank 5 as Navy Region Hawaii (NRH) letter 5090 Ser N45/044 dated January 23, 2014
- Initial Release Response Report, enclosed with NRH letter 5090 Ser N45/320 dated April 24, 2014
- Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/563 dated July 22, 2014
- Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/929 dated November 10, 2014
- Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/121 dated January 21, 2015
- Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/322 dated April 20, 2015
- Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/573 dated July 17, 2015
- Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/812 dated October 16, 2015
- Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/0411 dated January 13, 2016
- Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/0508 dated April 13, 2016

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- Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/0583 dated July 28, 2016
 - Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/0658 dated October 24, 2016
 - Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/0422 dated January 27, 2017
 - Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/0489 dated April 24, 2017
 - Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/0552 dated July 24, 2017
 - Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/0627 dated October 23, 2017
 - Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/0410 dated January 19, 2018
 - Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/0492 dated April 19, 2018
 - Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/0553 dated July 18, 2018
 - Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/0630 dated October 16, 2018
 - Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/0403 dated January 11, 2019
 - Quarterly Release Response Report enclosed with NRH letter 5090 Ser N45/0403 dated April 15, 2019

2.0 Background

The following sections provide a description of the site and information on the Facility.

2.1 Site Description

The Facility is located on federal government land (zoned a mix of F1- Military and Federal and P-1 Restricted Preservation districts) in south-central Oahu, approximately 2.5 miles northeast of Pearl Harbor. It is located on a low ridge on the western edge of the Koolau Mountain Range that divides Halawa Valley from Moanalua Valley. The Facility occupies 144 acres of land and the majority of the ground surface of the site lies at an elevation of approximately 200 to 500 feet above mean sea level (msl) (AECOM Technical Services, Inc., 2018).

The Facility is bordered on the southwest by residential neighborhoods and the United States (U.S.) Coast Guard reservation, on the southeast by residential neighborhoods in Moanalua

Valley, and on the northeast by preservation land. The Facility is bordered on the north by Halawa Correctional Facility and Halawa Industrial Park, which includes private businesses and a former bus facility. A quarry is located less than a quarter mile away to the northwest.

2.2 Facility Information

The Facility contains eighteen (18) active and two (2) inactive bulk fuel field-constructed underground storage tanks (USTs), which are operated by Naval Supply Systems Command (NAVSUP) Fleet Logistics Center (FLC) Pearl Harbor (formerly Fleet and Industrial Supply Center). The Facility was constructed by the U.S. Government in the early 1940s. Twenty (20) USTs and a series of tunnels were constructed to supply fuel to the Navy. Each UST has a capacity of approximately 12.5 million gallons. The Facility is located approximately 100 feet above the basal aquifer. The USTs currently contain Jet Fuel Propellant No. 5 (JP-5), North Atlantic Treaty Organization (NATO)-grade F-24 jet fuel, or Marine Diesel Fuel (F-76). Tank 5 was used to store Jet Fuel Propellant No. 8 (JP-8).

Four (4) groundwater monitoring wells (wells RHMW01, RHMW02, RHMW03, and RHMW05) are located within the lower access tunnel, and one (1) sampling point (RHMW2254-01) is located at Red Hill Shaft. Sampling point RHMW2254-01 is located inside the infiltration gallery of the Department of the Navy (Navy) Supply Well 2254-01.

Nine (9) groundwater monitoring wells (RHMW04, RHMW06, RHMW07, RHMW08, RHMW09, RHMW10, RHMW11, OWDFMW01, and HDMW2253-03) are located outside of the Facility tunnel system. Well OWDFMW01 is located at the former Oily Waste Disposal Facility, near Adit 3, and wells RHMW11 and HDMW2253-03 are located at the Halawa Correctional Facility (outside the Red Hill Facility).

3.0 Groundwater and Soil Vapor Monitoring

The following sections describe activities that were performed to monitor the groundwater and soil vapor beneath Tank 5 from April 1 through June 30, 2019.

3.1 Oil/Water Interface Measurements

The water level was gauged and measured for the presence of light non-aqueous phase liquids (LNAPLs) using an interface meter. The interface meter was lowered into the groundwater monitoring wells located within the lower access tunnel to determine the depth of water to the nearest 0.01 foot, and the existence of any immiscible layers (LNAPL).

Oil/water interface measurements were taken at groundwater monitoring wells RHMW01, RHMW02, RHMW03, and RHMW05 in April 2019. No LNAPL was observed. Following the oil/water interface measurements, transducers were installed in the monitoring wells for a synoptic water level survey. No oil/water interface measurements were taken in May and June due to the presence of the transducers.

A summary of interface measurements from January 2014 through April 2019 is presented in Appendix A.

3.2 Soil Vapor Monitoring

Soil vapor samples were collected and analyzed in the field for volatile organic compound (VOC) concentrations using a photo-ionization detector (PID). Soil vapor monitoring points (SVMPs) were given a SV prefix, followed by the associated tank number, and then the location under the tank: “S” for shallow or front of the UST, “M” for mid depth or middle of the UST, and “D” for deep or outer edge of the UST.

A conservative approach to assess the integrity of the associated tank system is to measure if VOC concentrations exceed 280,000 parts per billion by volume (ppbv) in soil vapor monitoring probes beneath tanks containing jet fuels (JP-5 or F-24), or 14,000 ppbv in soil vapor monitoring probes beneath tanks containing marine diesel fuel (F-76) (TEC, 2010). These values are 50 percent of the calculated vapor concentration from fuel-saturated water.

Soil vapor monitoring was performed at all active and accessible tanks in April, May, and June 2019. Soil vapor VOC concentrations at Tank 5 were below the action level of 280,000 ppbv during all three monitoring events. During the same monitoring events, soil vapor VOC concentrations at all other active and accessible tanks were below the action levels, with no consistent trending.

Soil vapor sampling results from January 2014 through May 2019 are presented in Appendix B. The results for June 2019 are being reviewed and will be submitted under separate cover.

3.3 Groundwater Sampling and Analysis

Groundwater samples were collected from 13 conventional monitoring locations and 1 multilevel monitoring location within the Red Hill groundwater monitoring network in April 2019. Groundwater samples were collected from sampling point RHMW2254-01 located at Red Hill Shaft, 11 monitoring wells within the Facility boundary (wells RHMW01 through RHMW10 and OWDFMW01), and the Halawa Deep Monitor Well (HDMW2253-03) located outside of the Facility. The multilevel monitoring location, RHMW11, is located outside of the Facility.

A groundwater monitoring report, which summarizes sampling activities and laboratory analytical results, will be submitted under separate cover.

3.4 Drinking Water Sampling

Drinking water samples were collected from the Red Hill Shaft post-treatment regulatory compliance sampling point (360-011, Tap Outside Chlorine Building) on June 25, 2019. Samples were analyzed for Lead, JP-8/F-24, and contaminants listed in the Transition Plan.

U.S. Environmental Protection Agency (EPA) Methods 524.2 (VOCs), 525.2 (SVOCs), 8015B (JP-8/F-24 and TPH-o), and 200.8 (Lead) were used and all analyses were conducted by labs certified by the DOH State Laboratories Division.

Sample test results were not available during this reporting period to be included in this report.

4.0 Continued Groundwater and Soil Vapor Monitoring

Continued monitoring of the groundwater and soil vapor will be conducted as follows:

- Oil/water interface measurements – quarterly
- Soil vapor sampling – monthly
- Groundwater sampling and analysis – quarterly

Monitoring results will be submitted to DOH for each sampling event.

5.0 Continued Drinking Water Sampling

Drinking water sampling will continue on a quarterly schedule in accordance with the approved Transition Plan. Samples will be taken at the entry point to the distribution system (360-011 Tap Outside Chlorine Building) and analyzed using the following analytical methods:

- VOCs – EPA 524.2
- SVOCs – EPA 525.2
- Gas Chromatography for JP-8/F-24 – EPA 8015
- Lead – EPA 200.8

6.0 Planned Future Release Response Actions

The Navy and DLA negotiated with the EPA and DOH (the “Regulatory Agencies”) release response actions that will be pursued. Future release response actions include determining the feasibility of alternatives for investigating and remediating releases from the Facility and continuing efforts to monitor and characterize the flow of groundwater around the Facility. A revised Work Plan/Scope of Work that describes the future release response actions was submitted pursuant to the Red Hill Administrative Order on Consent to the Regulatory Agencies in November 2016. Conditional approval was received from the Regulatory Agencies in December 2016.

The following documents were submitted for regulatory review:

- Monitoring Well Installation Work Plan Addendum No. 1 in January 2017
- Sampling and Analysis Plan in January 2017
- Existing Data Summary and Evaluation Report in March 2017
- Groundwater Flow Model Progress Report 01 in April 2017
- Sampling and Analysis Plan, Revision 01 in April 2017
- Data Gap Analysis Report in April 2017
- Monitoring Well Installation Work Plan Addendum No. 2 in August 2017
- Groundwater Flow Model Progress Report 02 in August 2017
- Groundwater Flow Model Progress Report 03 in December 2017
- Sentinel Well Network Development Plan in December 2017
- Risk Based Decision Criteria Development Plan in December 2017
- Technical Memorandum, Testing and Verification of Packer Integrity at RHMW11 in February 2018
- Seismic Profiling to Map Hydrostratigraphy in the Red Hill Area in March 2018
- Groundwater Flow Model Progress Report 04 in April 2018
- Conceptual Site Model Report and Groundwater Protection and Evaluation Considerations Report in July 2018
- Groundwater Flow Model Progress Report 05 in August 2018
- Groundwater Flow Model Progress Report 06 in December 2018
- Groundwater Flow Model Progress Report 07 in April 2019

Approval by the Regulatory Agencies of the documents will guide future release response actions.

7.0 Public Notifications

The Navy did not provide notifications to the public between April 1 and June 30, 2019.

8.0 Conclusions and Recommendations

Results of groundwater sampling and analysis and drinking water sampling and analysis indicate the release of JP-8 from Tank 5 has not impacted the Red Hill Shaft.

Additional release response actions have been negotiated with the EPA and DOH to protect the drinking water sources near the Facility.

The next quarterly release response report will be submitted in October 2019 and will cover the release response actions completed between July and September 2019.

9.0 References

AECOM Technical Services, Inc., 2018, Final First Quarter 2018 – Quarterly Groundwater Monitoring Report, Red Hill Bulk Fuel Storage Facility, Prepared for Department of the Navy, Naval Facilities Engineering Command, Hawaii, JBPHH, Hawaii, July 2018.

DOH, 2000, Technical Guidance Manual for Underground Storage Tank Closure and Release Response, Environmental Management Division, Solid and Hazardous Waste Branch, Underground Storage Tank Section, March 2000.

DOH, 2013, Technical Guidance Manual for the Implementation of the Hawaii State Contingency Plan, Office of Hazard Evaluation and Emergency Response, Interim Final, March 2013.

DOH, 2017, Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater, Environmental Management Division, Fall 2017.

Hawaii Administrative Rules, Title 11, Chapter 280.1, Underground Storage Tanks, July 2018.

TEC, 2007, Final Technical Report, Red Hill Bulk Fuel Storage Facility, Prepared for Department of the Navy, Commander Naval Facilities Engineering Command, Pacific, Pearl Harbor, Hawaii, August 2007.

TEC, 2008, Final Groundwater Protection Plan, Red Hill Fuel Storage Facility, prepared for Navy Region Hawaii, Pearl Harbor, Hawaii, January 2008, revised December 2009 and August 2014.

TEC, 2010, Final Soil Vapor Sampling Monitoring Analysis Letter Report, February 1, 2010.

Appendix A
Oil/Water Interface Measurements
January 2014 through April 2019

Red Hill Oil/Water Interface Measurements January 2014 through April 2019

Date	RHMW01			RHMW02			RHMW03			RHMW05		
	Elevation = 102.27 ft ¹			Elevation = 104.76 ft ¹			Elevation = 121.06 ft ¹			Elevation = 101.55 ft ¹		
	DTW (TOC)	SWL	LNAPL	DTW (TOC)	SWL	LNAPL	DTW (TOC)	SWL	LNAPL	DTW (TOC)	SWL	LNAPL
15-Jan-14	83.94	18.33	0	86.62	18.14	0	NT	NT	NT	NT	NT	NT
16-Jan-14	NT	NT	NT	NT	NT	NT	NT	NT	NT	83.09	18.46	0
22-Jan-14	83.53	18.74	0	86.20	18.56	0	NT	NT	NT	82.87	18.68	0
23-Jan-14	83.58	18.69	0	86.24	18.52	0	NT	NT	NT	82.94	18.61	0
24-Jan-14	83.57	18.70	0	86.23	18.53	0	NT	NT	NT	82.93	18.62	0
27-Jan-14	83.55	18.72	0	86.23	18.53	0	NT	NT	NT	82.93	18.62	0
28-Jan-14	83.56	18.71	0	86.25	18.51	0	102.52	18.54	0	82.94	18.61	0
29-Jan-14	83.56	18.71	0	86.22	18.54	0	NT	NT	NT	82.94	18.61	0
30-Jan-14	83.53	18.74	0	86.21	18.55	0	NT	NT	NT	82.93	18.62	0
31-Jan-14	83.53	18.74	0	86.19	18.57	0	NT	NT	NT	82.88	18.67	0
3-Feb-14	83.54	18.73	0	86.20	18.56	0	NT	NT	NT	82.91	18.64	0
4-Feb-14	83.54	18.73	0	86.20	18.56	0	NT	NT	NT	82.89	18.66	0
10-Feb-14	84.49	17.78	0	86.16	18.60	0	102.47	18.59	0	82.83	18.72	0
24-Feb-14	83.54	18.73	0	86.24	18.52	0	102.47	18.59	0	82.97	18.58	0
4-Mar-14*	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
13-Mar-14*	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
28-Mar-14	83.76	18.51	0	86.42	18.34	0	102.65	18.41	0	83.18	18.37	0
7-Apr-14*	83.42	18.85	0	86.43	18.33	0	NT	NT	NT	83.21	18.34	0
21-Apr-14	83.93	18.34	0	86.58	18.18	0	102.80	18.26	0	83.27	18.28	0
8-May-14*	84.03	18.24	0	86.68	18.08	0	NT	NT	NT	83.46	18.09	0
22-May-14*	83.81	18.46	0	86.47	18.29	0	NT	NT	NT	83.15	18.40	0
27-May-14	83.91	18.36	0	86.60	18.16	0	102.85	18.21	0	83.31	18.24	0
10-Jun-14*	83.93	18.34	0	86.55	18.21	0	NT	NT	NT	83.34	18.21	0
23-Jun-14	84.06	18.21	0	86.72	18.04	0	103.99	17.07	0	83.54	18.01	0
21-Jul-14	84.13	18.14	0	86.80	17.96	0	102.98	18.08	0	83.49	18.06	0
27-Aug-14	84.01	18.26	0	86.65	18.11	0	102.87	18.19	0	83.04	18.51	0
25-Sep-14	84.64	17.63	0	87.27	17.49	0	103.51	17.55	0	84.10	17.45	0
28-Oct-14	83.79	18.48	0	86.51	18.25	0	102.78	18.28	0	83.21	18.34	0
20-Nov-14	83.87	18.40	0	86.56	18.20	0	102.78	18.28	0	83.35	18.20	0
23-Dec-14	83.67	18.60	0	86.37	18.39	0	102.64	18.42	0	83.05	18.50	0
28-Jan-15	83.63	18.64	0	86.35	18.41	0	102.63	18.43	0	83.03	18.52	0
27-Feb-15	83.68	18.59	0	86.28	18.48	0	102.52	18.54	0	83.06	18.49	0
26-Mar-15	83.83	18.44	0	86.04	18.72	0	102.79	18.27	0	83.24	18.31	0
21-Apr-15	84.33	17.94	0	86.97	17.79	0	103.18	17.88	0	83.72	17.83	0
28-May-15	84.29	17.98	0	86.97	17.79	0	103.24	17.82	0	83.95	17.60	0
25-Jun-15	84.58	17.69	0	87.28	17.48	0	103.57	17.49	0	83.75	17.80	0
21-Jul-15	84.58	17.69	0	87.24	17.52	0	103.44	17.62	0	83.76	17.79	0
27-Aug-15	84.44	17.83	0	87.13	17.63	0	103.41	17.65	0	83.69	17.86	0
23-Sep-15	84.26	18.01	0	86.91	17.85	0	103.21	17.85	0	83.63	17.92	0
20-Oct-15	84.00	18.27	0	86.38	18.38	0	103.38	17.68	0	Obstructed	NT	NT
18-Nov-15	84.25	18.02	0	86.93	17.83	0	103.24	17.82	0	84.62 ²	16.93	0
17-Dec-15	83.76	18.51	0	86.36	18.40	0	102.56	18.50	0	83.18	18.37	0
20-Jan-16	83.31	18.96	0	85.97	18.79	0	102.21	18.85	0	Obstructed	NT	NT
17-Feb-16	83.17	19.10	0	85.81	18.95	0	102.10	18.96	0	Obstructed	NT	NT
15-Mar-16	82.89	19.38	0	85.60	19.16	0	101.82	19.24	0	82.26	19.29	0
20-Apr-16	82.97	19.30	0	85.63	19.13	0	101.91	19.15	0	82.31	19.24	0
23-May-16	83.14	19.13	0	85.81	18.95	0	102.03	19.03	0	82.50	19.05	0
21-Jun-16	83.16	19.11	0	85.77	18.99	0	10.03	111.03	0	82.54	19.01	0
20-Jul-16	83.32	18.95	0	85.99	18.77	0	102.31	18.75	0	82.63	18.92	0
23-Aug-16	83.27	19.00	0	85.96	18.80	0	102.20	18.86	0	82.63	18.92	0
21-Sep-16	83.13	19.14	0	85.74	19.02	0	102.06	19.00	0	82.44	19.11	0
19-Oct-16	83.01	19.26	0	85.69	19.07	0	101.95	19.11	0	82.39	19.16	0
17-Nov-16	82.92	19.35	0	85.56	19.20	0	101.82	19.24	0	82.24	19.31	0
20-Dec-16	82.67	19.60	0	85.36	19.40	0	101.61	19.45	0	82.01	19.54	0
31-Jan-17	82.45	19.82	0	85.13	19.63	0	101.46	19.60	0	82.04	19.51	0
22-Feb-17	82.37	19.90	0	85.01	19.75	0	101.31	19.75	0	81.72	19.83	0
24-Mar-17	82.49	19.78	0	85.19	19.57	0	101.45	19.61	0	81.84	19.71	0
20-Apr-17	82.59	19.68	0	85.25	19.51	0	101.5	19.56	0	81.94	19.61	0
26-May-17	82.45	19.82	0	85.13	19.63	0	101.39	19.67	0	81.80	19.75	0
22-Jun-17	82.94	19.33	0	85.59	19.17	0	101.89	16.17	0	82.30	19.25	0
21-Jul-17	83.43	18.84	0	86.5	18.26	0	Transducer Installed	NT	NT	82.81	18.74	0
20-Mar-18	83.56	18.71	0	86.24	18.52	0	102.55	18.51	0	82.89	18.66	0
25-Apr-18	83.47	18.80	0	86.14	18.62	0	102.38	15.68	0	82.86	18.69	0
22-May-18	83.61	18.66	0	86.28	18.47	0	102.56	15.68	0	82.86	18.69	0
20-Jun-18	83.63	18.64	0	86.28	18.47	0	102.57	18.49	0	82.99	18.56	0
25-Jul-18	83.55	18.72	0	86.33	18.43	0	102.58	18.48	0	82.90	18.56	0
21-Aug-18	Transducer Installed	NT	NT	86.32	18.44	0	102.58	18.48	0	Transducer Installed	NT	NT
30-Oct-18	82.64	19.63	0	85.34	19.42	0	101.58	19.48	0	81.99	19.56	0
24-Jan-19	82.30	19.97	0	84.96	19.80	0	101.22	19.84	0	81.66	19.89	0
26-Apr-19	82.45	19.82	0	58.18	19.58	0	101.41	19.65	0	81.88	19.67	0

Notes:

1 - Elevations were updated based on the Groundwater Flow Direction/Gradient and Tier 3 Risk Assessment Re-evaluation Letter Report, Red Hill Bulk Fuel Storage Facility, Pearl Harbor, Hawaii, Contract No. N47408-04-D-8514, Task Order 54, dated April 15, 2010.

2 - Dedicated groundwater pump was obstructing the path of the interface meter probe. Depth measured was based on the elevation of water when pump was removed from the monitoring well (RHMW05).

Measurements recorded by Environmental Science International from January 2014 to August 2015, unless otherwise noted.

Measurements recorded by Element Environmental, LLC from September 2015.

* - Measurements recorded by NAVFAC HI.

All units in feet (ft).

DTW (TOC) - depth to water from top of well casing

LNAPL - light non-aqueous phase liquid

NT - measurement not taken

SWL - static water level

Appendix B
Soil Vapor Sampling Results through May 2019

Figure 1
Soil Vapor Measurements
SV02

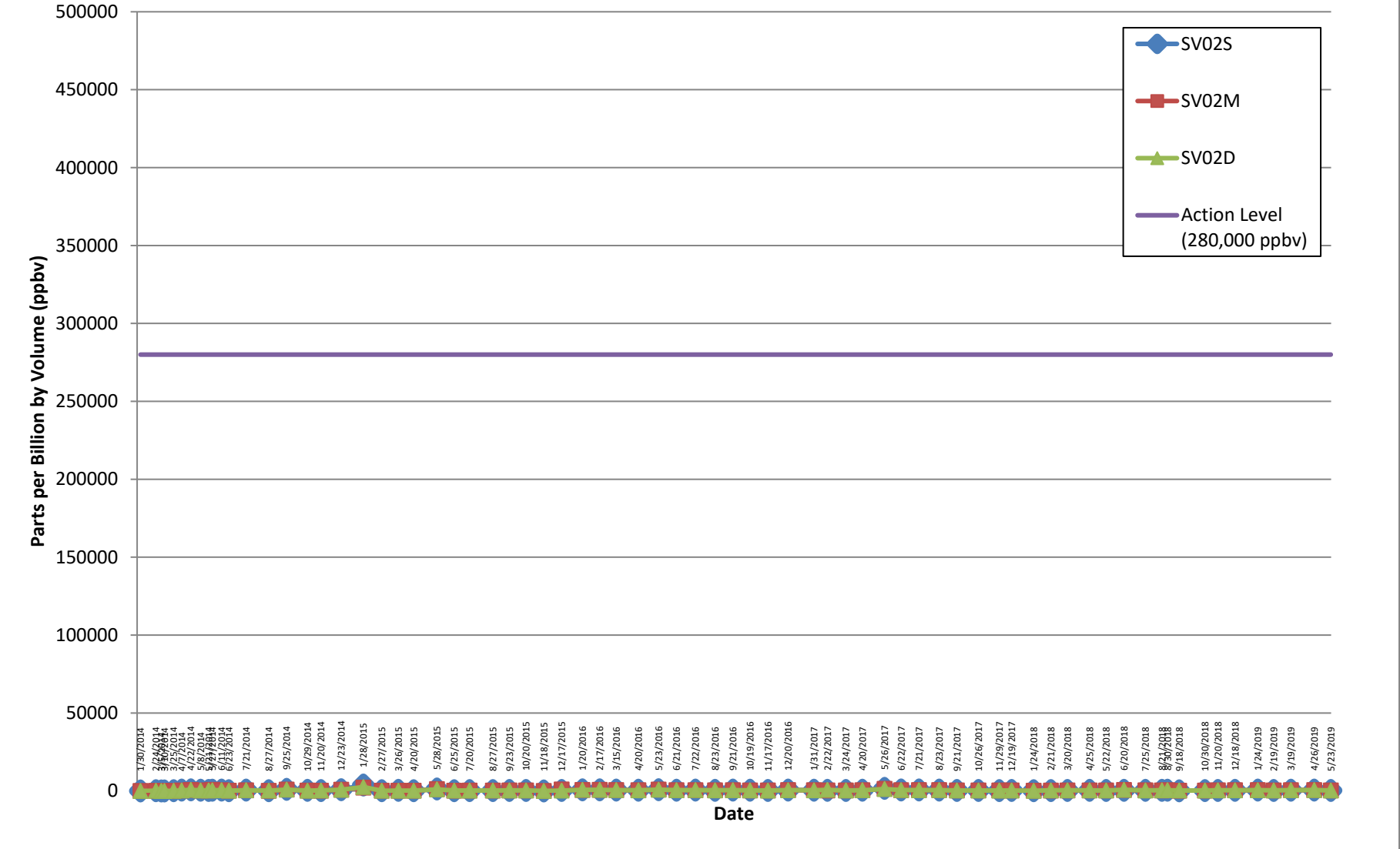


Figure 2
Soil Vapor Measurements
SV03

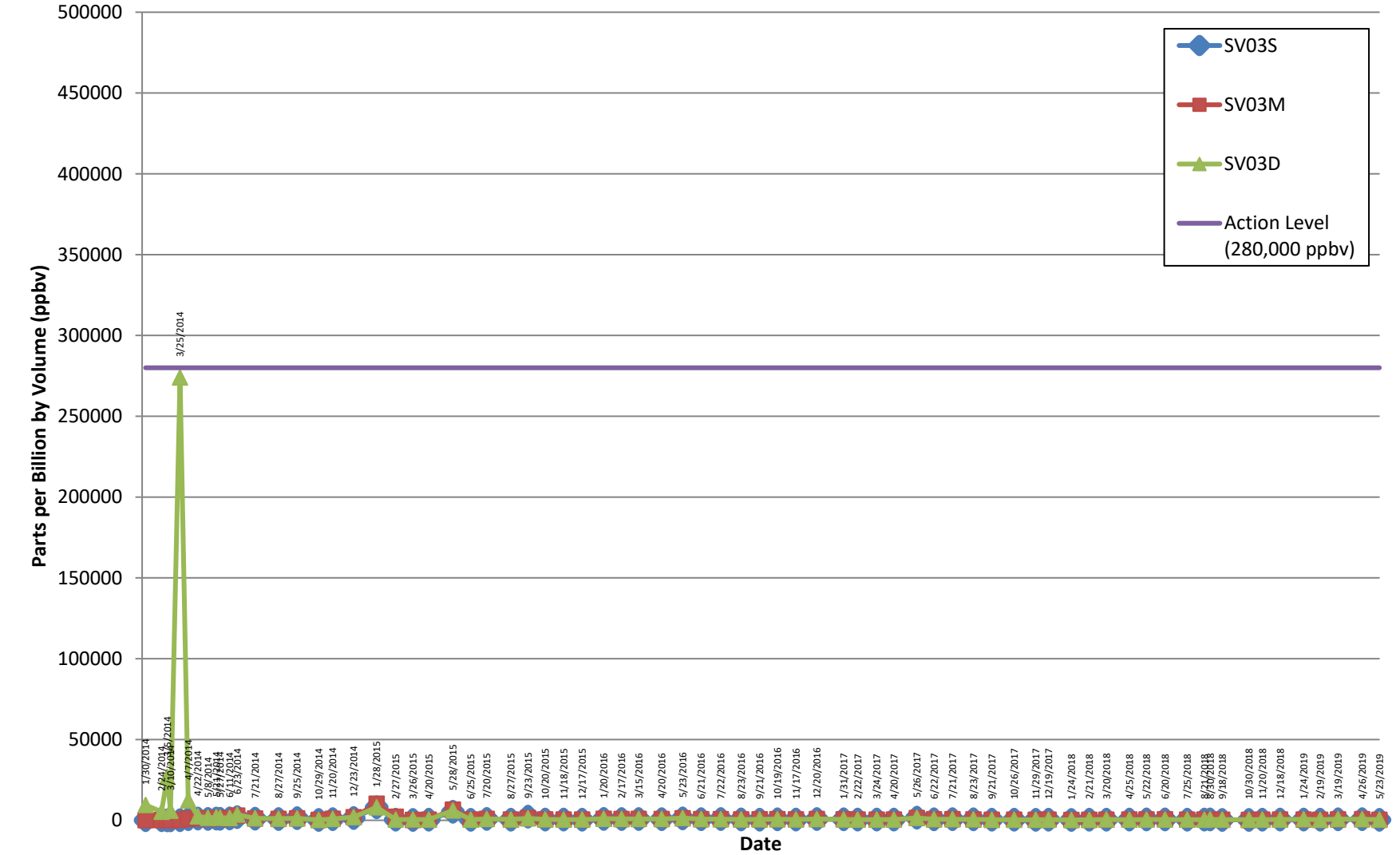


Figure 3
Soil Vapor Measurements
SV04

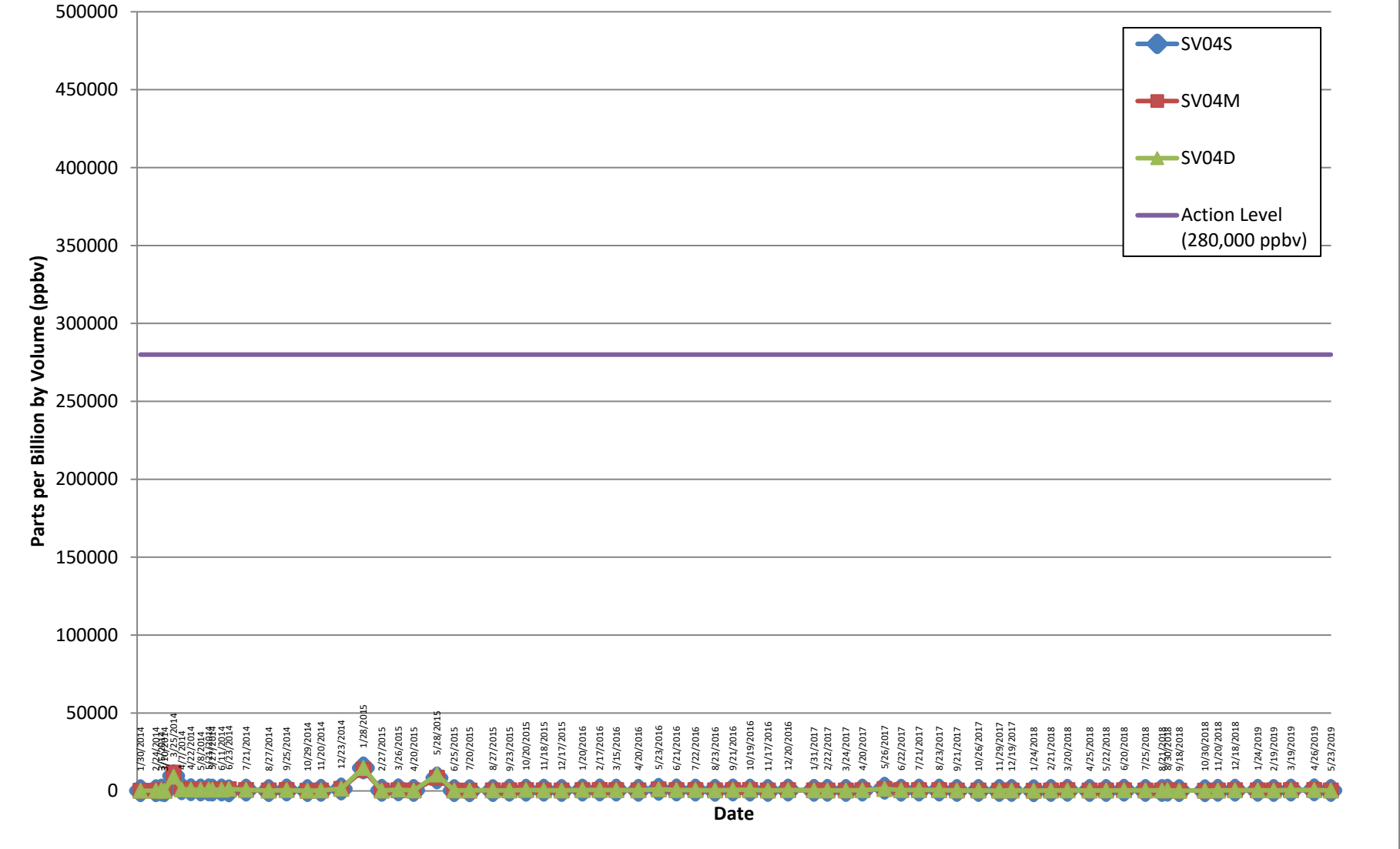


Figure 4 Soil Vapor Measurements SV05

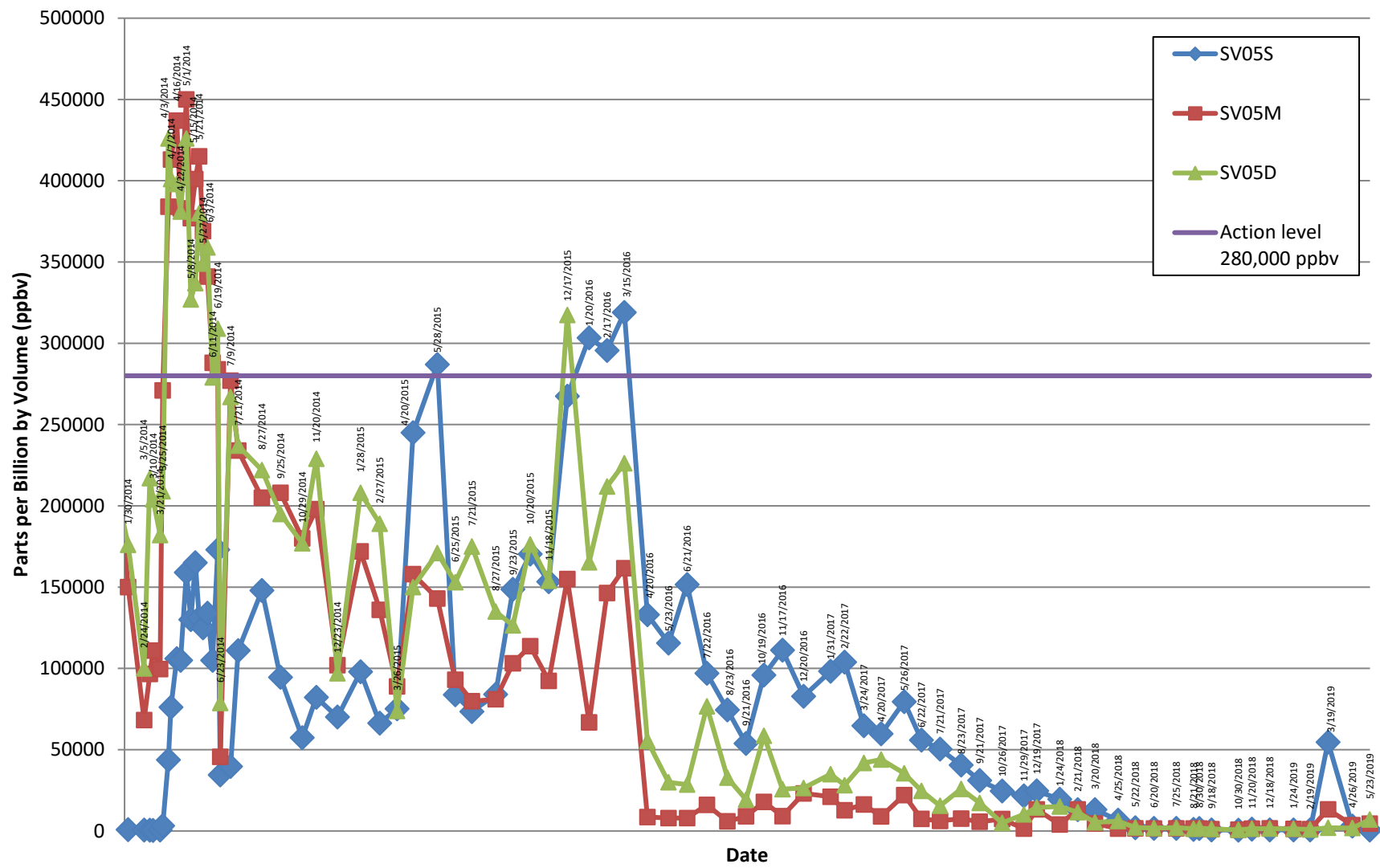


Figure 5
Soil Vapor Measurements
SV06

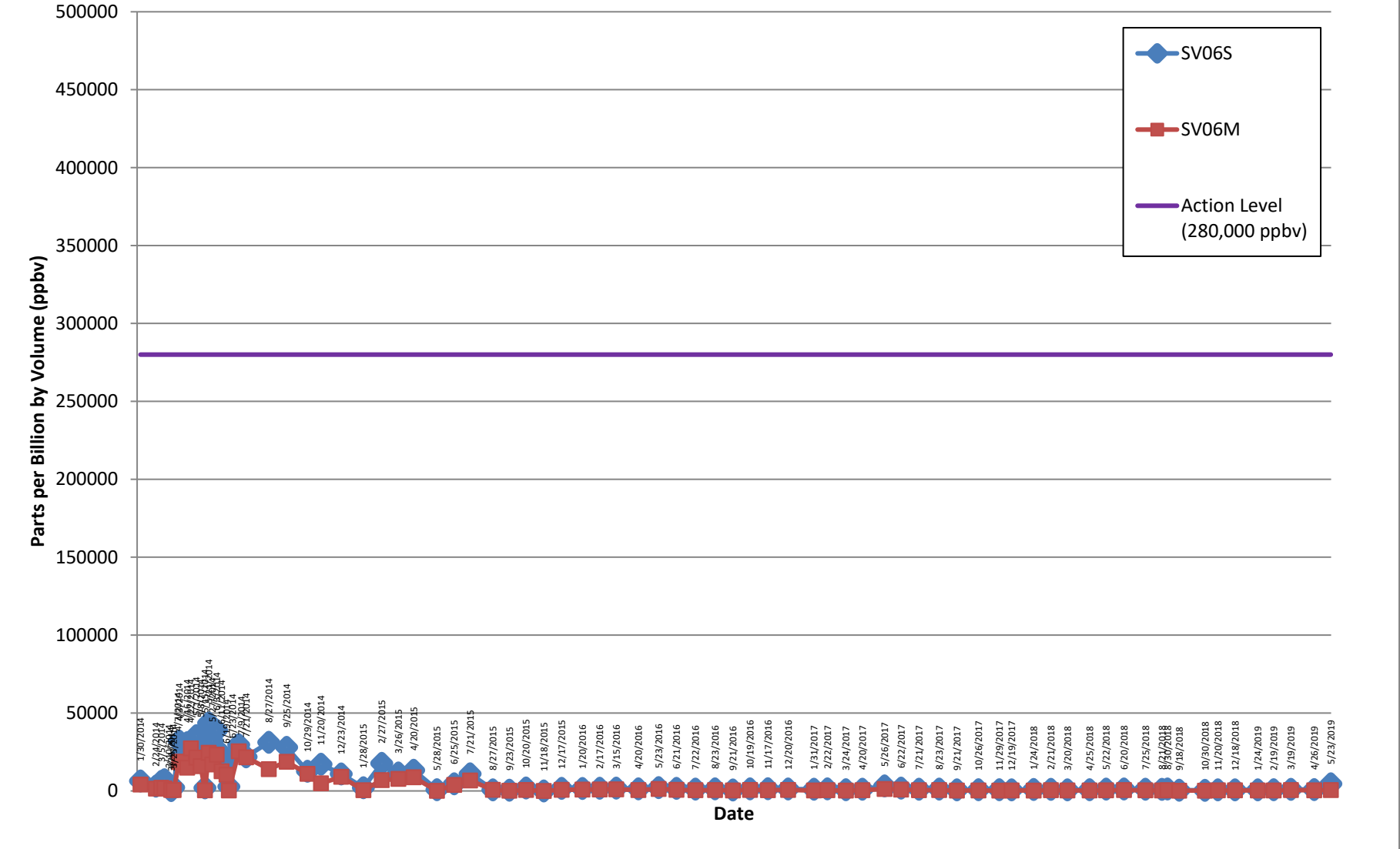


Figure 6
Soil Vapor Measurements
SV07

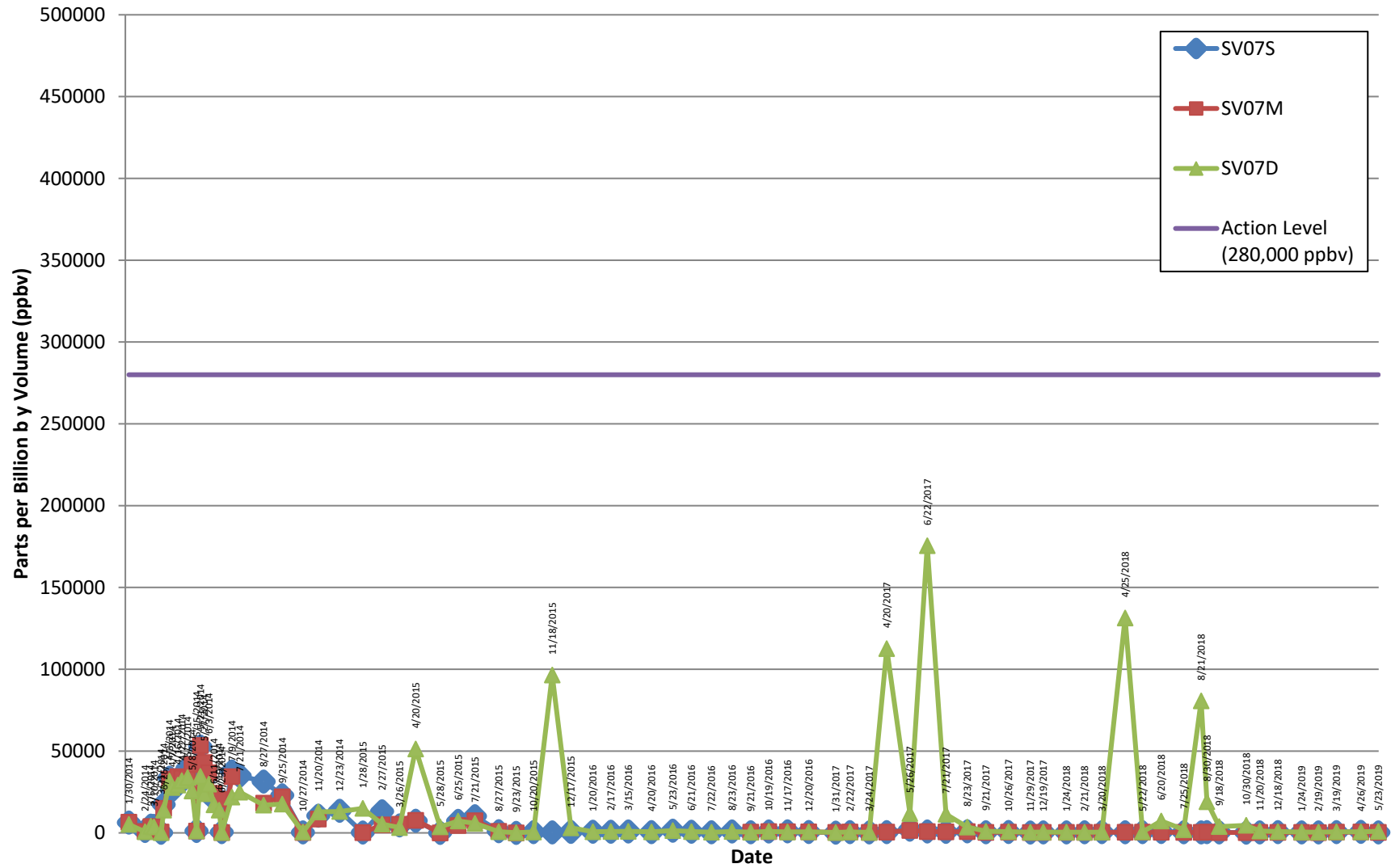


Figure 7
Soil Vapor Measurements
SV08

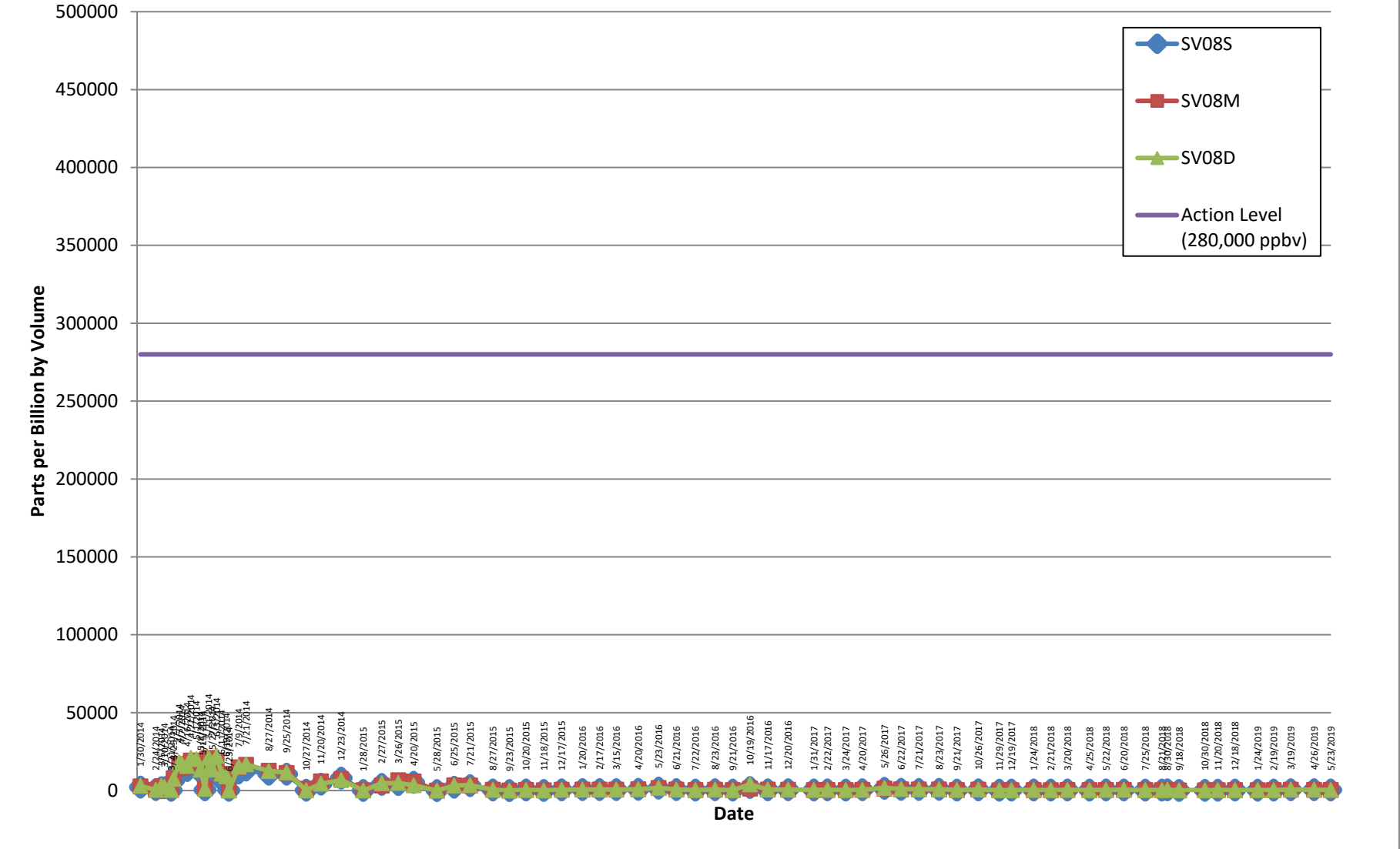


Figure 8
Soil Vapor Measurements
SV09

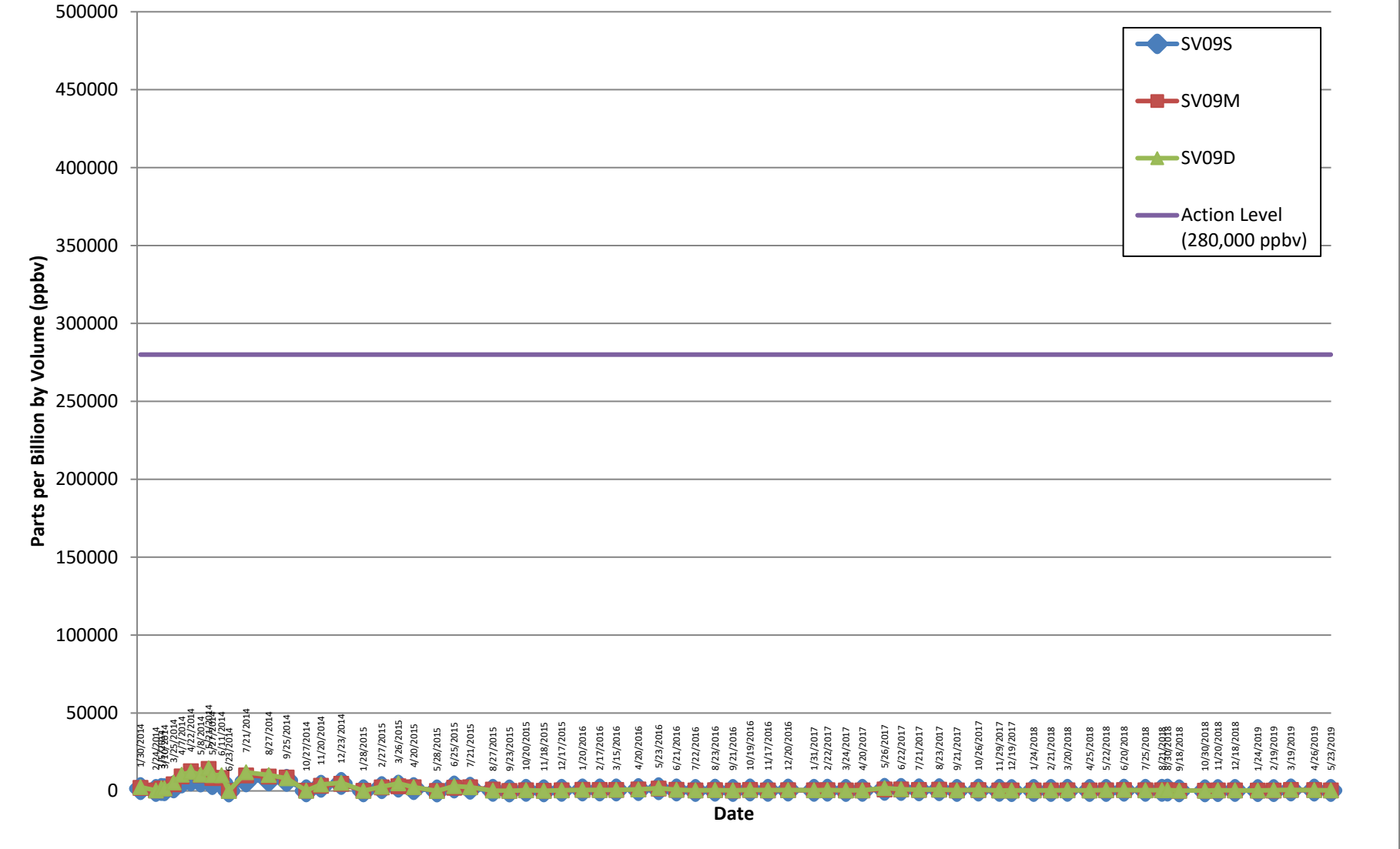


Figure 9 Soil Vapor Measurements SV10

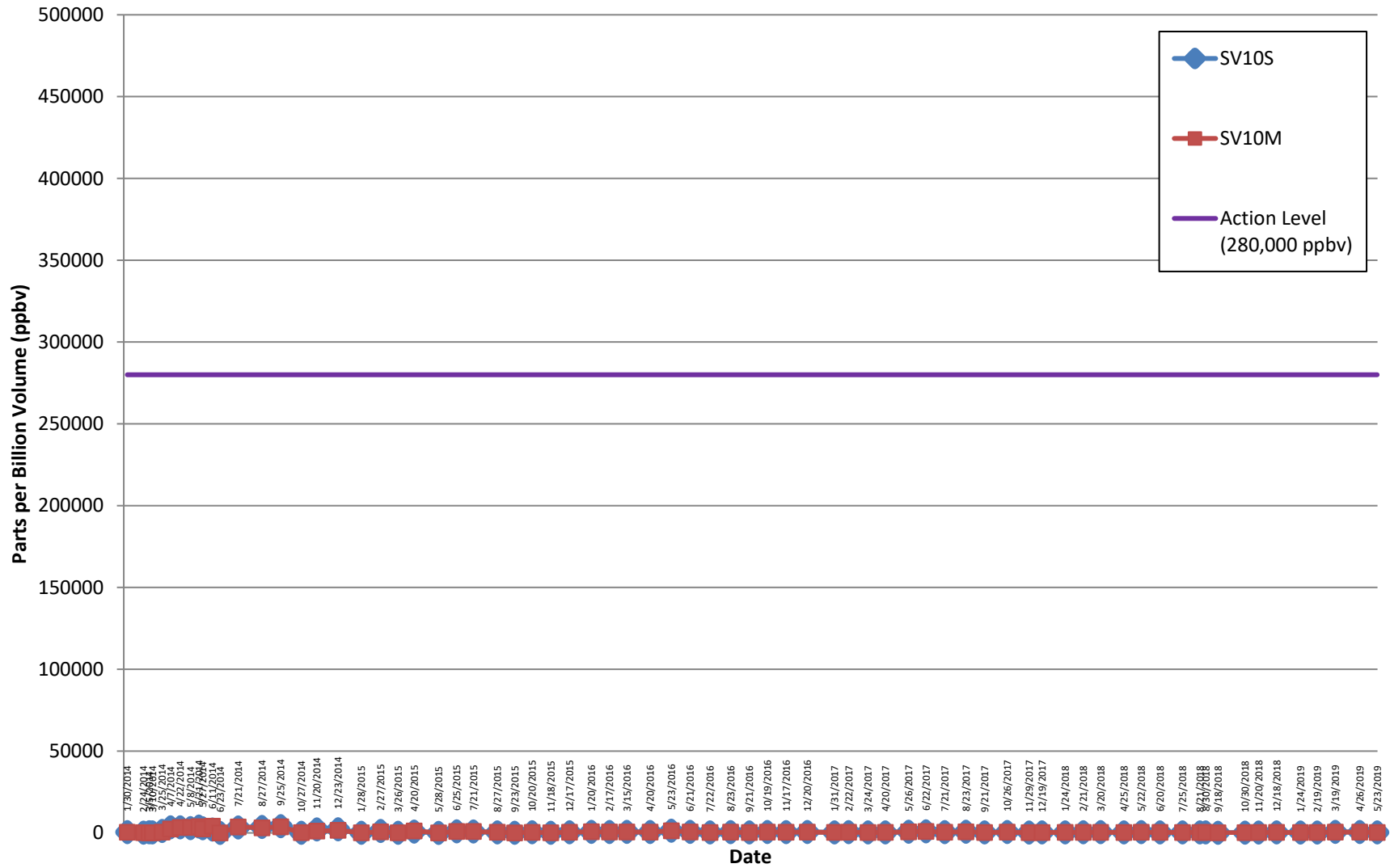


Figure 10
Soil Vapor Measurements
SV11

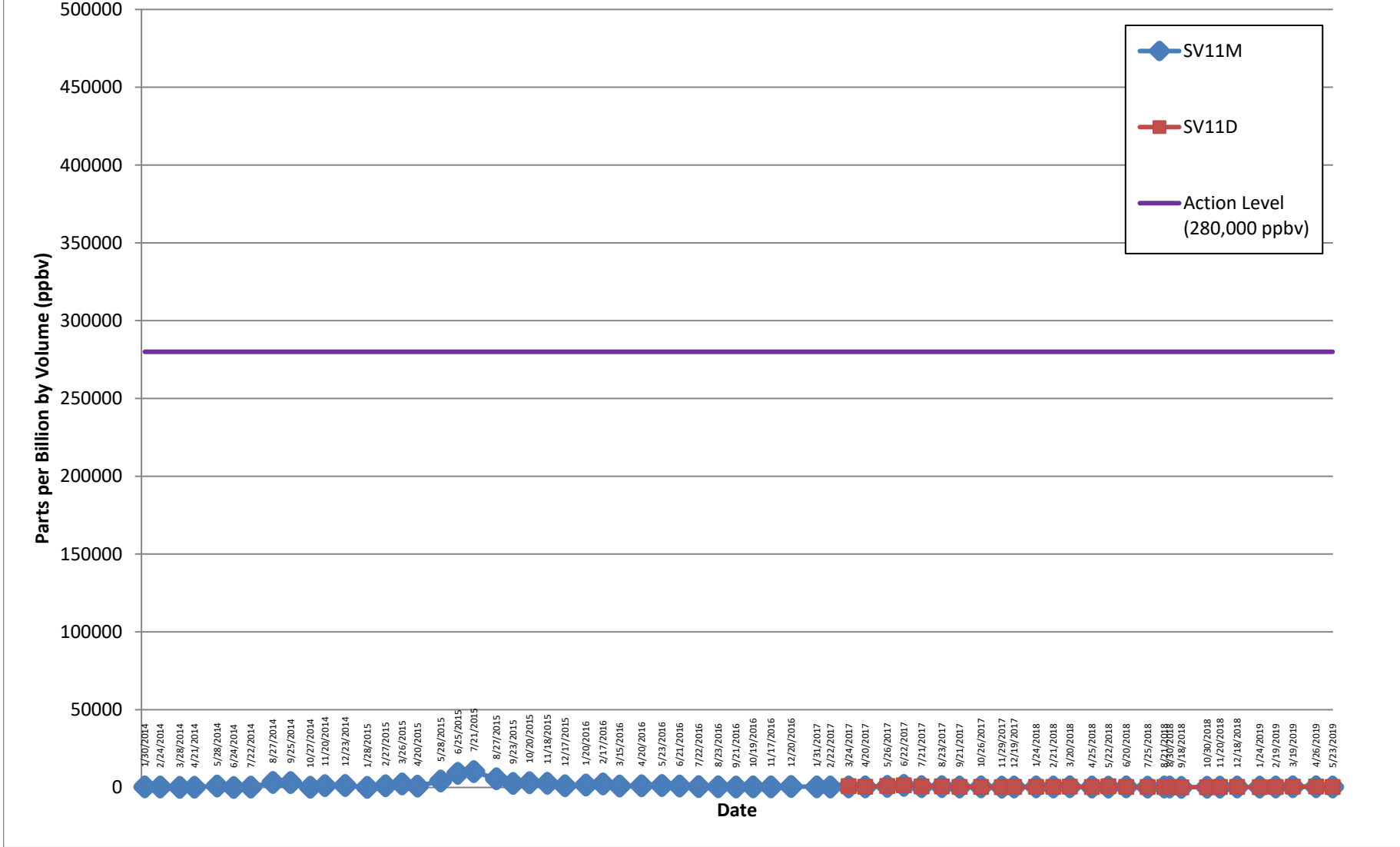


Figure 11
Soil Vapor Measurements
SV12

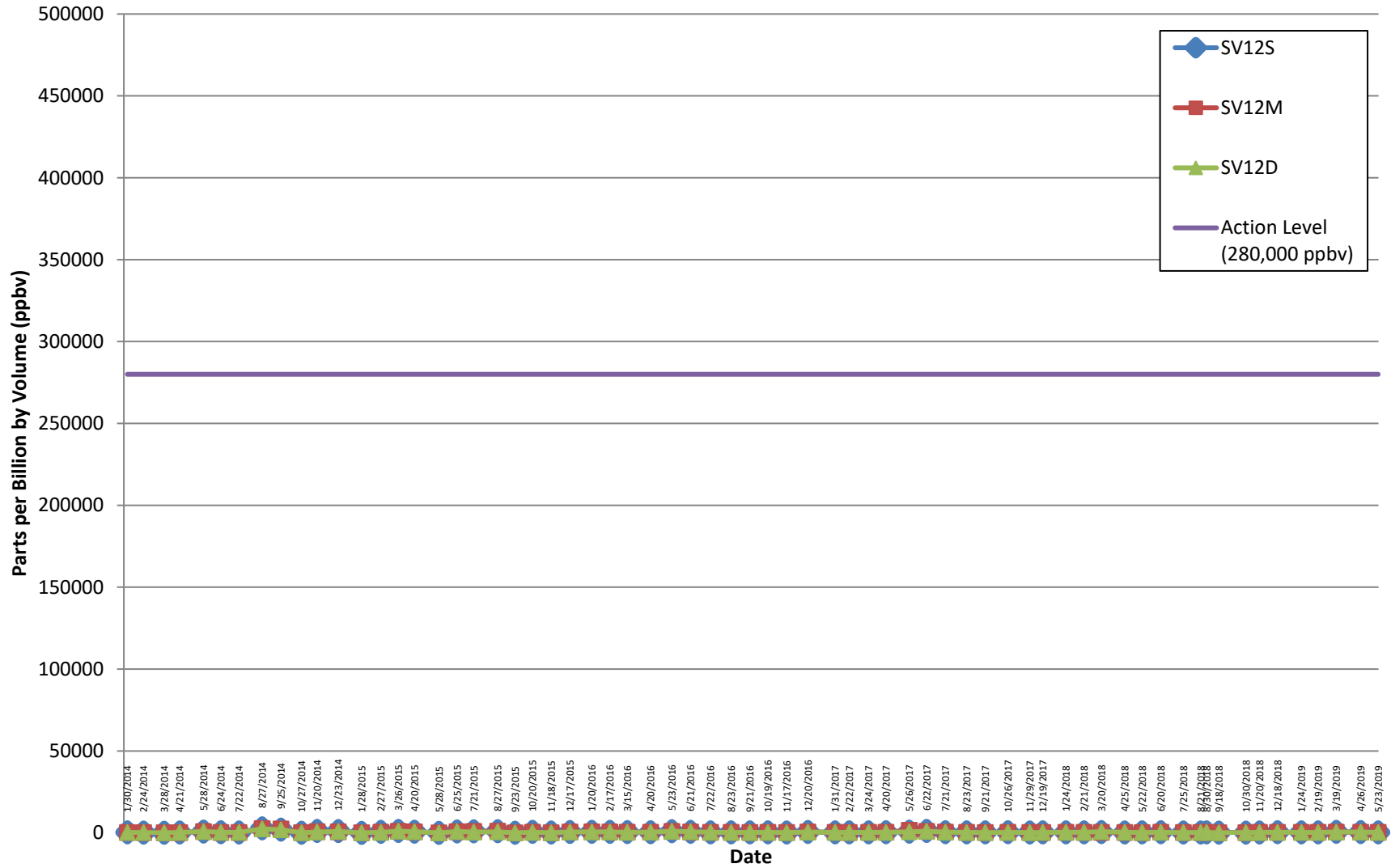


Figure 12
Soil Vapor Measurements
SV13

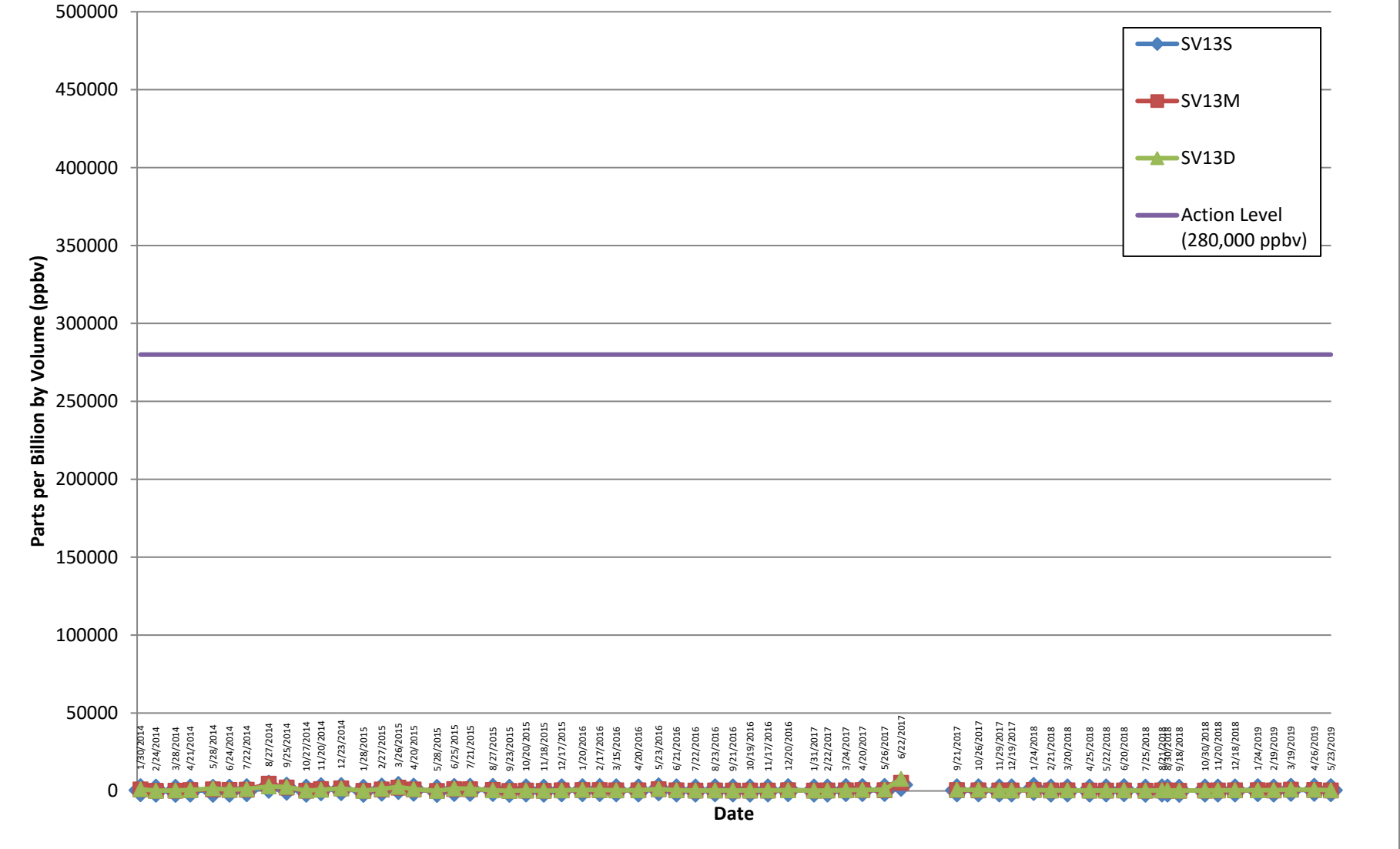


Figure 13
Soil Vapor Measurements
SV14

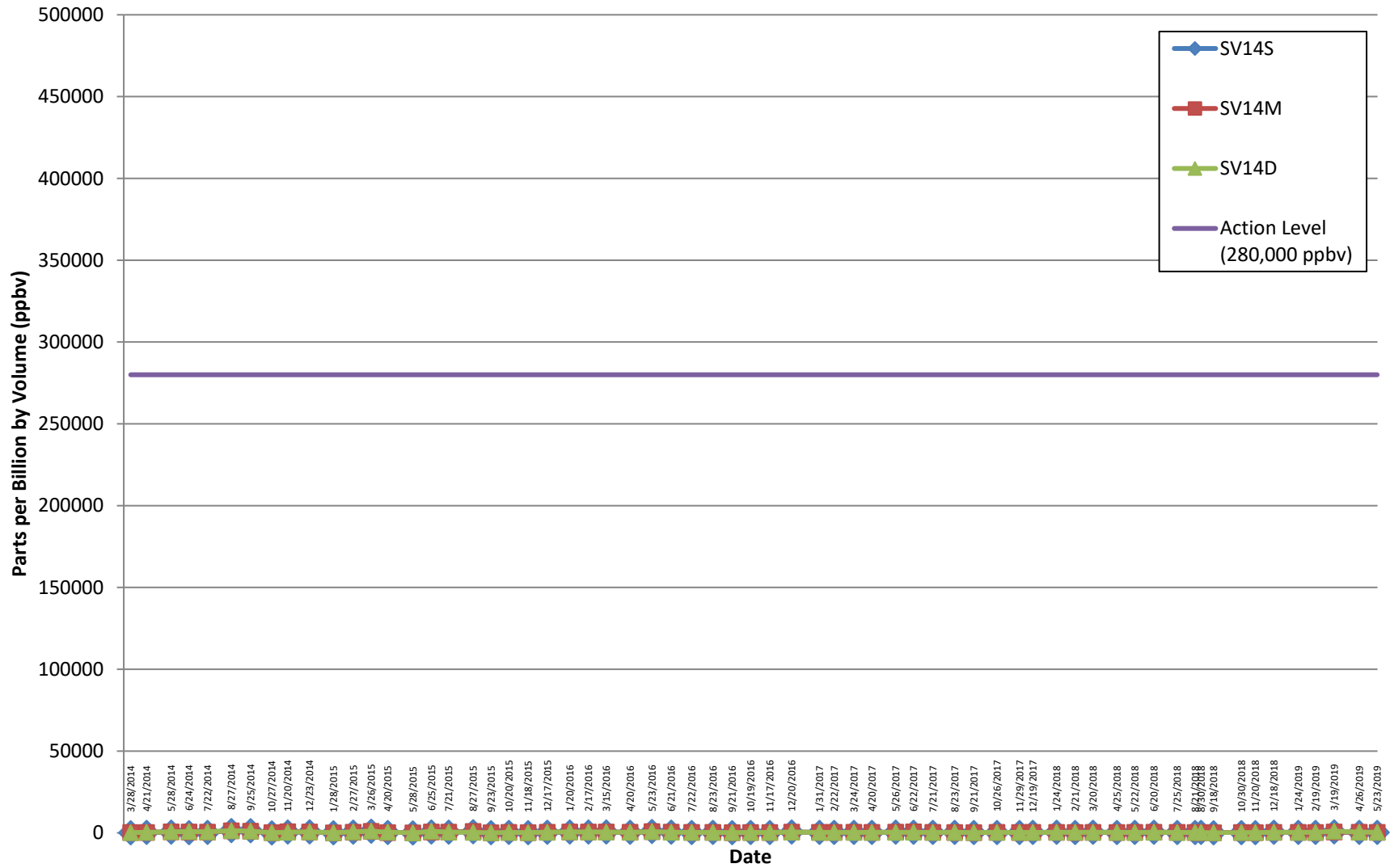


Figure 14
Soil Vapor Measurements
SV15

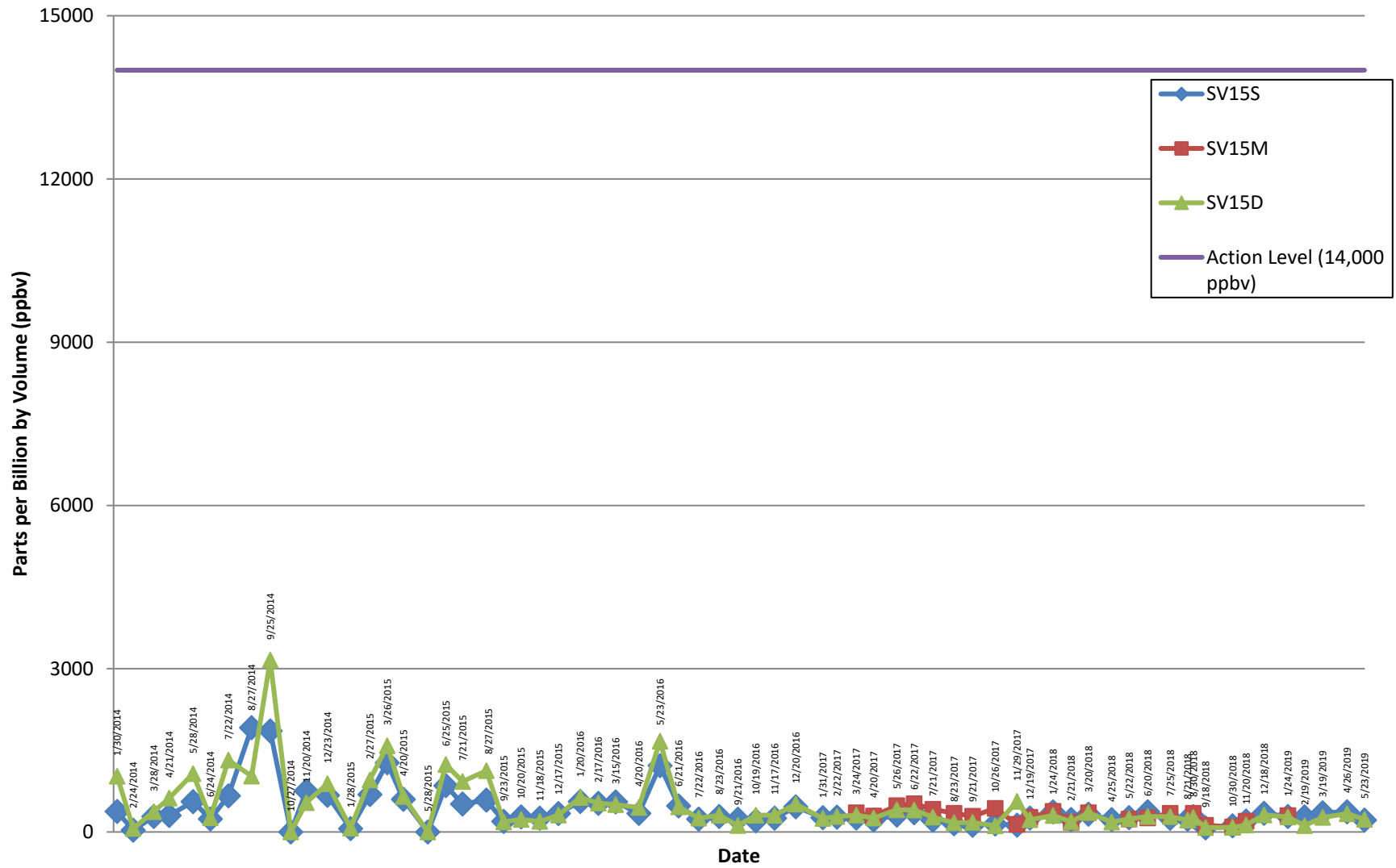


Figure 15
Soil Vapor Measurements
SV16

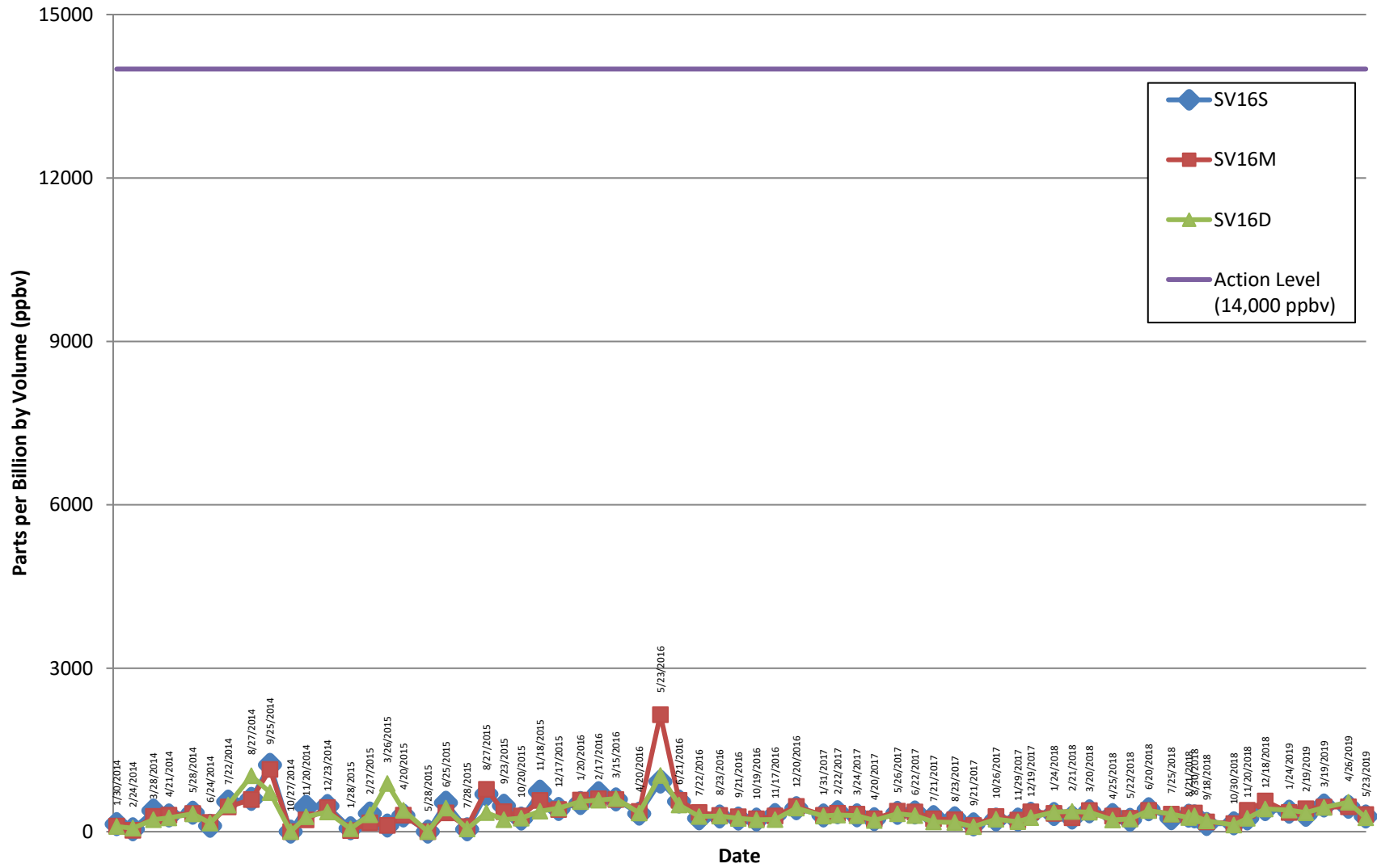


Figure 16
Soil Vapor Measurements
SV17

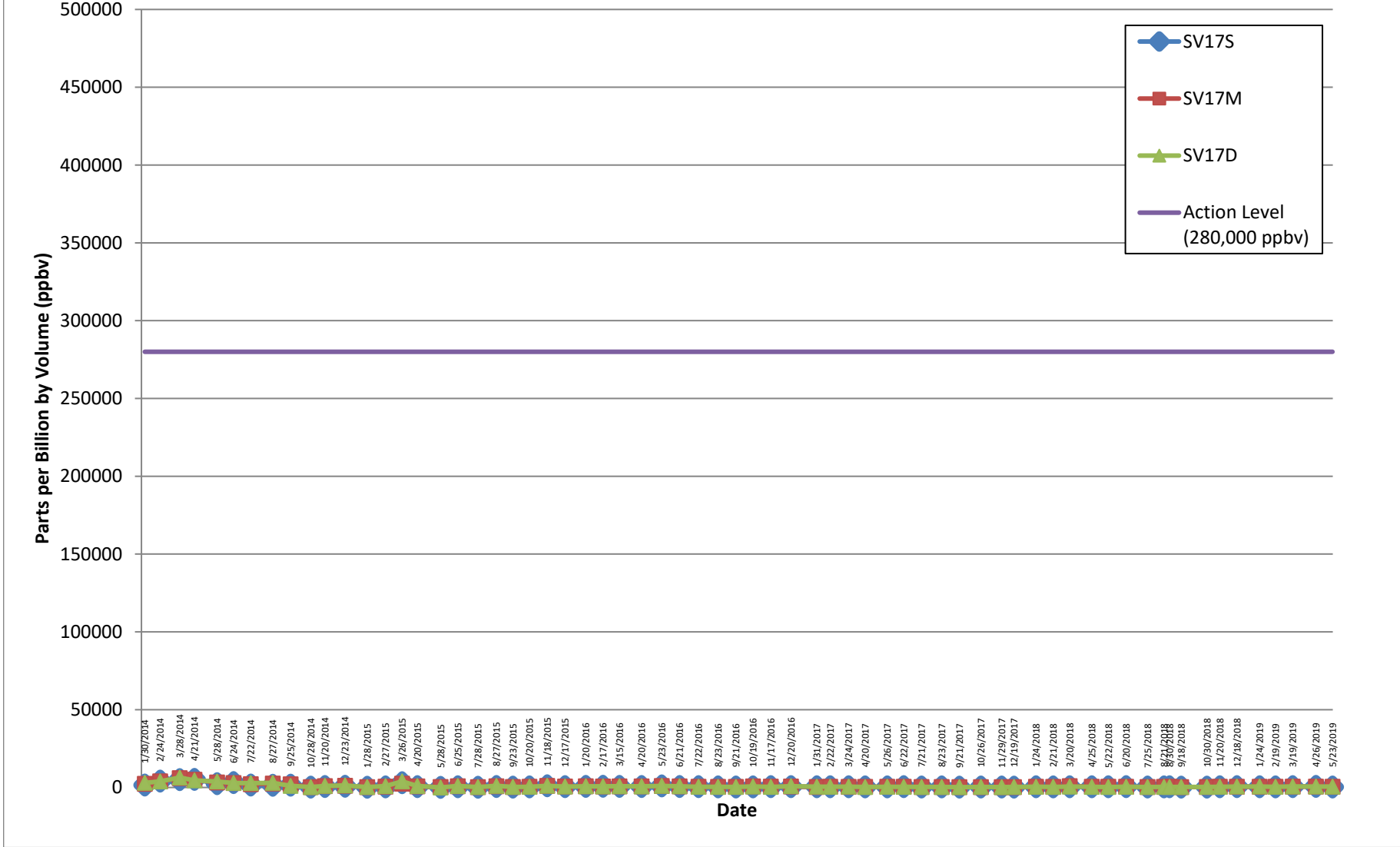


Figure 17
Soil Vapor Measurements
SV18

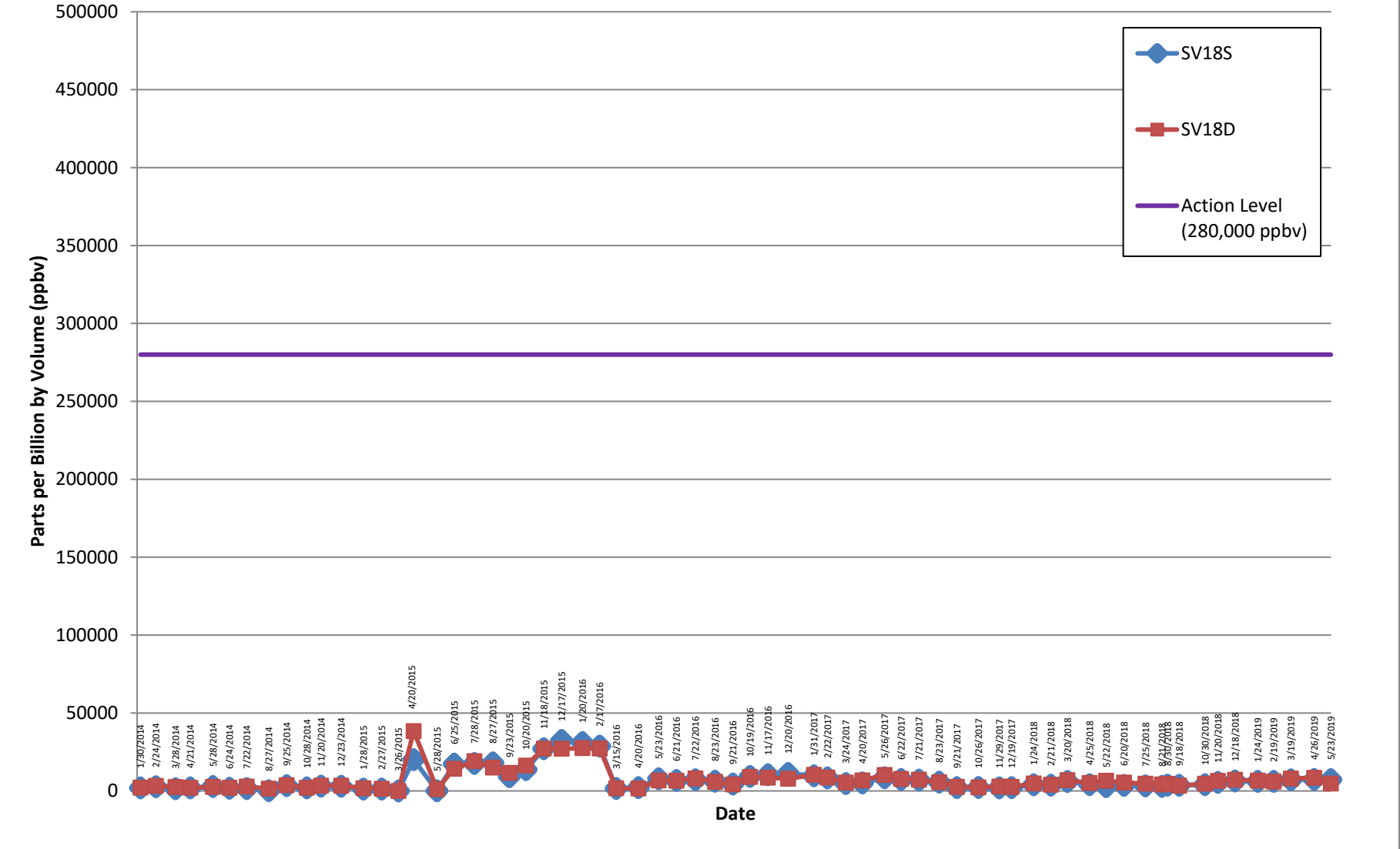


Figure 18
Soil Vapor Measurements
SV20

