



DEPARTMENT OF THE NAVY

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

5090
Ser N45/109
November 19, 2021

CERTIFIED NO: 9489 0090 0027 6232 9773 38

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 OCTOBER 2021
RED HILL BULK FUEL 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 October 15, 2021 using a photo-ionization detector (PID) 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. Each tank in the sampling network has 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 in the field are presented with the appropriate action level graphically in Enclosure 1. At Tank 5, the concentrations of VOCs detected were 403 ppbv (SVMP-5S), 478 ppbv (SVMP-5M), and 293 ppbv (SVMP-5D). VOC concentrations measured in all down-gradient tank SVMPs were between 101 and 213 ppbv.

Due to a strong increase trend in VOC concentrations at SVMP-7D, the Navy performed a causative investigation of fuel operations conducted during this time period. NAVSUP FLC Pearl Harbor Causative Research Report is submitted as Enclosure 2. This report documents causative research and findings to conclude there is no evidence of a leaking tank or spill at the Red Hill Complex that may have contributed to elevated soil vapor VOC concentrations.

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All VOC concentrations measured in October were below action levels, with no consistent trends observed over time. Additional monitoring in accordance with the DOH Transition Plan of June 10, 2021 in response to the May 6, 2021 pipeline breach is ongoing. These results are reported under separate cover. Regular monthly soil vapor VOC concentrations will continue to be sampled and reported with the next event scheduled for November 19, 2021.

If there are any questions regarding the October 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,



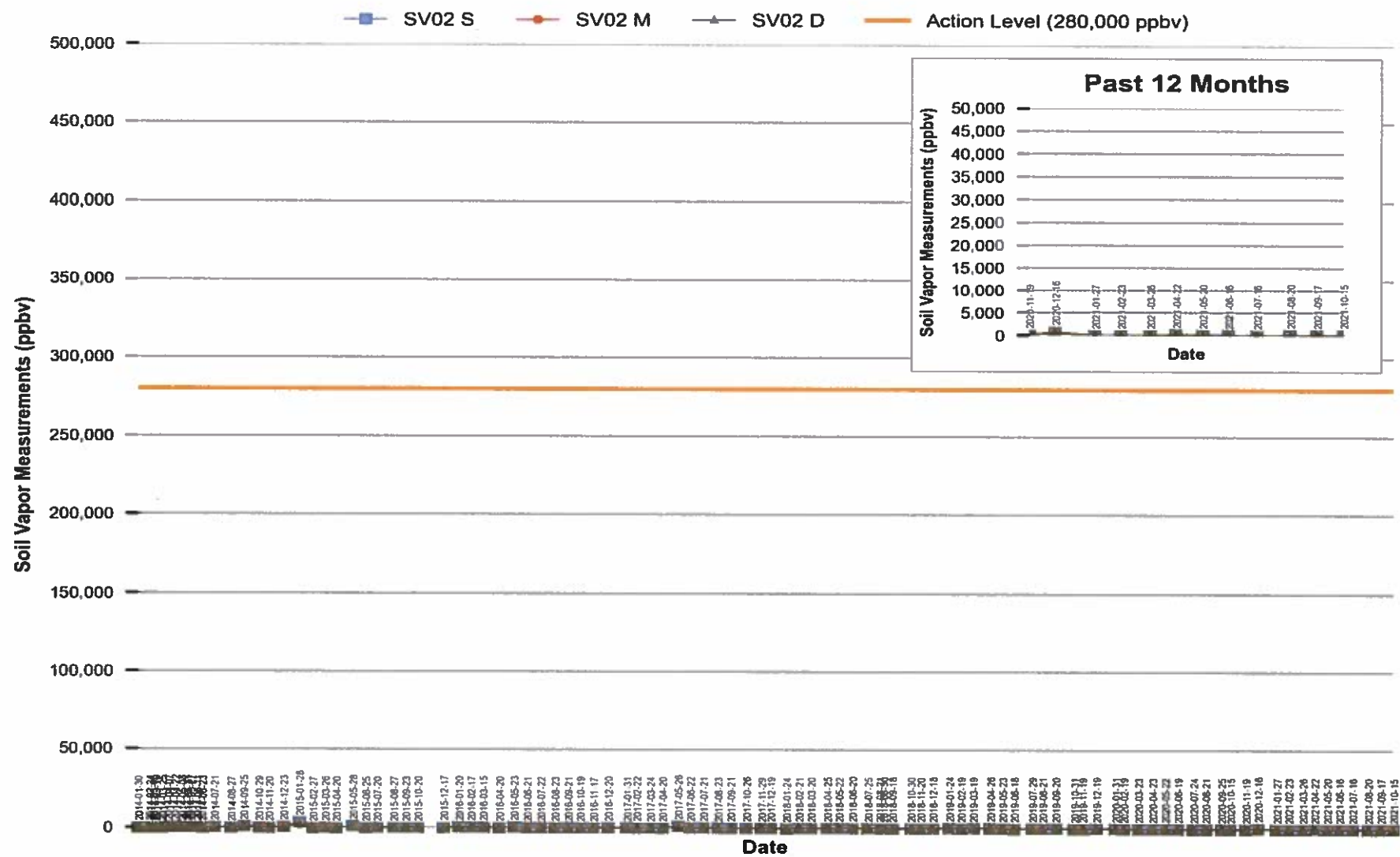
SHERRI R. ENG
Director
Regional Environmental Department
By direction of the
Commander

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



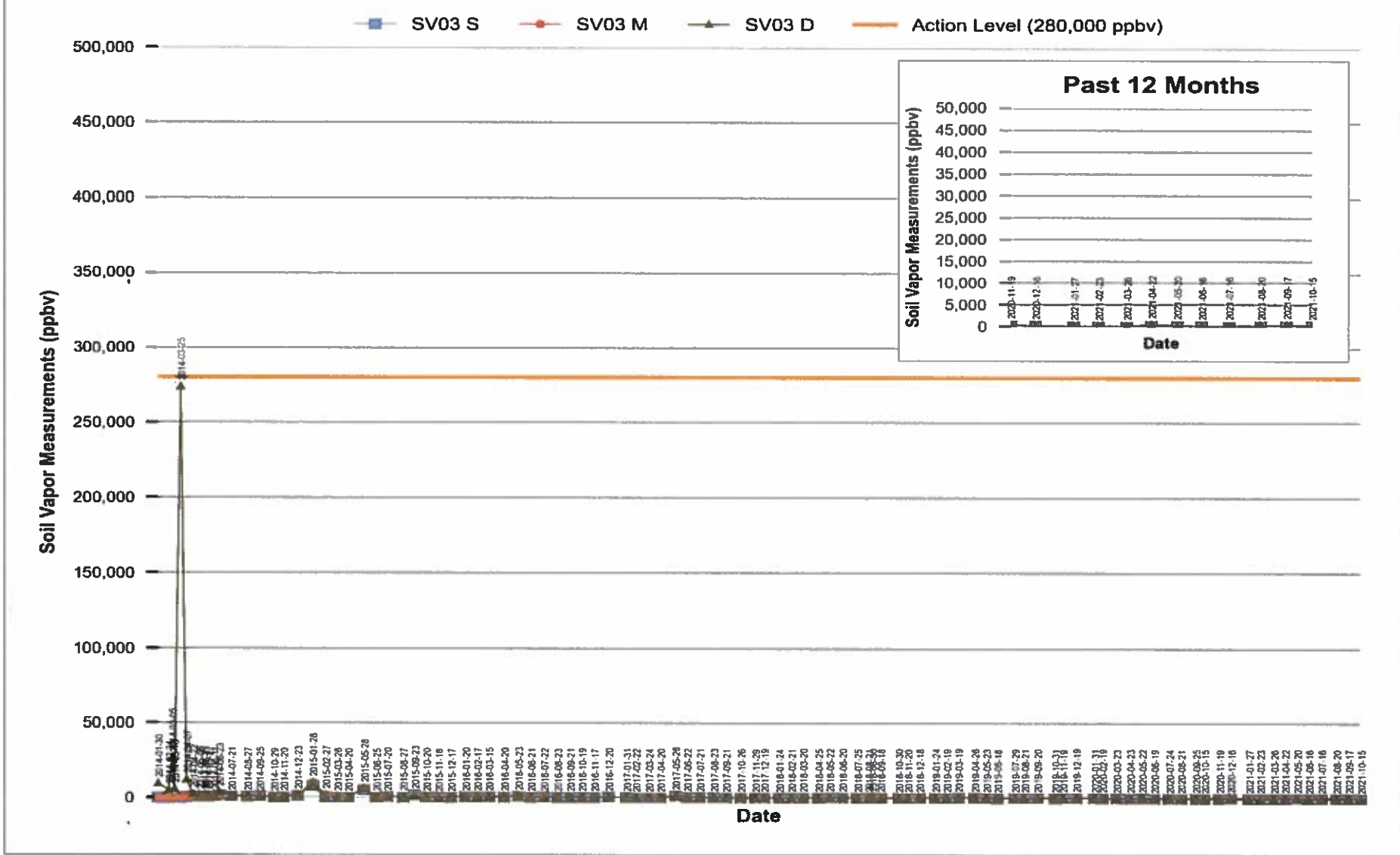
Notes (where applicable):

* "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 Oct 2021)



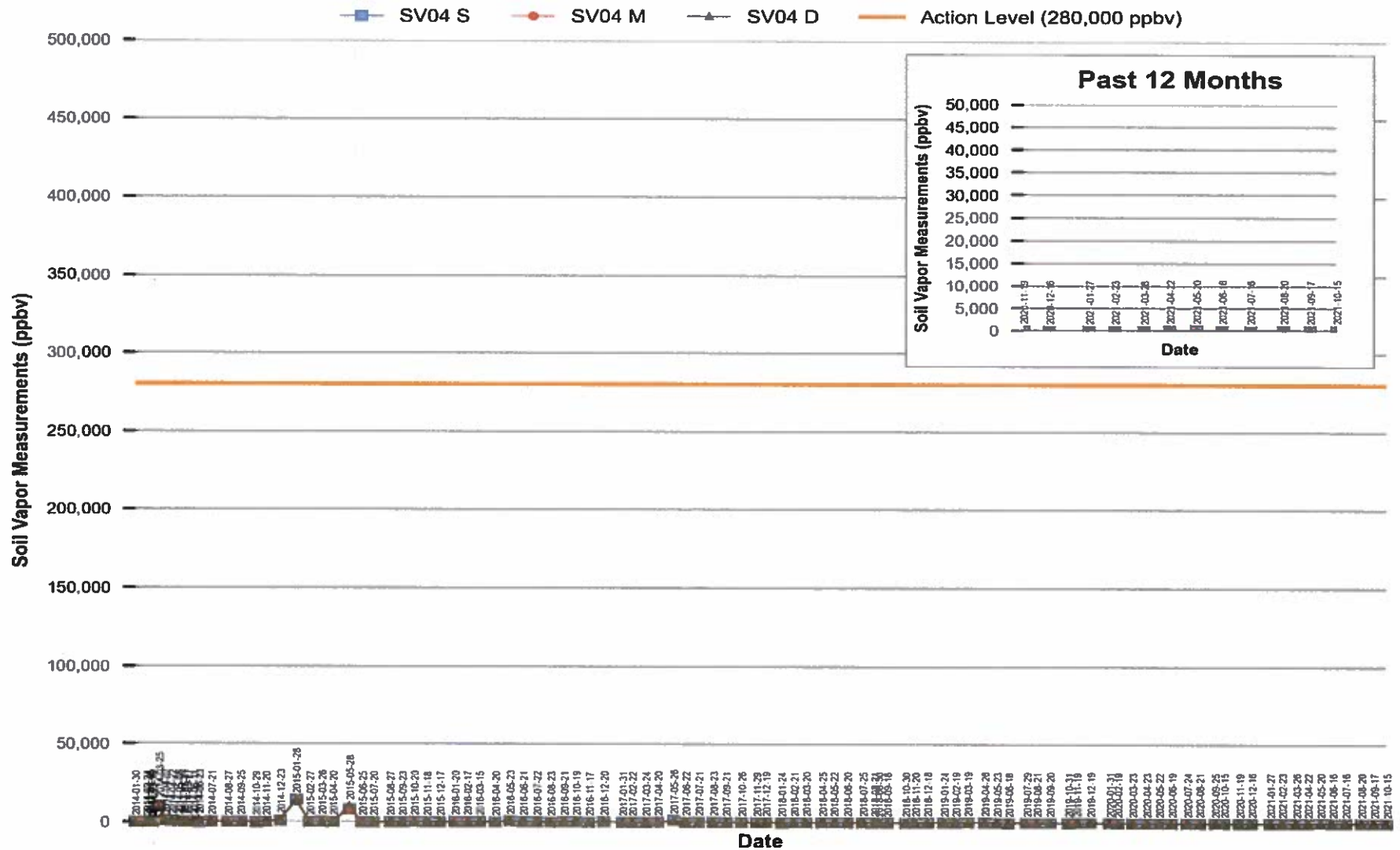
Notes (where applicable):

* "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 Oct 2021)



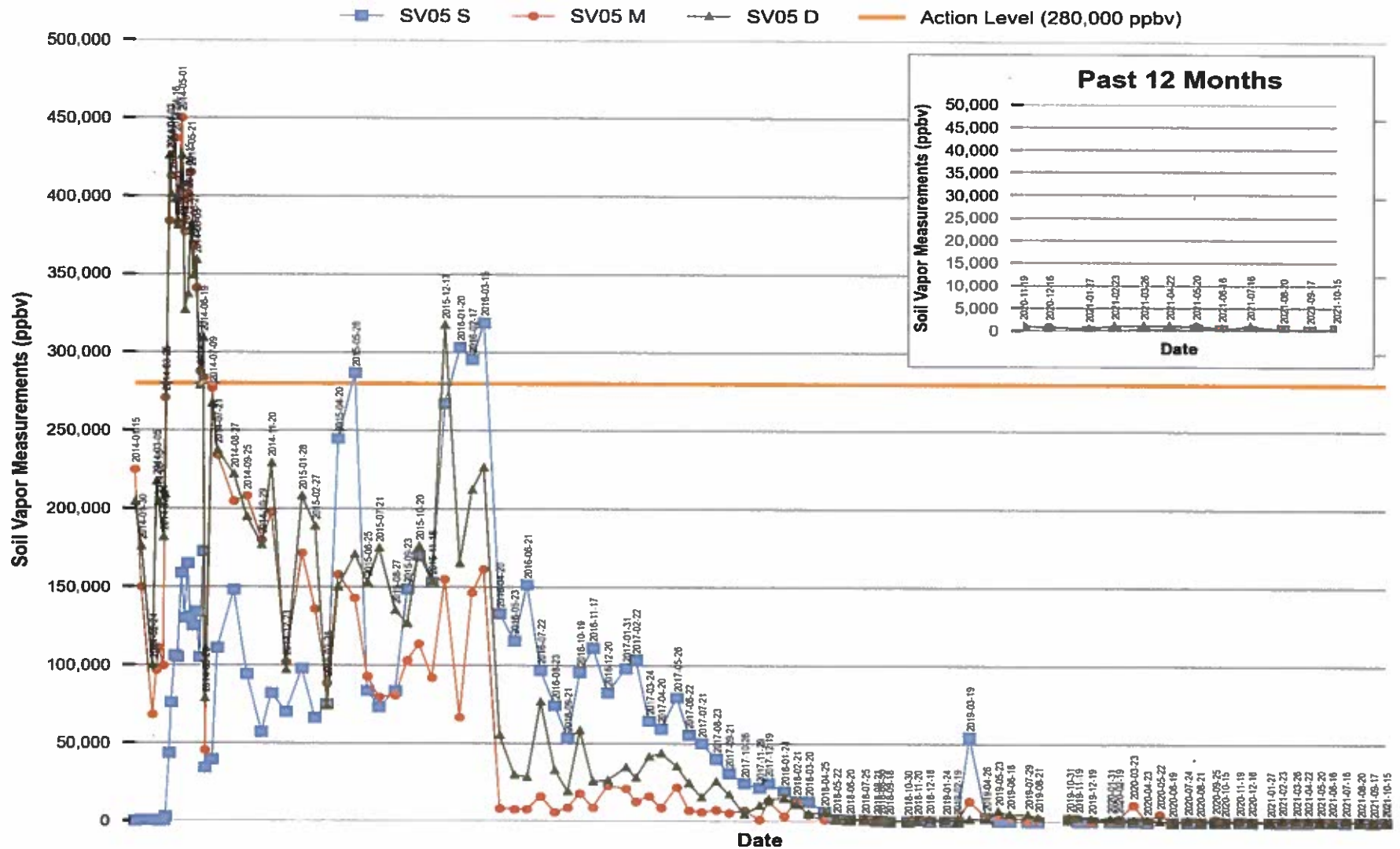
Notes (where applicable):

* "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 Oct 2021)



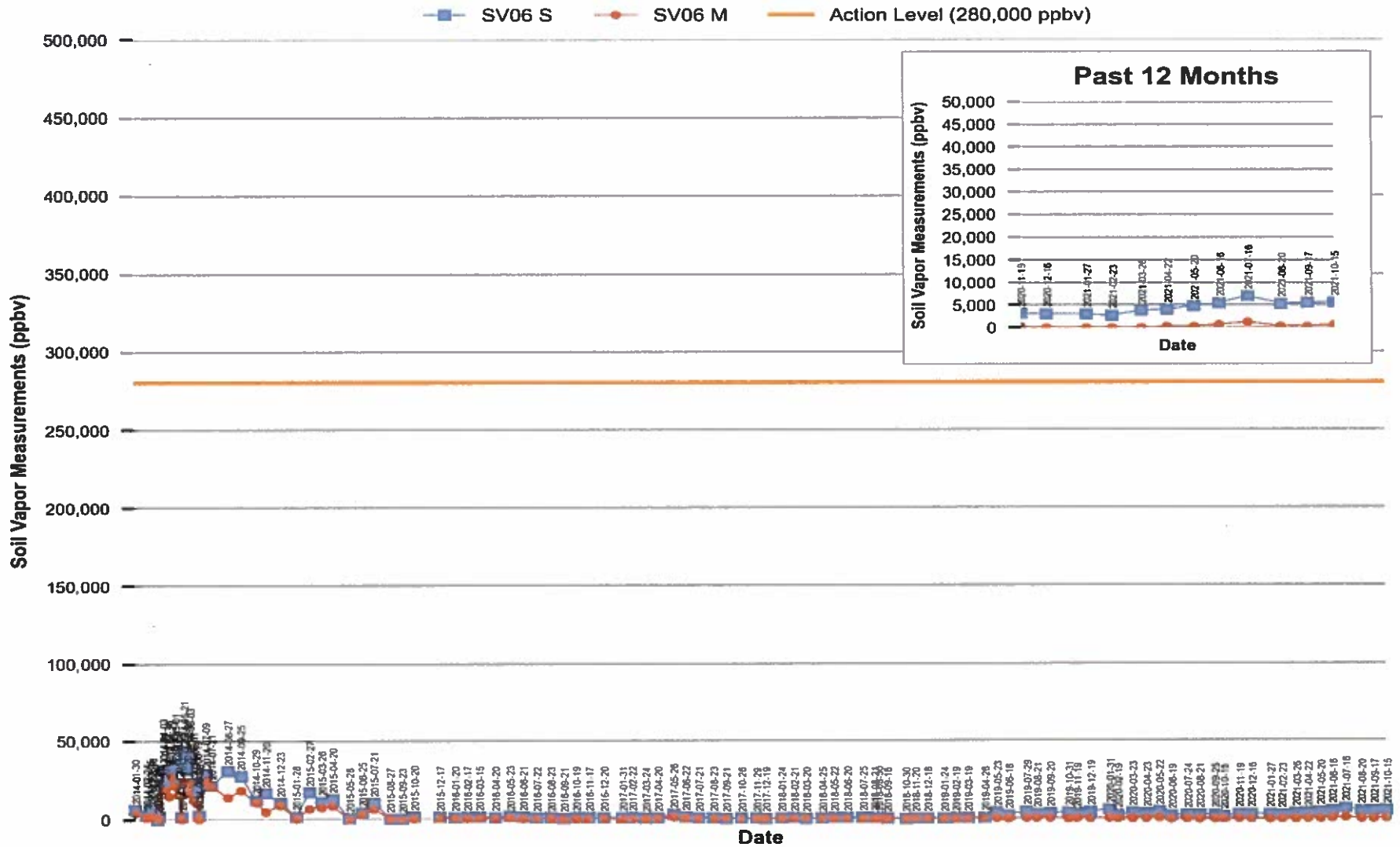
Notes (where applicable):

* "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 Oct 2021)



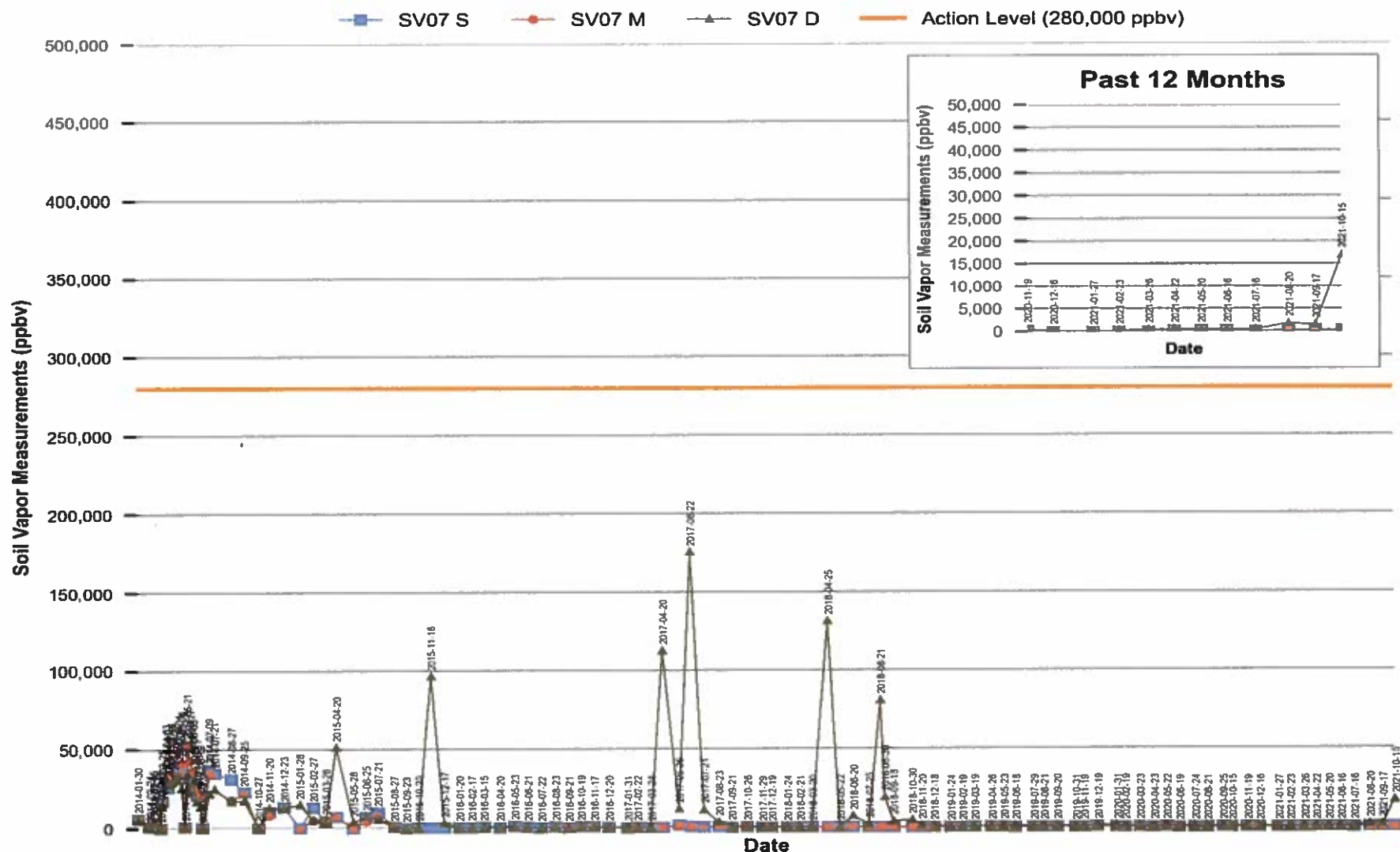
Notes (where applicable):

* "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 Oct 2021)



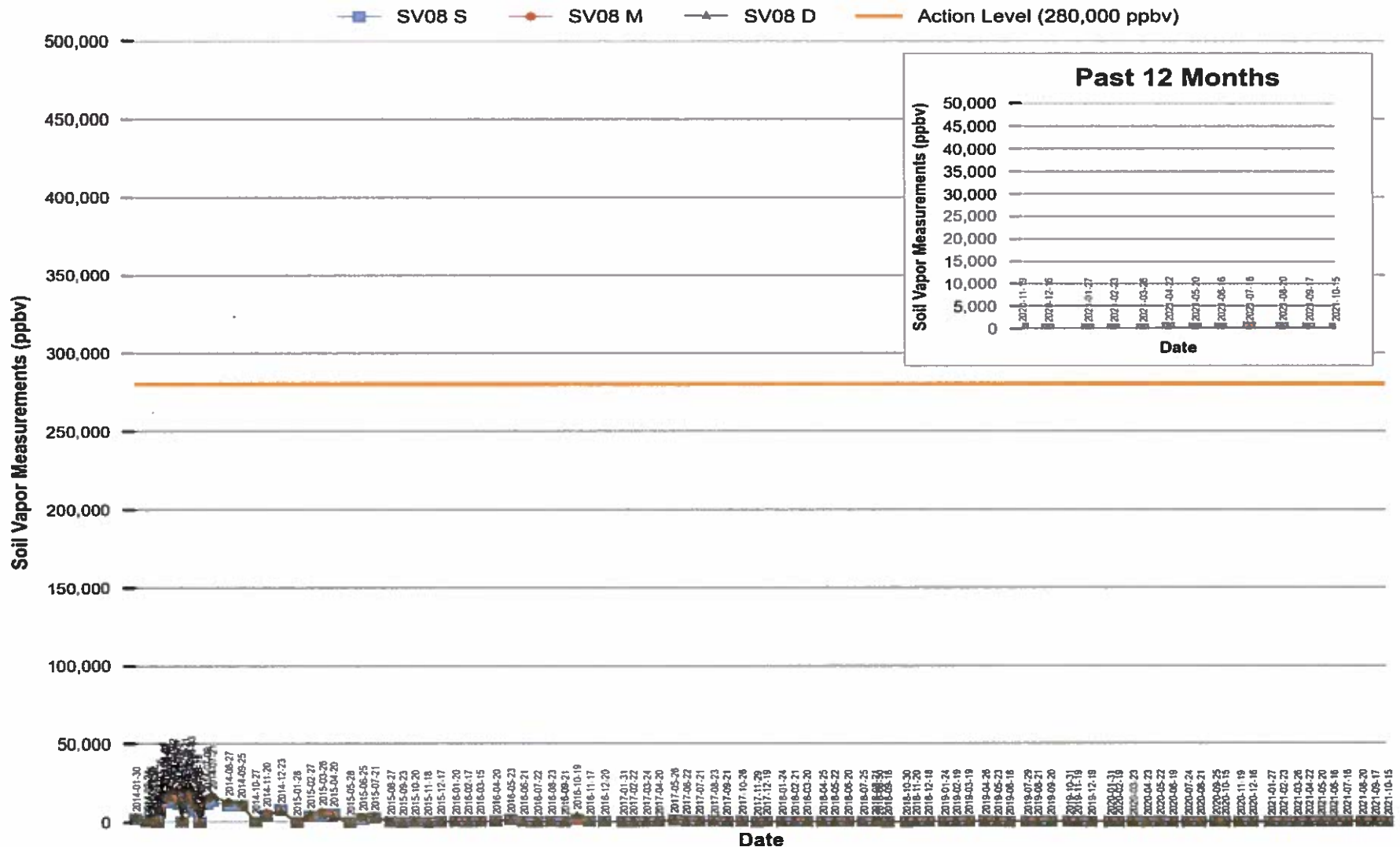
Notes (where applicable):

* "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 Oct 2021)



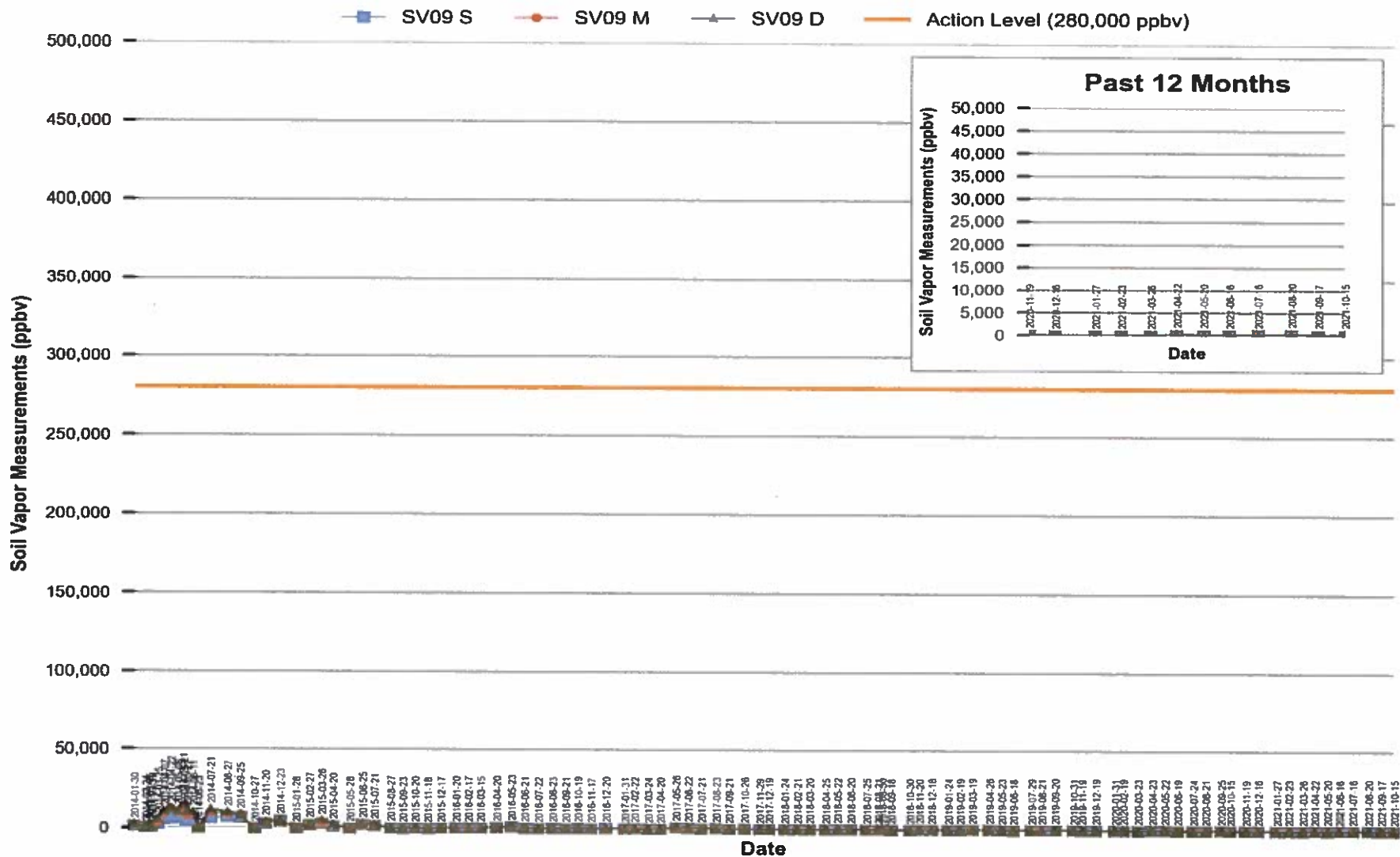
Notes (where applicable):

* "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 Oct 2021)



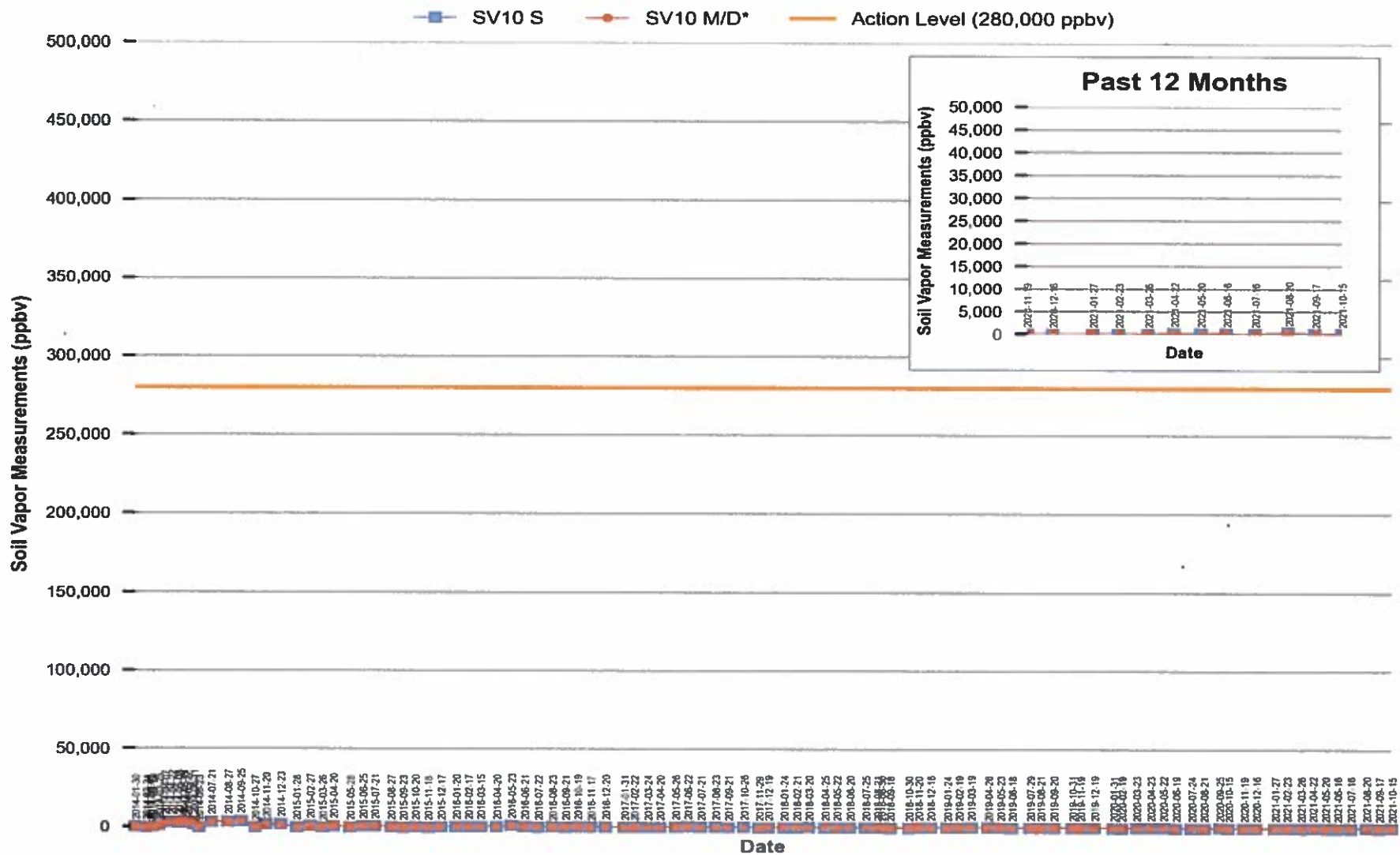
Notes (where applicable):

* "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 Oct 2021)



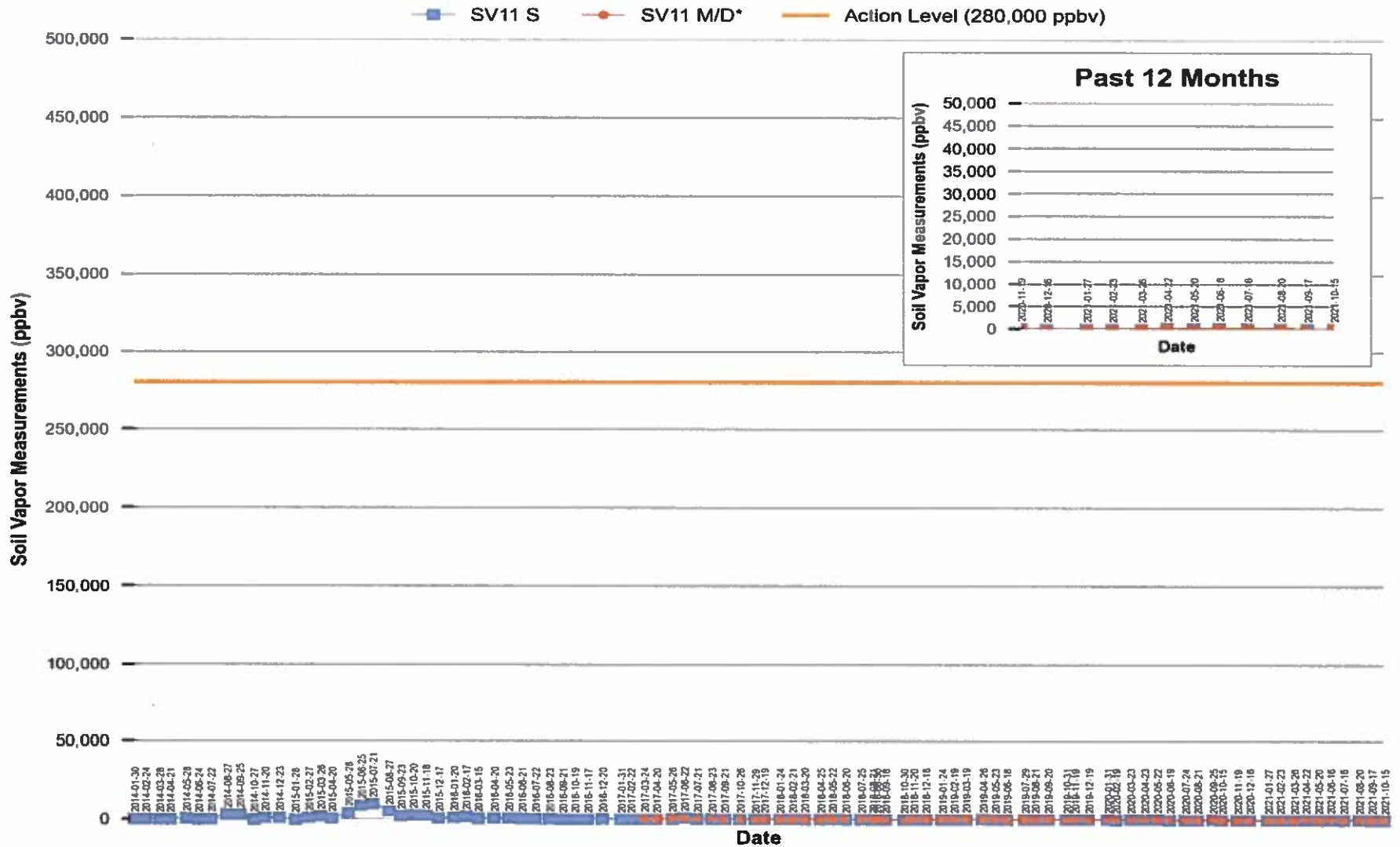
Notes (where applicable):

* "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 Oct 2021)



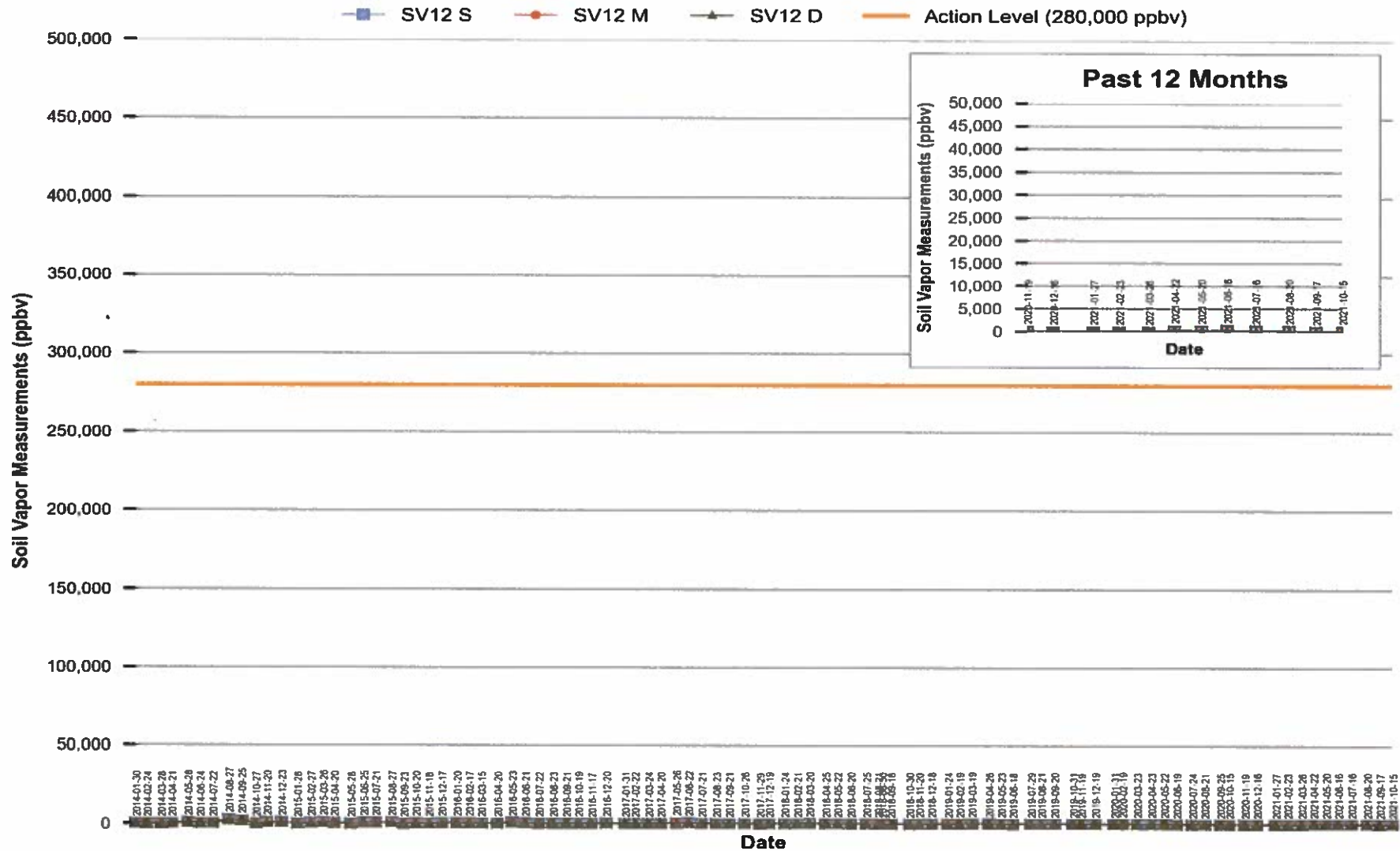
Notes (where applicable):

* "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 Oct 2021)



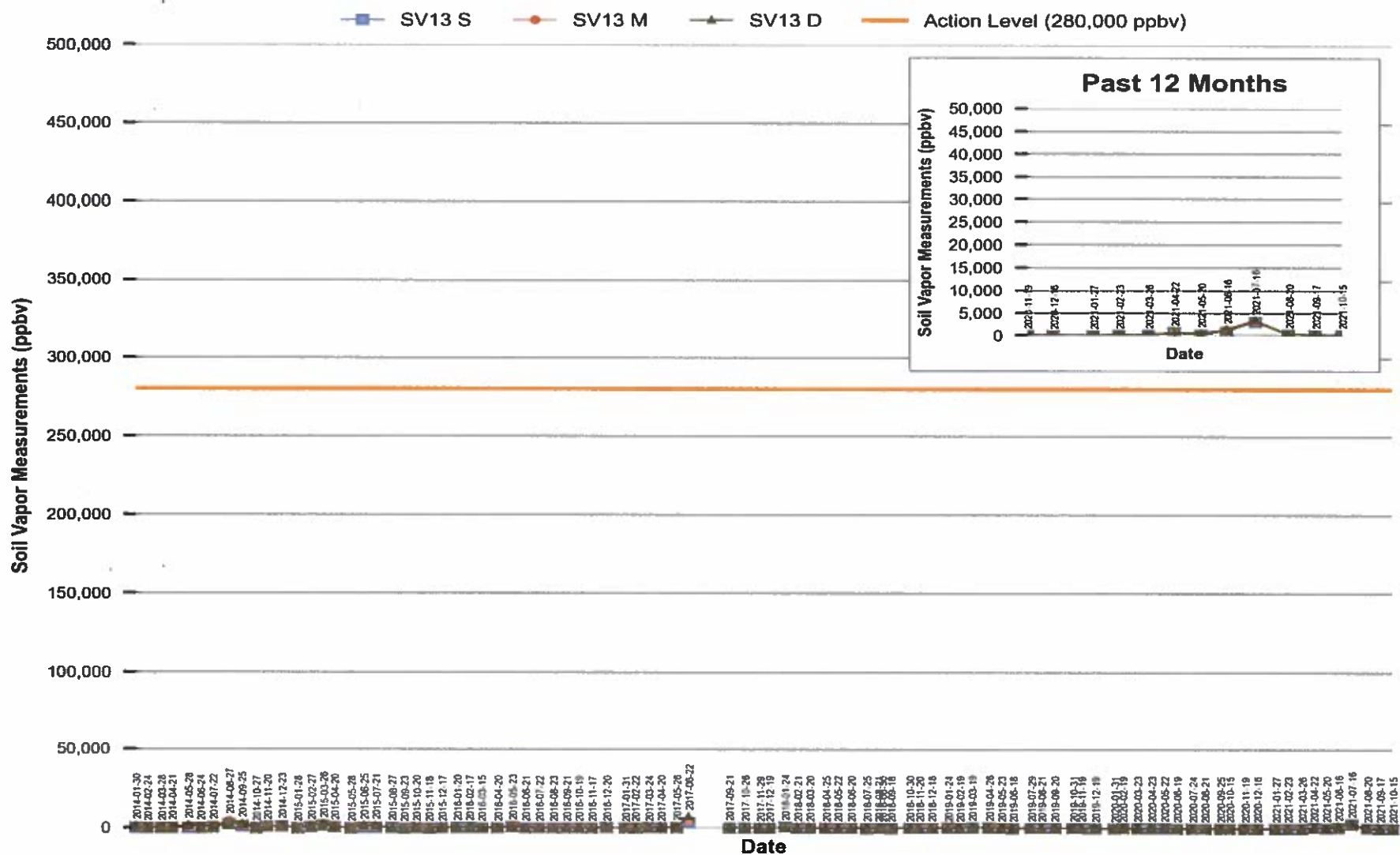
Notes (where applicable):

* "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 Oct 2021)



Notes (where applicable):

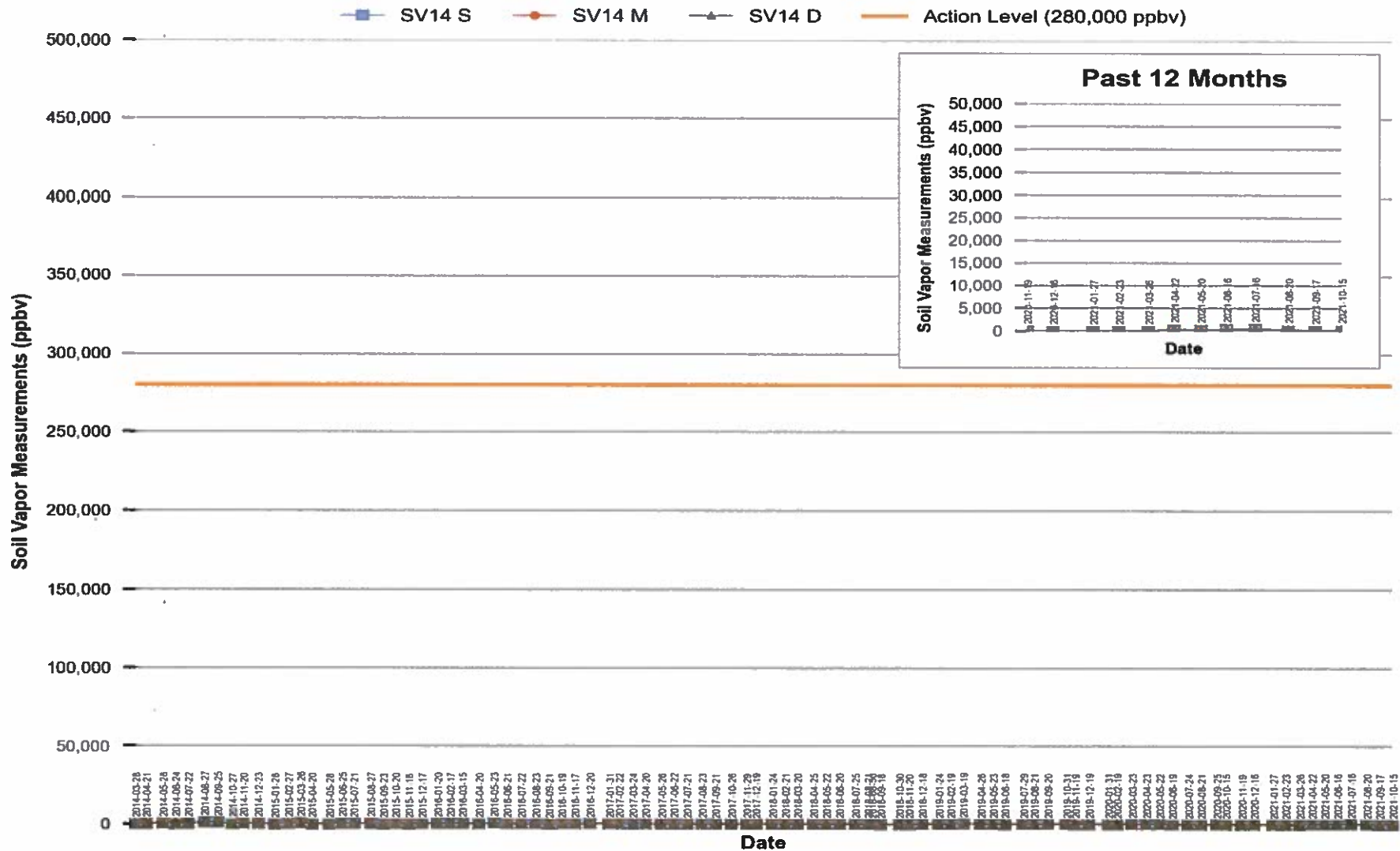
* "M/D" monitoring points were constructed to screen both middle & deep depth intervals along the respective underground storage tank.

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

Tank 13 is empty and inactive, undergoing clean, inspect & repair (CIR), but remains accessible for soil vapor monitoring events.

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



Notes (where applicable):

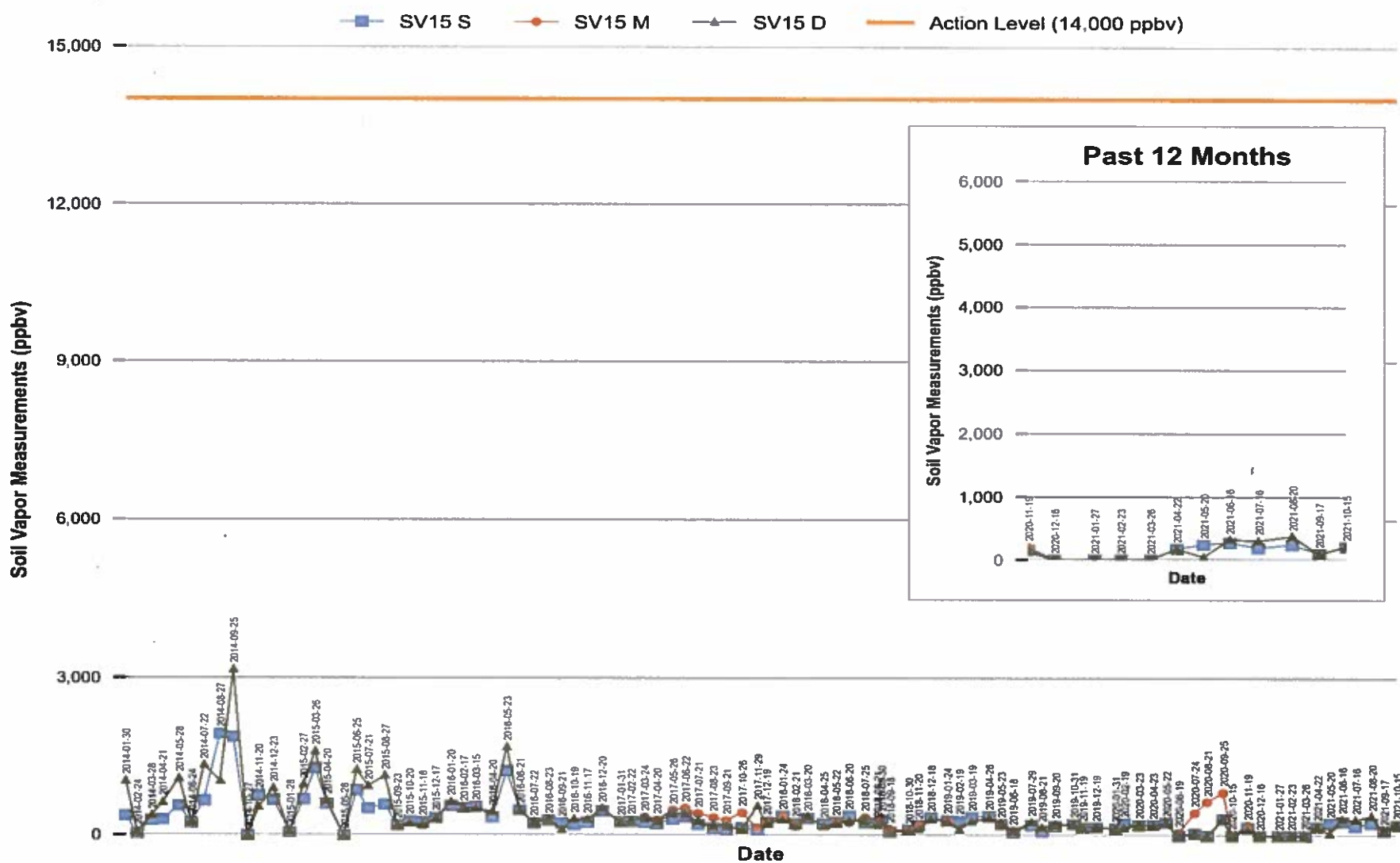
* "M/D" monitoring points were constructed to screen both middle & deep depth intervals along the respective underground storage tank.

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

Tank 14 is empty and inactive, undergoing clean, inspect & repair (CIR), but remains accessible for soil vapor monitoring events.

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



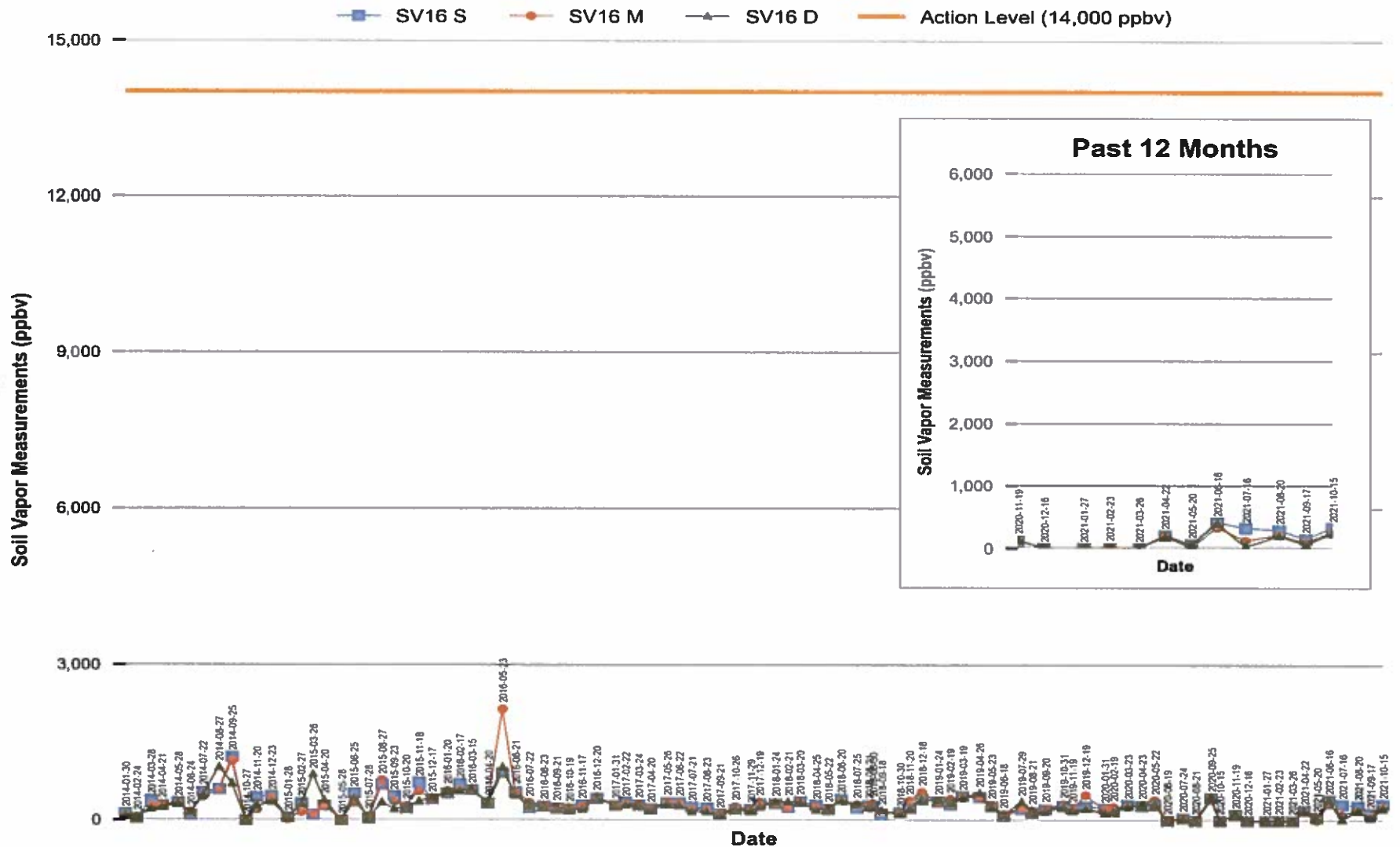
Notes (where applicable):

* "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 Oct 2021)



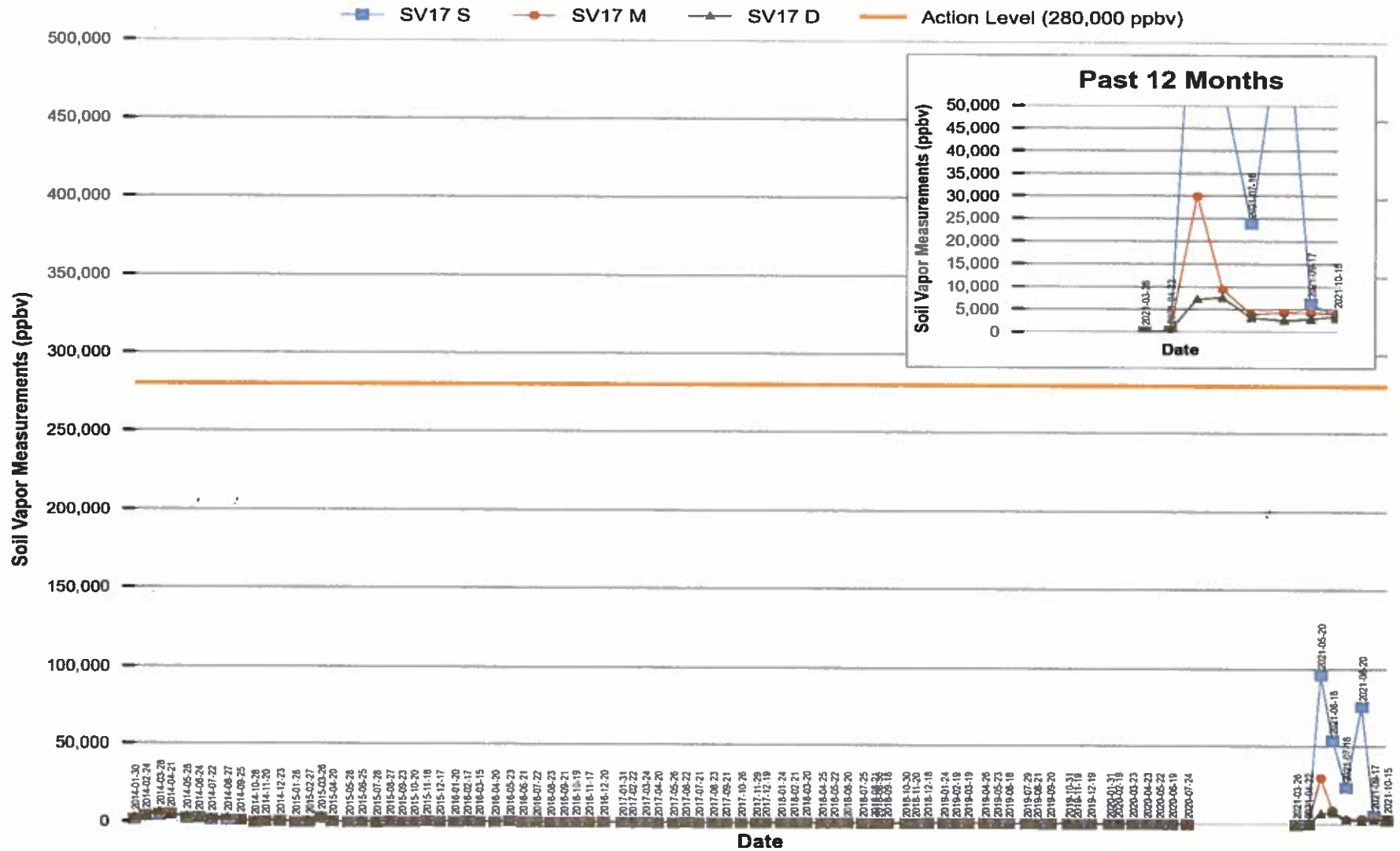
Notes (where applicable):

* "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 Oct 2021)



Notes (where applicable):

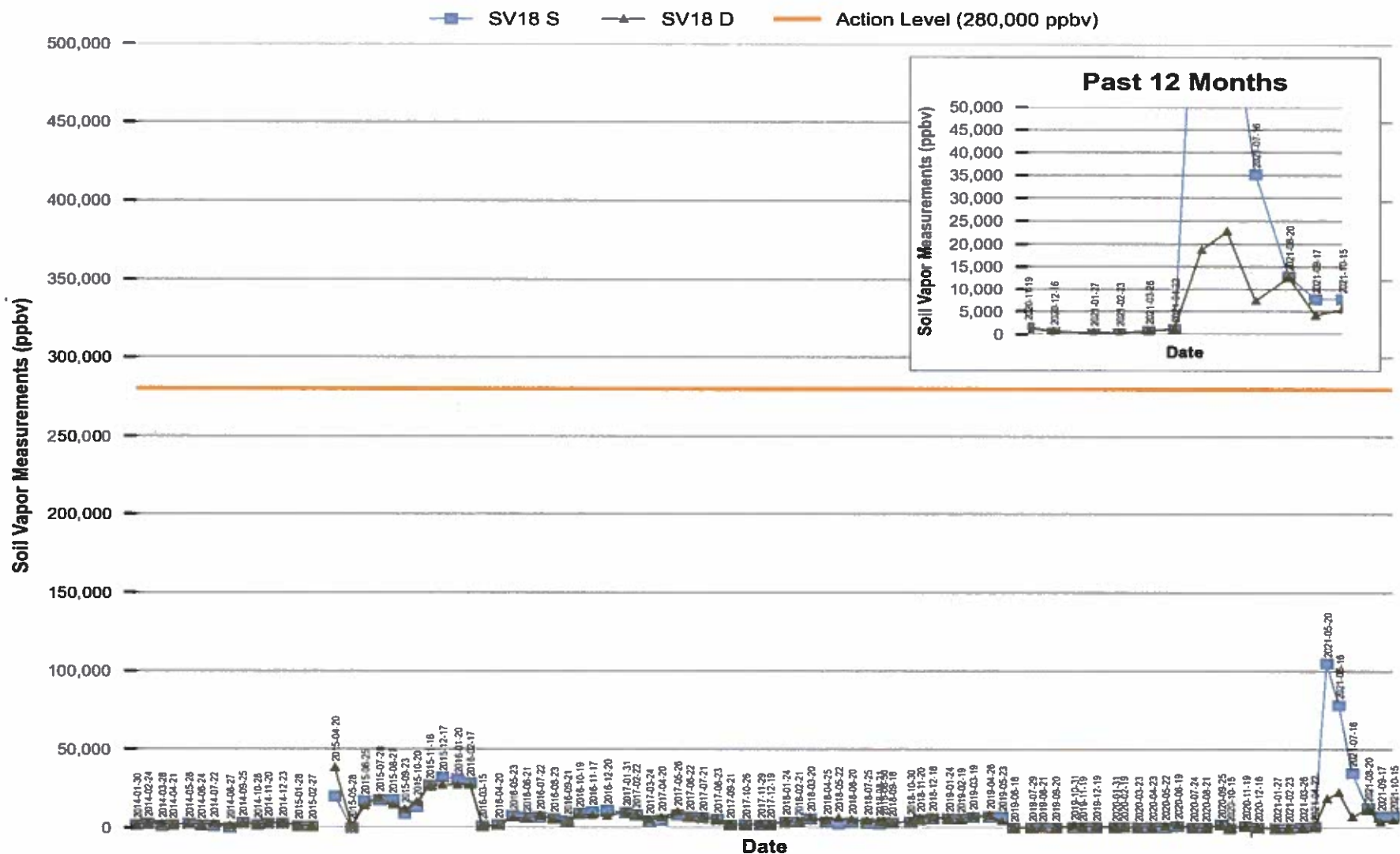
* "M/D" monitoring points were constructed to screen both middle & deep depth intervals along the respective underground storage tank.

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

Tank 17 is empty and inactive, undergoing clean, inspect & repair (CIR), but remains accessible for soil vapor monitoring events.

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



Notes (where applicable):

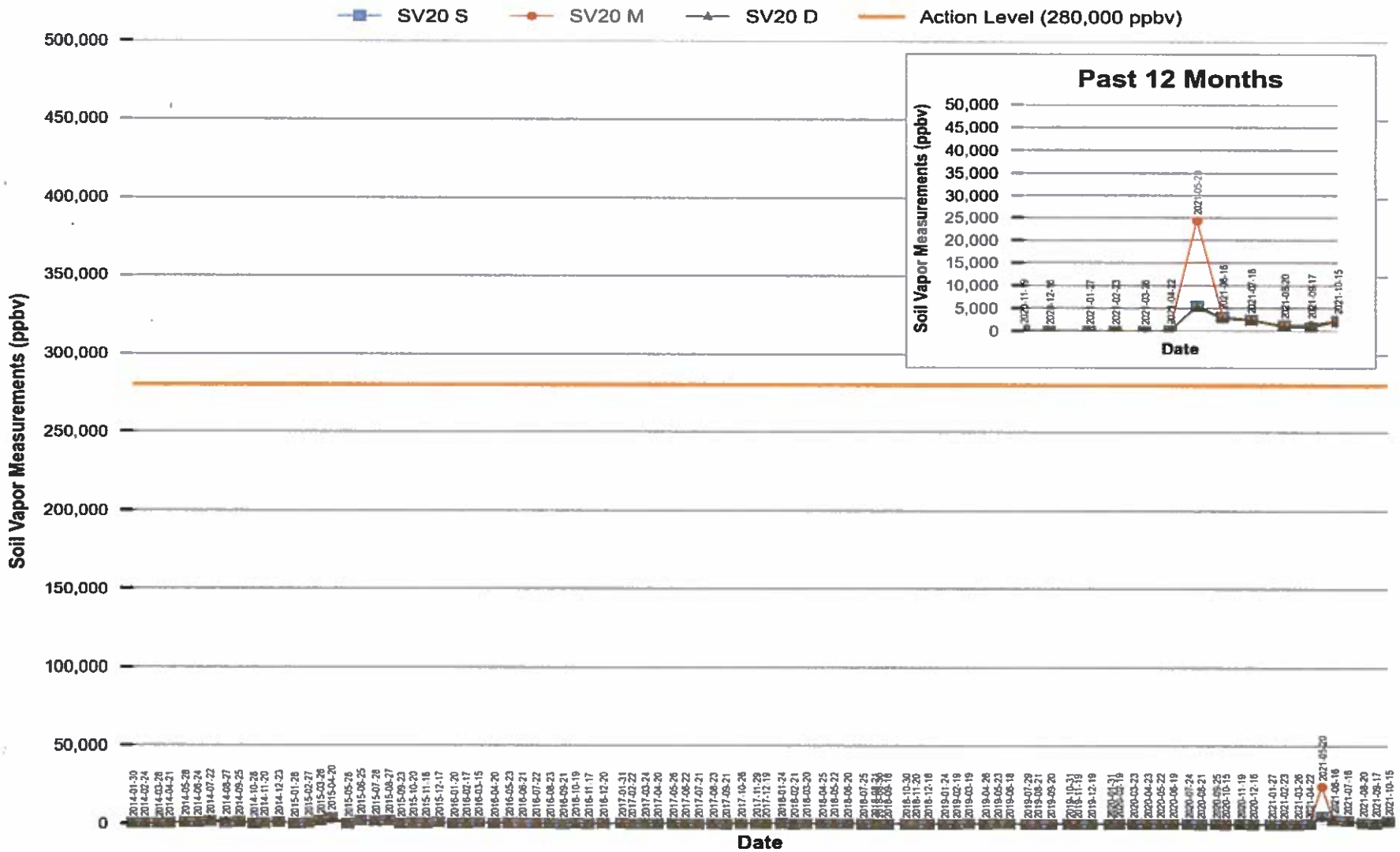
* "M/D" monitoring points were constructed to screen both middle & deep depth intervals along the respective underground storage tank.

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

Tank 18 is empty and inactive, undergoing clean, inspect & repair (CIR), but remains accessible for soil vapor monitoring events.

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

03 November 2021

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 October 2021

Ref: (a) Red Hill Bulk Fuel Storage Facility Groundwater Protection Plan
(b) Red Hill Soil Vapor Monitoring Report dated 22 October 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:
 - Strong increase trend in VOC concentrations at Tank 7 (deep port)
2. FLCPH causative research and findings:
 - a. The following Red Hill Fuel Storage Facility Underground Storage Tanks (USTs) are Out of Service: Tanks 1, 13, 14, 18, 19.
 - b. Reviewed all AFHE Unscheduled Fuel Movement (UFM) Alarm Summaries and UFM Reports. There were no UFM's recorded between sampling 17 September 21 and 15 October 21.
 - c. Red Hill maintenance and repair contractors did not report any factors that could have influenced increase in trends.
 - d. There were no fuel samples collected on the day of sampling 15 October 21 that could have potentially increased the sampling results during the round of sampling.
 - 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.
 - f. All active tanks have passed tank tightness testing within the required periodicity. Tank 7 passed the tank tightness testing on 11 OCT 21.
 - g. There is no evidence of a leaking tank in the Red Hill Complex or evidence of a spill that may have contributed to elevated soil vapor VOC levels in the area of elevated VOC concentrations.

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ENCLOSURE(2)