



**DEPARTMENT OF THE NAVY**  
COMMANDER  
NAVY REGION HAWAII  
850 TICONDEROGA ST STE 110  
JBP HH, HAWAII 96860-5101

5090  
N45  
January 22, 2020

**CERTIFIED NO: 7016 0910 0001 0892 0505**

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

Dear Mr. Takaba:

**SUBJECT: RED HILL TANK COMPLEX**  
**SOIL VAPOR SAMPLING RESULTS FOR NOVEMBER 2019**  
**DOH FACILITY ID NO. 9-102271**  
**DOH RELEASE ID NO. 990051, 010011, 020028, AND 140010**

Soil vapor samples were collected from beneath all active and accessible Red Hill tanks on November 19, 2019.

Soil vapor VOC concentrations were measured in the field using a photo-ionization detector. The soil vapor sampling results are being submitted as Enclosure 1.

A conservative approach is to assess the integrity of the associated tank system if VOC concentrations exceed 280,000 ppbv in soil vapor monitoring points (SVMPs) beneath tanks containing JP-5 or JP-8, or 14,000 ppbv in SVMPs beneath tanks containing marine diesel fuel. These values are 50 percent of the calculated vapor concentration from fuel-saturated water.

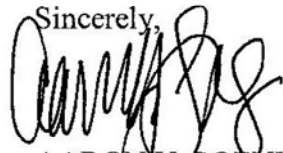
At Tank 5, the concentrations of VOCs detected in the front, middle, and outer edge soil vapor monitoring probes were 544 ppbv, 2,652 ppbv, and 2,824 ppbv, respectively. Tank 5 was emptied in January 2014 and has not contained fuel since that time. VOC concentrations in all down-gradient soil vapor monitors were below 472 ppbv.

All other VOC concentrations measured in November were about 59 to 1,547 times below the action levels, with no consistent trends observed. NAVSUP FLC Pearl Harbor Causative Research Report is submitted as Enclosure 2. Possible reasons for the results are speculative and may include, but not be limited to, ongoing projects in the tunnel, groundwater level fluctuations, rainfall (or lack thereof), bi-product of biodegradation, and fuel movement in the tanks and piping.

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Soil vapor VOC concentration trends will continue to be monitored. The next soil vapor sampling event is scheduled for December 2019, and will include collecting samples from soil vapor monitoring probes beneath all active and accessible tanks.

If there are any questions regarding this matter, or if more information is needed, please contact Ms. Raelynn Kishaba at (808) 471-4848.

Sincerely,  


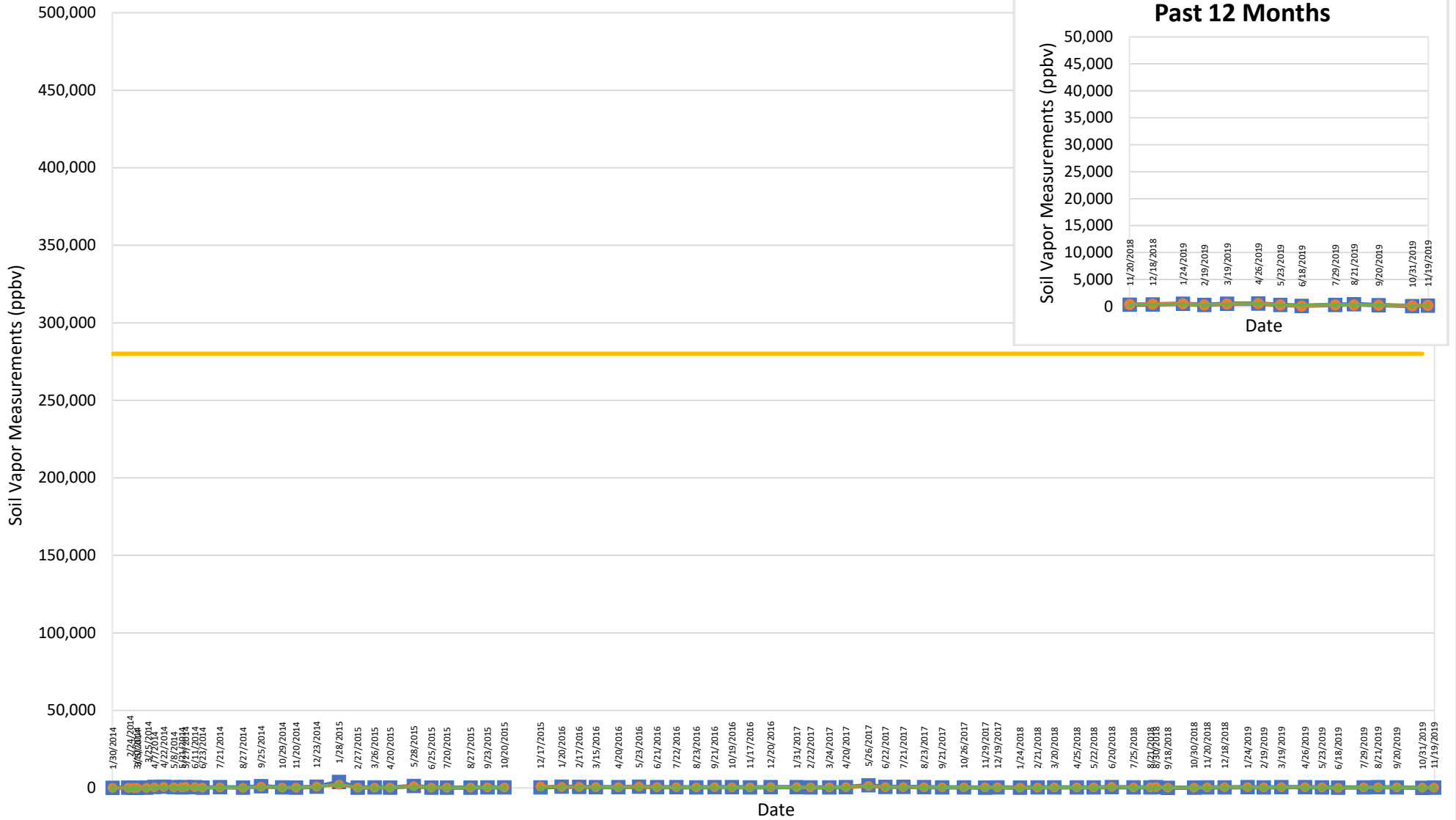
AARON Y. POENTIS  
Director  
Regional Environmental Department  
By direction of the  
Commander

- Enclosures: 1. Summary of Soil Vapor Sampling Results for Tanks 2 through 18 and 20 through November 2019 (18 pages)  
2. NAVSUP FLC Pearl Harbor Causative Research Report IRT Red Hill Soil Vapor Monitoring Report for November 2019

Copy to: Mr. Omer Shalev, U.S. EPA Region 9, Underground Storage Tank Program Office  
Mr. John Floyd, NAVSUP FLC Pearl Harbor  
Mr. Ralph Wells, DLA Energy Pacific

**Figure 1**  
**Soil Vapor Measurements - SV02 (F-24)**

SV02 S SV02 M SV02 D Action Level (280,000 ppbv)

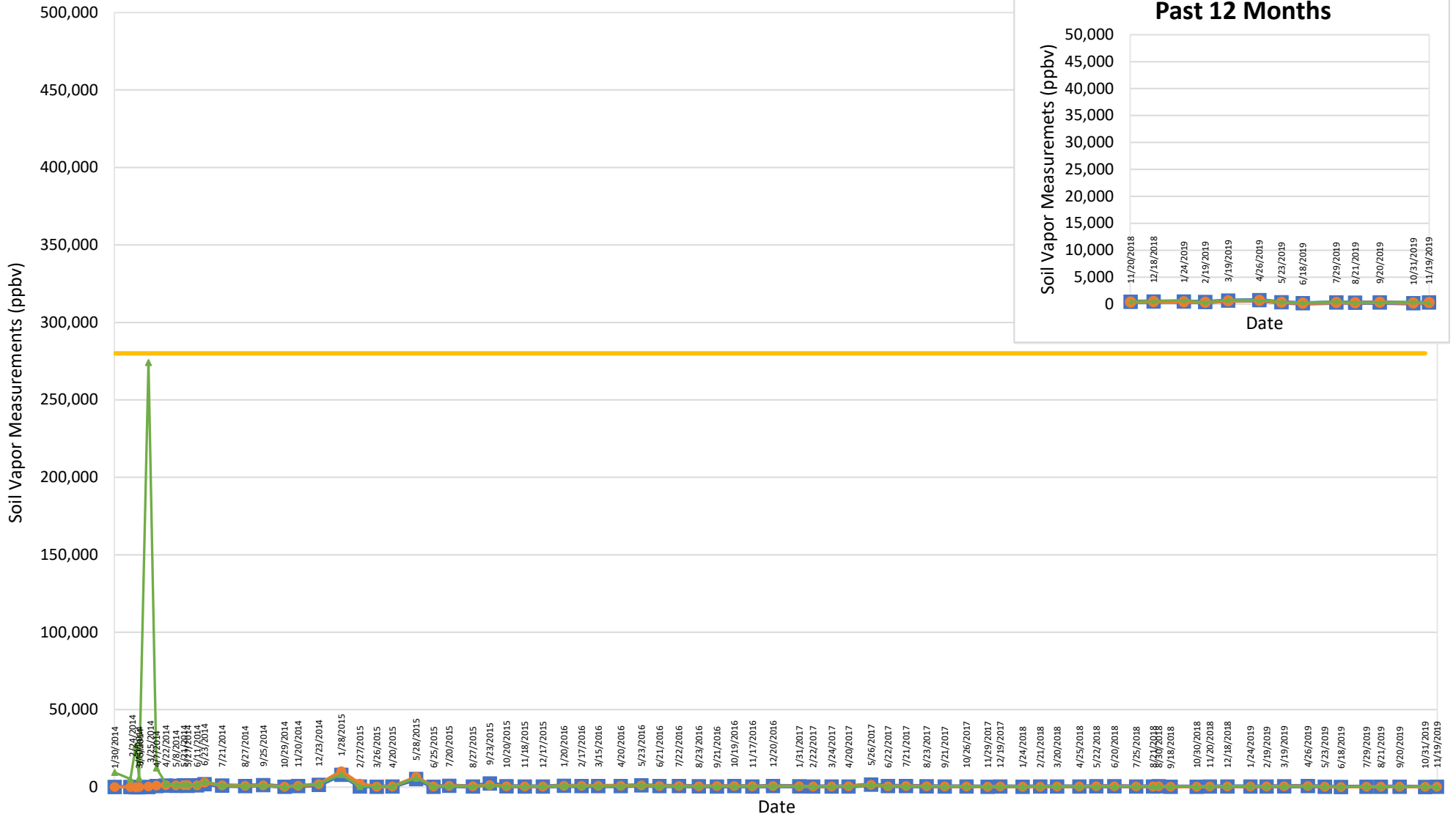


Notes:  
 ppbv: Parts Per Billion by Volume  
 F-24: Jet Fuel, Fuel Number 24

JP-5: Jet Fuel, Propellant Number 5  
 F-76: Marine Diesel, Fuel Number 76

**Figure 2**  
**Soil Vapor Measurements - SV03 (F-24)**

SV03 S SV03 M SV03 D Action Level (280,000 ppbv)

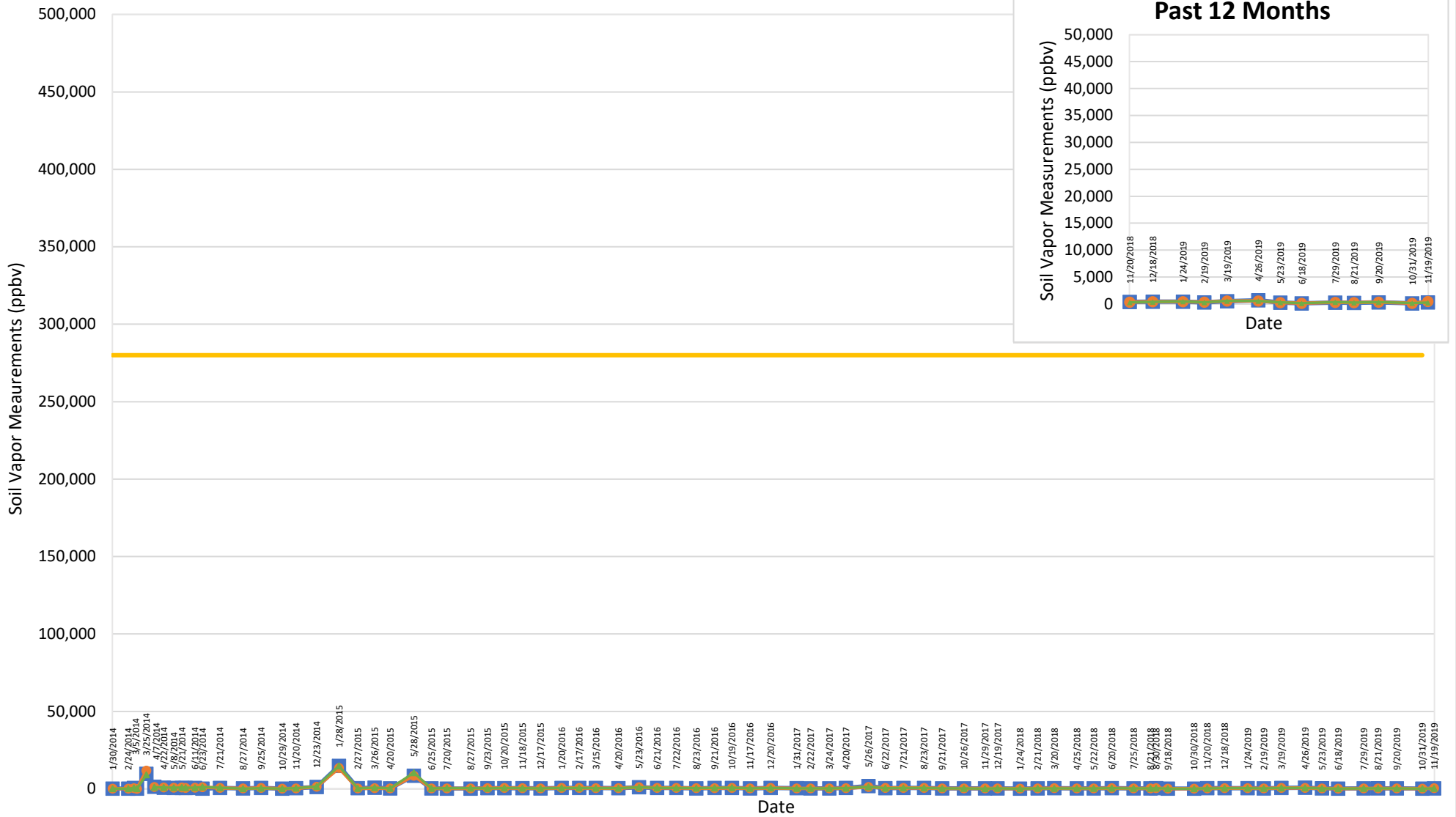


Notes:  
 ppbv: Parts Per Billion by Volume  
 F-24: Jet Fuel, Fuel Number 24

JP-5: Jet Fuel, Propellant Number 5  
 F-76: Marine Diesel, Fuel Number 76

**Figure 3**  
**Soil Vapor Measurements - SV04 (F-24)**

SV04 S SV04 M SV04 D Action Level (280,000 ppbv)

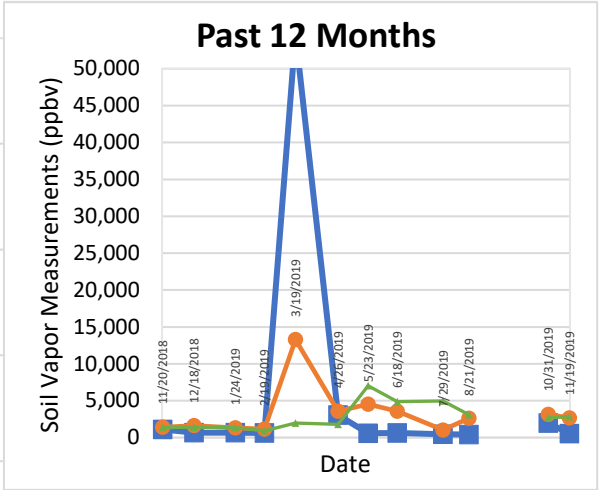
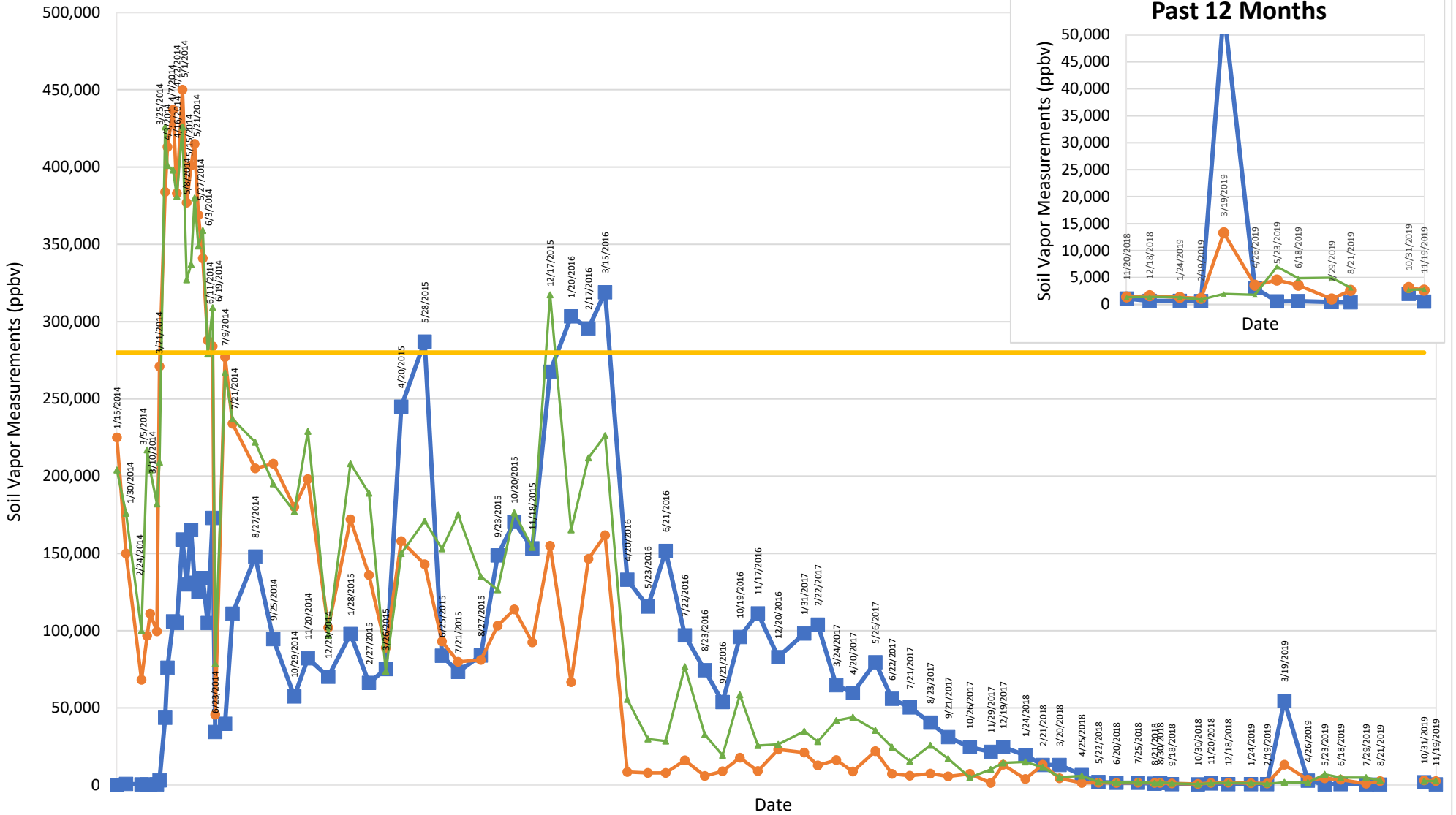


Notes:  
 ppbv: Parts Per Billion by Volume  
 F-24: Jet Fuel, Fuel Number 24

JP-5: Jet Fuel, Propellant Number 5  
 F-76: Marine Diesel, Fuel Number 76

**Figure 4**  
**Soil Vapor Measurements - SV05 (F-24)**

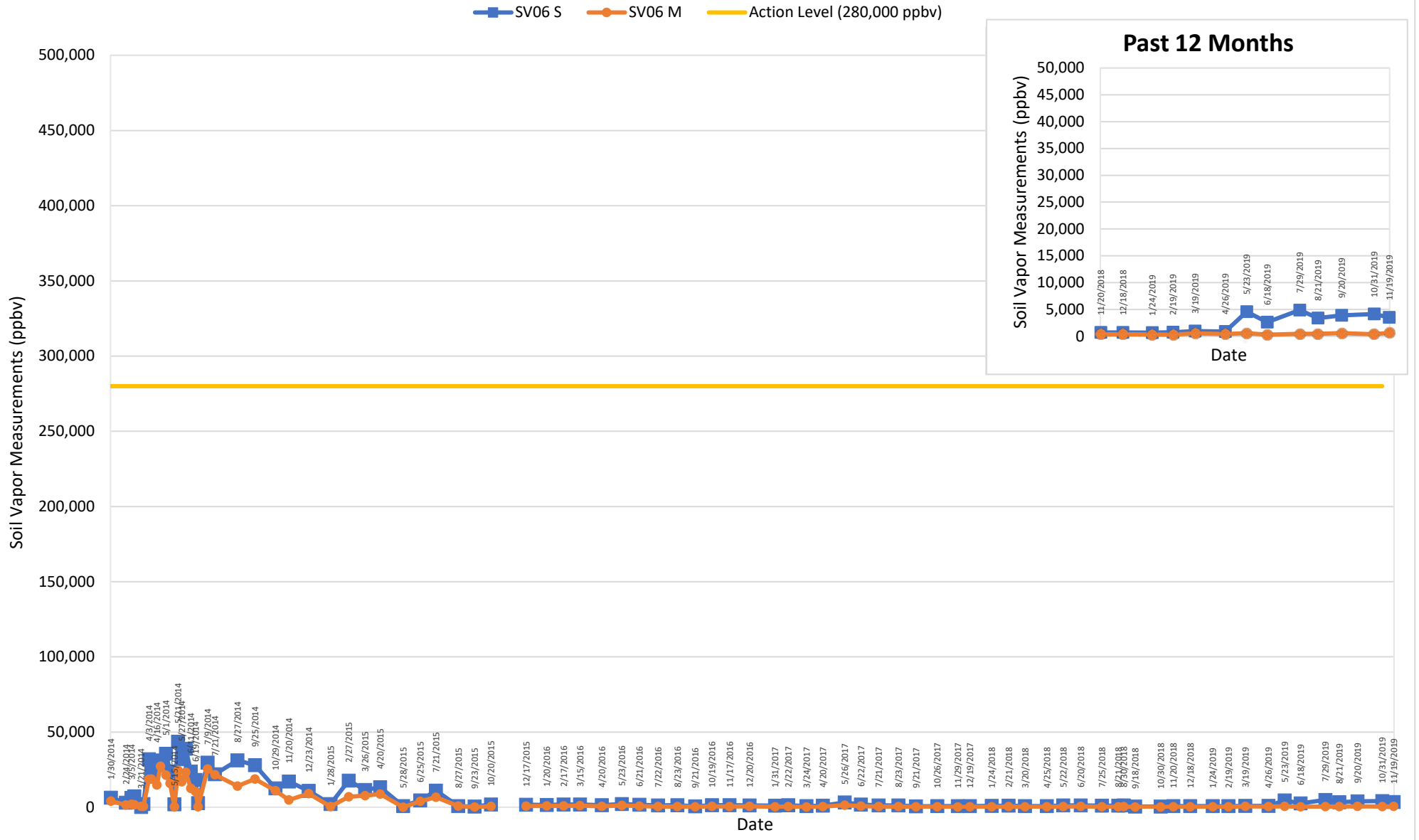
SV05 S    SV05 M    SV05 D    Action Level (280,000 ppbv)



Notes:  
 ppbv: Parts Per Billion by Volume  
 F-24: Jet Fuel, Fuel Number 24

JP-5: Jet Fuel, Propellant Number 5  
 F-76: Marine Diesel, Fuel Number 76

**Figure 5**  
**Soil Vapor Measurements - SV06 (F-24)**

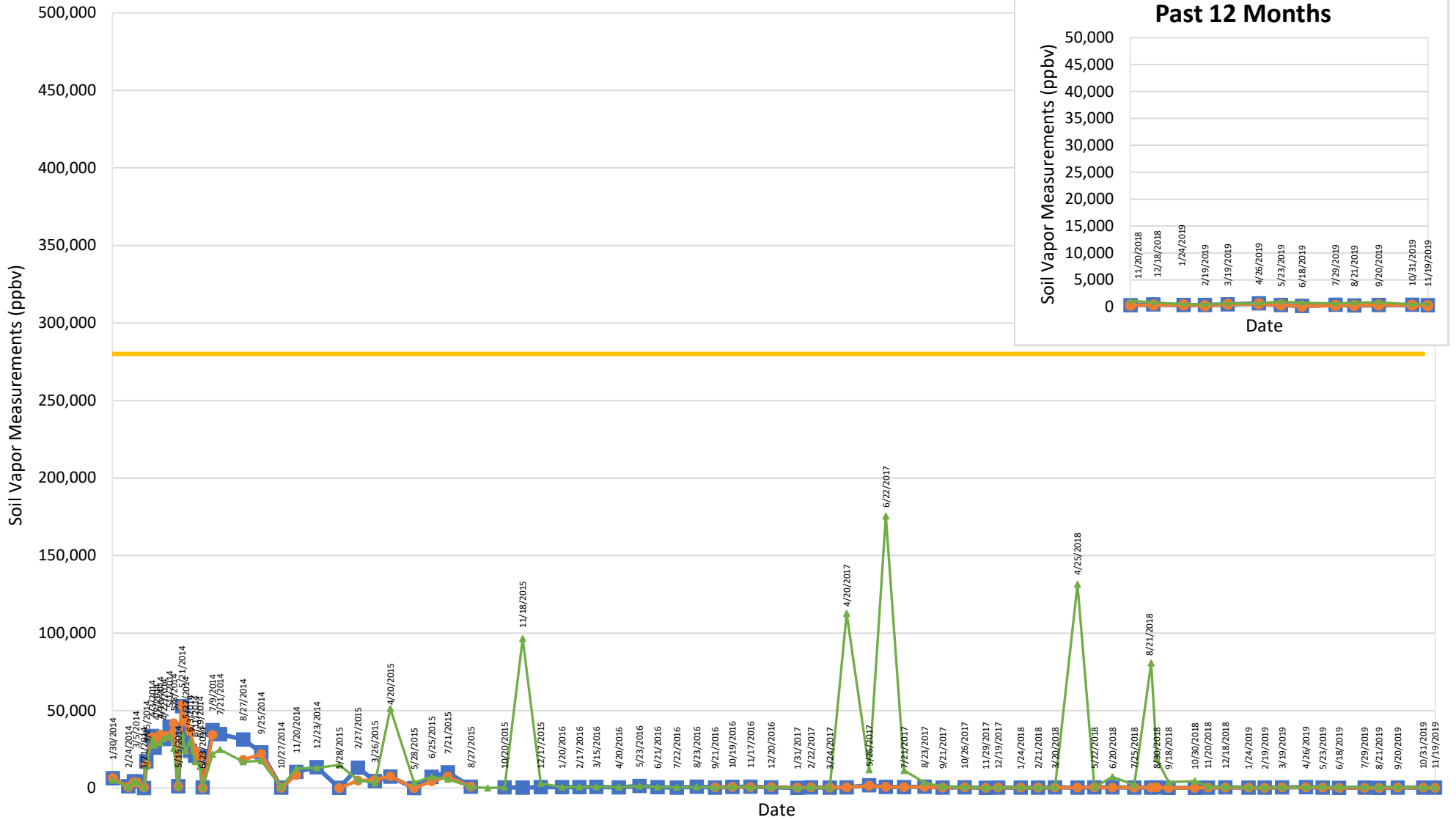


Notes:  
 ppbv: Parts Per Billion by Volume  
 F-24: Jet Fuel, Fuel Number 24

JP-5: Jet Fuel, Propellant Number 5  
 F-76: Marine Diesel, Fuel Number 76

**Figure 6**  
**Soil Vapor Measurements - SV07 (JP-5)**

—■— SV07 S —●— SV07 M —▲— SV07 D — Action Level (280,000 ppbv)



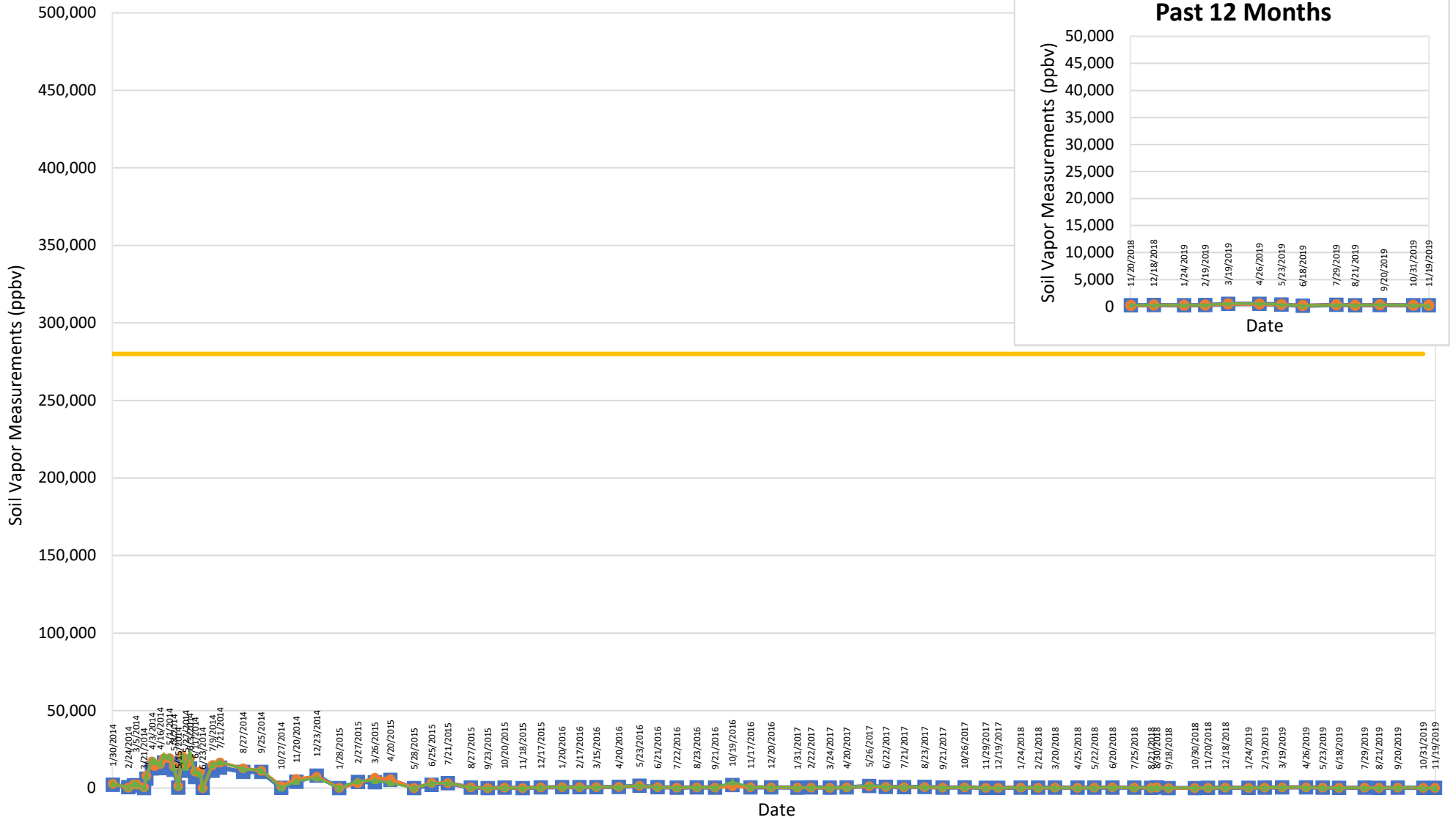
Notes:  
 ppbv: Parts Per Billion by Volume  
 F-24: Jet Fuel, Fuel Number 24

JP-5: Jet Fuel, Propellant Number 5  
 F-76: Marine Diesel, Fuel Number 76



**Figure 7**  
**Soil Vapor Measurements - SV08 (JP-5)**

SV08 S SV08 M SV08 D Action Level (280,000 ppbv)

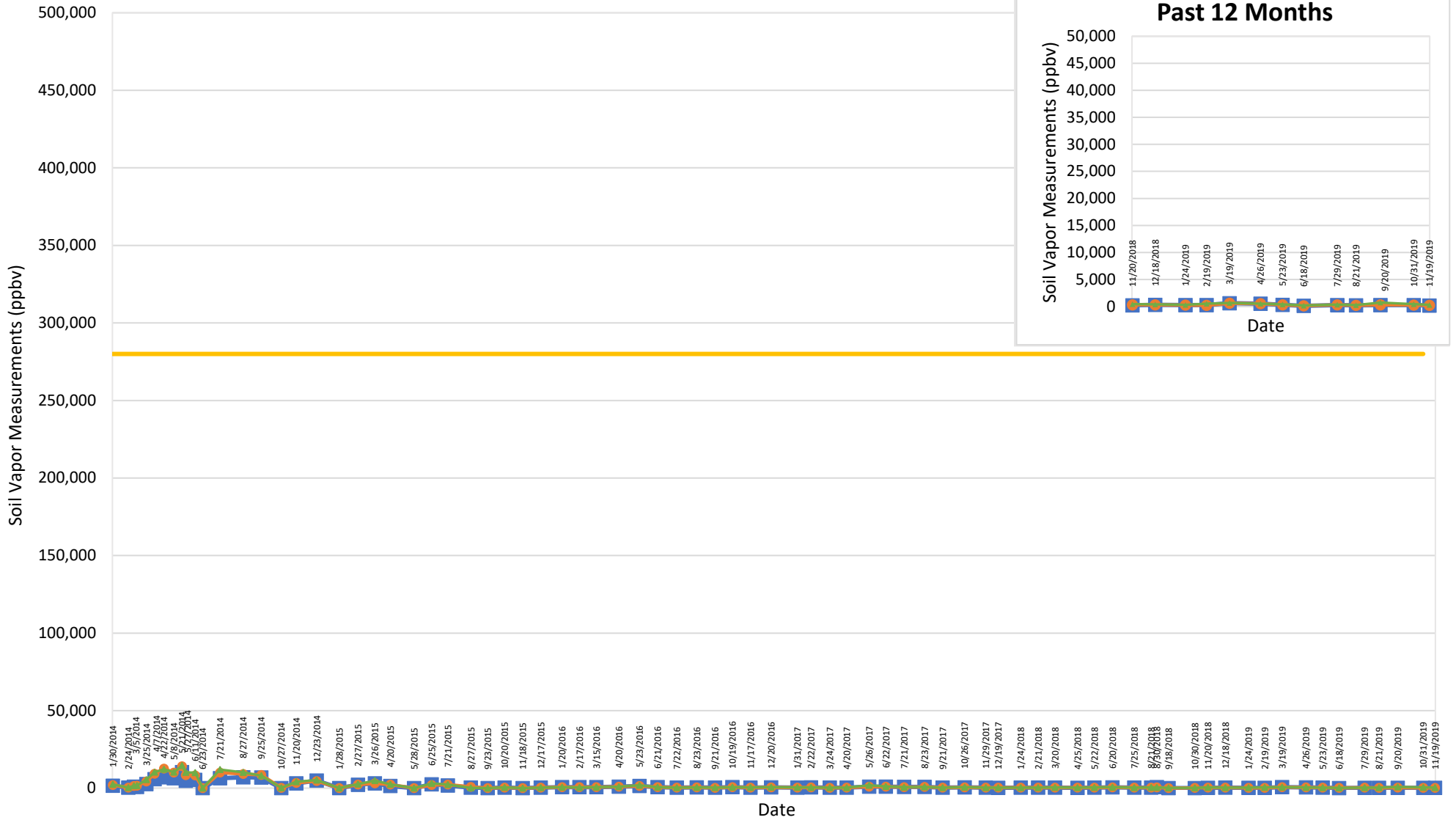


Notes:  
 ppbv: Parts Per Billion by Volume  
 F-24: Jet Fuel, Fuel Number 24

JP-5: Jet Fuel, Propellant Number 5  
 F-76: Marine Diesel, Fuel Number 76

**Figure 8**  
**Soil Vapor Measurements - SV09 (JP-5)**

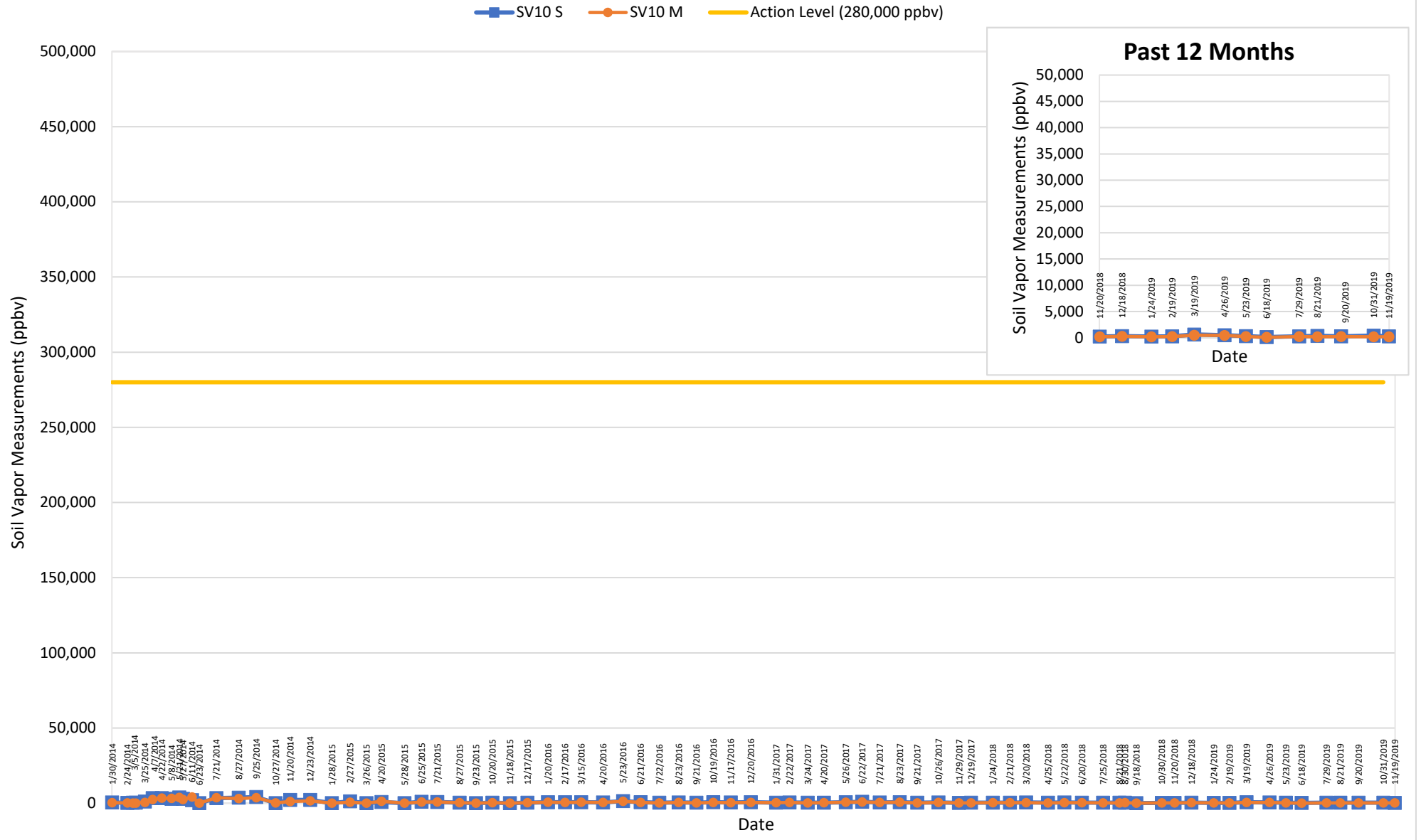
SV09 S   SV09 M   SV09 D   Action Level (280,000 ppbv)



Notes:  
 ppbv: Parts Per Billion by Volume  
 F-24: Jet Fuel, Fuel Number 24

JP-5: Jet Fuel, Propellant Number 5  
 F-76: Marine Diesel, Fuel Number 76

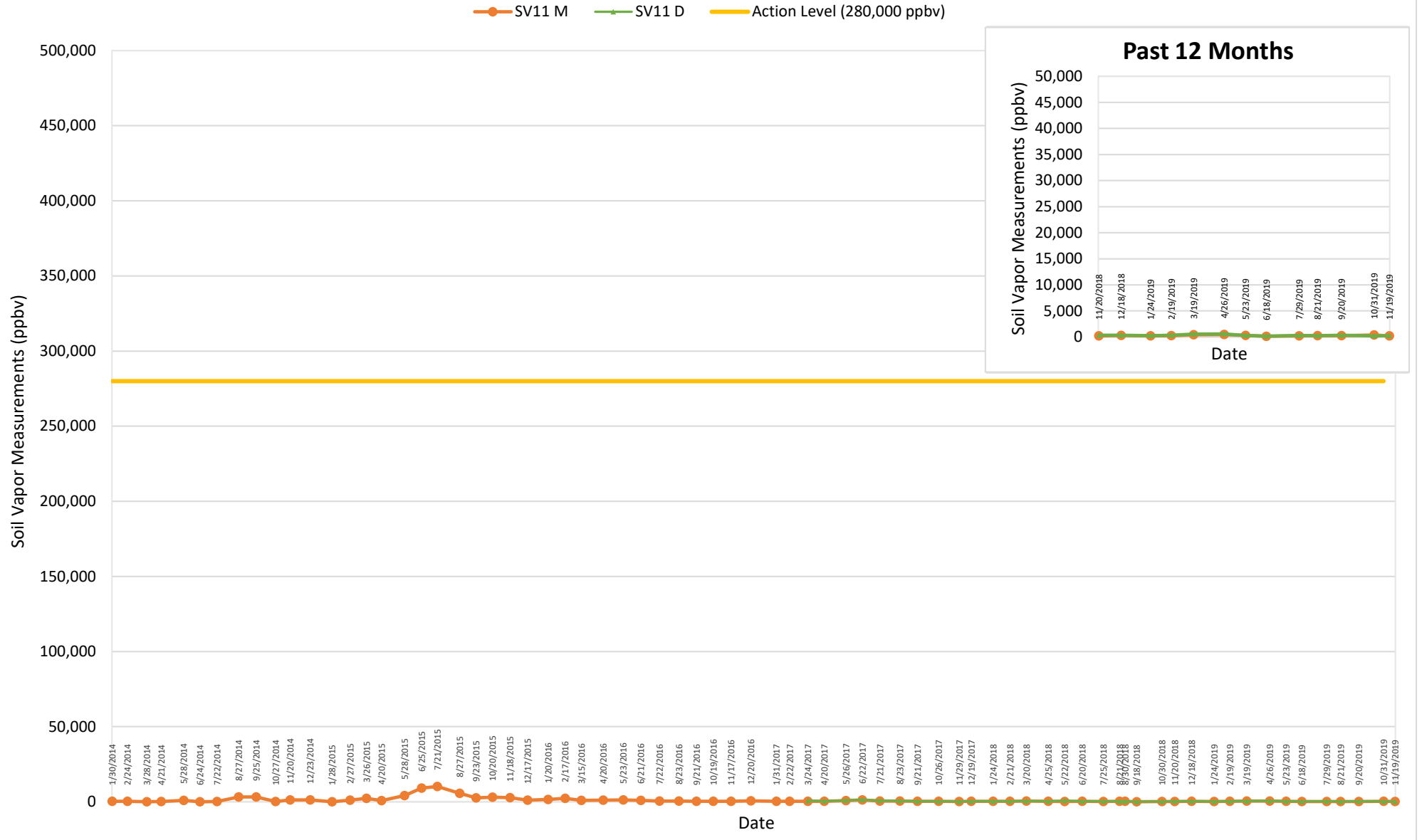
**Figure 9**  
**Soil Vapor Measurements - SV10 (JP-5)**



Notes:  
 ppbv: Parts Per Billion by Volume  
 F-24: Jet Fuel, Fuel Number 24

JP-5: Jet Fuel, Propellant Number 5  
 F-76: Marine Diesel, Fuel Number 76

**Figure 10**  
**Soil Vapor Measurements - SV11 (JP-5)**

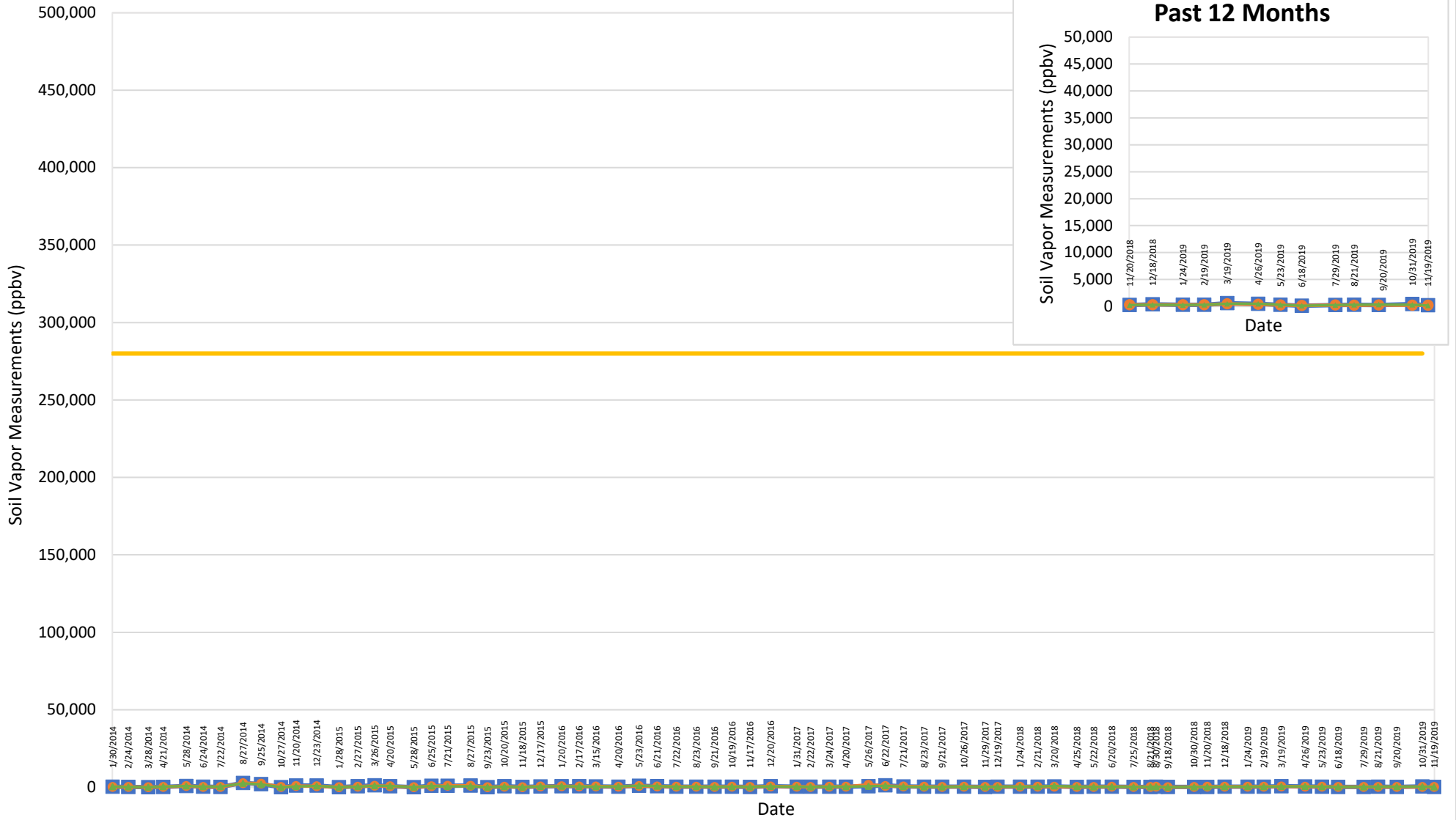


Notes:  
 ppbv: Parts Per Billion by Volume  
 F-24: Jet Fuel, Fuel Number 24

JP-5: Jet Fuel, Propellant Number 5  
 F-76: Marine Diesel, Fuel Number 76

**Figure 11**  
**Soil Vapor Measurements - SV12 (JP-5)**

SV12 S SV12 M SV12 D Action Level (280,000 ppbv)

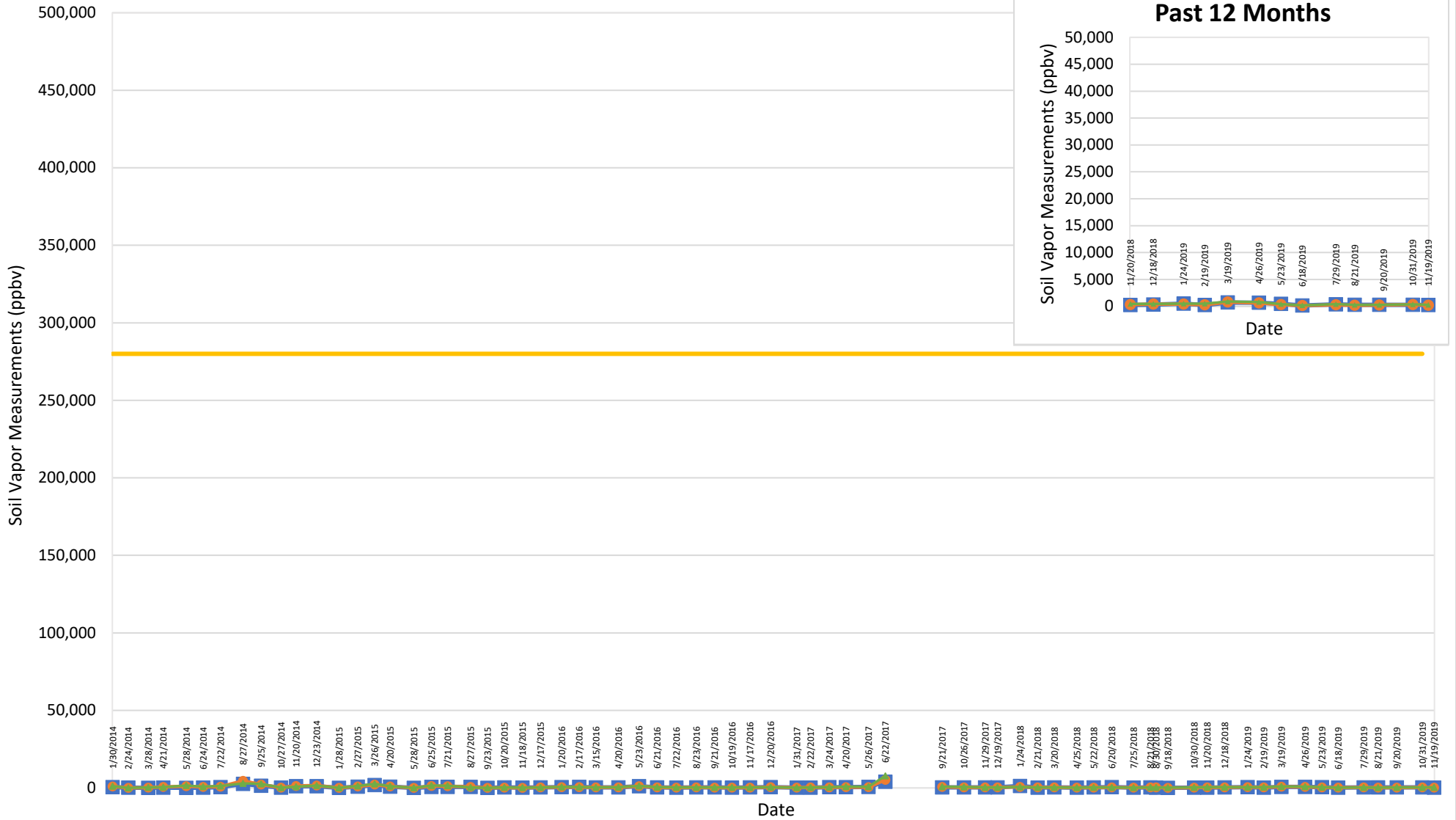


Notes:  
 ppbv: Parts Per Billion by Volume  
 F-24: Jet Fuel, Fuel Number 24

JP-5: Jet Fuel, Propellant Number 5  
 F-76: Marine Diesel, Fuel Number 76

**Figure 12**  
**Soil Vapor Measurements - SV13 (JP-5)**

SV13 S SV13 M SV13 D Action Level (280,000 ppbv)

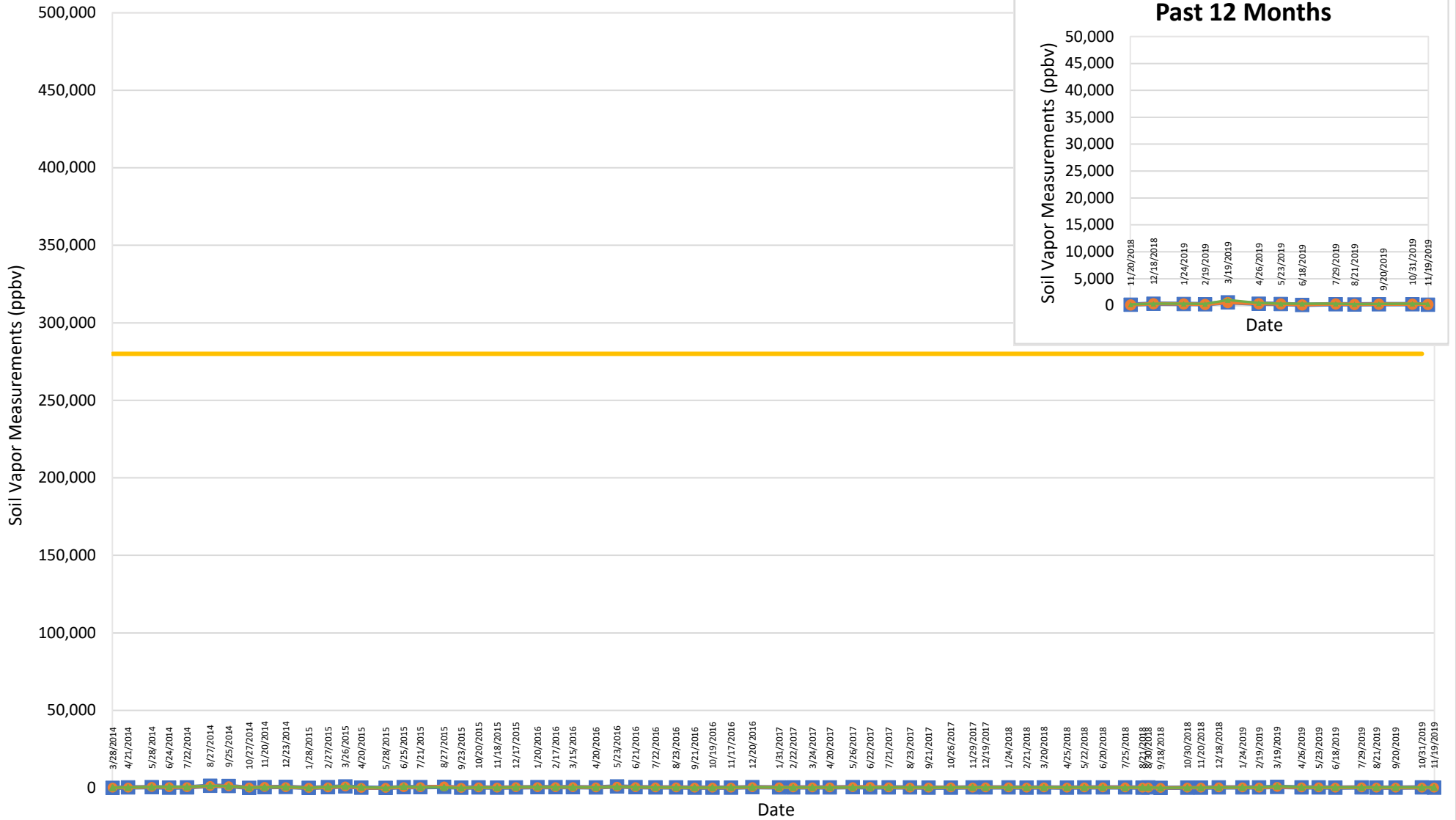


Notes:  
 ppbv: Parts Per Billion by Volume  
 F-24: Jet Fuel, Fuel Number 24

JP-5: Jet Fuel, Propellant Number 5  
 F-76: Marine Diesel, Fuel Number 76

**Figure 13**  
**Soil Vapor Measurements - SV14 (JP-5)**

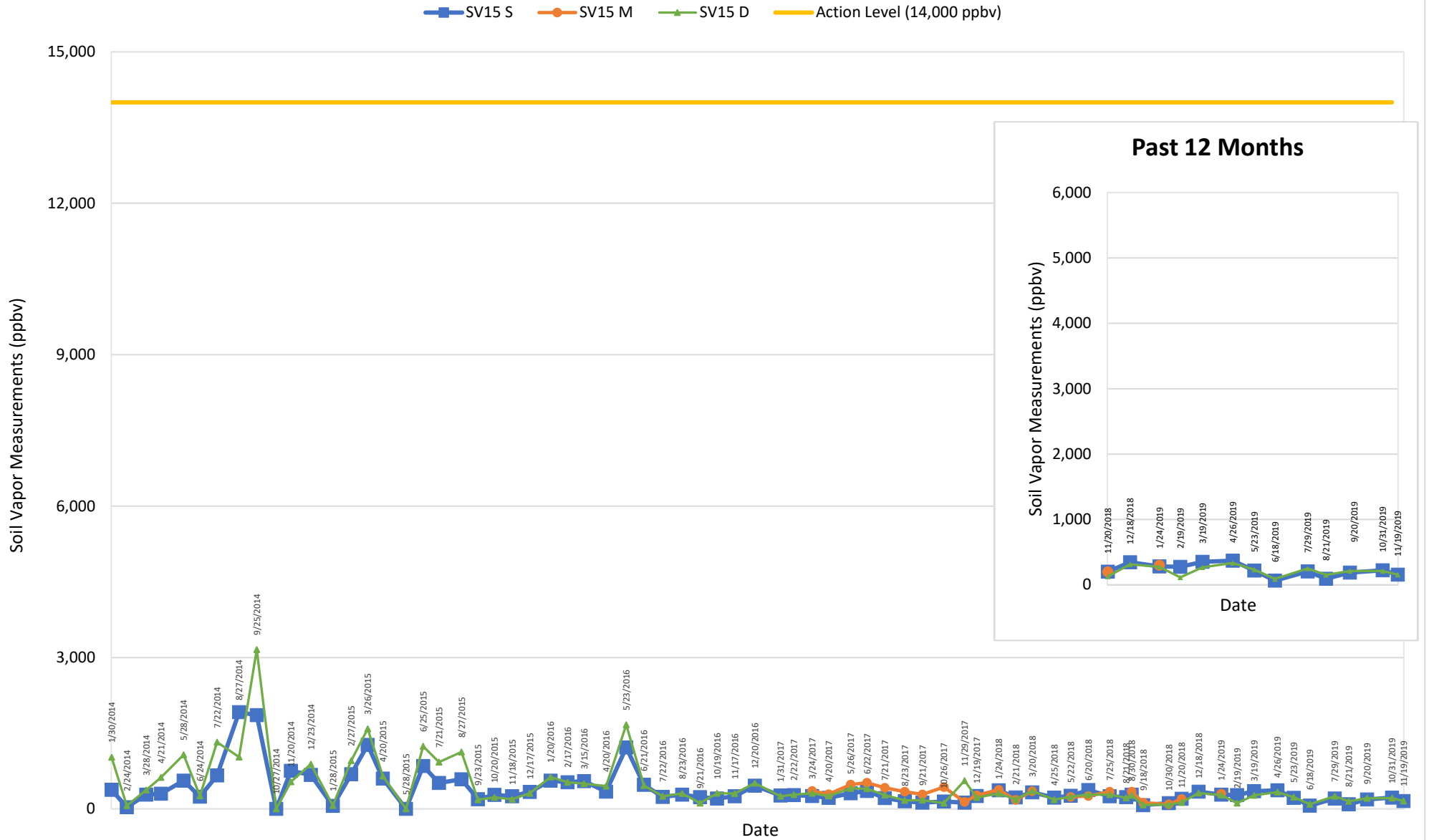
SV14 S SV14 M SV14 D Action Level (280,000 ppbv)



Notes:  
 ppbv: Parts Per Billion by Volume  
 F-24: Jet Fuel, Fuel Number 24

JP-5: Jet Fuel, Propellant Number 5  
 F-76: Marine Diesel, Fuel Number 76

**Figure 14**  
**Soil Vapor Measurements - SV15 (F-76)**

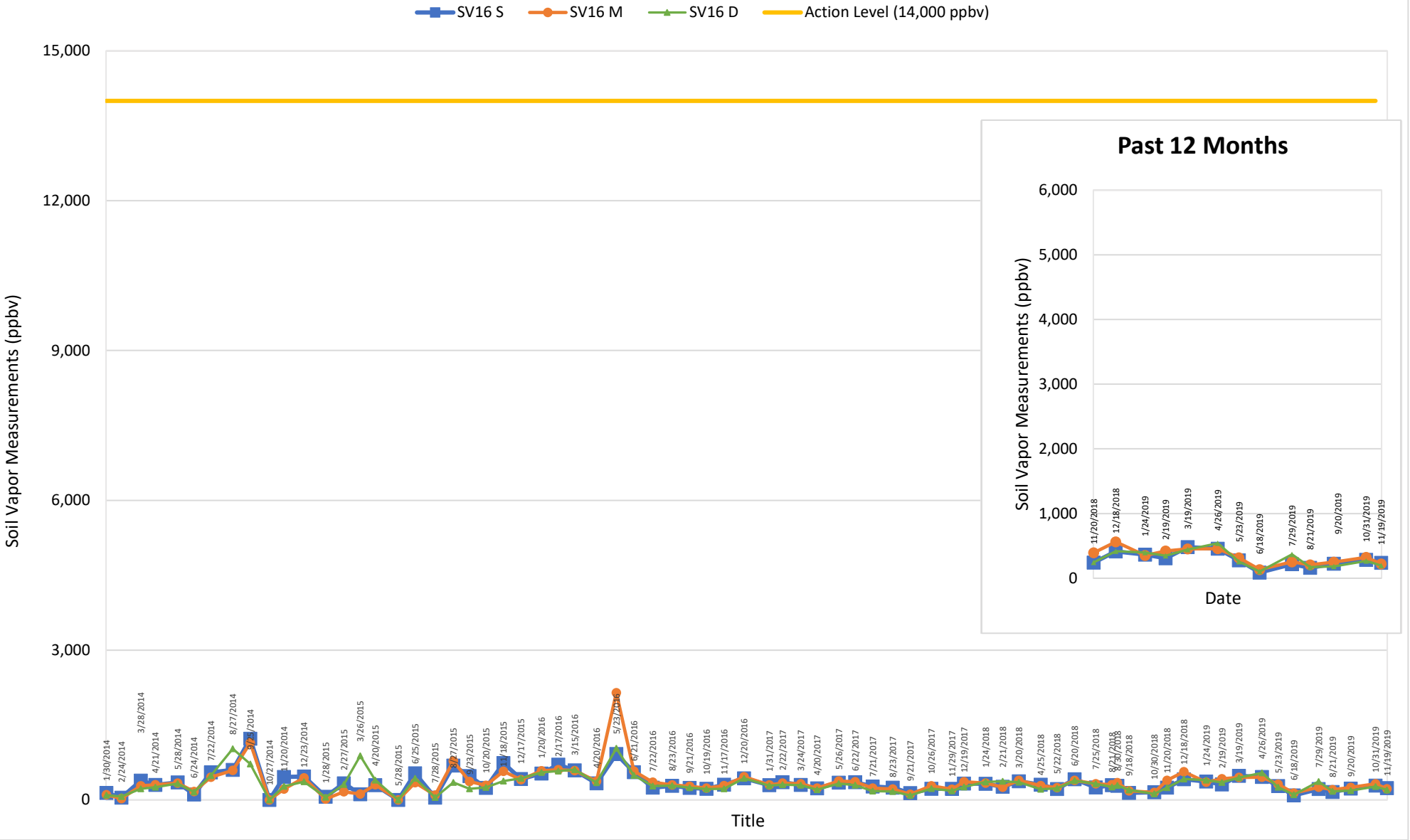


Notes:  
 ppbv: Parts Per Billion by Volume  
 F-24: Jet Fuel, Fuel Number 24

JP-5: Jet Fuel, Propellant Number 5  
 F-76: Marine Diesel, Fuel Number 76



**Figure 15**  
**Soil Vapor Measurements - SV16 (F-76)**

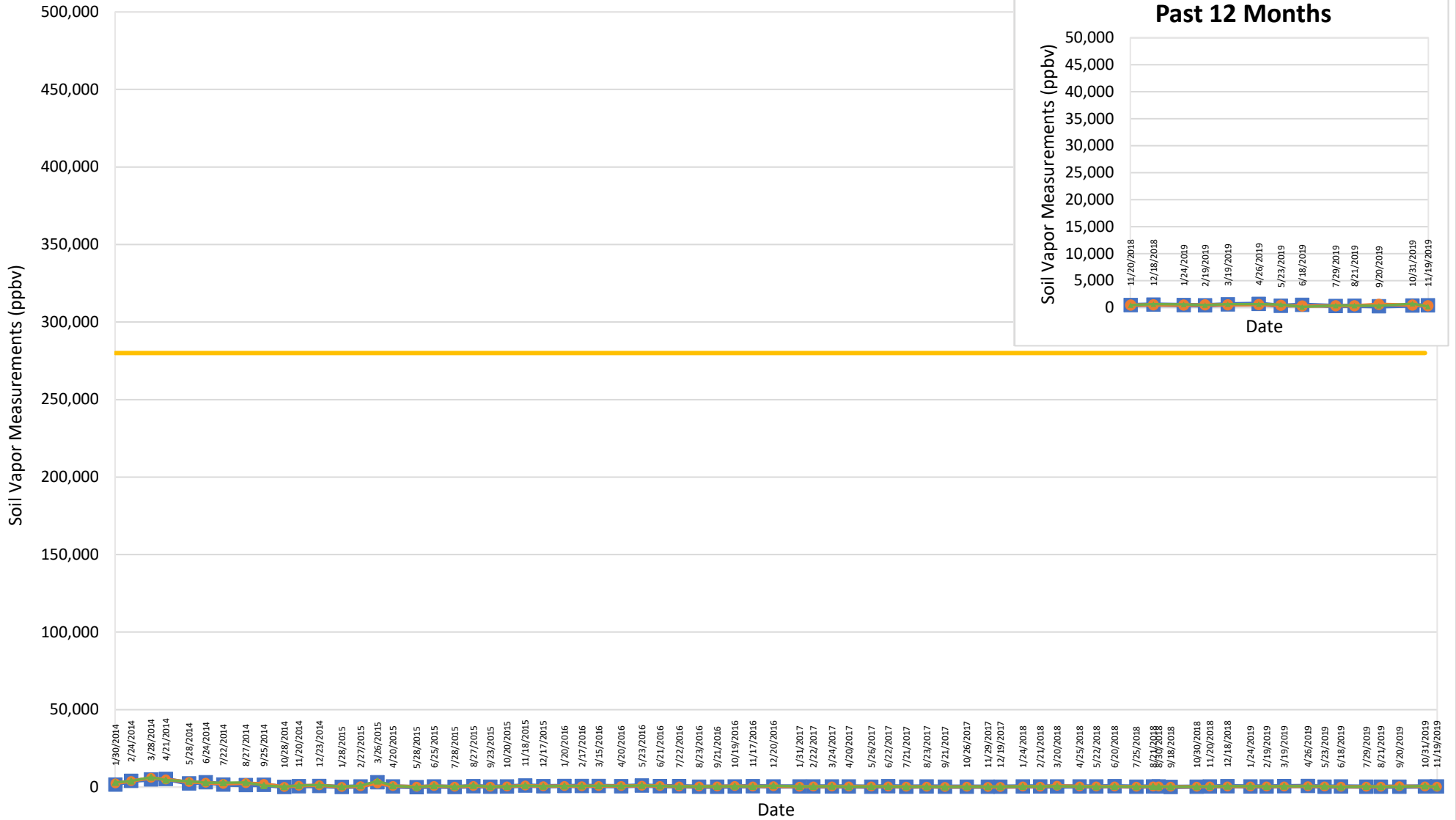


Notes:  
 ppbv: Parts Per Billion by Volume  
 F-24: Jet Fuel, Fuel Number 24

JP-5: Jet Fuel, Propellant Number 5  
 F-76: Marine Diesel, Fuel Number 76

**Figure 16**  
**Soil Vapor Measurements - SV17 (JP-5)**

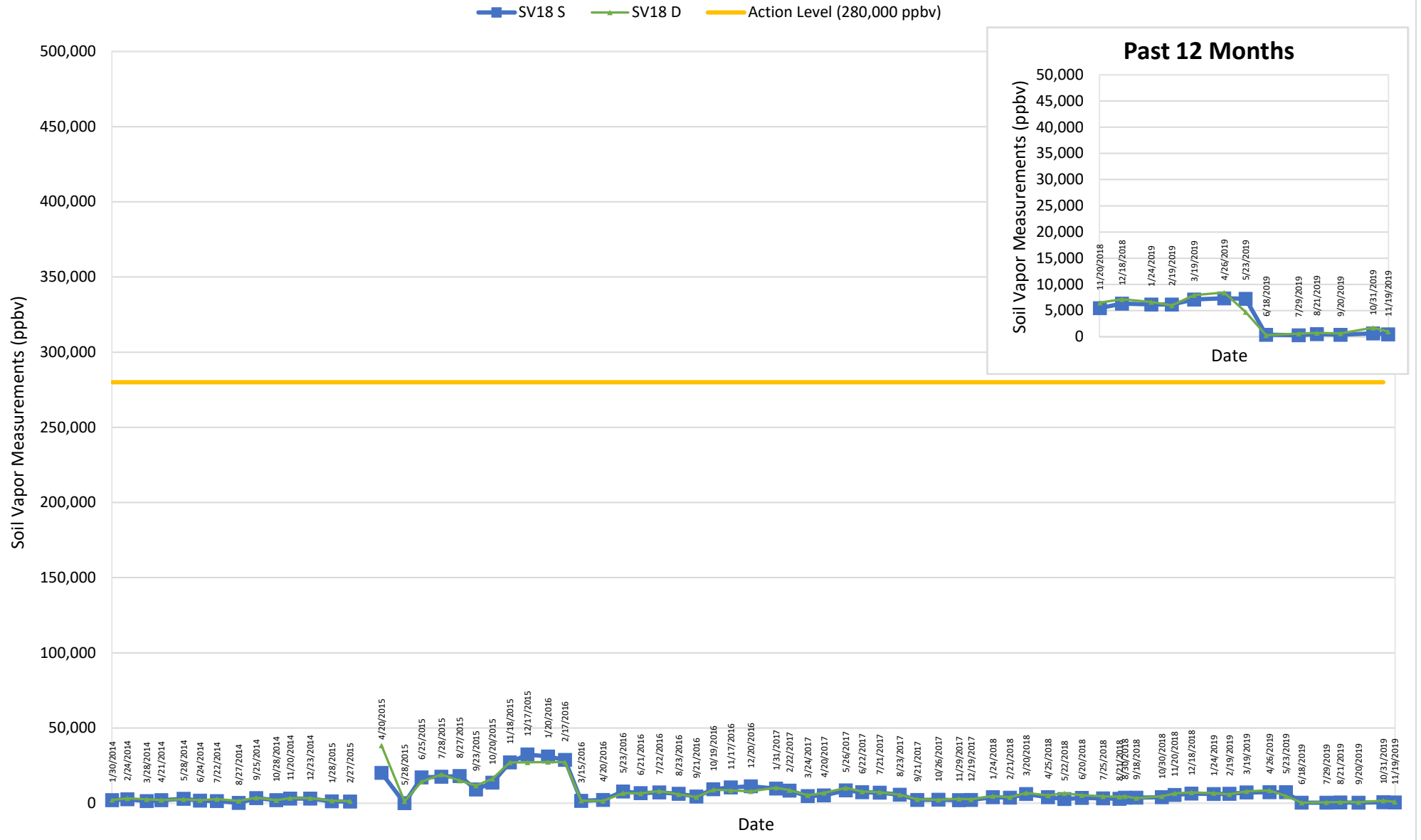
SV17 S    SV17 M    SV17 D    Action Level (280,000 ppbv)



Notes:  
 ppbv: Parts Per Billion by Volume  
 F-24: Jet Fuel, Fuel Number 24

JP-5: Jet Fuel, Propellant Number 5  
 F-76: Marine Diesel, Fuel Number 76

**Figure 17**  
**Soil Vapor Measurements - SV18 (JP-5)**

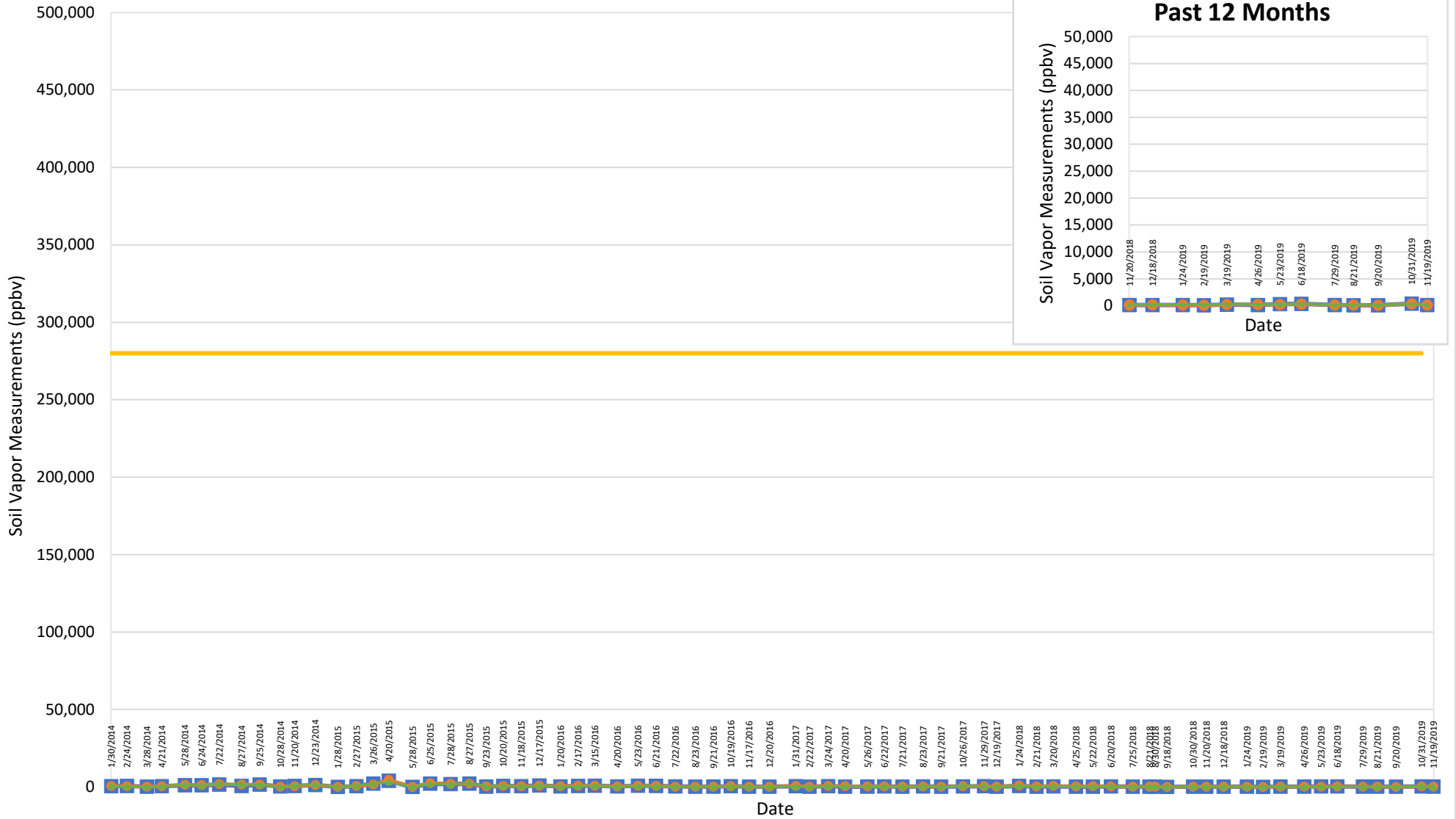


Notes:  
 ppbv: Parts Per Billion by Volume  
 F-24: Jet Fuel, Fuel Number 24

JP-5: Jet Fuel, Propellant Number 5  
 F-76: Marine Diesel, Fuel Number 76

**Figure 18**  
**Soil Vapor Measurements - SV20 (JP-5)**

SV20 S SV20 M SV20 D Action Level (280,000 ppbv)



Notes:  
 ppbv: Parts Per Billion by Volume  
 F-24: Jet Fuel, Fuel Number 24

JP-5: Jet Fuel, Propellant Number 5  
 F-76: Marine Diesel, Fuel Number 76

21 January 2020

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 NOVEMBER 2019

Ref: (a) Red Hill Bulk Fuel Storage Facility Groundwater Protection Plan  
(b) Red Hill Soil Vapor Monitoring Report for Round 140, dated 19 November 2019

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:

- Moderate increase at tank 18.
- Slight increase trends at tanks 4, 6, 7, 11-18, and 20.

2. FLCPH causative research and findings:

- a. Reviewed all AFHE Unscheduled Fuel Movement (UFM) Alarm Summaries and UFM Reports. The following Red Hill Fuel Storage Facility Underground Storage Tanks (USTs) are Out of Service for Clean, Inspect and Repair (CIR); Tanks 5, 13, 14 and 17.
- b. There were a total of nine (9) UFM's recorded between sampling events 139 and 140 during the period of 31 October 2019 – 19 November 2019:

31 Oct – RH16: A low UFM alarm occurred after completing an evolution. Dispatched Rover to tank and conditions were normal. Tank was top gauged and inventory had not changed since last report. Investigative actions confirmed no release of fuel from the tank occurred. Opened Trouble Ticket #4440934 to determine cause of erroneous alarm.

05 Nov – RH16: A low UFM alarm occurred after completing an evolution. Dispatched Rover to tank and conditions were normal. Tank was top gauged and inventory had not changed since last report. Investigative actions confirmed no release of fuel from the tank occurred. Opened Trouble Ticket #4440934 to determine cause of erroneous alarm.

07 Nov – RH04: A high UFM alarm occurred while creating an evolution. Dispatched Rover to tank and conditions were normal. Tank was top gauged and inventory had not changed since last report. Investigative actions confirmed no release of fuel from the tank occurred. The alarm was caused by operator error from a created evolution that was never started. No trouble ticket required.

07 Nov – RH03: A low UFM alarm occurred after completing an evolution. Dispatched Rover to tank and conditions were normal. Tank was top gauged and inventory had not changed since last report. Investigative actions confirmed no release of fuel from the tank occurred. Open Trouble Ticket #4440936 to determine cause of erroneous alarm.

Subj: NAVSUP FLC PEARL HARBOR CAUSATIVE RESEARCH REPORT IRT  
RED HILL SOIL VAPOR MONITORING REPORT FOR NOVEMBER 2019

13 Nov – RH20: A low UFM alarm occurred during an evolution. Maintenance technician was in the process of trouble shooting and conducting maintenance on the system. RH 20 was put into evolution, to create an UFM and conduct maintenance on the system. After maintenance on the system was completed, RH-20 was returned back to normal state. Confirmed no release of fuel from the tank occurred.

13 Nov – RH16: A low UFM alarm occurred during an evolution. After further investigation, the alarm was caused by operator error. No trouble ticket required. Investigative actions confirmed no release of fuel from the tank occurred.

14 Nov – RH20: A high UFM alarm occurred while tank was in idle. Dispatched Rover to tank and conditions were normal. Tank was top gauged and inventory had not changed since last report. Investigative actions confirmed no release of fuel from the tank occurred. Opened Trouble Ticket #4425798 to determine cause of erroneous alarm.

15 Nov – RH15: A low UFM alarm occurred after completing an evolution. Control Room Operator (PAPA) set an evolution to clear the alarm. Dispatched Rover to tank and all conditions were normal. Tank was top gauged and inventory had not changed since last reported. Investigative actions confirmed no release of fuel from the tank occurred. Open Trouble Ticket #4425758 to determine cause of erroneous alarm.

18 Nov – RH18: A low and high UFM alarms occurred. The alarm was caused by operator error from a created evolution that was never started prior to maintenance being conducted on the system. Investigative actions confirmed no release of fuel from the tank occurred. No trouble ticket required.

Reviewed Red Hill Inventory Trend Analysis Reports for November 2019; reports did not reveal evidence of a loss of fuel in any Red Hill tank.

- c. Red Hill maintenance and repair contractors did not report any factors that could have influenced increase in trends.
  - d. 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.
  - e. All active tanks have passed tank tightness testing within the required periodicity.
3. There are 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.

Richard Santos