



DEPARTMENT OF THE NAVY

COMMANDER  
NAVY REGION HAWAII  
850 TICONDEROGA ST STE 110  
JBPHH, HAWAII 96860-5101

FEB 14 2022 *cel*

5090  
Ser N45/040  
February 1, 2022

**CERTIFIED NO: 9489 0090 0027 6232 9782 12**

Mr. Richard Takaba  
Hawaii State Department of Health  
Solid and Hazardous Waste Branch  
Underground Storage Tank Section  
2827 Waimano Home Road #100  
Pearl City, HI 96782

Dear Mr. Takaba:

SUBJECT: SOIL VAPOR SAMPLING RESULTS FOR DECEMBER 2021  
RED HILL TANK COMPLEX  
DOH FACILITY ID NO. 9-102271  
DOH RELEASE ID NO. 990051, 010011, 020028, 140010, AND 210012

Monthly soil vapor samples were collected on December 17, 2021 from beneath all accessible Red Hill tanks, with the exception of Tanks 1 and 19, which are inactive and not included in the sampling network. The 18 tanks in the sampling network have two or three soil vapor monitoring points (SVMPs) screened within designated areas beneath the tanks. These SVMPs are each designated as shallow (S), middle (M), deep (D), or M/D.

To assess the integrity of the associated tank system, an action threshold or level was established as 50 percent of the calculated vapor concentration from fuel-saturated water. This conservative approach generated action thresholds of 280,000 ppbv for SVMPs beneath tanks containing jet fuels (F-24 or JP-5) and 14,000 ppbv for SVMPs beneath tanks containing marine diesel fuel (F-76).

Soil vapor VOC concentrations measured with a photo-ionization detector (PID) in the field are presented with the appropriate action level graphically in Enclosure 1. At Tank 5, the concentrations of VOCs detected in the SVMPs were 51 ppbv (SV05S), 125 ppbv (SV05M), and 299 ppbv (SV05D). VOC concentrations measured in all down-gradient tank SVMPs were between 0 and 186 ppbv.


The Navy performed a causative investigation of fuel operations conducted during this time period due to an increase in trends at SV17M and SV17D. NAVSUP FLC Pearl Harbor Causative Research Report is submitted as Enclosure 2. This report documents causative research and findings to conclude there was no evidence of a leaking tank or spill at the time of sampling at the Red Hill Complex that may have contributed to elevated soil vapor VOC concentrations.

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All VOC concentrations measured in December were below the action levels, with no consistent trends observed over time. Additional monitoring in accordance with the May 6, 2021 and November 20, 2021 Release Groundwater Sampling Plan is ongoing. These results are reported under separate cover. Regular monthly soil vapor VOC concentrations will continue to be sampled and reported. The January 14, 2022 event results will be submitted under separate cover.

If there are any questions regarding the December soil vapor sampling results, or if more information is needed, please contact Ms. Susan Lohr at (808) 471-4619 or Ms. Dayna Fujimoto at (808) 471-4805.

Sincerely,



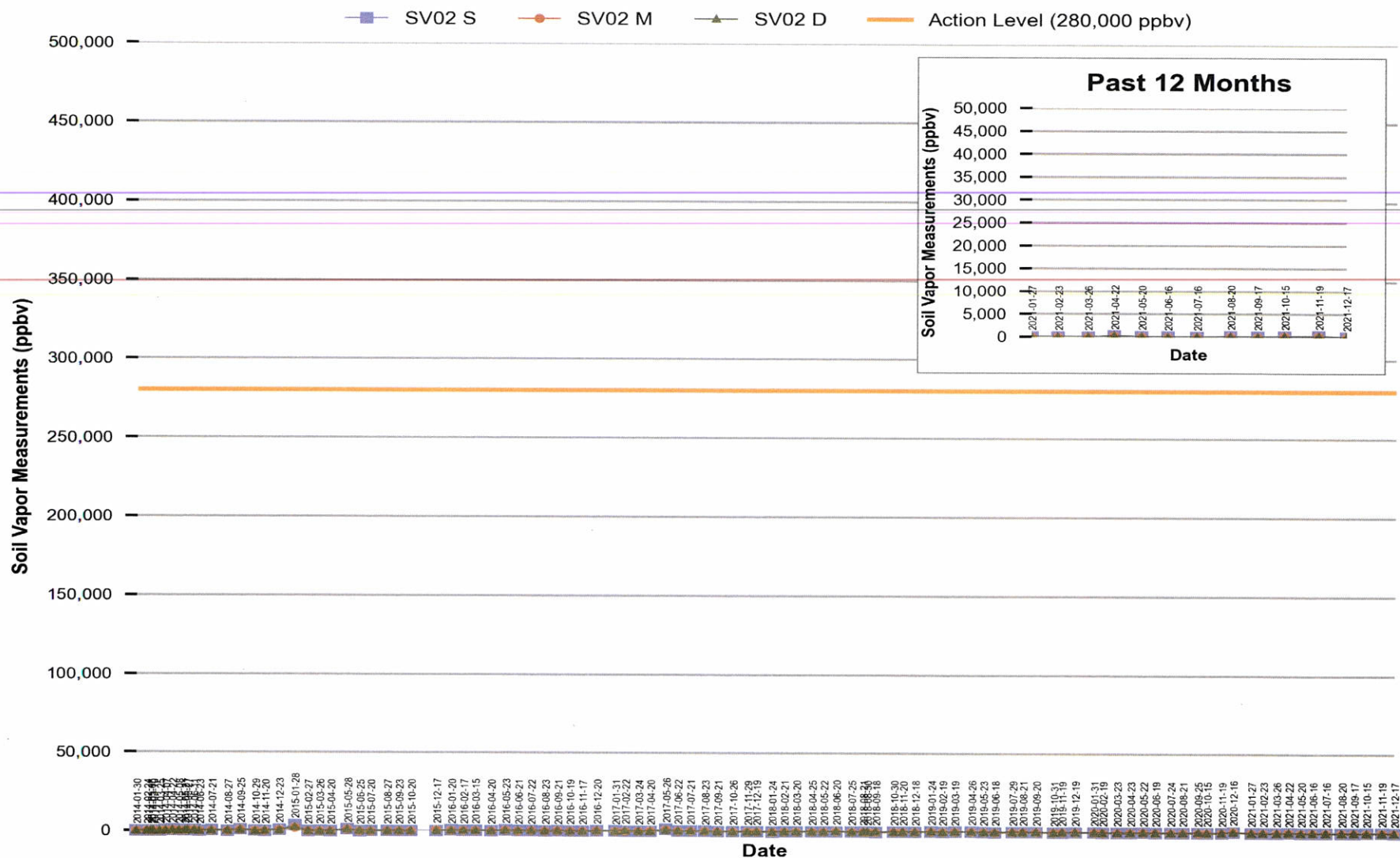
SHERRI R. ENG  
Director  
Regional Environmental Department  
By direction of the  
Commander

- Enclosures: 1. Graphical Summary of Soil Vapor Sampling Results for Tanks 2 - 18 and 20  
Data represented through December 2021 (18 pages)  
2. NAVSUP FLC Pearl Harbor Causative Research Report IRT Red Hill Soil  
Vapor Monitoring Report for December 2021

Copy to: Mr. John Floyd, NAVSUP FLC Pearl Harbor

Electronic Copies to: Ms. Gabriela Carvalho, U.S. EPA Region 9, Red Hill Program Coordinator  
Mr. John Reed, DLA Energy Pacific  
Mr. William Potter, DLA Energy - Engineering, Environmental, Property  
Directorate

**Figure 1**  
**Red Hill - Tank 02 (F-24)**  
**Soil Vapor Measurements (Jan 2014 Through Dec 2021)**



Notes (where applicable):

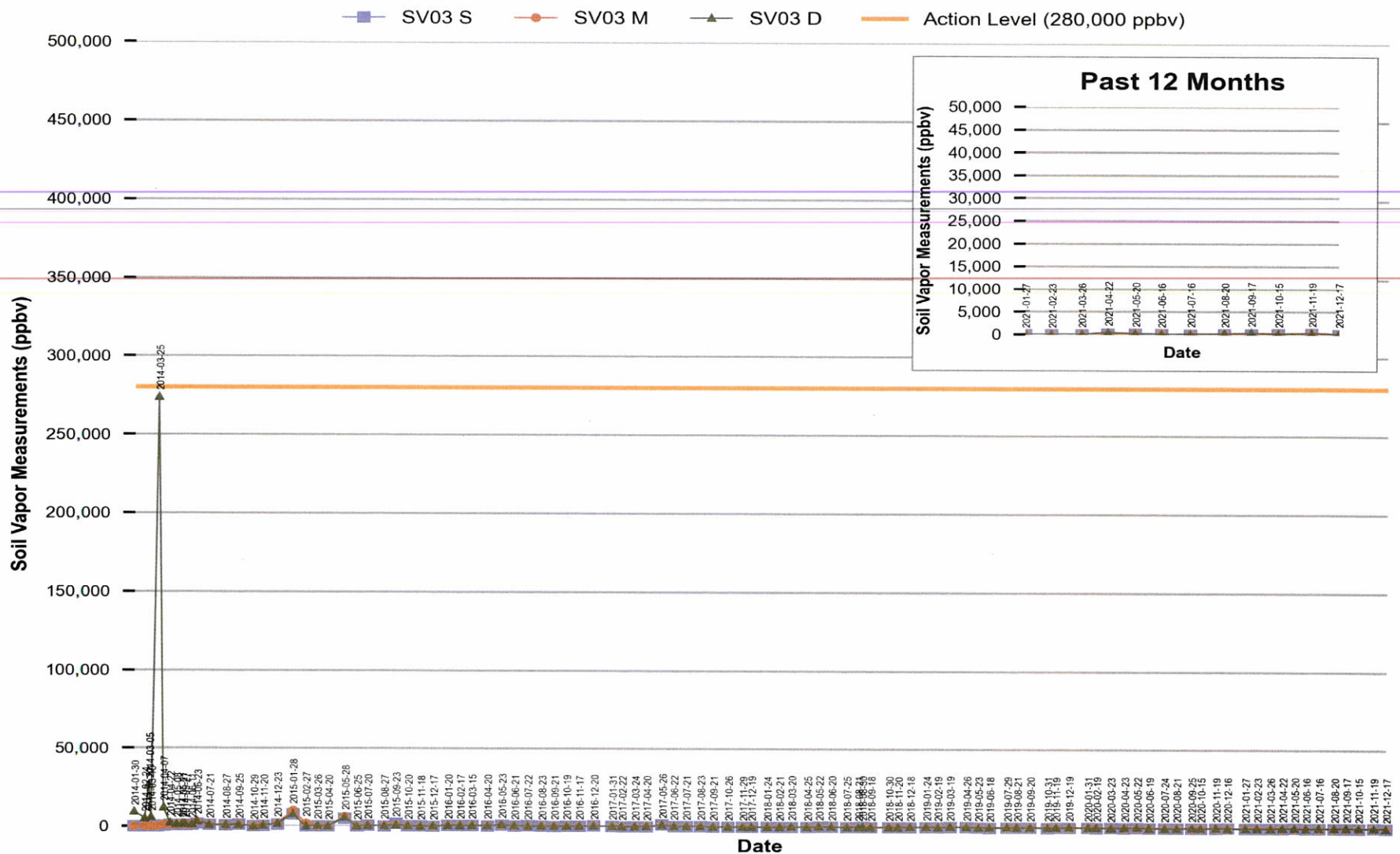
\* "M/D" monitoring points were constructed to screen both middle & deep depth intervals along the respective underground storage tank.

F-24: Jet Fuel, Fuel Number 24  
 F-76: Marine Diesel, Fuel Number 76

JP-5: Jet Fuel, Propellant Number 5  
 ppbv: Parts Per Billion by Volume



**Figure 2**  
**Red Hill - Tank 03 (F-24)**  
**Soil Vapor Measurements (Jan 2014 Through Dec 2021)**



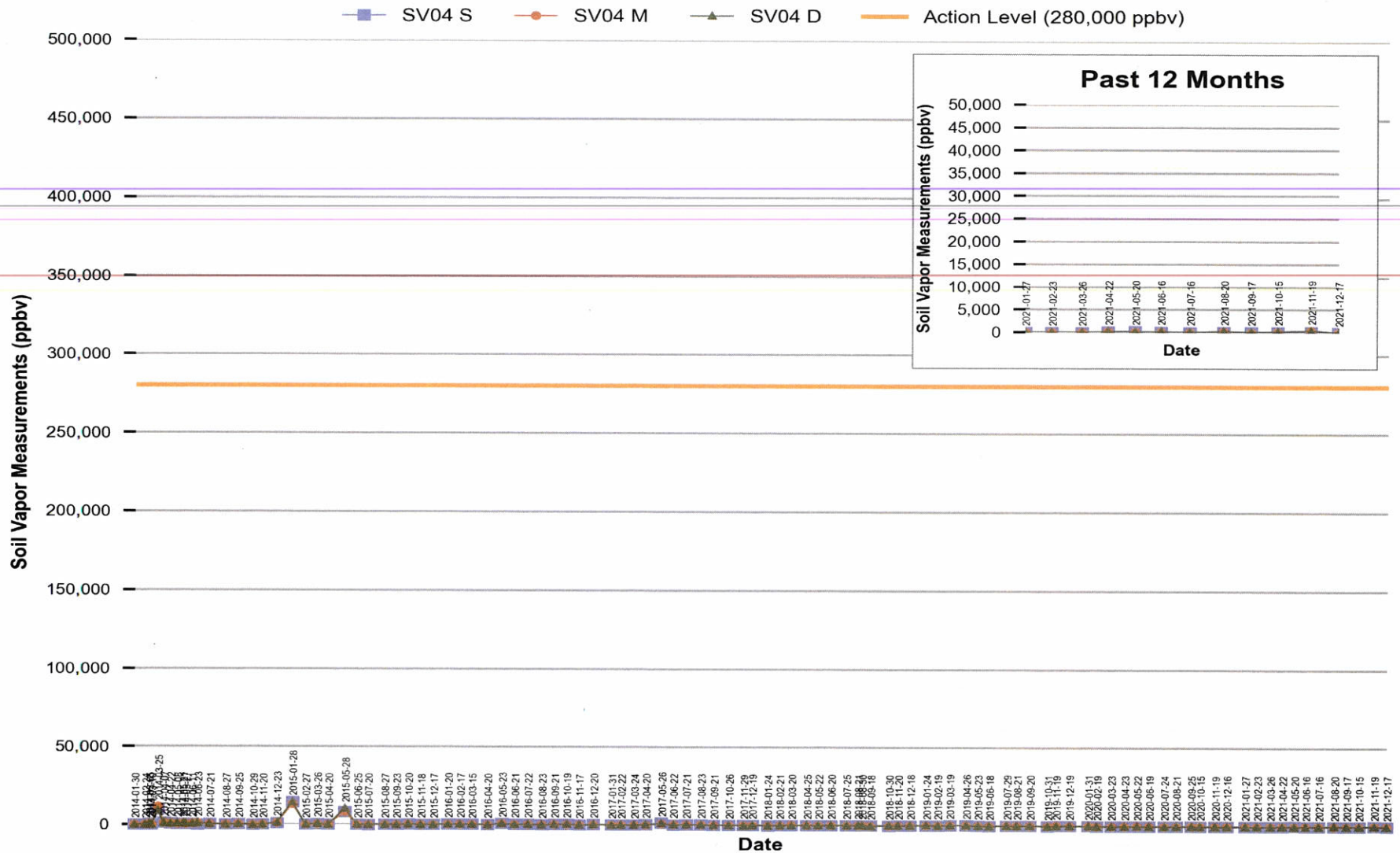
Notes (where applicable):

\* "M/D" monitoring points were constructed to screen both middle & deep depth intervals along the respective underground storage tank.

F-24: Jet Fuel, Fuel Number 24  
 F-76: Marine Diesel, Fuel Number 76

JP-5: Jet Fuel, Propellant Number 5  
 ppbv: Parts Per Billion by Volume

**Figure 3**  
**Red Hill - Tank 04 (F-24)**  
**Soil Vapor Measurements (Jan 2014 Through Dec 2021)**



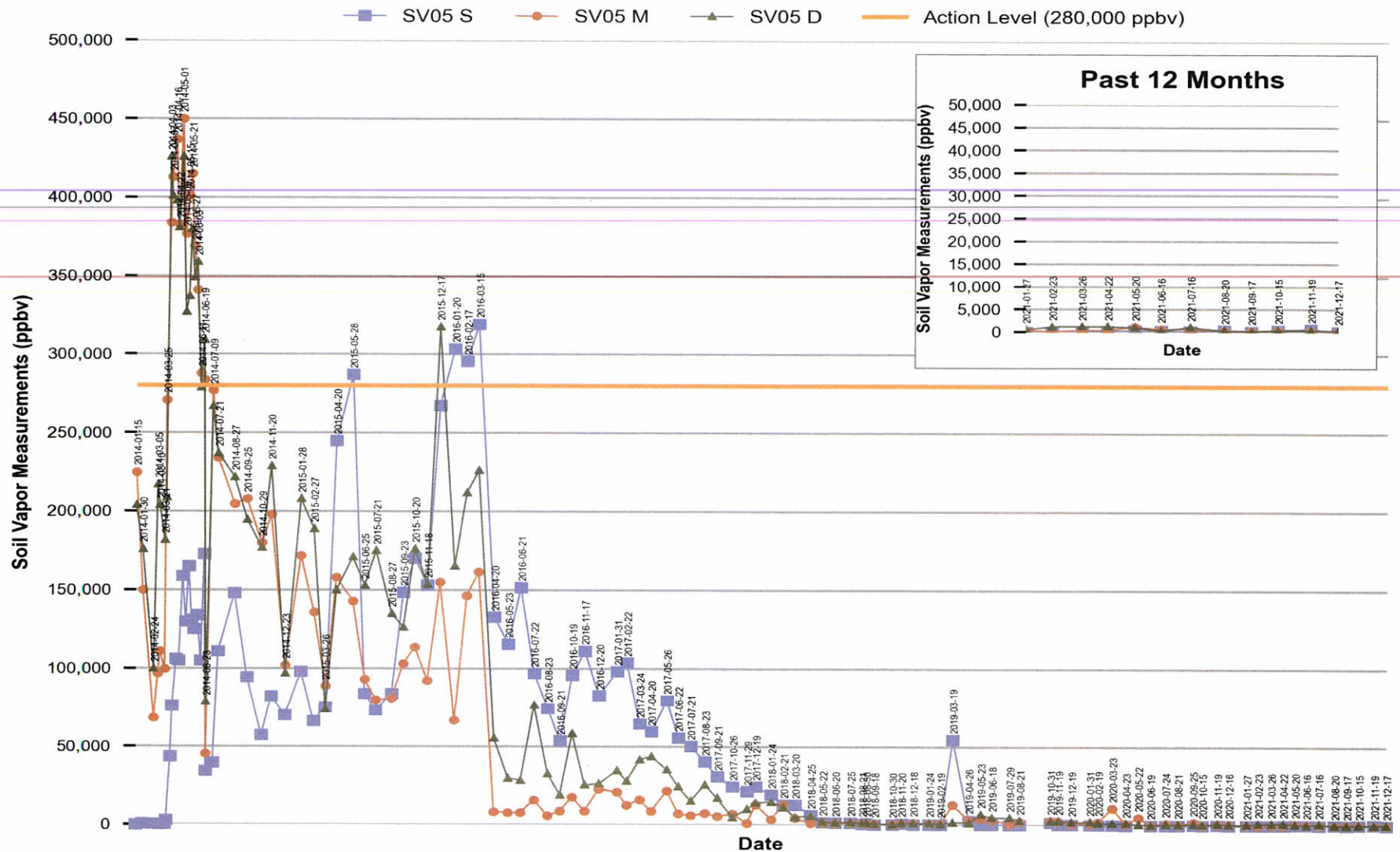
Notes (where applicable):

\* "M/D" monitoring points were constructed to screen both middle & deep depth intervals along the respective underground storage tank.

F-24: Jet Fuel, Fuel Number 24  
 F-76: Marine Diesel, Fuel Number 76

JP-5: Jet Fuel, Propellant Number 5  
 ppbv: Parts Per Billion by Volume

**Figure 4**  
**Red Hill - Tank 05 (F-24)**  
**Soil Vapor Measurements (Jan 2014 Through Dec 2021)**



Notes (where applicable):

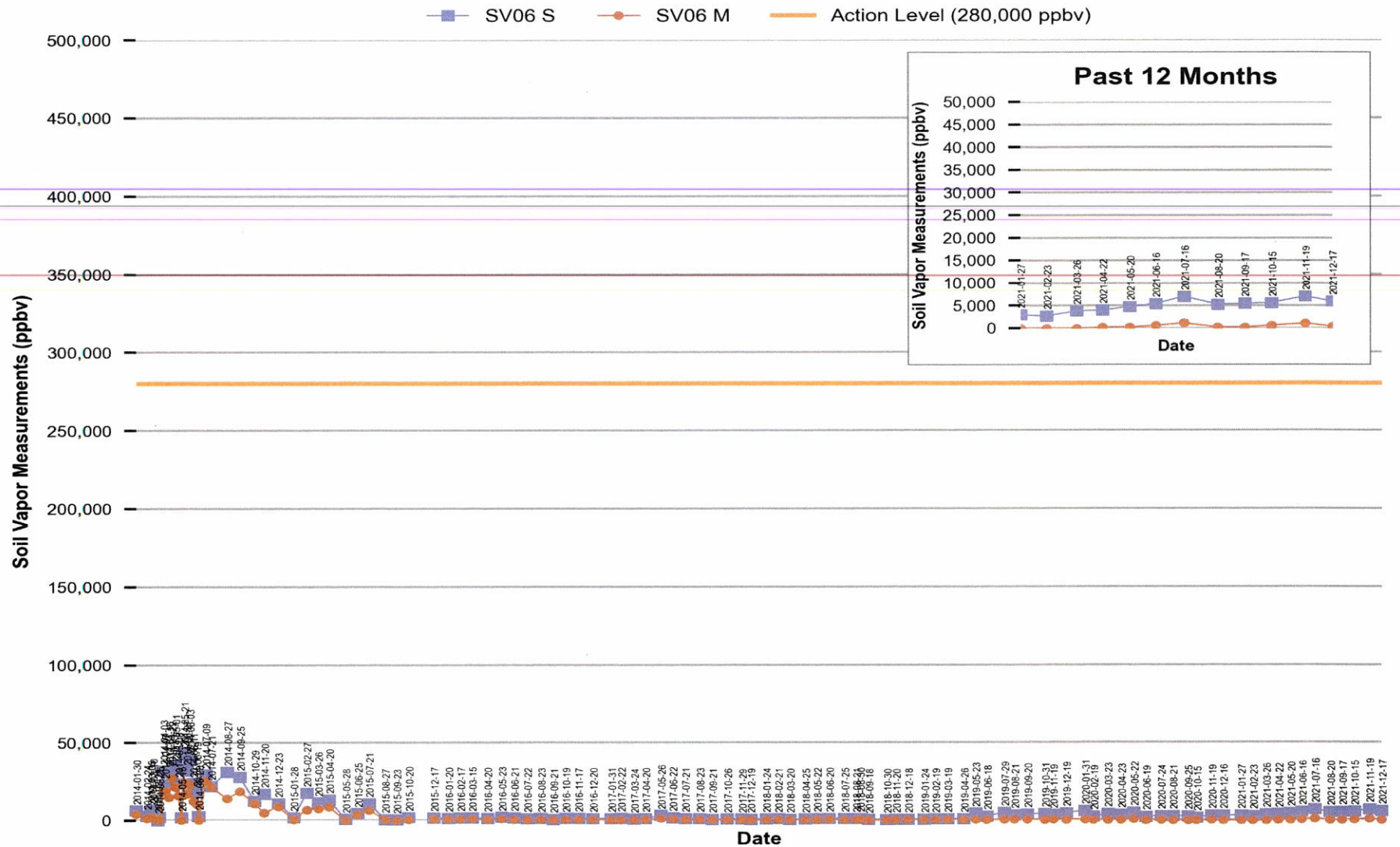
\* "M/D" monitoring points were constructed to screen both middle & deep depth intervals along the respective underground storage tank.

F-24: Jet Fuel, Fuel Number 24  
 F-76: Marine Diesel, Fuel Number 76

JP-5: Jet Fuel, Propellant Number 5  
 ppbv: Parts Per Billion by Volume



**Figure 5**  
**Red Hill - Tank 06 (F-24)**  
**Soil Vapor Measurements (Jan 2014 Through Dec 2021)**



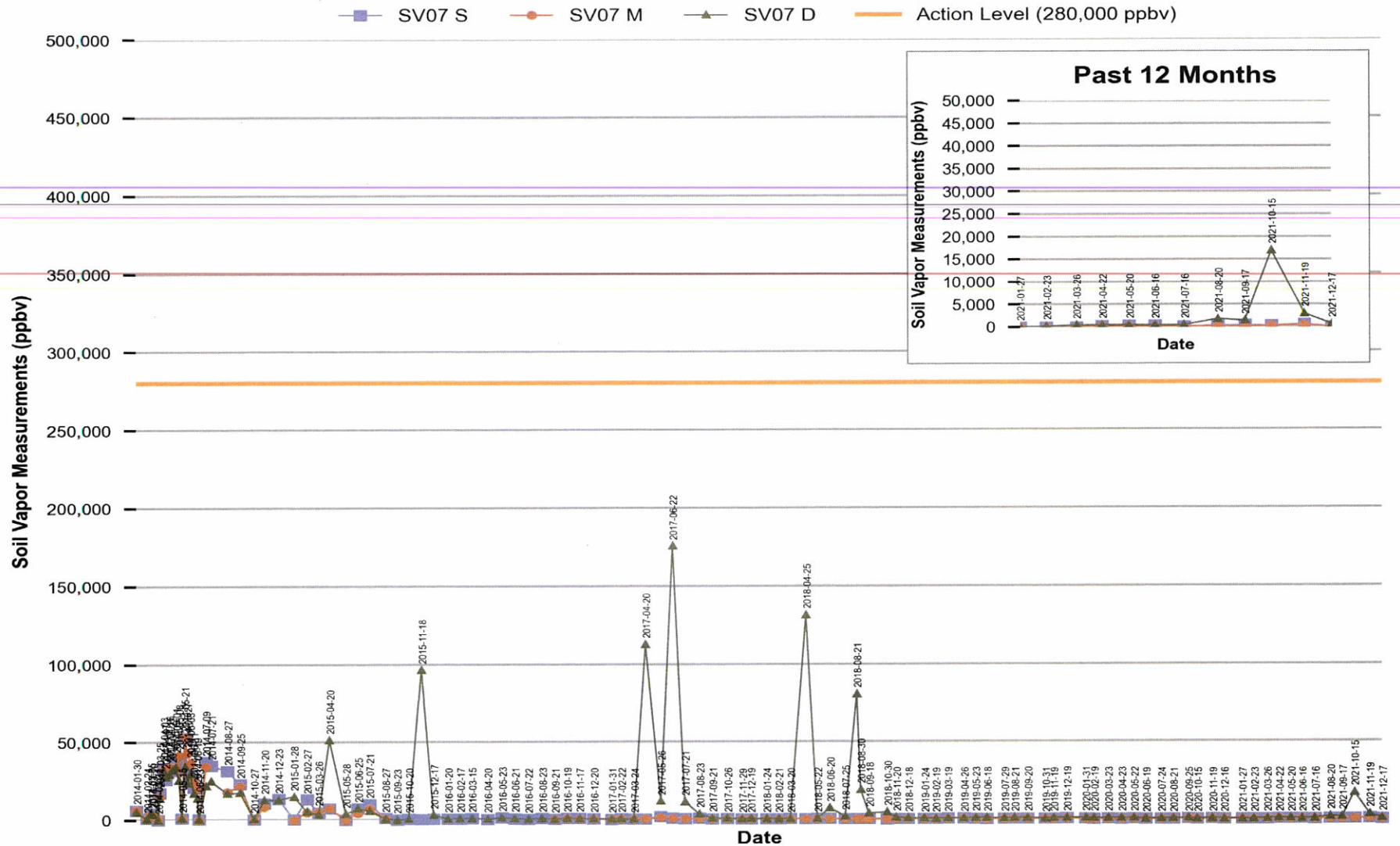
Notes (where applicable):

\* "M/D" monitoring points were constructed to screen both middle & deep depth intervals along the respective underground storage tank.

F-24: Jet Fuel, Fuel Number 24  
 F-76: Marine Diesel, Fuel Number 76

JP-5: Jet Fuel, Propellant Number 5  
 ppbv: Parts Per Billion by Volume

**Figure 6**  
**Red Hill - Tank 07 (JP-5)**  
**Soil Vapor Measurements (Jan 2014 Through Dec 2021)**



Notes (where applicable):

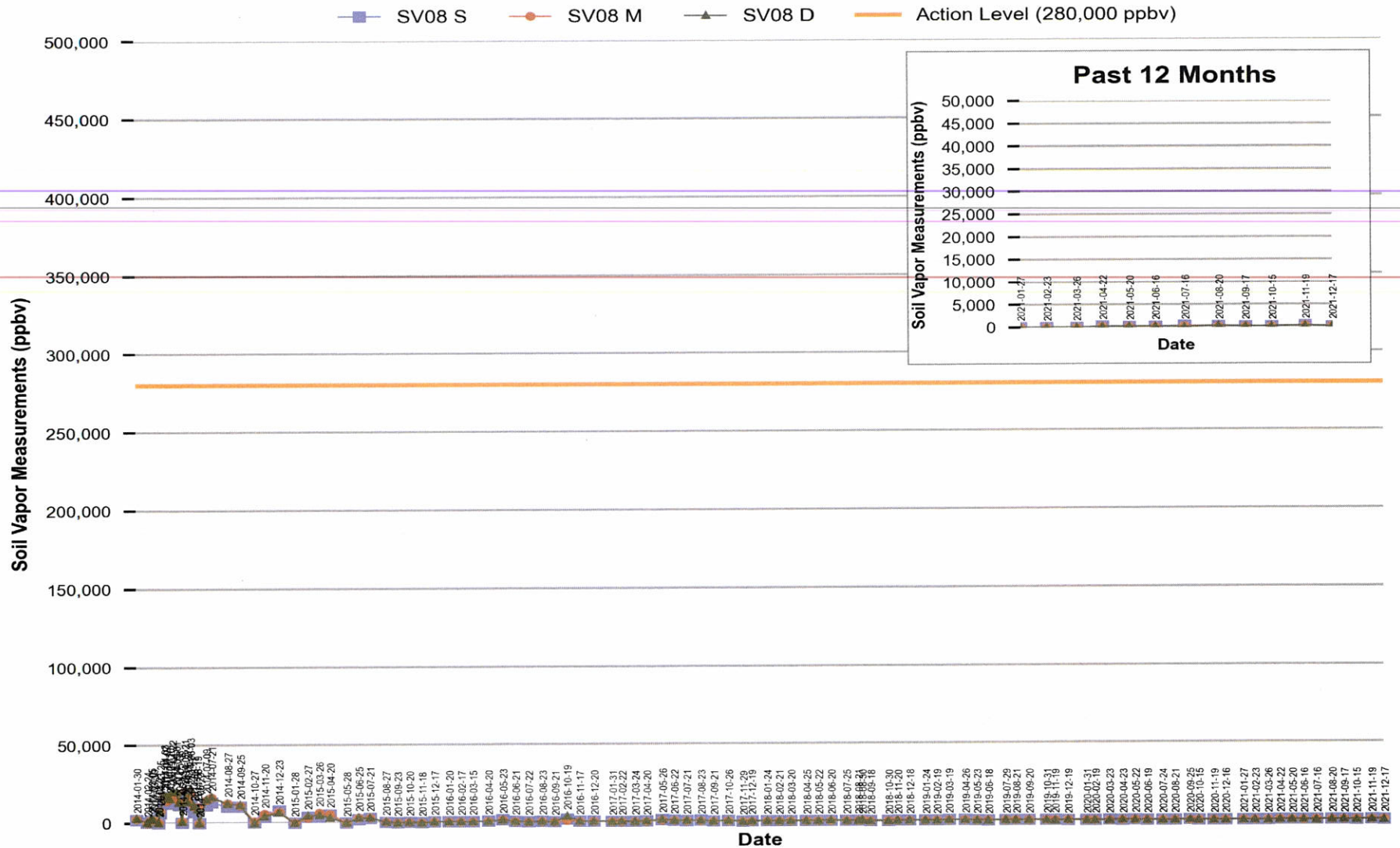
\* "M/D" monitoring points were constructed to screen both middle & deep depth intervals along the respective underground storage tank.

F-24: Jet Fuel, Fuel Number 24  
 F-76: Marine Diesel, Fuel Number 76

JP-5: Jet Fuel, Propellant Number 5  
 ppbv: Parts Per Billion by Volume



**Figure 7**  
**Red Hill - Tank 08 (JP-5)**  
**Soil Vapor Measurements (Jan 2014 Through Dec 2021)**



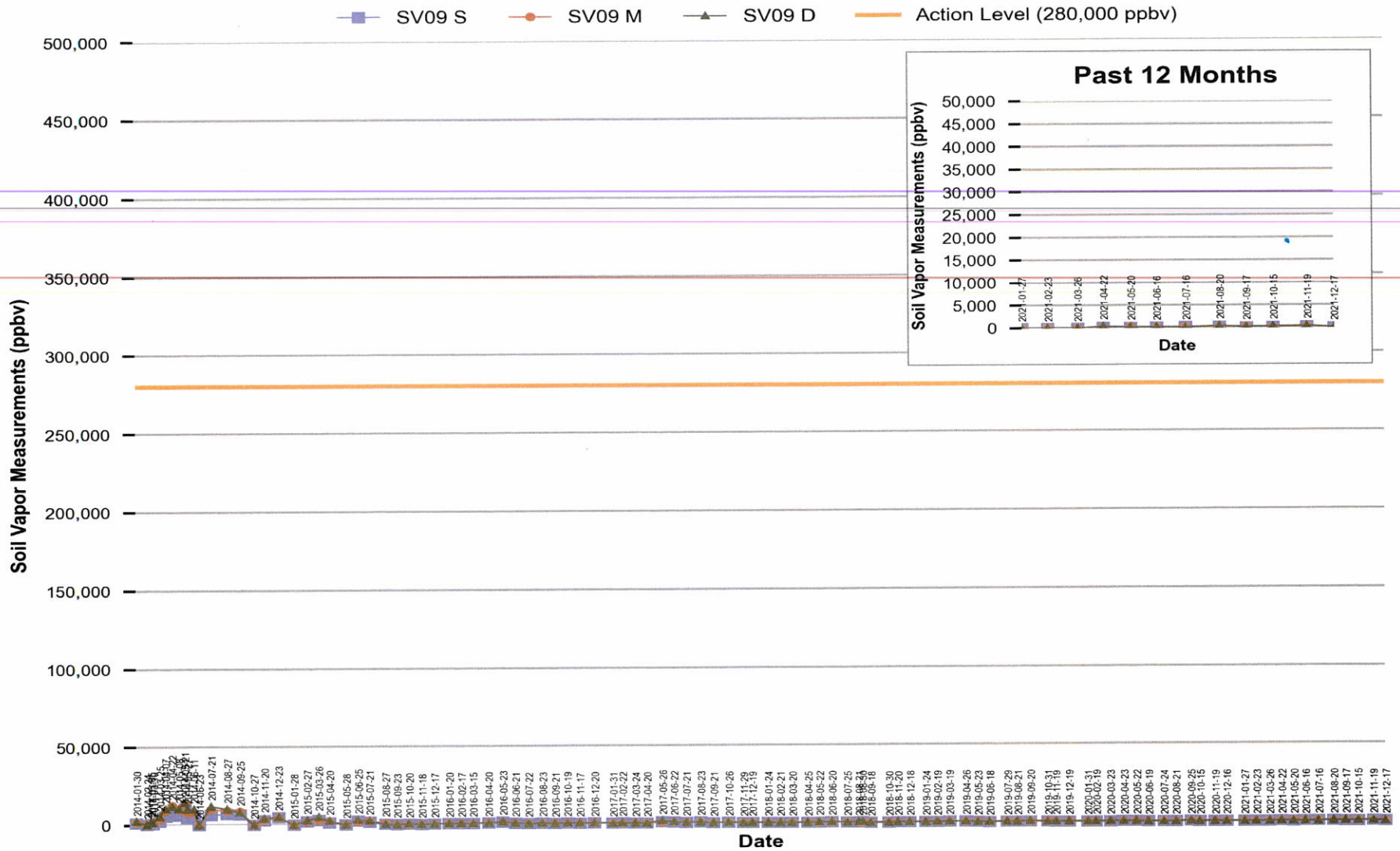
Notes (where applicable):

\* "M/D" monitoring points were constructed to screen both middle & deep depth intervals along the respective underground storage tank.

F-24: Jet Fuel, Fuel Number 24  
 F-76: Marine Diesel, Fuel Number 76

JP-5: Jet Fuel, Propellant Number 5  
 ppbv: Parts Per Billion by Volume

**Figure 8**  
**Red Hill - Tank 09 (JP-5)**  
**Soil Vapor Measurements (Jan 2014 Through Dec 2021)**



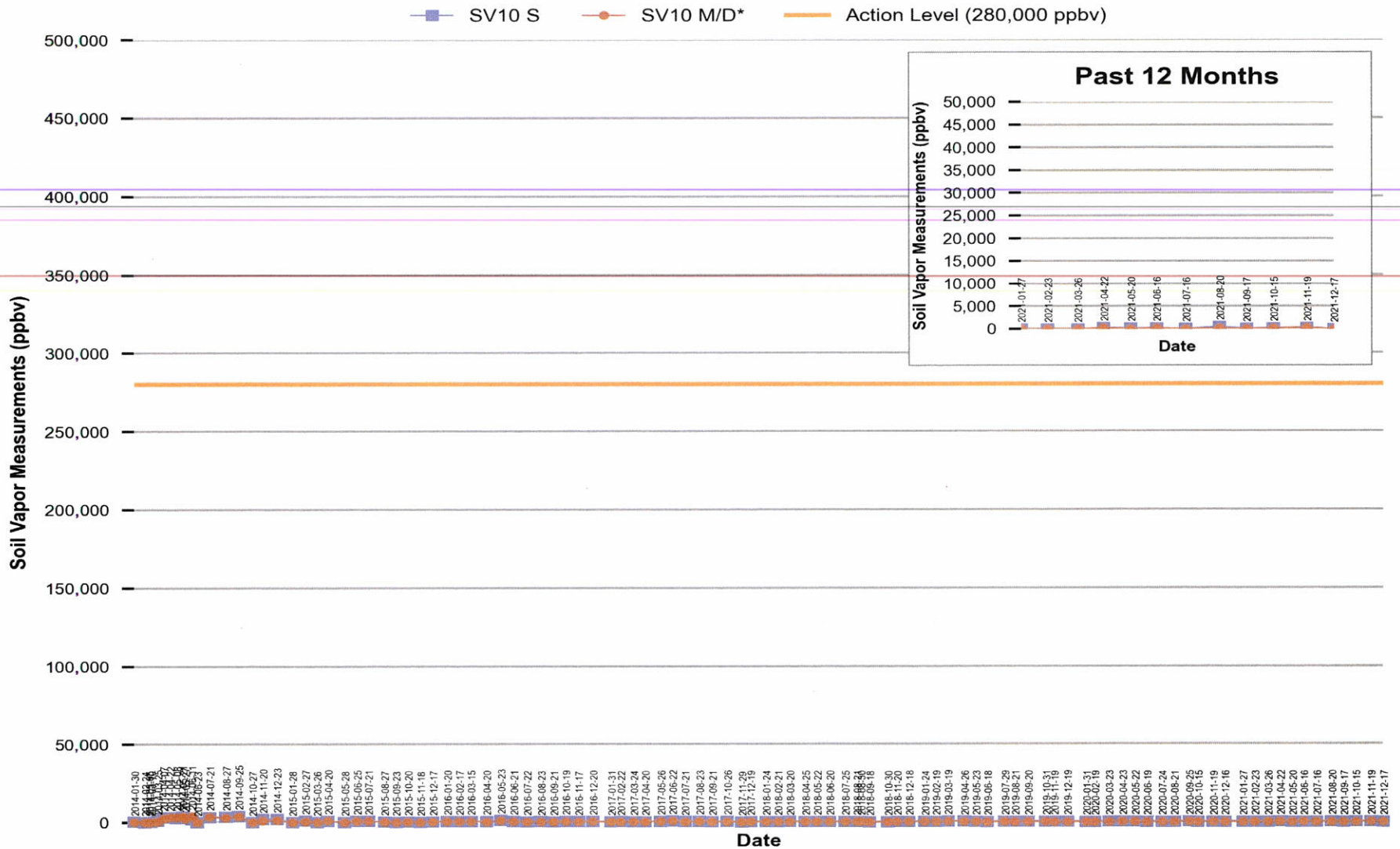
Notes (where applicable):

\* "M/D" monitoring points were constructed to screen both middle & deep depth intervals along the respective underground storage tank.

F-24: Jet Fuel, Fuel Number 24  
 F-76: Marine Diesel, Fuel Number 76

JP-5: Jet Fuel, Propellant Number 5  
 ppbv: Parts Per Billion by Volume

**Figure 9**  
**Red Hill - Tank 10 (JP-5)**  
**Soil Vapor Measurements (Jan 2014 Through Dec 2021)**



Notes (where applicable):

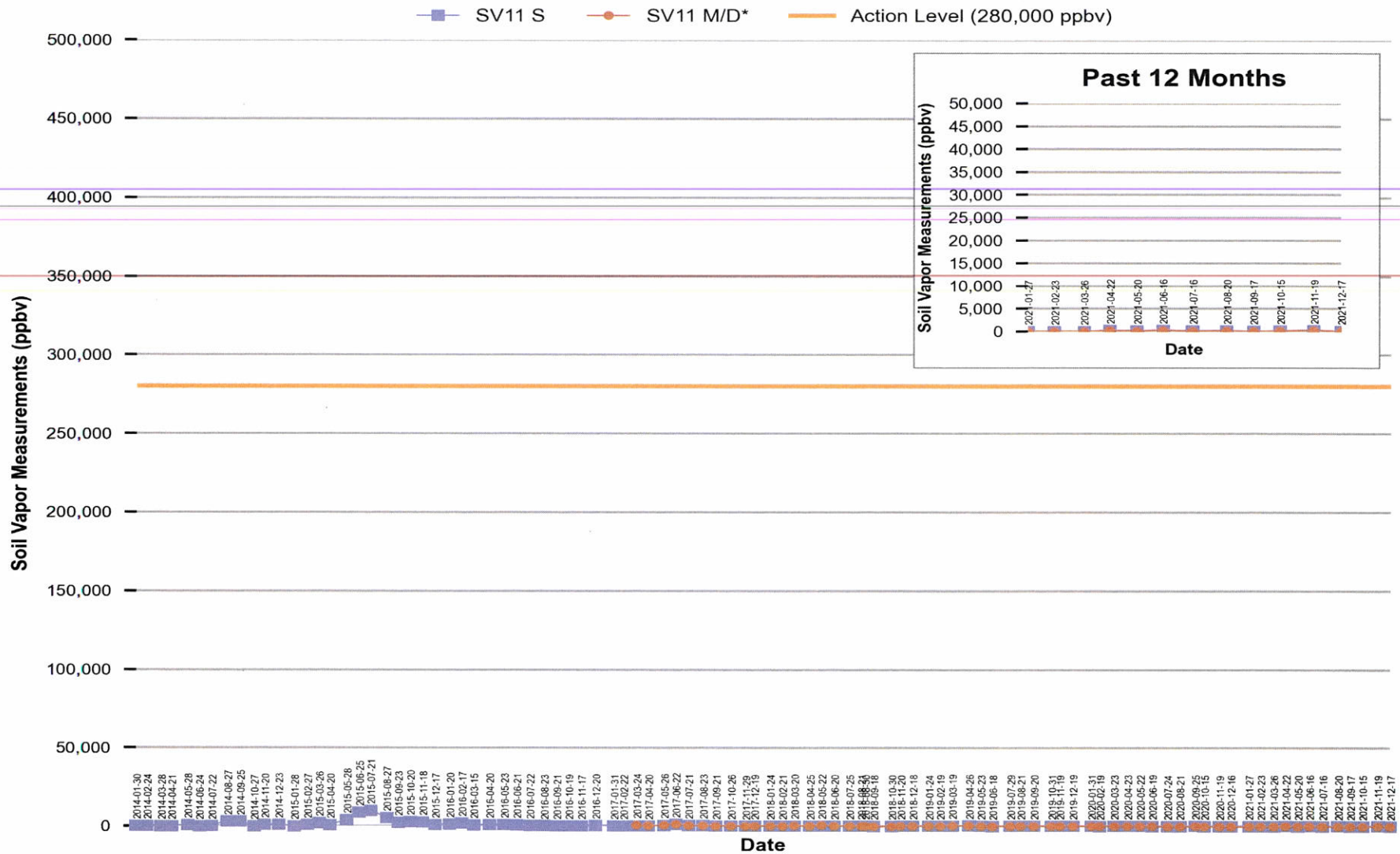
\* "M/D" monitoring points were constructed to screen both middle & deep depth intervals along the respective underground storage tank.

F-24: Jet Fuel, Fuel Number 24  
 F-76: Marine Diesel, Fuel Number 76

JP-5: Jet Fuel, Propellant Number 5  
 ppbv: Parts Per Billion by Volume



**Figure 10**  
**Red Hill - Tank 11 (JP-5)**  
**Soil Vapor Measurements (Jan 2014 Through Dec 2021)**



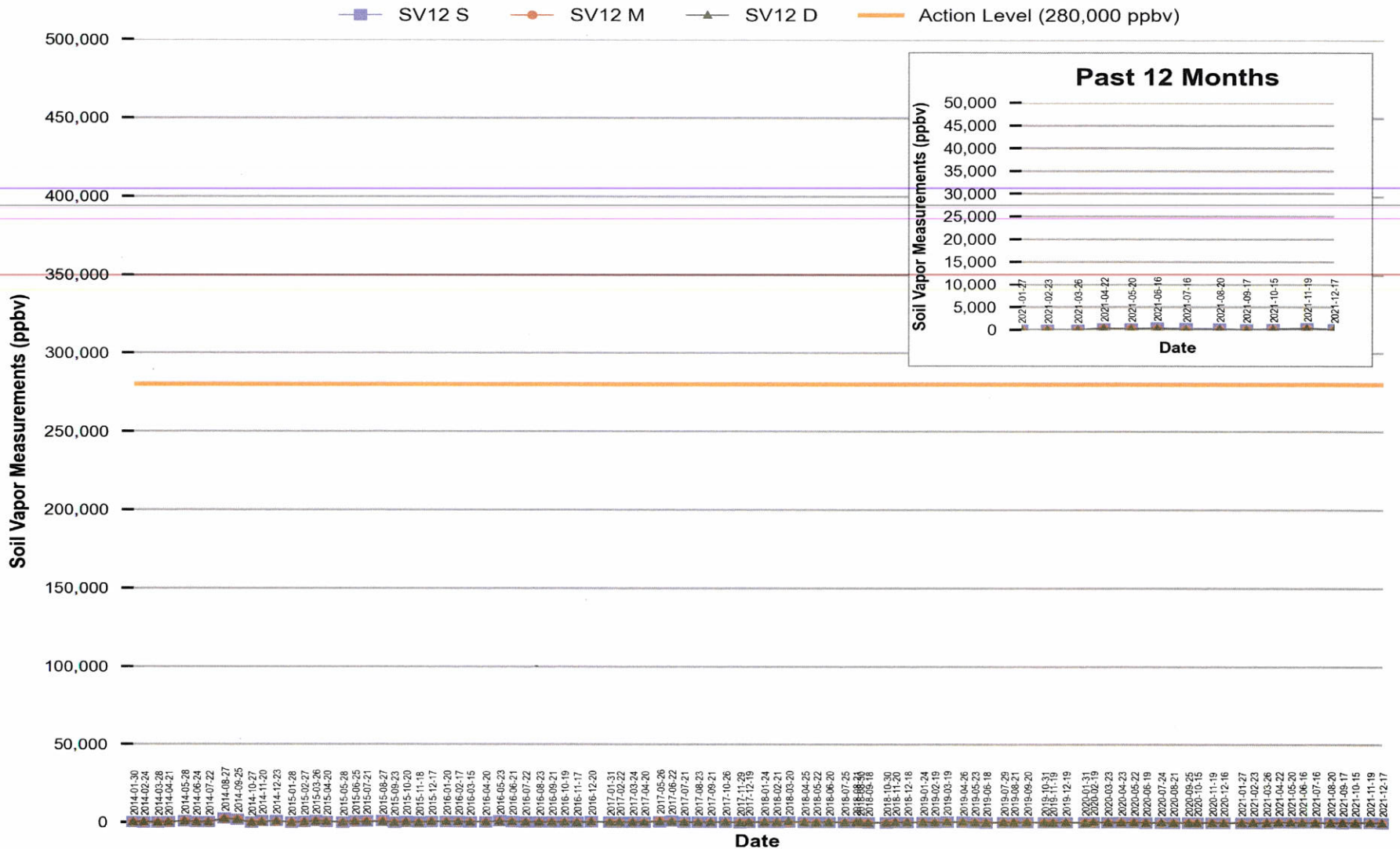
Notes (where applicable):

\* "M/D" monitoring points were constructed to screen both middle & deep depth intervals along the respective underground storage tank.

F-24: Jet Fuel, Fuel Number 24  
 F-76: Marine Diesel, Fuel Number 76

JP-5: Jet Fuel, Propellant Number 5  
 ppbv: Parts Per Billion by Volume

**Figure 11**  
**Red Hill - Tank 12 (JP-5)**  
**Soil Vapor Measurements (Jan 2014 Through Dec 2021)**



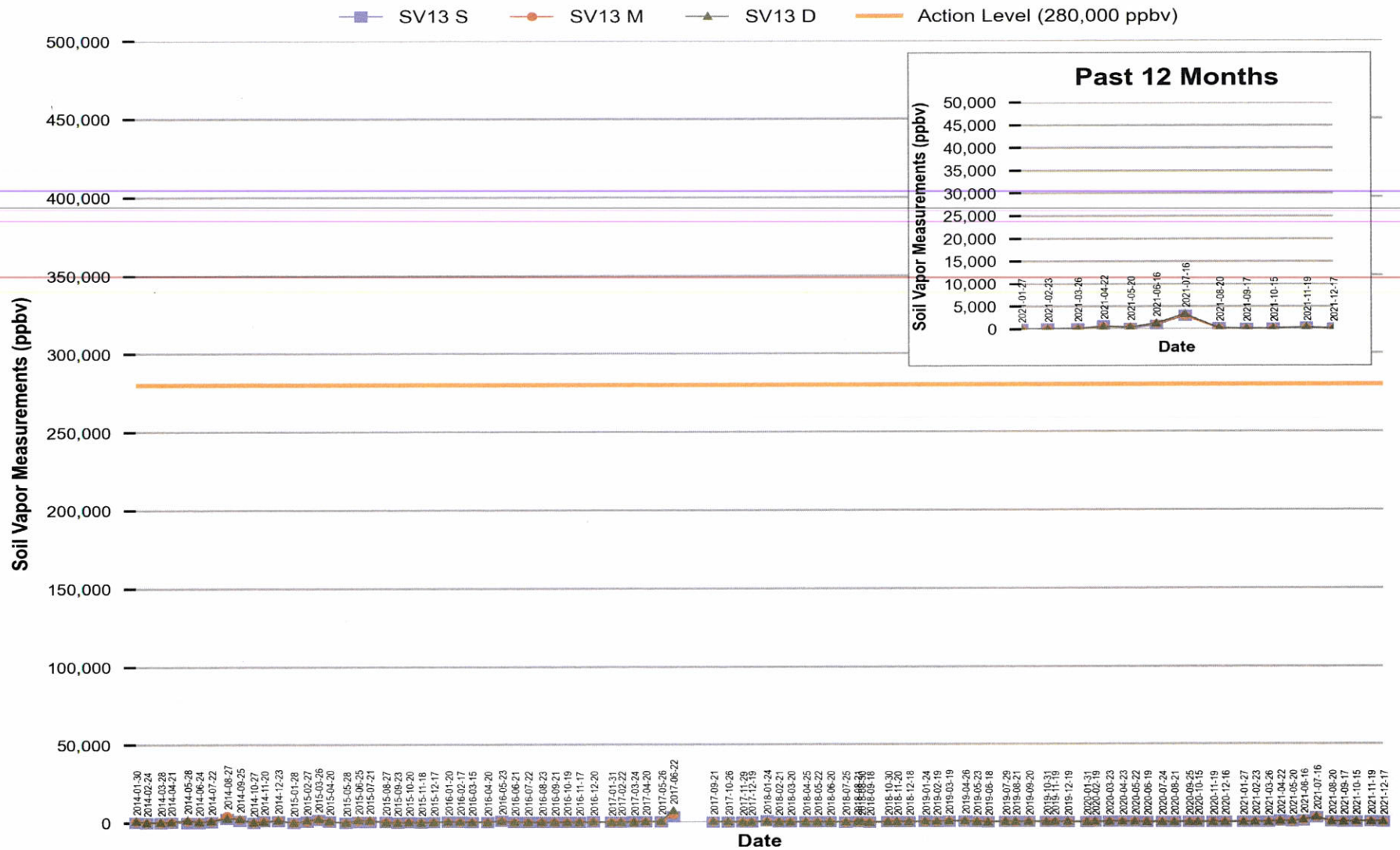
Notes (where applicable):

\* "M/D" monitoring points were constructed to screen both middle & deep depth intervals along the respective underground storage tank.

F-24: Jet Fuel, Fuel Number 24  
 F-76: Marine Diesel, Fuel Number 76

JP-5: Jet Fuel, Propellant Number 5  
 ppbv: Parts Per Billion by Volume

**Figure 12**  
**Red Hill - Tank 13 (JP-5)**  
**Soil Vapor Measurements (Jan 2014 Through Dec 2021)**



Notes (where applicable):

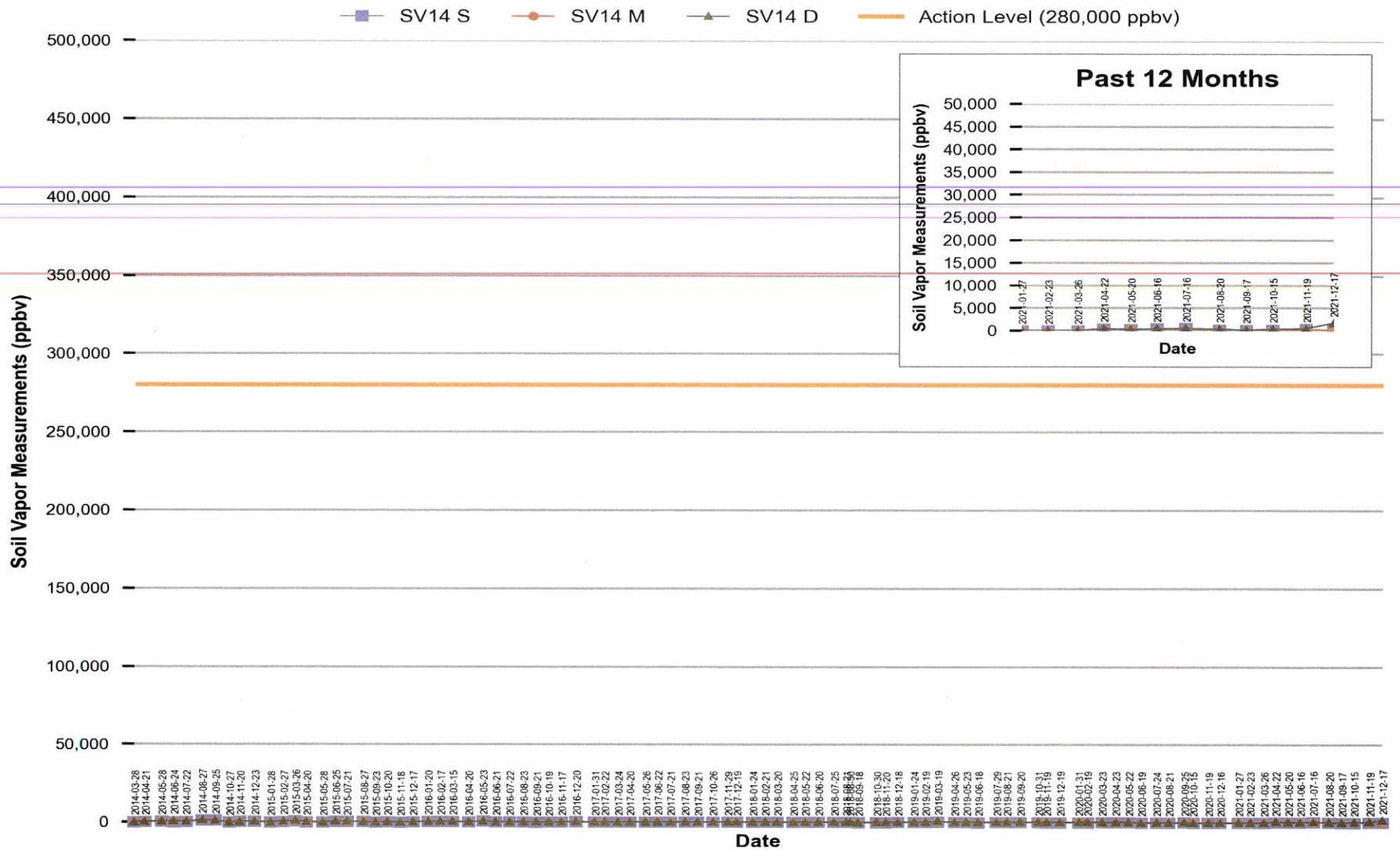
\* "M/D" monitoring points were constructed to screen both middle & deep depth intervals along the respective underground storage tank.

F-24: Jet Fuel, Fuel Number 24  
 F-76: Marine Diesel, Fuel Number 76

JP-5: Jet Fuel, Propellant Number 5  
 ppbv: Parts Per Billion by Volume



**Figure 13**  
**Red Hill - Tank 14 (JP-5)**  
**Soil Vapor Measurements (Mar 2014 Through Dec 2021)**



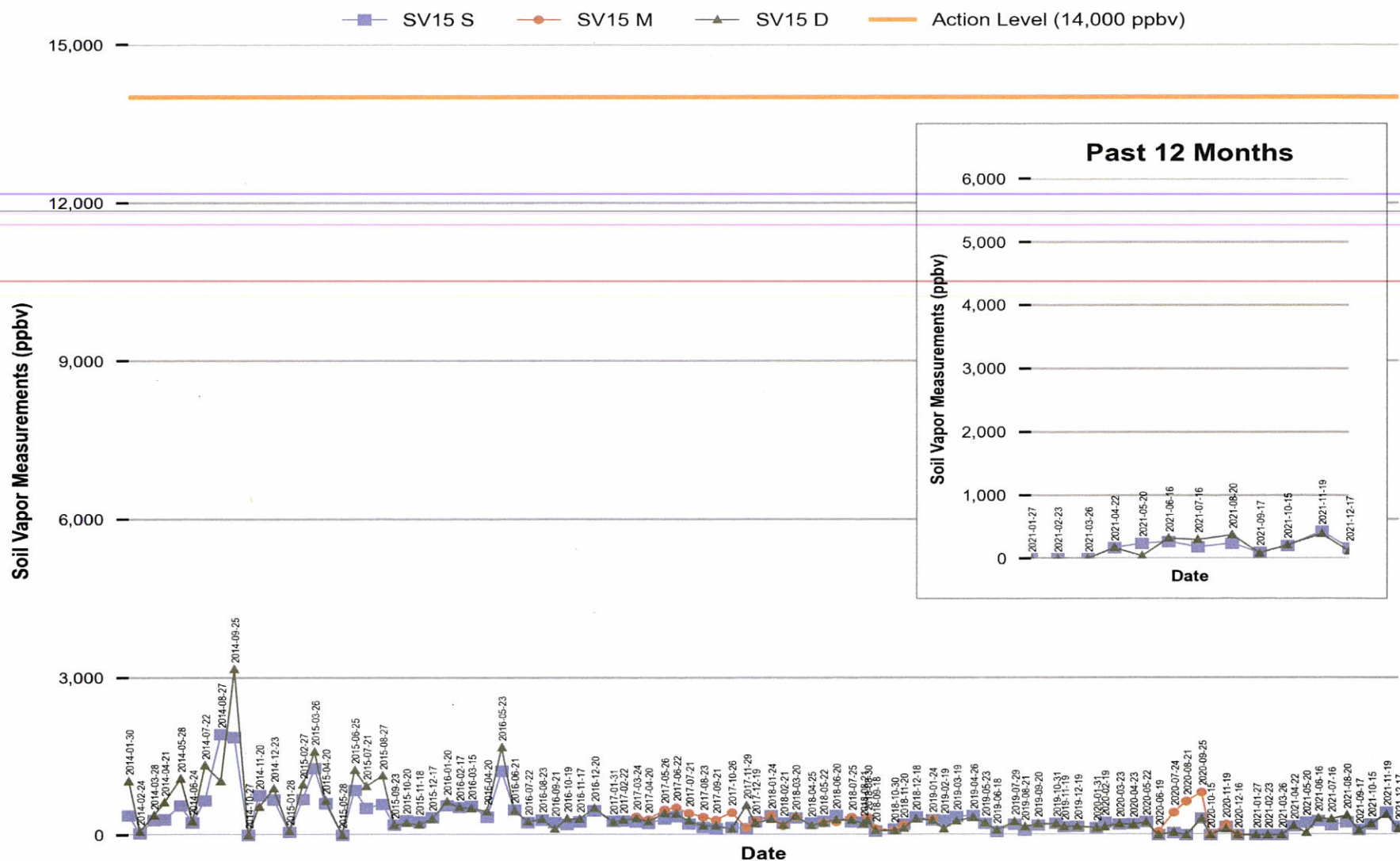
Notes (where applicable):

\* "M/D" monitoring points were constructed to screen both middle & deep depth intervals along the respective underground storage tank.

F-24: Jet Fuel, Fuel Number 24  
 F-76: Marine Diesel, Fuel Number 76

JP-5: Jet Fuel, Propellant Number 5  
 ppbv: Parts Per Billion by Volume

**Figure 14**  
**Red Hill - Tank 15 (F-76)**  
**Soil Vapor Measurements (Jan 2014 Through Dec 2021)**



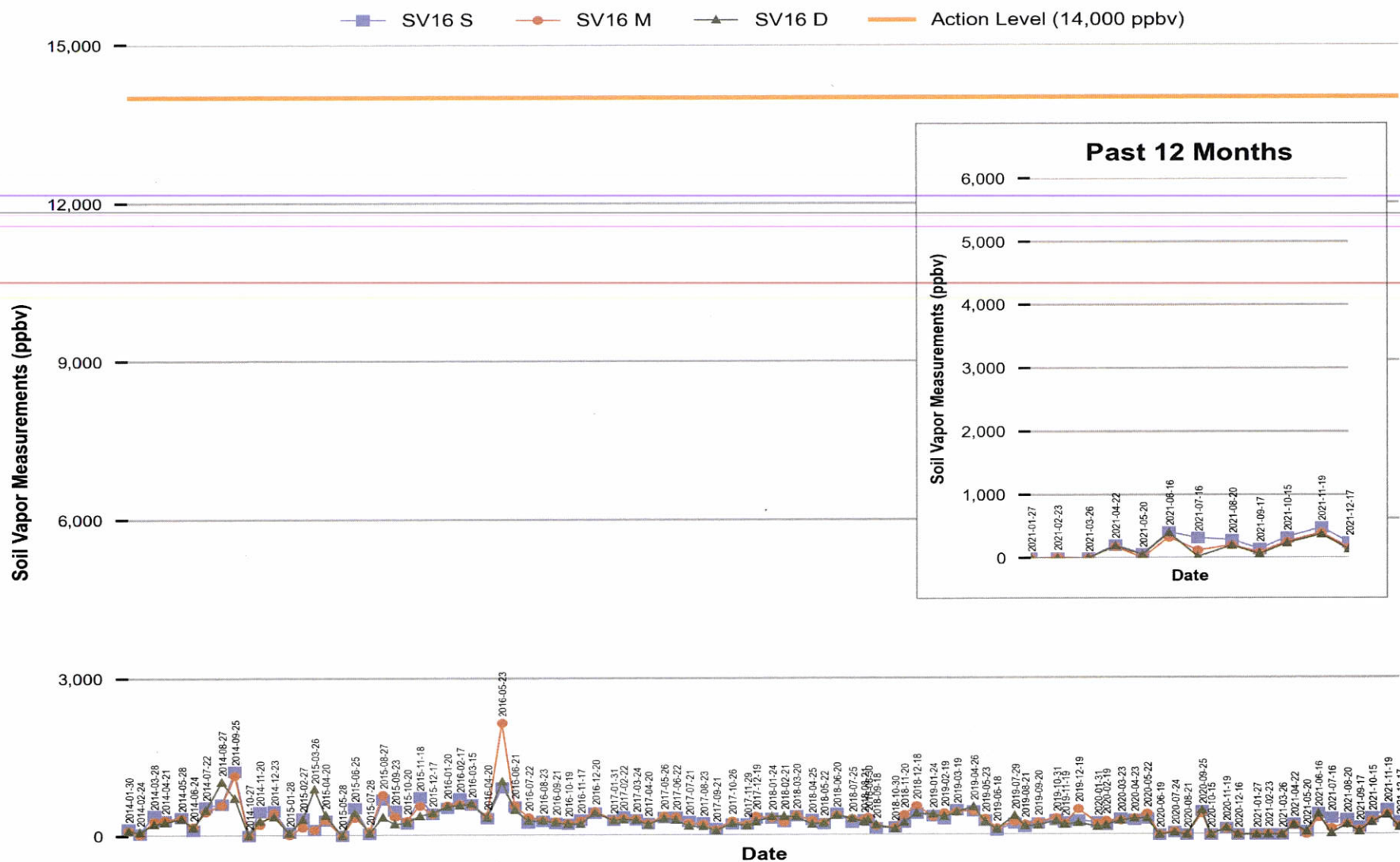
Notes (where applicable):

\* "M/D" monitoring points were constructed to screen both middle & deep depth intervals along the respective underground storage tank.

F-24: Jet Fuel, Fuel Number 24  
 F-76: Marine Diesel, Fuel Number 76

JP-5: Jet Fuel, Propellant Number 5  
 ppbv: Parts Per Billion by Volume

**Figure 15**  
**Red Hill - Tank 16 (F-76)**  
**Soil Vapor Measurements (Jan 2014 Through Dec 2021)**



Notes (where applicable):

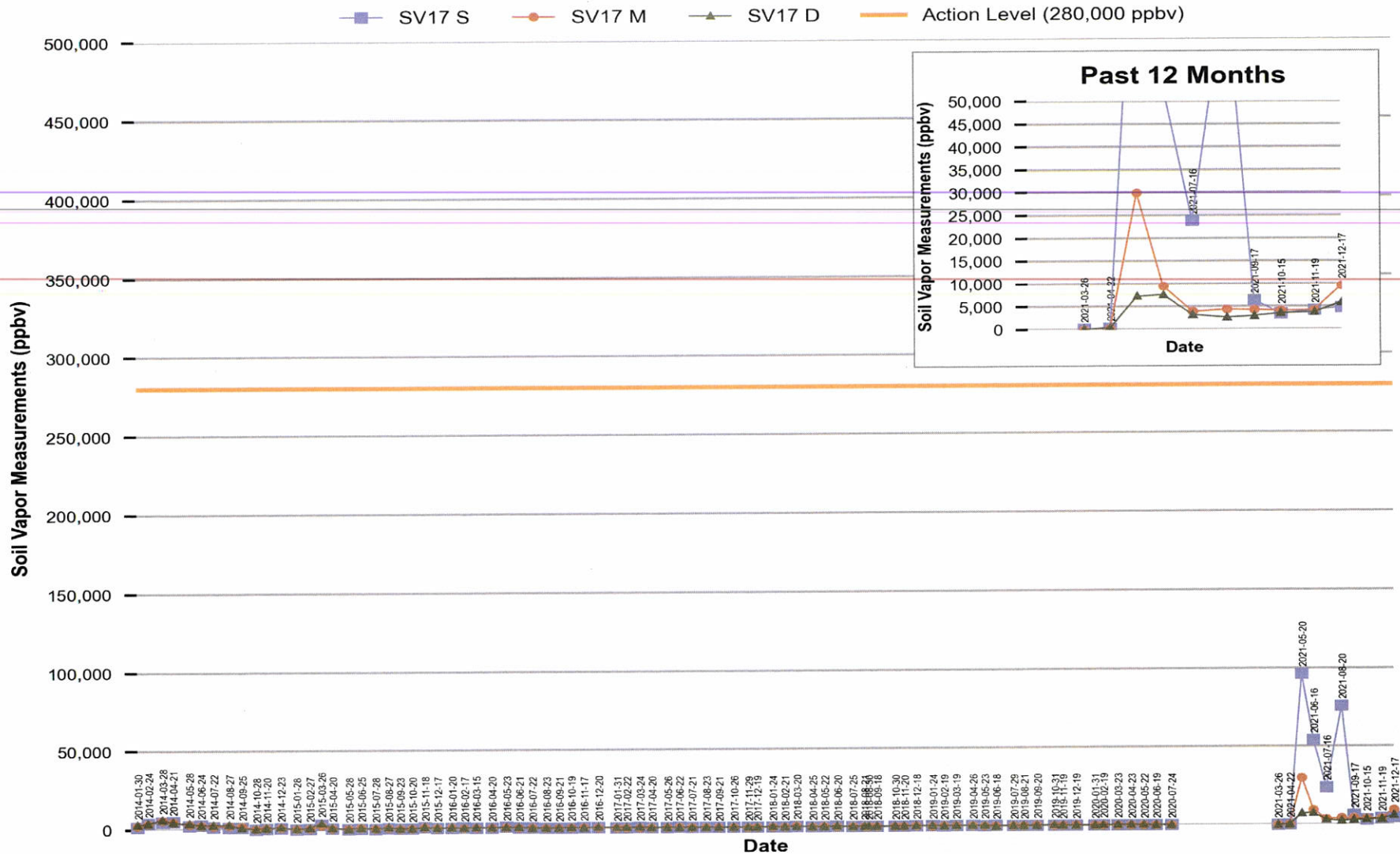
\* "M/D" monitoring points were constructed to screen both middle & deep depth intervals along the respective underground storage tank.

F-24: Jet Fuel, Fuel Number 24  
 F-76: Marine Diesel, Fuel Number 76

JP-5: Jet Fuel, Propellant Number 5  
 ppbv: Parts Per Billion by Volume



**Figure 16**  
**Red Hill - Tank 17 (JP-5)**  
**Soil Vapor Measurements (Jan 2014 Through Dec 2021)**



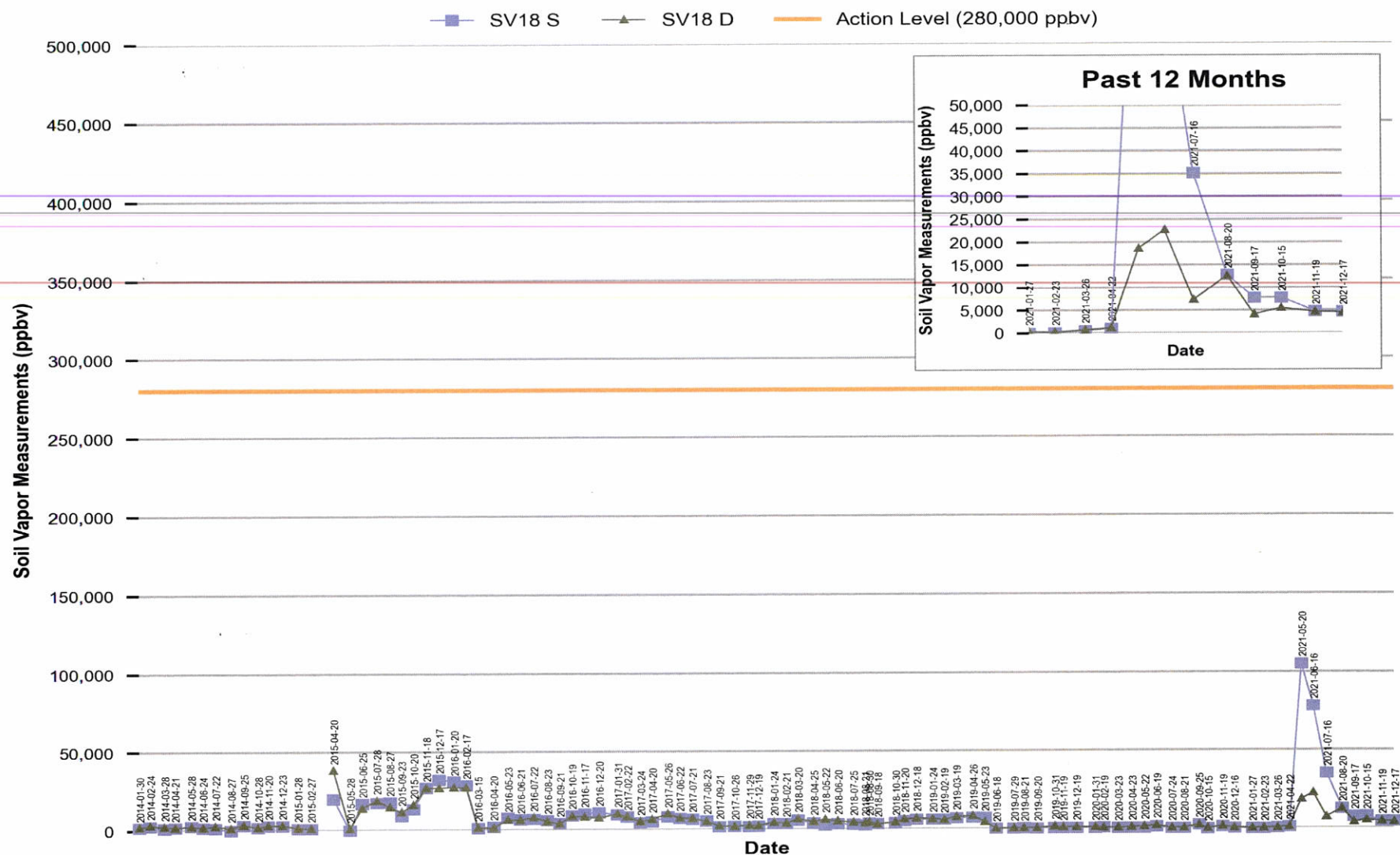
Notes (where applicable):

\* "M/D" monitoring points were constructed to screen both middle & deep depth intervals along the respective underground storage tank.

F-24: Jet Fuel, Fuel Number 24  
 F-76: Marine Diesel, Fuel Number 76

JP-5: Jet Fuel, Propellant Number 5  
 ppbv: Parts Per Billion by Volume

**Figure 17**  
**Red Hill - Tank 18 (JP-5)**  
**Soil Vapor Measurements (Jan 2014 Through Dec 2021)**



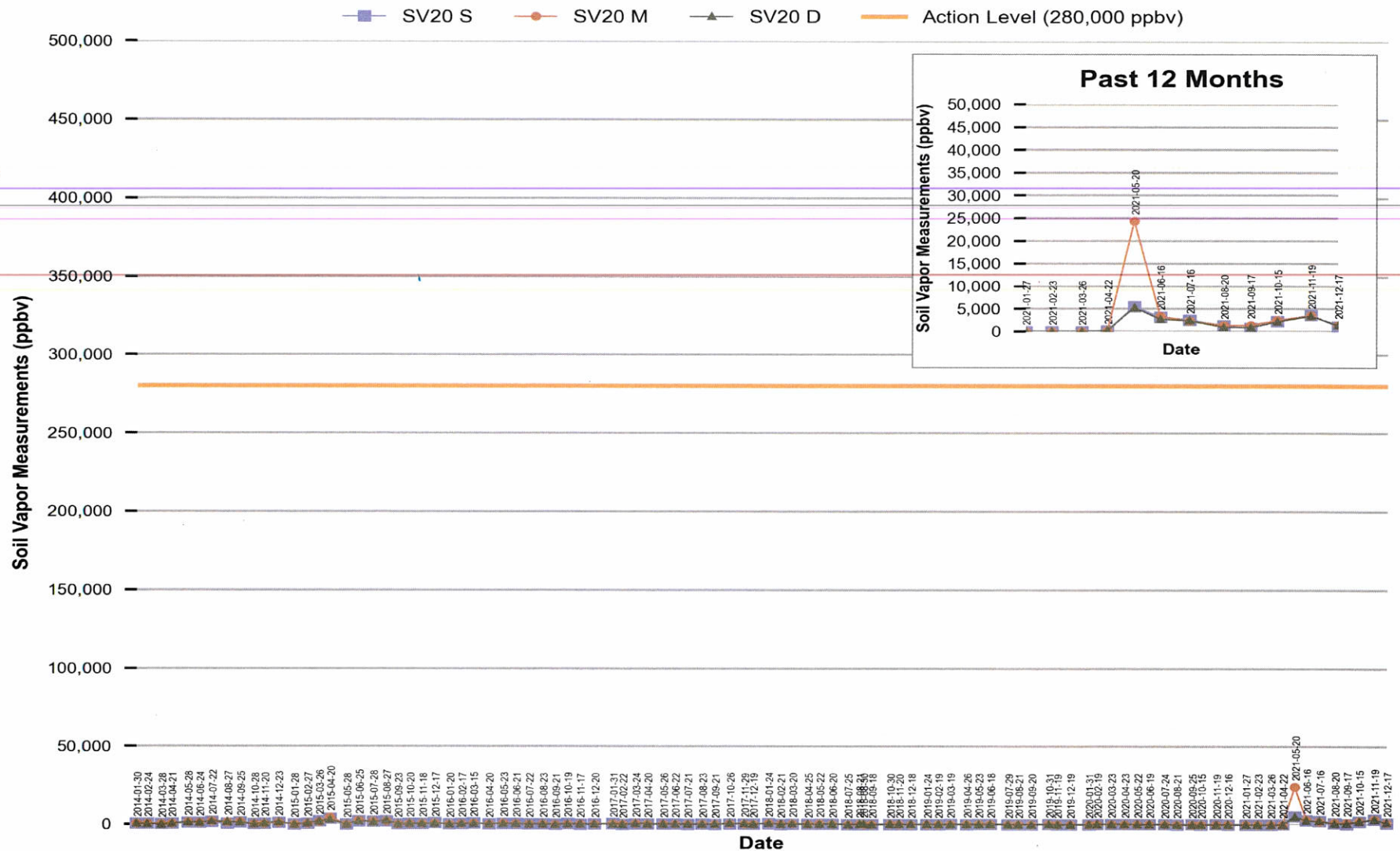
Notes (where applicable):

\* "M/D" monitoring points were constructed to screen both middle & deep depth intervals along the respective underground storage tank.

F-24: Jet Fuel, Fuel Number 24  
 F-76: Marine Diesel, Fuel Number 76

JP-5: Jet Fuel, Propellant Number 5  
 ppbv: Parts Per Billion by Volume

**Figure 18**  
**Red Hill - Tank 20 (JP-5)**  
**Soil Vapor Measurements (Jan 2014 Through Dec 2021)**



Notes (where applicable):

\* "M/D" monitoring points were constructed to screen both middle & deep depth intervals along the respective underground storage tank.

F-24: Jet Fuel, Fuel Number 24  
 F-76: Marine Diesel, Fuel Number 76

JP-5: Jet Fuel, Propellant Number 5  
 ppbv: Parts Per Billion by Volume



20 January 2022

From: Environmental Protection Specialist, NAVSUP FLC Pearl Harbor, HI  
To: Environmental Department, NAVFAC Pearl Harbor, HI

Subj: NAVSUP FLC PEARL HARBOR CAUSATIVE RESEARCH REPORT IRT RED HILL  
SOIL VAPOR MONITORING REPORT FOR DECEMBER 2021

Ref: (a) Red Hill Bulk Fuel Storage Facility Groundwater Protection Plan  
(b) Red Hill Soil Vapor Monitoring Report dated 21 December 2021

1. Ref (a) requires NAVSUP FLCPH investigate possible fuel leaks. Refs (b) reported the following soil vapor monitoring results at the Red Hill Fuel Storage Facility:

- A moderately increasing trend for SVMP SV14D
- Strong increase trend in VOC concentrations at Tank 17 Mid and Deep ports.

2. FLCPH causative research and findings:

- a. The following Red Hill Fuel Storage Facility Underground Storage Tanks (USTs) are Out of Service: Tanks 1, 14, 18 and 19.
- b. Reviewed all AFHE Unscheduled Fuel Movement (UFM) Alarm Summaries and UFM Reports. There was a UFM at tank 4 on 12/10/2021 and 12/11/2021 due to the installation of a new hard drive to the AHFE system. The alarm was promptly normalized and acknowledged by the operators.
- c. Red Hill maintenance and repair contractors did not report any factors that could have influenced an increase in trends for the soil vapor monitoring.
- d. There were no fuel samples collected from 19 November 2021- 17 December 2021 that would've potentially caused an increase to the sample result.
- e. Inspection of the area surrounding all Red Hill tanks did not show evidence of a fuel leak or evidence that any fuel had spilled in the area that would have affected sampling on 17 December 21.
- f. All active tanks have passed tank tightness testing within the required time period. Tank 17 was empty during the time of sampling and is still empty.
- g. There is no evidence of a leaking tank in the Red Hill Complex. No evidence of a spill that may have contributed to elevating the samples taken from tank 17 monitoring ports.

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ENCLOSURE(2)