Naval Facilities Engineering Systems Command
BRAC PMO West
San Diego, CA

FINAL
LANDFILL GAS MONITORING REPORT FOR APRIL - JUNE 2021

Post-Removal Action, Parcel E-2, Industrial Landfill

HUNTERS POINT NAVAL SHIPYARD, SAN FRANCISCO, CA

July 27, 2021

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Acronyms and Abbreviations

%	percent
°F	degrees Fahrenheit
§	Section (precedes section number in citing regulations)
BAAQMD	Bay Area Air Quality Management District
BCT	BRAC Cleanup Team
BRAC	Base Realignment and Closure
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CIWMB	California Integrated Waste Management Board
DP	discharge point
DTSC	Department of Toxic Substances Control
ft	feet
GMP	gas monitoring probe
HPNS	Hunters Point Naval Shipyard
in.	inches
INYA	INYA Inc.
IR	Installation Restoration
IR-01/21	Installation Restoration Site 01/21
ITSI	Innovative Technical Solutions, Inc.
LEL	lower explosive limit
MCP	Final Interim Landfill Gas Monitoring and Control Plan
mph	miles per hour
msl	mean sea level
MW	monitoring well
NA	not applicable
Navy	U.S. Department of the Navy
n/d	no data
NMOC	non-methane organic compound
PG&E	Pacific Gas and Electric
PID	photoionization detector
ppmv	parts per million by volume
PV	passive vent
RCRA	Resource Conservation and Recovery Act
SVE	soil vapor extraction
TCRA	time-critical removal action
Tetra Tech	Tetra Tech EM Inc.
UCSF	University of California, San Francisco

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1.0 Introduction

INYA Inc. (INYA) received Contract No. N62473-19-C-0009 from the U.S. Department of the Navy (Navy), Base Realignment and Closure Program Management Office, West to provide technical support at Hunters Point Naval Shipyard (HPNS) in San Francisco, California. Under this contract, INYA monitors and, as needed, controls migration of landfill gas from the Industrial Landfill in Installation Restoration (IR) Site 01/21 (IR-01/21) within Parcel E-2 at HPNS (Figure 1). All monitoring is conducted using the requirements of Title 27 of the California Code of Regulations (27 CCR), Section (§) 20921(a)(2) as guidance. This report contains the results of landfill gas and water level monitoring conducted in April, May, and June 2021.

Historical investigations at the landfill, the purpose and scope of the monthly monitoring events, and the organization of this report are discussed below. Additional site background information prior to 2002 is presented in the Final Monthly Landfill Gas Monitoring Report for January 2004 submitted by Tetra Tech EM Inc. (Tetra Tech; 2004a).

Routine monitoring is performed with multiple handheld field instruments that are calibrated for the constituents of concern prior to monitoring. All values reported here are from handheld equipment and not from a fixed laboratory, and therefore may be skewed low due to limitations of handheld field equipment. However, the detection limit of the handheld field equipment is low enough to correlate to the action levels at the Parcel E-2 landfill and is appropriate for the compliance monitoring being conducted at Parcel E-2.

Construction activities are ongoing as the final remedy is being installed at Parcel E-2. Slight variations in monitoring activities may occur as a result of the installation work and are explained in subsequent sections of this report.

1.1 Historical Investigations at the Landfill

In 2002, the Navy conducted an evaluation to characterize and delineate landfill gas at the Industrial Landfill as part of the nonstandard data gaps investigation at Parcel E (Tetra Tech, 2003). At that time, field personnel surveyed ambient air and soil gas and installed gas monitoring probes (GMPs) from which samples have been collected on a weekly and quarterly basis to the present. Monitoring results from 2002 indicated that methane, the main component of landfill gas, was present at levels above the lower explosive limit (LEL, which is 5 percent [%] by volume in air) at the following locations:

- Subsurface areas in the northern portion of the landfill;
- Above ground in ambient air at four areas within the University of California, San Francisco (UCSF) property (herein referred to as “the UCSF Compound”).

Additionally, trace amounts of methane and non-methane organic compounds (NMOCs) were detected in the crawlspace of Building 830 within the UCSF Compound. However, the concentration of NMOCs detected at each of these locations was well below action levels and did not pose a threat to human health (Tetra Tech, 2003). Methane was not detected at any of the GMPs along Crisp Avenue, indicating that landfill gas had not migrated northward beyond the UCSF Compound to Crisp Avenue or non-Navy property.

From summer 2002 through May 2003, the Navy conducted a time-critical removal action (TCRA) to address the levels of methane above the LEL on the UCSF Compound. The goals of the TCRA were (1) to reduce levels of methane within the UCSF Compound to below the LEL of 5% in accordance with the requirements at 27 CCR §20921(a)(2), and (2) to prevent future migration of landfill gas to the UCSF Compound. A landfill gas control system, which could be operated passively or actively, was installed to achieve the goals of the TCRA until the final landfill remedy was designed and constructed. The draft TCRA closeout report contains a detailed summary of monitoring results, potential migration pathways for landfill gas, and the response actions taken to address the gas migration scenarios, including installation of a grout curtain in selected areas (Tetra Tech, 2004b).

From May 2003 through November 2003, the Navy continued monitoring at passive vents (PVs) PV-01 through PV-04 (PV-05 was installed after November 2003), at GMP01A through GMP12 along the fence immediately north of the landfill, and at GMP20 and GMP21 along the western edge of the landfill. On November 4, 2003, landfill gas monitoring and control activities were suspended temporarily until they were resumed on January 21, 2004, when a contract for continued activities was implemented. In September 2004, the Navy revised the Parcel E boundary, and the Industrial Landfill area was given the designation “Parcel E-2” (current parcel boundaries are shown on Figure 1).

In January 2005, the Navy transferred Parcel A, which is adjacent to Parcel E-2 to the northwest and northeast, to the City of San Francisco. The quarterly report text and figures now designate the former Parcel A areas as “Non-Navy Property.”

Figure 2 shows the site map and landfill gas monitoring locations.

1.2 Purpose and Scope

This quarterly monitoring report presents and summarizes the evaluation of monitoring data collected in April, May, and June 2021, based on the modified program schedule proposed by the Navy and approved by the Department of Toxic Substances Control (DTSC) on October 20, 2008 (see Section 2.3 below). This report was prepared using the requirements of 27 CCR §20934 as guidance. Specifically, this report provides the following information:

- Concentrations of methane measured at each monitored GMP and within each of three on-site structures.
- Concentrations of oxygen, carbon dioxide, and NMOCs measured at each GMP and within each on-site structure in the current program.
- The dates and times of monitoring activities and the barometric pressures, atmospheric temperatures, general weather conditions, probe pressures, and water levels measured or recorded during the monitoring events.
- Names of monitoring personnel and a brief description of the sampling apparatus and methods employed.
- Documentation of the dates, extraction locations, periods of operation, and any maintenance issues or field work variances related to operation of the landfill gas control system.

The numbering/reference system used in the report text, tables, and figures correlates monitoring results with the corresponding GMPs and other locations monitored, as recorded in the landfill gas and water level monitoring logs (included in Appendix A).

1.3 Report Organization

This report is organized as follows:

Section 1 provides an introduction to, and an overview of, recent investigations that have occurred at the landfill.

Section 2 presents the overall objectives and methods of the landfill gas monitoring/control program, as well as a brief overview of recent operating conditions.

Section 3 presents the results of the monthly monitoring for landfill gas (including any required follow-up monitoring and/or response actions), as well as additional information relating to probe pressures, water levels, and meteorological data for this period.

Section 4 provides an evaluation of the monitoring results for this quarter.

Section 5 is an overall summary of the monitoring report and current system status.

Section 6 lists the documents used as background references for this report.

Tables and figures are included after Section 6, followed by the appendices:

Appendix A presents landfill gas monitoring data for the monthly monitoring events and depth-to-water data for the last month in the reporting period (as recorded on the Landfill Gas Monitoring Logs and Water Level Monitoring Log).

Appendix B provides a summary of other monitoring results (i.e., for landfill cap monitoring wells) for the current monitoring period.

2.0 Monitoring Program Objectives and Methodologies

The objectives established and methods employed in the landfill gas monitoring program at HPNS Parcel E-2 are described in detail below.

2.1 Objectives

The objectives of monitoring landfill gas are to (a) verify that the landfill gas control system at Parcel E-2 is effectively reducing levels of methane to below the LEL, and (b) prevent hazardous levels of landfill gas from migrating to the UCSF Compound and other adjacent non-Navy property. Title 27 CCR provides standards for monitoring and controlling combustible gases such as methane. Bay Area Air Quality Management District (BAAQMD) Regulation 8, Rule 34, addresses control of NMOC emissions from solid waste disposal sites.

The landfill gas monitoring and control requirements of 27 CCR and BAAQMD Rule 34 apply to landfills operating under state Resource Conservation and Recovery Act (RCRA) permits. These requirements can be applied to older, inactive, or closed landfills if they pose a potential threat to public health and safety or the environment. The applicability or relevance and appropriateness of 27 CCR requirements to the industrial landfill at IR-01/21 are evaluated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process. BAAQMD Rule 34 does not regulate the landfill in Parcel E-2. However, both the 27 CCR and Rule 34 requirements were used as guidelines for development and implementation of the Final Interim Landfill Gas Monitoring and Control Plan (MCP) (Tetra Tech, 2004c), pending completion of the final CERCLA remedy for the landfill, which is currently being constructed.

Title 27 CCR §20921 sets forth the following three performance standards for control of landfill gas at closed landfills:

- Concentrations of methane gas must not exceed 1.25% by volume in air (25% of the LEL) within any on-site structure.
- The concentration of methane gas migrating from the landfill must not exceed 5% by volume in air at the property boundary or an alternative boundary approved in accordance with 27 CCR §20925.
- Trace gases (NMOCs) must be controlled to prevent adverse acute and chronic exposure to toxic and/or carcinogenic compounds.

The criteria for the first two requirements are clear, but the third requirement does not identify specific field monitoring limits for trace gas concentrations. As a result, action levels for field monitoring of NMOCs were established based on an evaluation of previous risk assessments along with health and safety criteria (Tetra Tech, 2002). The health and safety criterion limits NMOCs in the breathing zone to 5 parts per million by volume (ppmv). This criterion is applied to on-site structures and utilities

that are accessible to workers, and to surface locations in the UCSF Compound where landfill gas has been historically detected, including the crawlspace under Building 830.

Previous risk assessments described in the MCP show that subsurface trace NMOCs found in GMPs within the UCSF Compound and along Crisp Avenue do not pose an unacceptable health risk (Tetra Tech, 2004c). An action level of 500 ppmv was therefore established for NMOCs in GMPs. The 5% limit for methane at the property boundary (the second requirement stated above) does not apply to passive vents or to monitoring wells located on the landfill. Passive vents are part of the landfill gas migration control system, and frequently exceed 5% methane by design. Additionally, the 5% limit does apply at the GMPs, which are located at various distances outside the Gundwall barrier that reduces the outward migration of landfill gas from the trench and passive vents.

The requirements for monitoring and reporting landfill gas, as set forth in 27 CCR, are summarized as follows:

- Perimeter Monitoring Network (§20925): Gas monitoring probes will be located near the site property boundary, with lateral spacing of no more than 1,000 feet and at depths above groundwater and bedrock.

- Structural Monitoring (§20931): The design of the monitoring network will encompass on-site structures, including buildings, basements, manholes, pipelines, and utility vaults. Methods for on-site structural monitoring may include periodic monitoring using either permanently installed probes or gas surveys, or continuous monitoring systems.

- Monitored Parameters (§20932): All gas monitoring probes and on-site structures will be monitored for methane, and for trace NMOCs if required.

- Monitoring Frequency (§20933): At a minimum, quarterly monitoring is required. More frequent monitoring may be required at locations where monitoring results indicate that landfill gas is migrating or is accumulating in structures.

- Reporting (§20934): Results of landfill gas monitoring will be submitted to the California Integrated Waste Management Board (CIWMB) within 90 days, provided compliance levels are maintained. When compliance levels are exceeded, the results must be submitted within 5 days. A letter that describes the nature and extent of the problem and any immediate corrective actions that must be taken to protect public health and safety and the environment will be submitted within 10 days.

Portions of the landfill gas control system, and some of the current monitoring points are on property that the Navy has transferred to UCSF. Negotiations between the Navy and UCSF regarding the property that contains the landfill gas control system

resulted in the creation of an easement that allows the Navy to maintain and monitor facilities on UCSF property. The easement was finalized on July 21, 2006.

2.2 Monitoring Methodologies

Landfill gas monitoring locations are sampled either monthly or quarterly, as specified in the program schedule for each current monitoring location, to evaluate migration from the landfill and to verify that the landfill gas control system is achieving the regulatory requirements set forth in 27 CCR §20921 and BAAQMD Rule 34. This section briefly discusses the procedures used to monitor landfill gas. The MCP provides a more detailed discussion of monitoring procedures.

An RKI Eagle 2 landfill gas analyzer was used to monitor concentrations of methane, oxygen, and carbon dioxide; the percentage of the methane LEL; and real-time temperatures and barometric pressures. A calibrated Mini RAE photoionization detector (PID) was used to monitor NMOCs. An air-sampling pump was used to purge the GMPs prior to monitoring. Pressure in the GMPs was measured using a Dwyer Magnehelic pressure gauge.

Before soil gas readings were recorded at each GMP, pressure was measured using the Magnehelic pressure gauge with a scale of 0 to 10 inches of water. The air pump was then connected to the sampling port of the GMP and used to purge air from the GMP for at least one minute at 3,000 cubic centimeters per minute. After the GMP was purged, the RKI Eagle 2 landfill gas meter was connected to the sampling port. Readings were recorded when the concentration of landfill gas was stable for at least 30 seconds. Background levels of NMOCs were recorded from the PID by recording the ambient air reading before the meter was connected to the sampling port. After the background level of NMOCs was recorded, the PID was connected to the sampling port to measure NMOCs. The concentration of NMOCs was recorded when the PID indicated a stable value for at least 30 seconds.

Table 1 identifies the personnel conducting the monitoring events and the equipment used during monitoring. Table 2 lists the monitored locations by location category.

2.3 Fieldwork Variances

There have been a number of fieldwork variances as the monitoring and control activity protocols were applied after the TCRA in 2003. Monitoring and control activities began on a consistent basis in January 2004. From that time until August 28, 2004, gas extraction along the landfill gas barrier wall was performed semi-continuously at the points where the highest methane concentrations were observed, PV-02 and PV-03, and occasionally at GMP24, as needed. The control system was operated under non-standardized protocols until the MCP was finalized in August 2004. Several modifications to the initial protocols have been implemented in accordance with the provisions of the MCP, to refine the program and develop the most effective method of controlling landfill gas in Parcel E-2.

In addition to the procedures implemented in response to the variances described in this section, protocol modifications have included the following:

- From January 27, 2004, to August 28, 2004, active extraction was performed on a semi-continuous basis at PV-02 or PV-03 (24 hours a day for two to three weeks at a time) in an attempt to determine whether continual active extraction was truly necessary to control landfill gas. (As discussed below, several modifications to this approach have been implemented; and in February 2006 it was determined that, as long as a permanent power source is in place, continuous extraction should not be interrupted for reasons other than periodic maintenance.)
- Initially, active extraction was not performed at PV-02 or PV-03 on the day of the monitoring event, due to the concern that this might prevent landfill gas from reaching the PID or the gas analyzer while other passive vents were being monitored. The procedure was changed in July 2004, when it was determined that this method was not presenting a true snapshot of trench conditions under continuous active extraction (the predominant state of operation).
- The active extraction flow produced by the soil vapor extraction (SVE) blower motor initially was controlled by restricting the main inlet valve on the trailer instead of by opening the secondary bleed-off valve. This method created unnecessary vacuum pressure on the intake and significantly reduced the effectiveness of the extraction system. The operating procedure was changed in July 2004 and the bleed-off valve was utilized, significantly increasing extraction flow rates while reducing stress on the motor.
- From October 2004 through February 2005, active extraction was performed continuously at PV-02 for one full week just prior to the monthly monitoring event. Because of concerns that an extraction schedule limited to one week per month might allow landfill gas to migrate off the site during the time when extraction was not occurring, the active gas extraction schedule was changed in March 2005. The revised protocol called for active gas extraction to be performed for 40 consecutive hours each week.

As documented in the August and September 2004 monthly reports (Innovative Technical Solutions, Inc. [ITSI] 2005a, 2005b), the landfill gas control system was without power from August 28, 2004, through September 28, 2004, due to damage to the electrical service drop caused by workers at the Golden Gate Railroad Museum yard. During this time, the system was passively venting from PV-01, PV-02, PV-04, and PV-05. PV-03 was not vented during this time. A mobile generator was brought on site on September 29, 2004, and was employed as the power source for active extraction until Pacific Gas and Electric (PG&E) power was restored in March 2006. Active gas extraction was resumed at PV-02 on September 29, 2004, and continued until October 7, 2004, along with extraction at GMP24 from September 30, 2004, to October 4, 2004 (ITSI 2005b, 2005c).

Beginning in May 2005, monthly gas monitoring events were conducted following a period of several days when only passive extraction occurred, and just before the active extraction system was activated, so that the data collected represented the presumed worst-case conditions of the extraction schedule. This practice was replaced by the continuous (24 hours a day, 7 days a week) active extraction schedule adopted on February 8, 2006, after it was determined that the 40-hours-per-week active extraction schedule was no longer sufficient to control methane migration to the fence line GMPs, particularly GMP01A and GMP07A. Further discussion of the methane results observed at GMP01A and GMP07A during January and February 2006, and factors which may have contributed to these concentrations, can be found in the Final Monthly Landfill Gas Monitoring Report for December 2006 (ITSI, 2007).

Beginning in October 2005, passive vents PV-01, PV-03, PV-04, and PV-05 were closed off during any active extraction at PV-02, to maximize the efficiency of methane extraction from the interception trench. These vents were re-opened when active extraction was concluded. This practice was discontinued in December 2005 because of concerns that closing the vents may put undue vacuum pressure on the interception trench. The vents are now left open at all times.

In June 2005, PG&E approved a revised power installation plan to provide temporary power for three years, under a permit that could be extended until a final remedy and the resultant power needs for the Parcel E-2 landfill are determined. The temporary plan included installing two power poles, coordinating a power drop and meter installation with PG&E, terminating unused lines and conduits, and removing an existing power pole that was no longer needed. Following Navy approval of the cost proposal for the performance of this work in December 2005, and PG&E approval of the final plan for the installation work in February 2006, the new power poles were installed on February 28, 2006. PG&E made the power connections on March 24, 2006, and power was restored to the active extraction system on March 27, 2006.

At some point between the April 2006 and May 2006 monitoring events, well IR74MW01A was damaged by construction crews working on the non-Navy property (formerly known as HPNS Parcel A) along and north of Crisp Avenue, and water level measurements could not be taken at this well for several months. IR74MW01A was repaired on September 8, 2006.

At some point between 1100 hours on April 16, 2007, and 0730 hours on April 18, 2007, the electrical service drop for the active extraction system was damaged, presumably by high winds. The service drop was spliced and repaired by electrical crews, and active extraction was resumed at 1700 hours on April 19, 2007.

Following a recommendation made by Gino Yekta of the CIWMB, the probe assemblies on all GMPs were modified during the week of April 21 through April25, 2008, to ensure that a continuous seal was maintained between monitoring events. This was accomplished by replacing the original flex hose connections between the PVC risers and stopcock valves with PVC fittings.

As a result of discussions during a site visit by DTSC and CIWMB on September 16, 2008, the following changes in GMP monitoring locations and monitoring frequency were proposed by the Navy, and subsequently approved by DTSC on October 20, 2008:

- **Compliance probes:** GMP10, GMP11A, GMP13, GMP14, GMP15, GMP16, GMP32, GMP33, GMP34, and GMP35

  The monitoring of these probes was reduced from monthly to quarterly. These probes had no methane detections over the life of the monitoring program and, while NMOCs have been detected at significant levels, no NMOC action level exceedances have occurred. As of the June 2011 quarterly event, GMPs 17 through 21, and GMPs 27 through 31 have been replaced by GMP33, GMP34, and GMP35. These replacement probes are monitored quarterly.

- **Probes with recent detections:** GMP01A, GMP07A, and GMP22

  The monitoring of these probes was reduced from monthly to quarterly. GMP01A and GMP07A had methane levels above the regulatory level of 5% in January/February of 2006, while GMP22 had an NMOC level above 100 ppmv in September 2008.

- **Probes with no methane detections:** GMP02A, GMP03, GMP04A, GMP05B, GMP06B, GMP09, GMP12, GMP25, and GMP26

  Monitoring of these probes was discontinued. These probes had no methane detections and no NMOC detections above 10 parts per million reported through September 2008.

- **Probes with recurring methane detections:** GMP08A, GMP23, and GMP24

  The monitoring of these probes has continued on a monthly schedule. These probes had recurring methane detections to that point, although only GMP24 had an action level or regulatory level exceedance.

The October 2008 monitoring event was the first monthly event performed under this modified program schedule. The first quarterly monitoring event under the revised schedule was performed in December 2008. Quarterly events now are conducted during the last month of each calendar quarter (i.e., March, June, September, and December).

On Tuesday, February 17, 2009, following a significant storm event, it was discovered that the electrical service drop for the landfill gas active extraction system had been damaged, rendering the active extraction system inoperable. The service drop was replaced on Friday, February 20, 2009, and active extraction was not resumed until after the monthly monitoring event was completed, in order to assess the worst-case conditions at the monitoring probes. As an additional precaution, GMP01A and GMP07A were included in the February 2009 monitoring event, as these two locations have had exceedances in the past and are the probes most likely to be

influenced negatively by the lack of active extraction on the collection trench. All methane detections during this event were below the 2.5% HPNS action level.

At approximately 0500 hours on April 14, 2010, power to the active extraction system was interrupted by PG&E crews working along Crisp Avenue. As an additional precaution, GMP01A and GMP07A were included in the April 2010 monitoring event, as these two locations have had exceedances in the past and are the probes most likely to be influenced negatively by the lack of active extraction on the collection trench. All methane detections during this event were below the 2.5% HPNS action level. Power was reinstated and active extraction resumed at 0930 hours on April 15, 2010.

Except for GMP32, all of the Crisp Avenue GMPs and groundwater monitoring locations (GMP13, GMP14, GMP15, GMP16, GMP17, GMP18, GMP19, GMP27, GMP28, GMP29, GMP30, GMP31, and IR74MW01A) were removed during sewer line trenching activities on Crisp Avenue in 2010. These probes were replaced on June 29 through June 30, 2011, by GMP33, GMP34, and GMP35, which were installed to specifications prescribed by the MCP, and incorporated suggestions from the California Department of Resources, Recycling, and Recovery–Closure & Facility Engineering Unit. In addition, water level monitoring locations IR01P03AA and IR01P03AB have been pressure-grouted by the basewide well decommissioning contractor and are therefore no longer monitored.

At some point between 1300 hours on March 20, 2015, and 0800 hours on March 23, 2015, the electrical line to the active extraction system was severed, presumably by vandalism. The line was repaired and maintenance was performed on the unit. Active extraction resumed at 1500 hours on March 26, 2015.

Due to perimeter road installation, the active extraction unit was removed from service for the month of August 2017. After construction improvements, the extraction unit was placed back into service.

The HPNS meteorological tower was removed from service in April 2018. Weather data has since been obtained from the National Climatic Data Service archives for the San Francisco Airport, accessible at: http://www.ncdc.noaa.gov/cdo-web/search

Active gas venting had been continuously functioning at PV-02 (with few exceptions) since April 15, 2010. During the second quarter of the last calendar year (2020) the active gas venting system at PV-02 was offline for approximately 29 hours while system maintenance was conducted. During the last quarter, electrical power to the venting system at PV-02 was interrupted due to a system fault at approximately 1600 hours on November 2, 2020 (as interpreted from the PG&E invoice). The loss of power was identified during the November monthly monitoring event (November 12, 2020), and system troubleshooting was performed through the end of December (as scheduling allowed). The system fault was isolated to an overhead line connecting the PG&E meter (at Building 809) to the system breaker panel, but repair was not completed during the last quarter of 2020. In the current quarter (April to June 2021) it was not possible to complete the troubleshooting efforts and perform repairs due to

safety considerations related to weather conditions. Ponding of rainwater that occurred in December 2020 directly under the overhead power line remained throughout the quarter. As a result, there was no active venting performed at PV-02 during the current quarter (as detailed below). Precautions were taken to conduct additional ambient air monitoring during this quarter to demonstrate that no adverse conditions developed as a result of the loss of active venting at the site. Results of ambient air monitoring during the current quarter are provided in Appendix A.

April 2021 Operations:	0 hours
May 2021 Operations:	0 hours
June 2021 Operations:	0 hours
Total Quarterly Operations:	**0 hours**

2.4 Data Evaluation

Results of landfill gas monitoring were evaluated against the performance standards and action levels for methane and NMOCs outlined in the MCP, which are based on the performance standards set forth in 27 CCR and BAAQMD Rule 34. Section 3 of this report summarizes the results of landfill gas monitoring during this reporting period.

2.5 Deviations

It was determined at the November/December 2006 Base Realignment and Closure Cleanup Team (BCT) meeting that while monthly monitoring at HPNS Parcel E-2 remained appropriate, formal reports were needed less frequently. Therefore, it was agreed that, under current conditions, the Final Monthly Landfill Gas Monitoring Report for December 2006 (ITSI, 2007) would be the last formal monthly report. Also agreed was starting in January 2007, monthly monitoring and BCT presentations would continue but formal reports only would be issued quarterly.

It was further determined at the July 2007 BCT meeting that the quarterly reports would be submitted only as final reports. The first quarterly report submitted as such was issued in October 2007 and covered the third quarter of 2007. Final quarterly reports have been issued for each subsequent calendar quarter.

As discussed in Section 2.3, reductions in GMP monitoring locations and frequency were proposed by the Navy following discussions during a site visit by representatives of DTSC and CIWMB on September 16, 2008, and were approved by DTSC on October 20, 2008.

During the current quarter, additional monitoring measurements were taken at GMP01A and at ambient air monitoring locations Light Pole, Fence Line, Basketball Court, 830crawlspace, and East of DP1 during the April and May monthly monitoring events.

3.0 Monitoring Results

Results of monthly monitoring measurements recorded at the landfill during April 2021 and May 2021, and the quarterly monitoring measurements from June 2021, are described below. Monitoring events were conducted on April 6, 2021, May 13, 2021, and June 10, 2021. Monthly monitoring events in April and May included landfill gas measurements only and the June quarterly monitoring included both landfill gas and depth-to-water measurements. Appendix A contains all of the landfill gas monitoring data for this quarter. Appendix B summarizes results of landfill gas monitoring at locations other than those specified in the MCP. These locations (specifically, the groundwater monitoring wells on the landfill cap) are monitored quarterly to evaluate the presence of methane in the landfill relative to methane concentrations observed in the GMPs. Documenting the fluctuation of methane levels observed in the landfill wells over time also helps to demonstrate the wide variability of methane concentrations relative to seasonal conditions such as temperature and groundwater elevation.

3.1 Methane Results

This section summarizes the results of methane monitoring during this reporting period. The results for methane (excluding passive vents and the wells listed in Appendix B) are shown on Figure 3 and Figure 4. Methane results for each MCP-specified location monitored for the three sampling events are located in Appendix A. Note that all methane concentrations are reported as percentage of methane by volume and as a percentage of the LEL.

The results for specific monitoring locations are summarized below and described in greater depth in the subsections that follow for the various location categories.

- **Fence Line** (between the landfill and the UCSF Compound); one elevated level of methane was measured at GMP01A in April (4.7%), but was below the LEL of 5%. Detectable levels of methane were also measured at GMP01A (0.4% in May and June). All of the other monitoring results were non-detect in April, May, and June.
- **UCSF Compound**; low levels of methane were detected at GMP24 (0.1% in April and 0.8% in May) and at GPM22 (0.1% in June).
- **Crisp Avenue**; no methane was detected at any measurement points.
- **Structural Locations**; no methane was detected at any of the structural measurement points in April, May, or June.
- **Ambient Air Locations**; no methane was detected at any of the points monitored for ambient conditions during the April, May, and June events.
- **Control System** (for landfill gas); readings ranged up to 65.5% methane for the PV locations (consistent with previous monitoring).

The fence line between the landfill and the UCSF Compound is considered the property boundary for the landfill gas monitoring program (Tetra Tech, 2004c), which

is of significance for reporting the monitoring results consistent with Title 27 CCR §20921 (see Section 2.1 above).

3.1.1 Fence Line

Methane concentrations measured at the fence line sample locations along the northwestern and northeastern perimeter of the landfill represent methane concentrations of soil gas migrating beyond the site boundary. These locations (GMP01A, GMP07A, GMP08A, GMP10, GMP11A, GMP20, and GMP21) are specified in the modified monitoring program discussed in Section 2.3. Only one of these monitoring points had an elevated level of methane during the April monitoring period, and none during the May or June periods.

- *All of the concentrations measured at the GMP sampling locations along the fence line were below the regulatory performance standard and the HPNS site action level for May and June monitoring periods. Only one location, GMP01A, had an elevated level of methane during the April monitoring period; however, it was below the 5% performance level at 4.7%).*

Figures 3 and 9 show methane results along the fence line and Appendix A provides the methane data for these GMP locations. Neither GMP10 nor GMP21 were accessible during this monitoring period (in March) due to ongoing construction activities to install the final remedy. GMP21 was not locatable for the first time during the previous event and had been measured consistently for several years prior to that event.

3.1.2 UCSF Compound

GMPs monitored within the UCSF Compound (GMP22, GMP23, and GMP24) represent an area between the boundary of the landfill and the compliance probes on Crisp Avenue. GMP23 and GMP24 are monitored monthly (i.e., three times per quarter) and GMP22 is monitored quarterly (i.e., once per quarter). Three of the seven measurements of methane within the UCSF Compound taken during this quarter had detectable but low levels (0.1%, 0.1%, and 0.8%).

- *The regulatory performance standard of less than 5% methane by volume and the HPNS site action level of 2.5% were therefore met at all UCSF GMPs for all monitoring events during the monitoring period.*

Appendix A provides the methane measurement data at the GMPs in the UCSF Compound.

3.1.3 Crisp Avenue

All of the monitoring locations along Crisp Avenue (GMP32, GMP33, GMP34, and GMP35) are scheduled to be monitored quarterly (i.e., only once per quarter). None of the measurements taken in June registered a detectable level of methane.

- *The regulatory performance standard of less than 5% methane by volume and the HPNS site action level of 2.5% were therefore met at all locations.*

Appendix A provides the methane measurement data at the GMPs along Crisp Avenue.

3.1.4 Structural Locations

Monitoring for methane was performed in April, May, and June for the crawlspace at Building 830 (in the UCSF compound) and at the on-site "utilities" locations (catch basins DP1 and DP2). None of the methane readings at these locations had detectable levels.

- *The regulatory performance standard of less than 1.25 percent (%) methane by volume in air (25% of the LEL) within on-site structures was met.*

These structural locations are being monitored by the Navy because of their proximity to the landfill. Figure 4 shows the methane monitoring results for these locations and Appendix A provides methane measurement data at the structural locations.

3.1.5 Ambient Air Locations

In accordance with MCP guidelines, three ambient air locations within the UCSF compound (Ambient Location A [fence line], Ambient Location B [basketball court], and the light pole) had not been monitored since 2006, because of the prior, ongoing absence of methane or NMOC detections. However, because active gas extraction was interrupted starting in November 2020, ambient air monitoring resumed at these locations. During the present quarter, measurements were taken at the ambient air locations in April, May, and June. No detectable levels of methane were found in any of the measurements taken.

- *The regulatory performance standard of less than 1.25 percent (%) methane by volume in air (25% of the LEL) in ambient air sampling was met.*

The ambient air monitoring locations are shown on Figure 3 and the methane monitoring results for these locations are provided in Appendix A (in Table A-1 and Table A-2, and under the "structural locations" heading of Table A-3).

3.1.6 Control System

During the monitoring event on June 10, 2021, measurements for methane were taken at landfill gas control system locations (PV-01, PV-03, PV-04, and PV-05). The active system at PV-02 was again not monitored because it was not in operation. From each of the four units monitored, three measurements were taken: an "influent" measurement (soil gas coming directly from the landfill), a "carbon1" measurement (effluent from the first carbon vessel), and a "hydrosil" measurement (effluent from the last vessel of the filter system). The damaged piping discovered at PV-02 during the March 2021 monitoring has been repaired. The hole in the second carbon vessel

of the PV-02 system discovered at the same time (and temporarily covered with pipe tape) will need to be replaced within the next year.

- *Measured methane concentrations ranged from a high of 65.5% by volume in the influent sample at the PV-01 location to 0.0% from all sample ports at PV05.*

Appendix A provides complete methane monitoring results for the control system sample locations.

3.2 Non-Methane Organic Compound Results

During the April-June 2021 monitoring period, NMOCs were measured concurrently with methane measurements at all locations. Results of these measurements are presented in the tables provided in Appendix A and Appendix B and summarized below. Figures 5, 6, and 7 present the historical results for NMOCs in GMPs at the fence line, within the UCSF compound, and along Crisp Avenue, respectively, for each monitoring event from January 2019 through June 2021.

- **Fence Line (Figure 5).** There are seven monitoring locations along the fence line, and one of these (GMP08A) is generally sampled monthly, the others only quarterly. Two of the sampling locations (GMP10 and GMP21) were not accessible for measurements during the quarterly event. Only one of the monitoring points (GMP01A) had a low positive reading for NMOCs both in May (1.0 ppmv) and in June (0.7 ppmv). (The action level is 500 ppmv.)
- **UCSF Compound (Figure 6)**. The field measurements at GMP23 and GMP24 were non-detect for April, May, and June, and non-detect for GMP22 in June. (The action level is 500 ppmv).
- **Crisp Avenue (Figure 7)**. Only one of the four measurements collected at the Crisp Avenue sampling locations in June 2021 had a detectable NMOC level (GMP32 at 0.3 ppmv). (The action level is 500 ppmv.)
- **Structural Locations**. None of the three structural location measurements collected in June 2021 had a detectable level of NMOC. (The action level for these locations is 5 ppmv).
- **Ambient Air Locations**. Ambient air measurements were made at three locations (the Light Pole, Fence Line, and Basketball Court) during the April, May, and June monitoring events. None of these measurements had detectable levels of NMOC. (The action level for these locations is 5 ppmv.)
- **Control System**. There are five passive vent monitoring locations (PV-01, PV-02, PV-03, PV-04, and PV-05). Each location has three distinct sample points (at the influent, after the first carbon canister, and at the effluent sampling port, i.e., the hydrosil canister outlet). These locations are only sampled once per quarter, and for this period it was in June 2021. Because the active system was down, no samples were collected at PV-02. Nine of the 12 sampling points monitored had detectable levels of NMOCs, ranging from

0.2 ppmv to 19.9 ppmv. (The action level for these monitoring points is 100 ppmv.)

Due to a previous problem with the PID pump (described in Section 3.2 of the March 2006 Monthly Report [ITSI, 2006]), pre-monitoring and post-monitoring field checks of PID vacuum pressure are performed along with the regular field calibrations to verify that the instrument's pump is functioning properly. For each monitoring event during the current monitoring period, it was determined that the PID was creating sufficient vacuum to generate accurate readings. A calibrated Mini RAE 2000 PID was used to attain the NMOC readings.

- *During the current monitoring period, NMOCs were not detected at any of the locations within the UCSF Compound. Measurable concentrations of NMOCs were detected at GMP01A in May and June (at 1.0 ppmv and 0.7 ppmv respectively) and at GMP32 in June (at 0.3 ppmv) in the control system locations that were monitored. NMOC concentrations at all sampling locations were well below the applicable action level, so no further action or follow-up monitoring was necessary during this monitoring period.*

When NMOC data indicate that a PV location is approaching saturation (consistent rise in NMOC results), the drum may be replaced as a precautionary measure by moving the second-position (effluent) carbon drum to the first position and placing a new carbon drum in the second position. The second carbon drum is present at each passive vent to further reduce the amount of NMOCs emitted to the environment by venting from the extraction system. The carbon and hydrosil (potassium permanganate) drums also may require occasional replacement due to corrosion of the drum exteriors after several years in operation. Since drums were replaced in the second quarter of 2020 at locations PV-04 and PV-05, the remaining control system locations have been checked on a quarterly basis for indications that a change-out is required. No indications that a change-out is required were noted during the June 2021 monitoring event.

3.3 Trace Gas Results

Oxygen is not regulated under 27 CCR or BAAQMD Rule 34 but is monitored for low concentrations in soil that may indicate a concern for elevated landfill gas levels. During this monitoring period, oxygen concentrations in all GMPs monitored within the UCSF compound and the GMPs along the fence line ranged from well below to just at the standard atmospheric concentration of 20.9 percent. During this monitoring event, oxygen values in ranged from 0.0 to 18.1 percent by volume in the UCSF compound GMPs, and 0.0 to 18.2 percent by volume along the fence line. Low-oxygen conditions are consistent with influence from the Parcel E-2 landfill. Appendix A presents the monitoring results for oxygen during the monitoring period.

Carbon dioxide is not regulated under 27 CCR or BAAQMD Rule 34, but carbon dioxide concentrations generally are elevated where landfill gas is present. During the monitoring period, carbon dioxide concentrations in the GMPs closest to the landfill (i.e., those along the fence line and in the UCSF compound) ranged from 0.3

to 28.6 percent by volume. In addition, all of the locations monitored (with the exception of structural locations) were above the standard atmospheric concentration of approximately 0.04 percent (400 ppmv). Carbon dioxide concentrations at probe locations on Crisp Avenue, which are farther away from the landfill, ranged from 0.8 to 5.5 percent by volume. All carbon dioxide monitoring results are presented in Appendix A.

3.4 Probe Pressures

Measurement of air pressure at the GMPs helps assess whether landfill gas is accumulating and can provide information about the influence of the extraction system on mitigating any increases in the presence of landfill gas. During this monitoring period, gauge pressure at the GMPs (pressure in the probes relative to atmospheric pressure) was measured using a Magnehelic pressure gauge. Pressure was measured at 0.0 inches at all GMPs monitored during this period except GMP24 (0.6 in.) and IR01MWI-5 (-0.04 in.). Appendix A presents the probe pressure readings recorded at GMPs during these events.

3.5 Water Levels

Water level measurements are recorded quarterly primarily to confirm that the bottom of the landfill gas barrier wall is below the top of the saturated zone, thus preventing landfill gas from migrating underneath the barrier wall. Water level measurements also provide information about the thickness of the vadose zone, as the lower boundary of the vadose zone is determined by the elevation of the water table.

On June 10, 2021, water levels were measured at eleven locations consisting of groundwater monitoring wells, piezometers, and gas monitoring probes. IR01P04A was inaccessible during this monitoring period due to an obstruction within the well. Water levels were measured as depths below the tops of well casings, then converted to depths below ground surface, and finally to elevations relative to mean sea level (msl) using the surveyed elevations for these locations. Appendix A (Table A-4) lists the measured water levels and the converted values for this event.

Groundwater generally flows to the east and southeast, from the non-Navy property north of Parcel E-2 toward San Francisco Bay and to a groundwater sink near the northern end of the boundary between Parcels D and E. The water level readings collected during this monitoring event indicate that the bottom of the barrier wall, which ranges in elevation from -1.2 feet msl (i.e., 1.2 feet below msl) to 1.9 feet above msl, was submerged below the water table at all locations monitored (with the lowest measured elevation being 3.99 feet above msl).

As discussed in greater detail in Section 4, there appears to be an inverse relationship between methane concentrations and groundwater elevations at GMP24 (which historically tends to be the location with the highest methane concentrations). In general, the lower the groundwater elevation at IR01MW05A (near GMP24), the higher the methane concentration at GMP24. Figure 8 illustrates this relationship.

3.6 Meteorological Data

Meteorological data are used qualitatively to evaluate whether changes in weather affect the behavior of landfill gas. For example, a rapid decrease in barometric pressure may affect the amount of landfill gas that is released, and temperature may affect the rate of landfill gas generation. In addition, precipitation and the elevation of the water table influence the volume of the vadose zone and may influence the potential buildup of pressure behind submerged probe screens.

The HPNS meteorological tower was removed from service in April 2018. Since that date, weather data has been obtained from the National Climatic Data Service archives for the closest monitoring location (the San Francisco Airport, station #72494023234). Data include wind speed and direction, air temperature, relative humidity, precipitation, dew point, and barometric pressure.

Tables 3a, 3b, and 3c present the daily meteorological data collected for April, May, and June 2021, respectively. All daily meteorological data are averages of hourly data except daily precipitation, which is the sum of hourly precipitation data, and cumulative precipitation, which is the season-to-date total at the end of each day.

Table 4 summarizes monthly meteorological data from January 2019 through June 2021. All monthly meteorological data are averages of hourly data except monthly precipitation, which is the sum of hourly precipitation data and cumulative precipitation, and is the season to-date total at the end of each month.

Concentrations of methane may be affected by atmospheric variations, although other factors (e.g., groundwater elevation, soil saturation, or changes in the operation of the extraction system) may overshadow any such effects. Figures 9 and 10 illustrate the daily barometric pressures and observed methane concentrations for each day that methane was monitored at GMPs at the fence line and within the UCSF compound. Similarly, Figures 11 and 12 illustrate the daily temperatures and the observed methane concentrations at the same GMPs. Long-term (seasonal) effects on GMPs appear to influence the presence of methane, as discussed in Section 4.

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4.0 Evaluation of Results

The primary objective of landfill gas monitoring at HPNS Parcel E-2 is to verify that the landfill gas control system is effective in preventing migration of landfill gas to the UCSF compound and adjacent non-Navy property. Monitoring locations include GMPs, the crawlspace at Building 830, the on-site utilities, and the landfill gas control system.

During this quarterly monitoring period, there were no methane exceedances on the landfill side of the barrier wall and extraction trench. There were no other exceedances at monitoring points on the fence line, within the UCSF Compound, or along Crisp Avenue. Since the time that regular monitoring began in January 2004, initiation of the active gas extraction system has been required on twenty-four occasions when methane concentrations at GMP24 have met or exceeded the project action level. In most of the instances for which concurrent groundwater and landfill gas data are available, the groundwater table in the area between IR01MW05A and GMP32 was less than 5.5 feet msl (see Figure 8 for correlation between UCF compound GMPs and water levels). One possible explanation for these elevated dry-season detections of methane is that lower groundwater levels, combined with a dry and therefore less-constricted vadose zone, permit greater gas flow in the subsurface in this area. Monthly monitoring data are reviewed on an ongoing basis to identify possible seasonal and other influences on gas migration.

During the current quarterly monitoring period, none of the measurements of methane and none of the NMOC concentrations were detected above regulatory action levels by field monitoring instruments. This was true for all GMP locations monitored this quarter.

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5.0 Summary

Landfill gas monitoring and water level measurement activities took place in April, May, and June 2021. Title 27 CCR limits concentrations of methane gas to:

- 5 percent by volume at the site boundary and
- 1.25 percent by volume in on-site structures.

All of the methane measurements taken during the current monitoring period were below the corresponding methane action levels. No action or follow-up monitoring was necessary during this period.

The established action levels for NMOCs (based on an evaluation of previous risk assessments and health and safety criteria [Tetra Tech, 2002]) are:

- 500 ppmv in GMPs;
- 5 ppmv within Building 830;
- 5 ppmv in on-site utilities;
- 5 ppmv in ambient air (recorded in the breathing zone); and
- 100 ppmv for two consecutive days from a control system outlet.

All NMOC results during the monitoring period were below the corresponding NMOC action levels; therefore, no action or follow-up monitoring was necessary during this period.

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6.0 References

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Tetra Tech, 2004b. Draft Landfill Gas Time-Critical Removal Action Closeout Report, Parcel E, Industrial Landfill, Hunters Point Shipyard, San Francisco, California. March 19.

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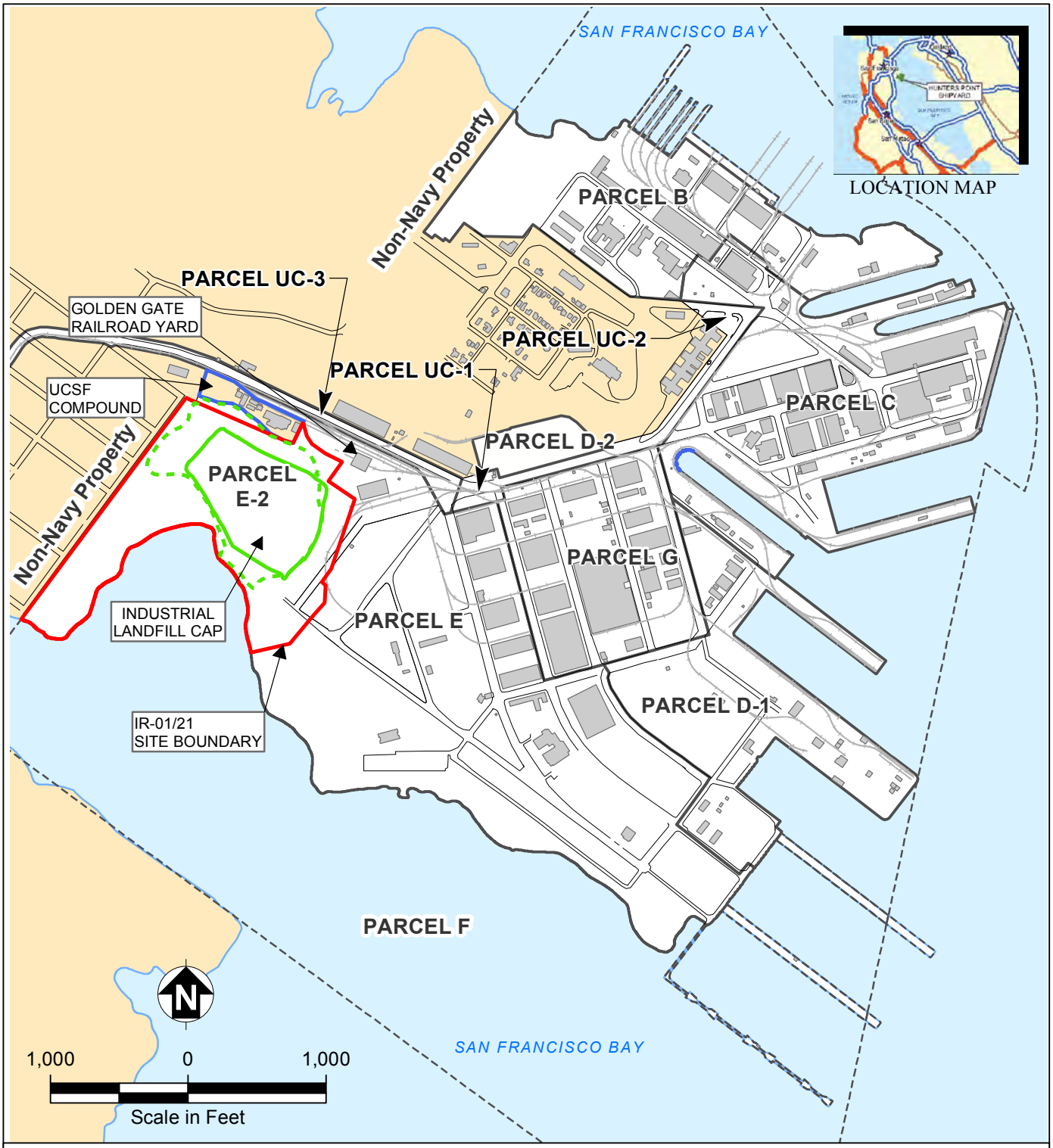
FIGURES

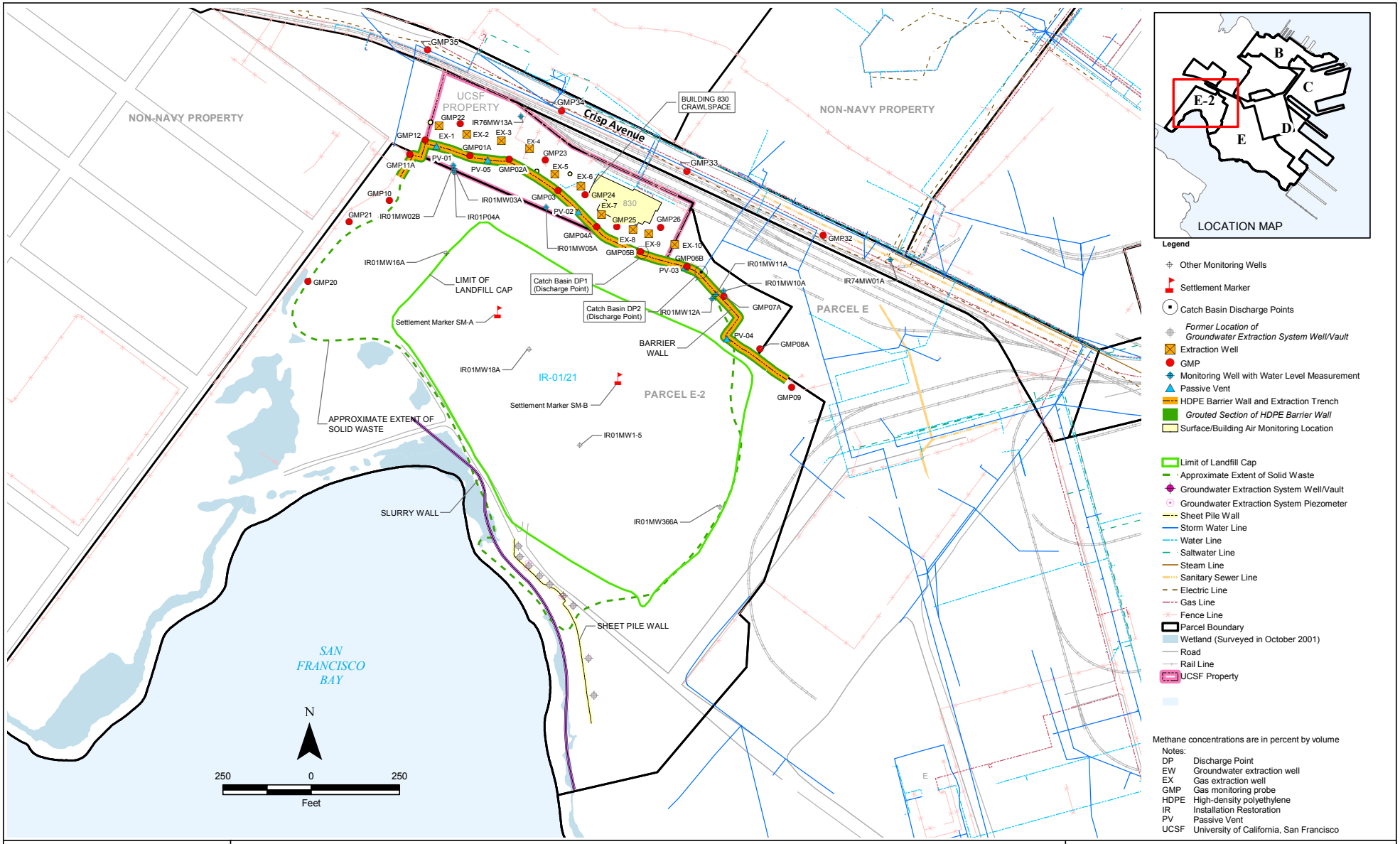


- Parcel Boundary
- University of California, San Francisco Compound
- Parcel F Boundary
- Non-Navy Property
- Building
- Rail Line
- Road
- Parcel E-2 Boundary
- Parcel F Boundary
- Estimate of Solid Waste Extent
- Interim Landfill Cap Extent

Hunters Point Naval Shipyard, San Francisco, California
Department of the Navy, BRAC PMO West, San Diego, California

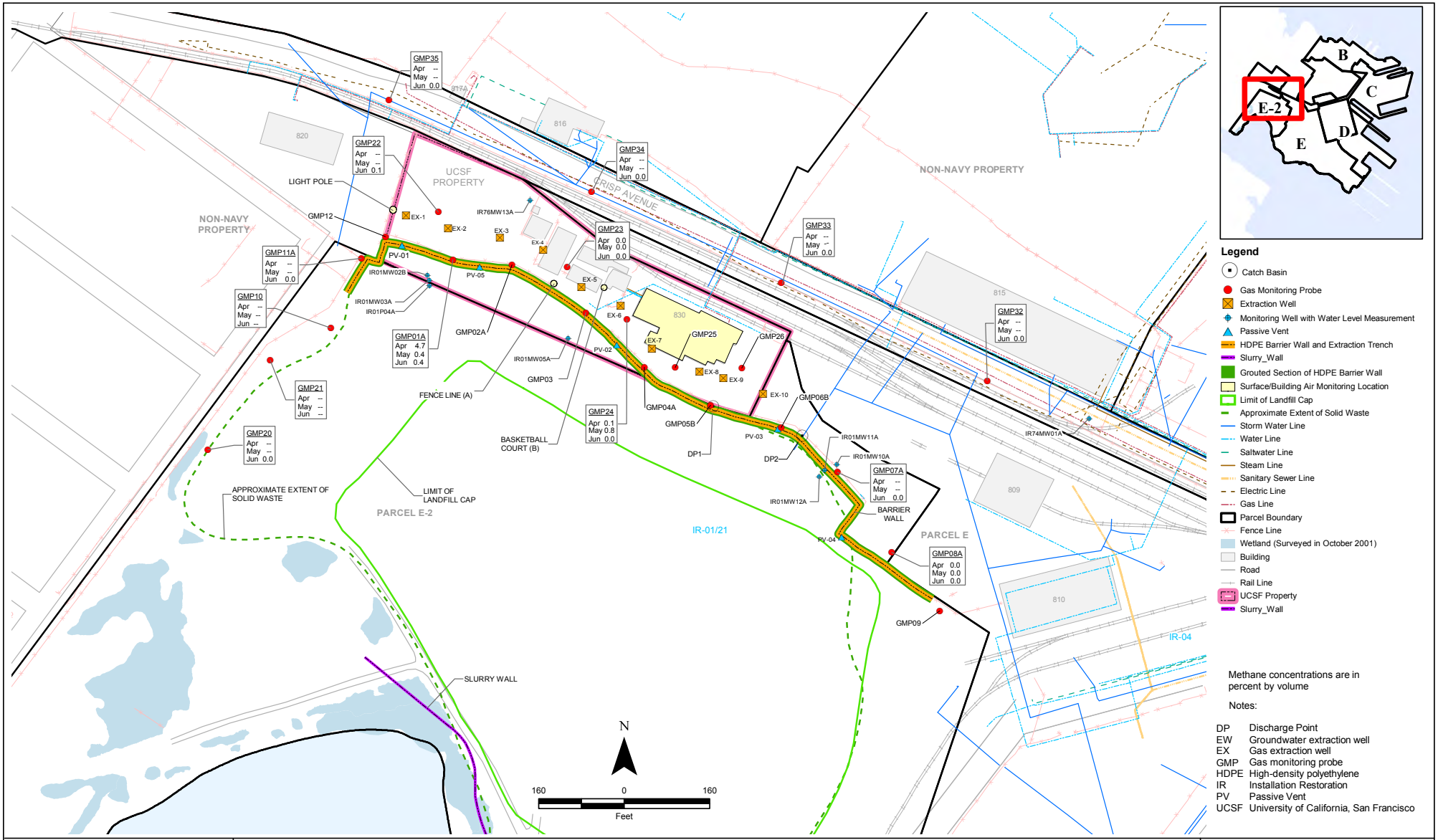
FIGURE 1

SITE VICINITY MAP



Quarterly Landfill Gas Monitoring Report
Hunters Point Naval Shipyard
San Francisco, California

FIGURE 2
Site Map and
Landfill Gas Monitoring Locations



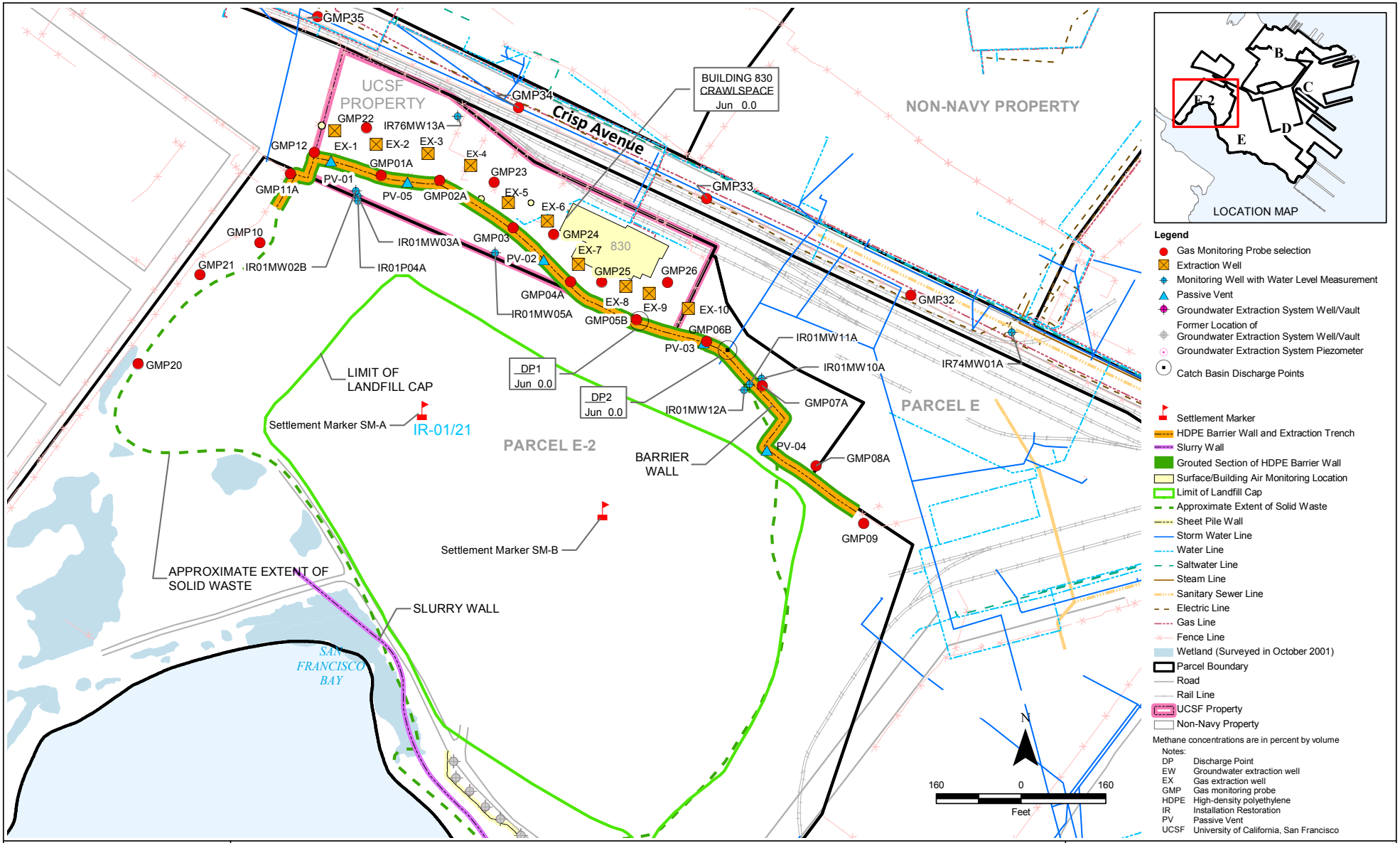
Methane concentrations are in percent by volume

Notes:

DP	Discharge Point
EW	Groundwater extraction well
EX	Gas extraction well
GMP	Gas monitoring probe
HDPE	High-density polyethylene
IR	Installation Restoration
PV	Passive Vent
UCSF	University of California, San Francisco

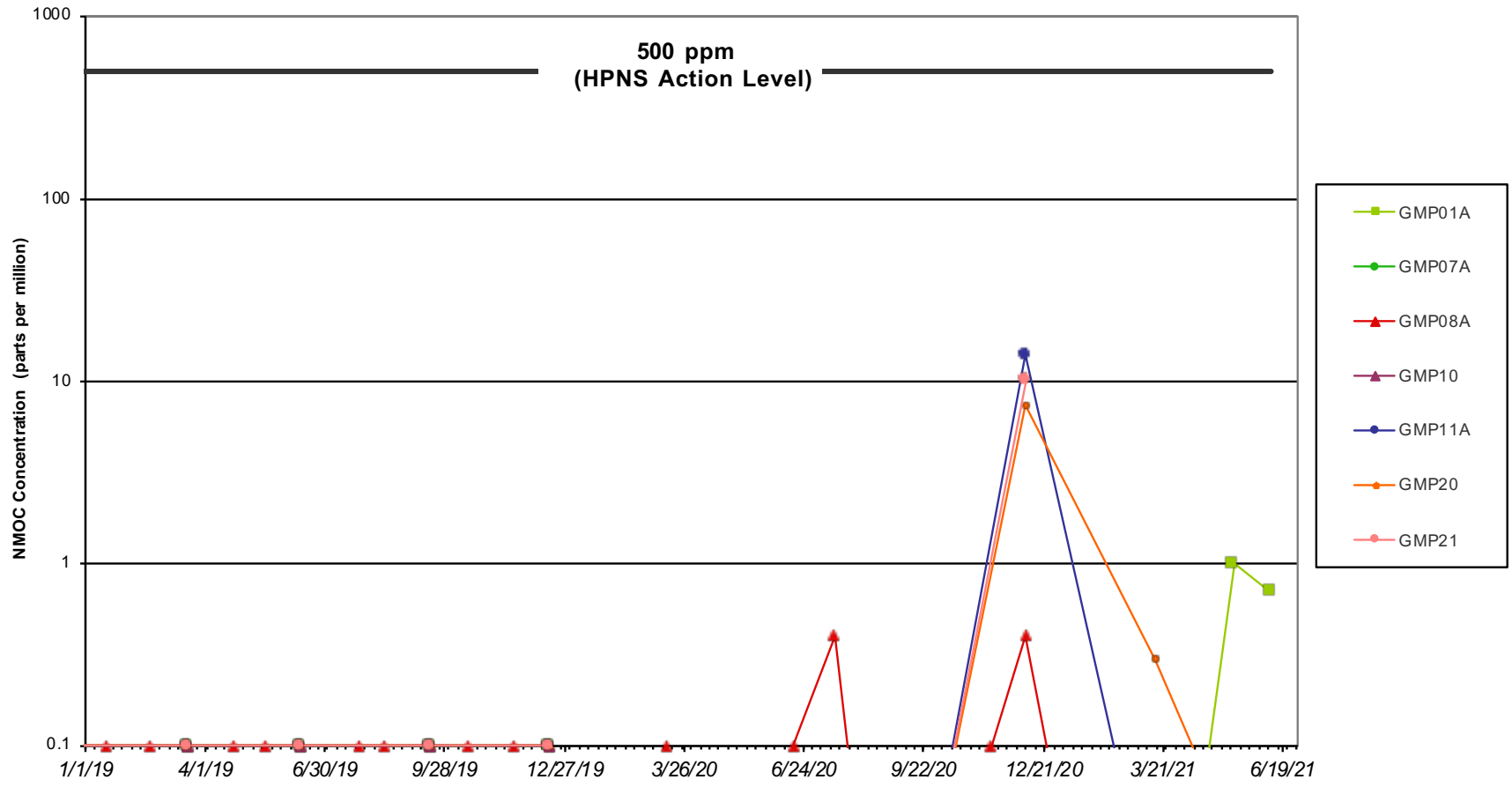
Quarterly Landfill Gas Monitoring Report
Hunters Point Naval Shipyard
San Francisco, California

FIGURE 3
Methane Concentrations at GMPs April-June 2021



Quarterly Landfill Gas Monitoring Report
Hunters Point Naval Shipyard
San Francisco, California

FIGURE 4
Methane Concentrations at
Structural Locations April-June 2021

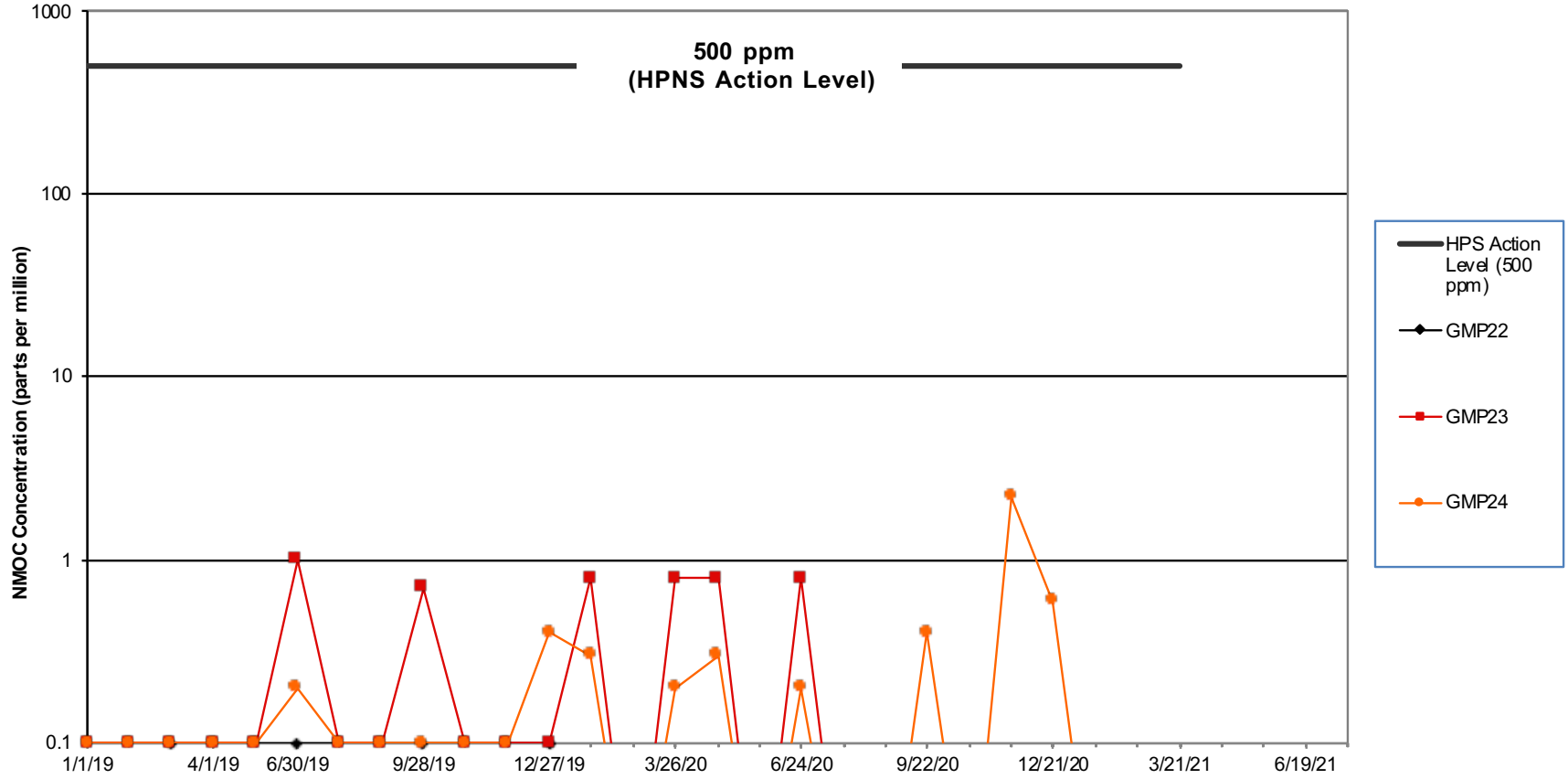


Notes: Based on a Navy proposal approved by DTSC on October 20, 2008, monitoring has been discontinued at the following Fence Line locations: GMP02A, GMP03, GMP04A, GMP05B, GMP06B, GMP09, and GMP12. Monitoring at GMP08A will continue monthly, while all other Fence Line locations will be monitored quarterly (see Section 2.3 of the report text).
GMPs with NMOC detections during the indicated interval are shown with legend entries in bold.
Periods of active gas extraction are specified in Section 2.3.1 of the report text.

GMP Gas monitoring probe
NMOC Non-methane organic compound

Hunters Point Naval Shipyard, San Francisco, CA
U.S. Navy, Southwest Division, NAVFAC, San Diego

Figure 5
NMOC Concentrations for
GMPs at the Fence Line
January 2019 - June 2021

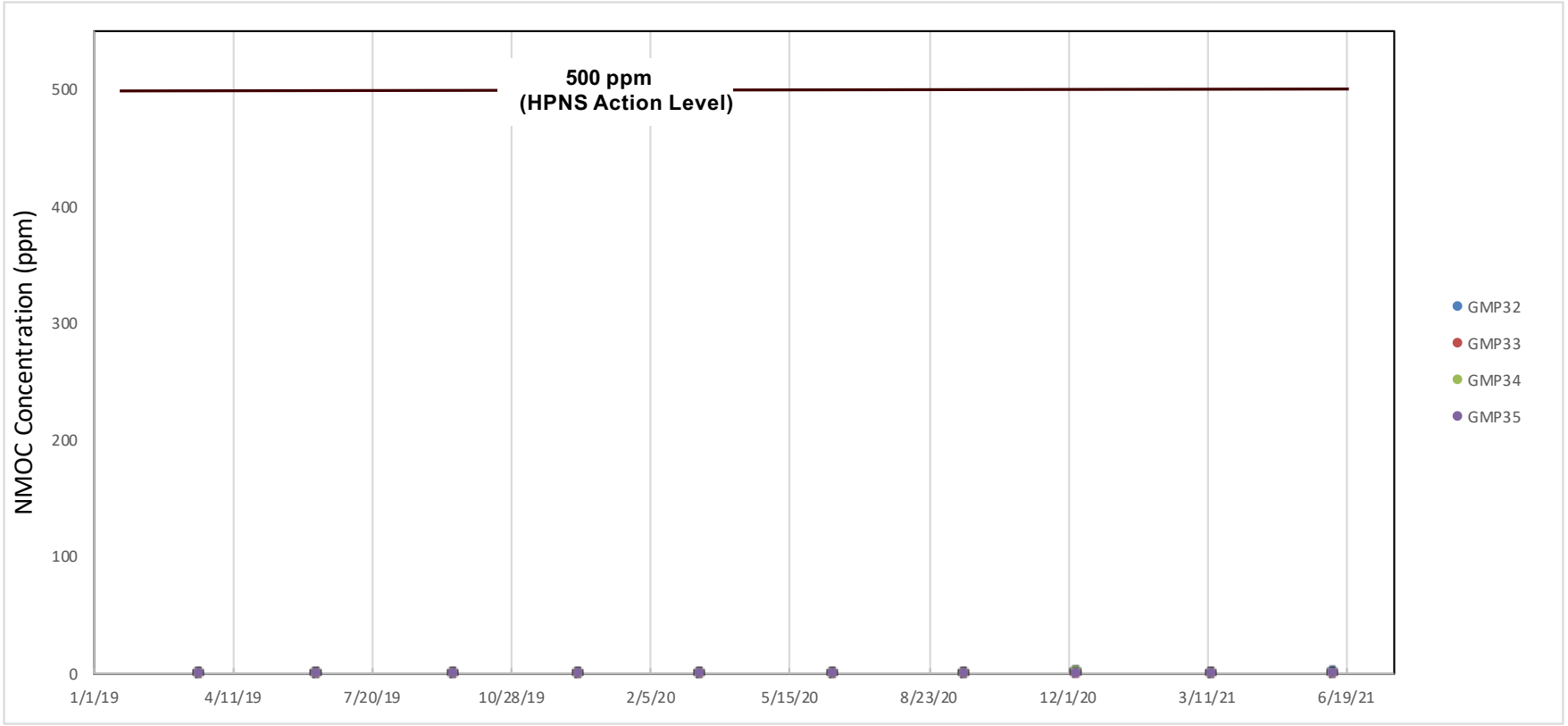


Notes: Based on a Navy proposal approved by DTSC on October 20, 2008, monitoring has been discontinued at the following UCSF locations: GMP25 and GMP26. Monitoring at GMP23 and GMP24 will continue monthly, while GMP22 will be monitored quarterly (see Section 2.3 of the report text).
GMPs with NMOC detections during the indicated interval are shown with legend entries in bold.
Periods of active gas extraction are specified in Section 2.3.1 of the report text.

GMP Gas monitoring probe
NMOC Non-methane organic compound
UCSF University of California, San Francisco

Hunters Point Naval Shipyard, San Francisco, CA
U.S. Navy, Southwest Division, NAVFAC, San Diego

Figure 6
NMOC Concentrations for
GMPs at the UCSF Compound
January 2019 - June 2021

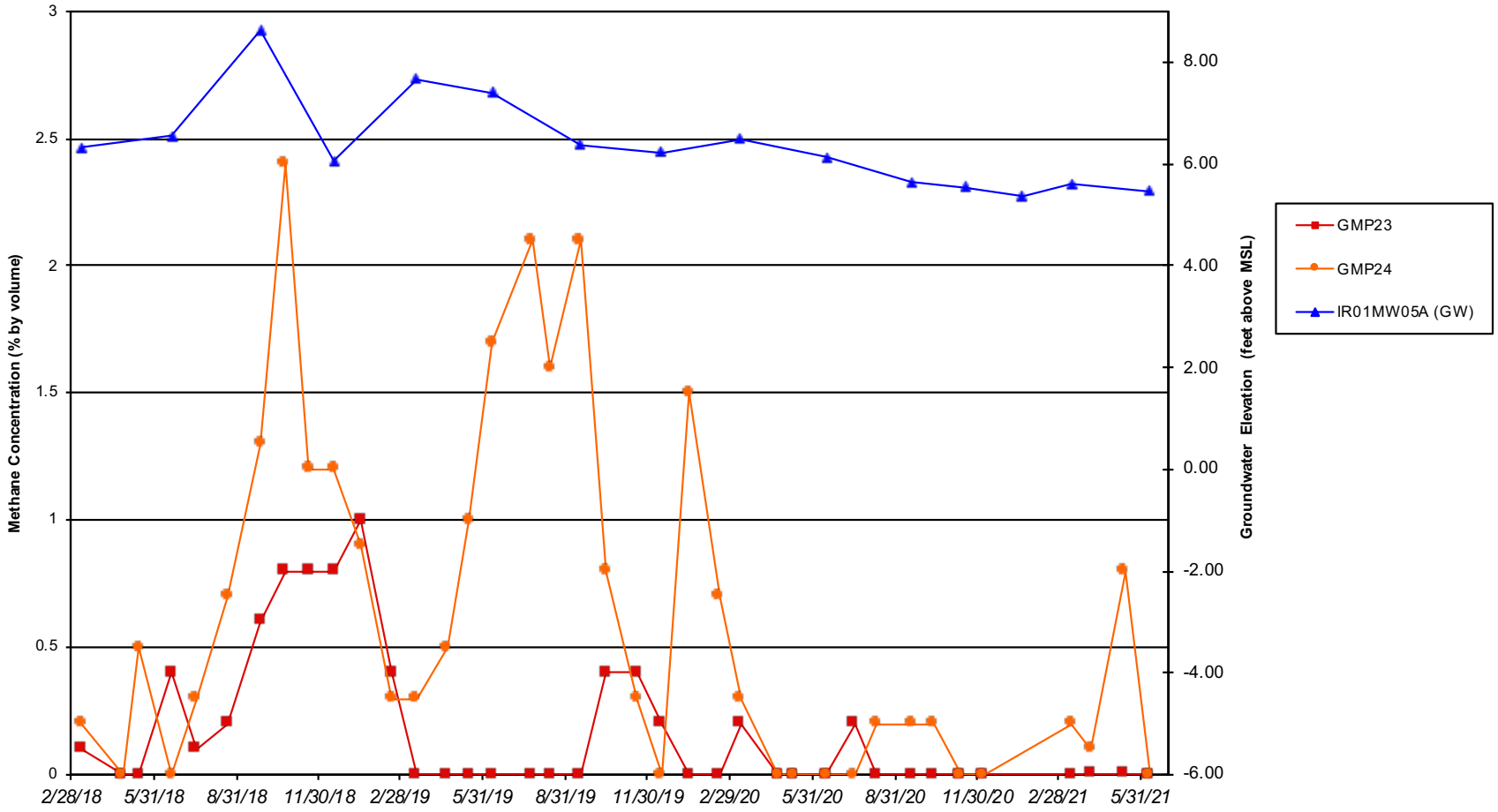


Notes: Based on a Navy proposal approved by DTSC on October 20, 2008, all Crisp Avenue locations will be monitored quarterly rather than monthly (see Section 2.3 of the report text).
GMPs with NMOC detections during the indicated interval are shown with legend entries in bold.
Periods of active gas extraction are specified in Section 2.3.1 of the report text.
GMP32 was temporarily inaccessible due to trenching activities, and was not monitoried from September 2010 through January 2011. June 2011 was the first monitoring event including GMP33, GMP34, and GMP35.

GMP Gas monitoring probe
NMOC Non-methane organic compound

Hunters Point Naval Shipyard, San Francisco, CA
U.S. Navy, Southwest Division, NAVFAC, San Diego

Figure 7
NMOC Concentrations for
GMPs on Crisp Avenue
January 2019 - June 2021



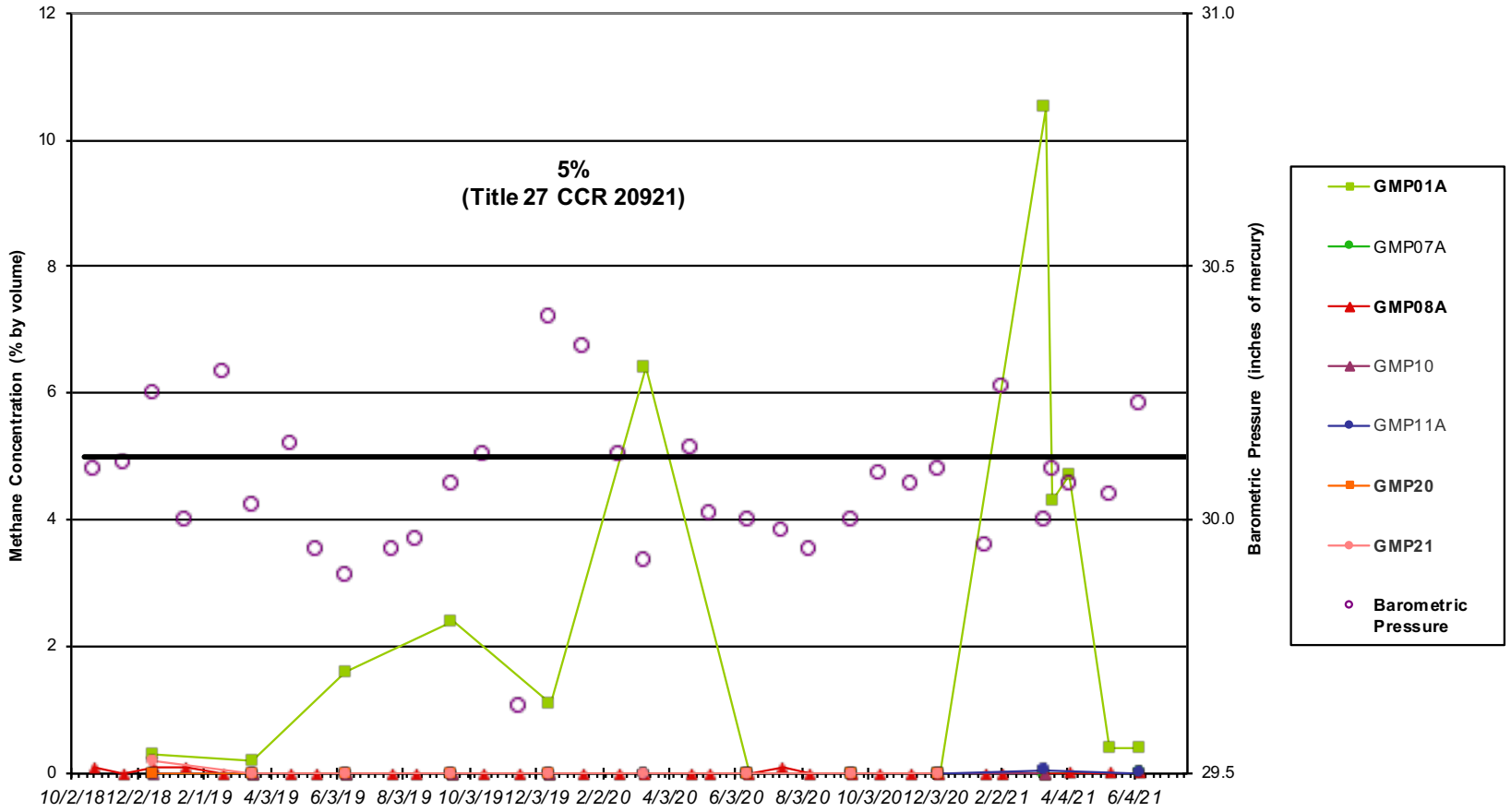
Notes: Based on a Navy proposal approved by DTSC on October 20, 2008, all water level measurements will be collected quarterly rather than monthly (see Section 2.3 of the report text).
Groundwater elevations are shown in blue for the groundwater monitoring location nearest GMP23 and GMP24. Results shown are for routine events only; no follow-up monitoring is displayed.

CH4 Methane
GWE Groundwater elevation, feet above mean sea level
GMP Gas monitoring probe

Hunters Point Naval Shipyard, San Francisco, CA
U.S. Navy, Southwest Division, NAVFAC, San Diego

Figure 8
Seasonal Patterns of
Methane Concentrations at GMP23, GMP24
and Groundwater Elevations at IR01MW05A
March 2018 – June 2021

Figures



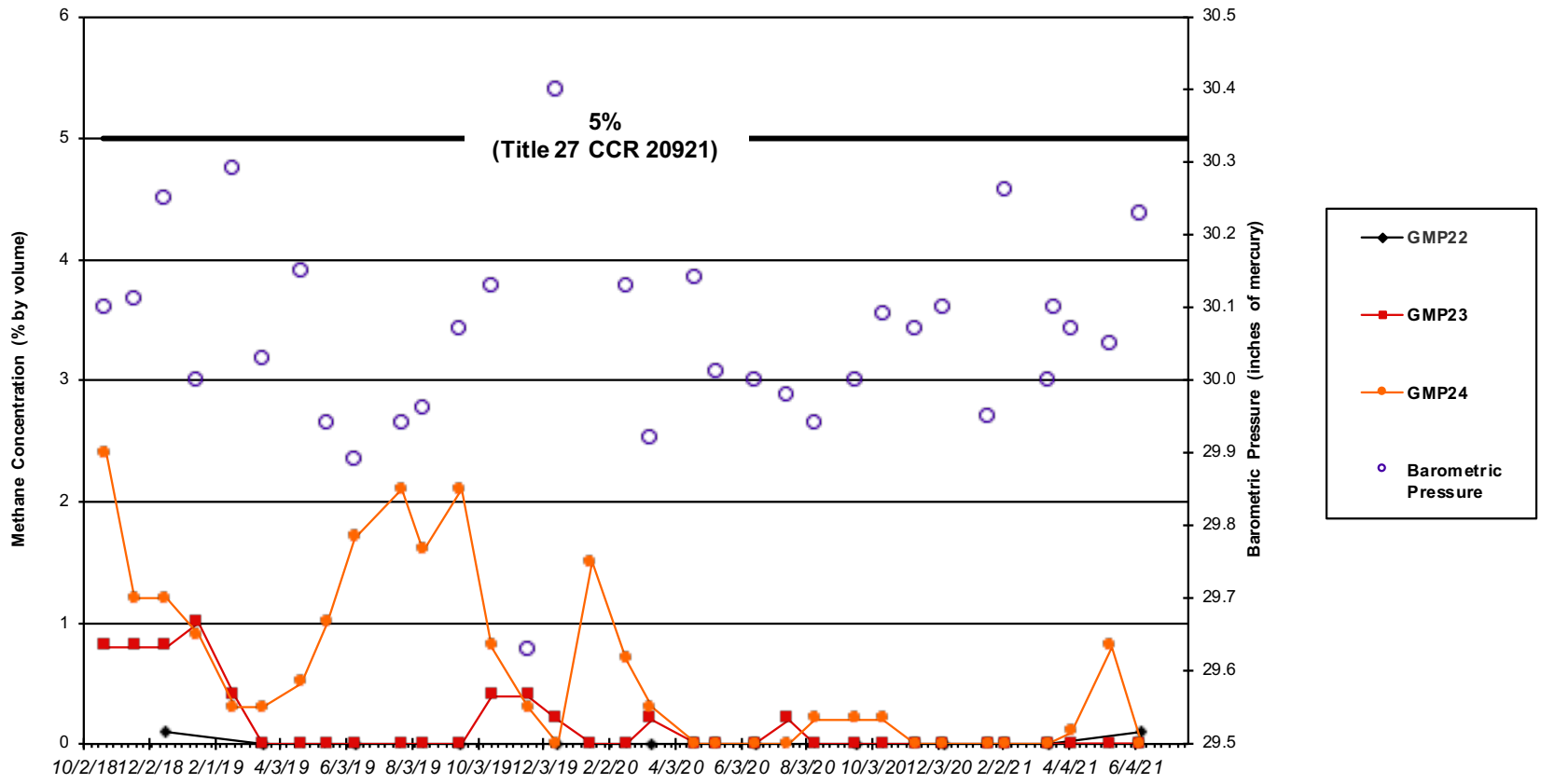
Notes: Based on a Navy proposal approved by DTSC on October 20, 2008, monitoring has been discontinued at the following Fence Line locations: GMP02A, GMP03, GMP04A, GMP05B, GMP06B, GMP09, and GMP12. Monitoring at GMP08A will continue monthly, while all other locations will be monitored quarterly (see Section 2.3 of the report text).
GMPs with methane detections during the indicated interval are shown with legend entries in bold.

27 CCR Title 27 of the California Code of Regulations
GMP Gas monitoring probe

Hunters Point Naval Shipyard, San Francisco, CA
U.S. Navy, Southwest Division, NAVFAC, San Diego

Figure 9
Methane Concentrations and Barometric Pressures for GMPs at the Fence Line
October 2018 - June 2021

Figures



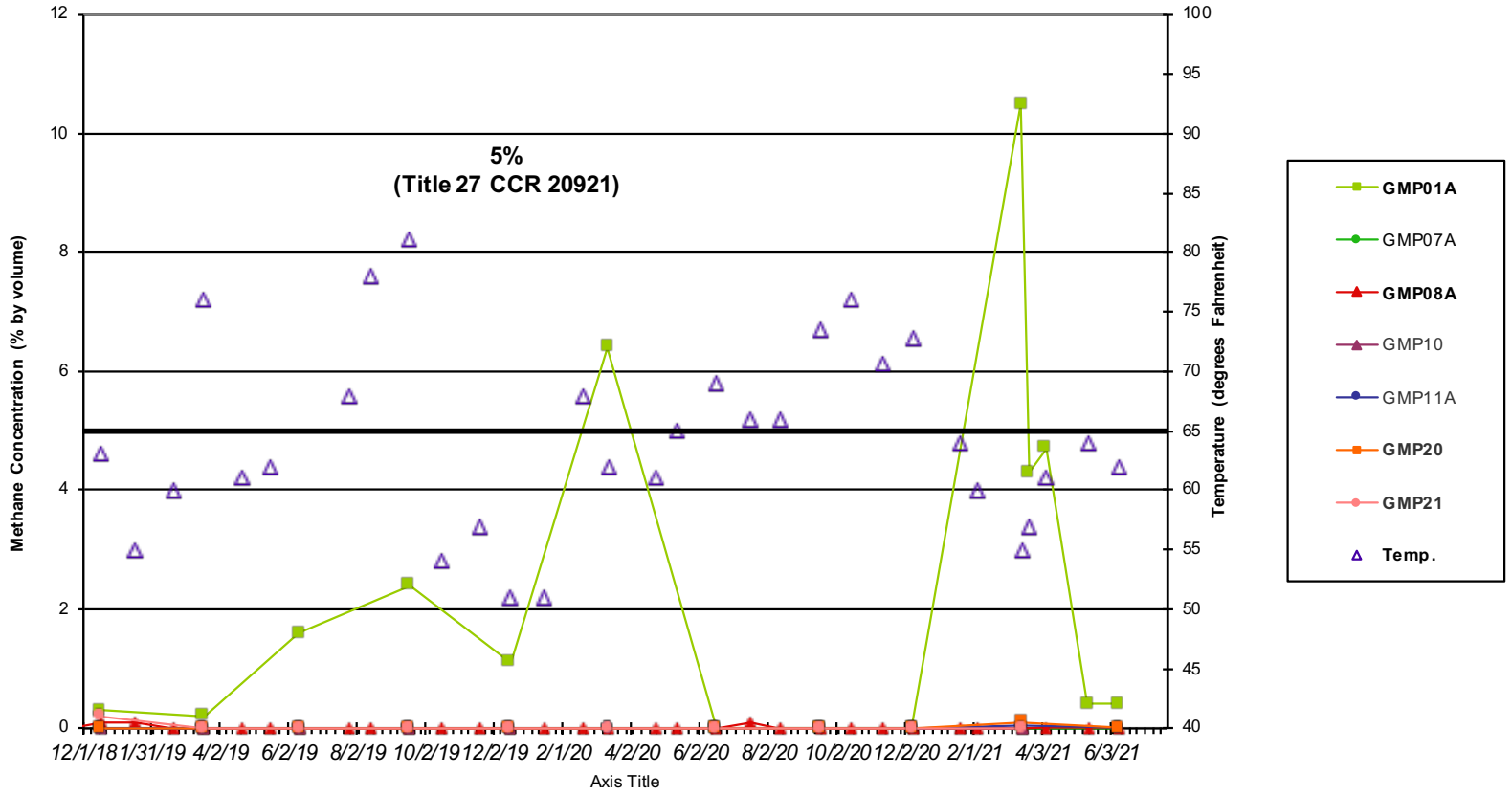
Notes: Based on a Navy proposal approved by DTSC on October 20, 2008, monitoring has been discontinued at the following UCSF locations: GMP25 and GMP26. Monitoring at GMP23 and GMP24 will continue monthly, while GMP22 will be monitored quarterly (see Section 2.3 of the report text).
In addition to the results for scheduled monitoring events, data shown on this figure reflect follow-up monitoring for any exceedances.
GMPs with methane detections during the indicated interval are shown with legend entries in bold.

27 CCR Title 27 of the California Code of Regulations
GMP Gas monitoring probe
UCSF University of California, San Francisco

Hunters Point Naval Shipyard, San Francisco, CA
U.S. Navy, Southwest Division, NAVFAC, San Diego

Figure 10
Methane Concentrations and
Barometric Pressures for
GMPs at the UCSF Compound
October 2018 - June 2021

Figures



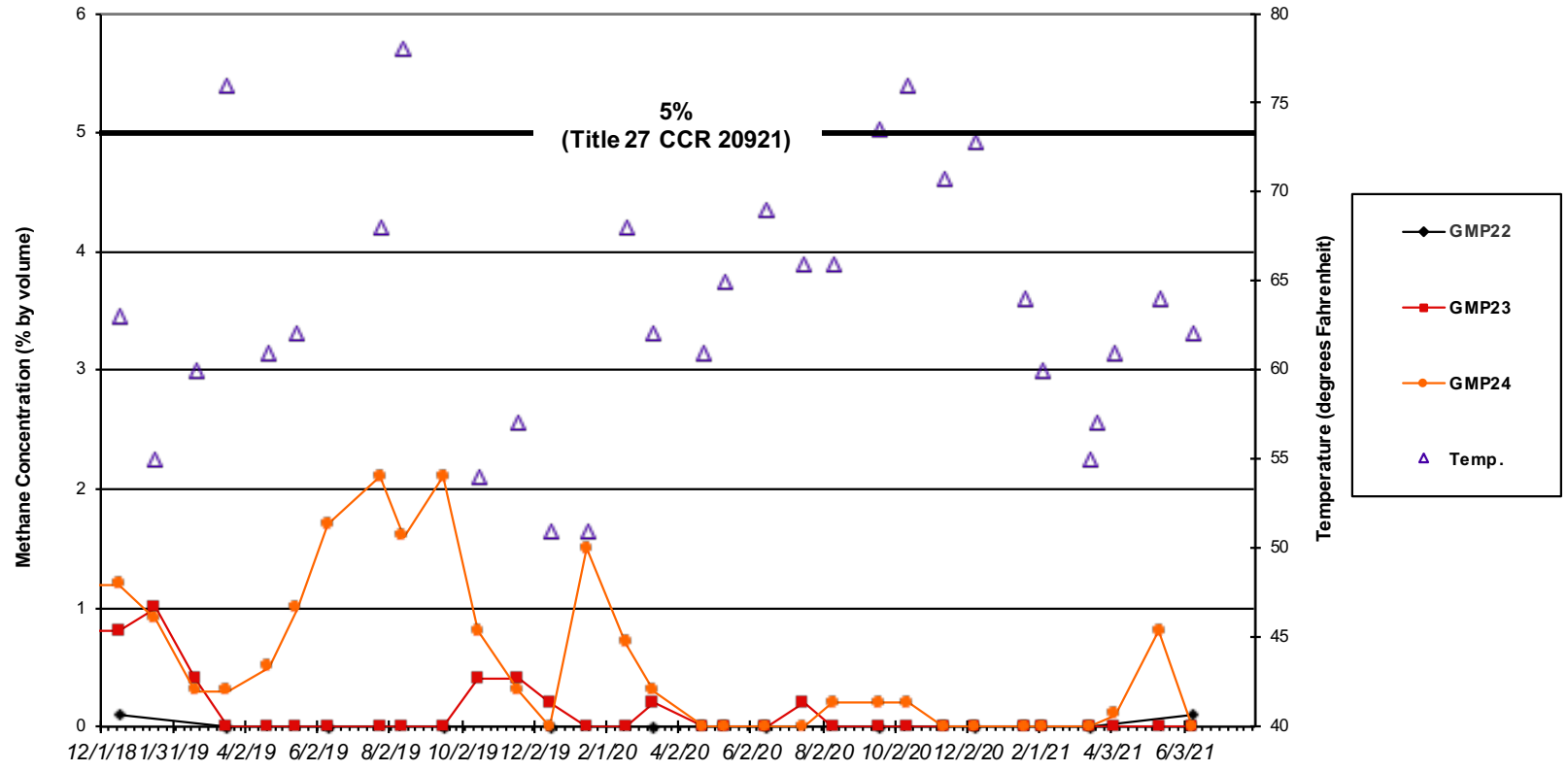
Notes: Based on a Navy proposal approved by DTSC on October 20, 2008, monitoring has been discontinued at the following Fence Line locations: GMP02A, GMP03, GMP04A, GMP05B, GMP06B, GMP09, and GMP12. Monitoring at GMP08A will continue monthly, while all other Fence Line locations will be monitored quarterly (see Section 2.3 of the report text).
GMPs with methane detections during the indicated interval are shown with legend entries in bold.

27 CCR Title 27 of the California Code of Regulations
GMP Gas monitoring probe

Hunters Point Naval Shipyard, San Francisco, CA
U.S. Navy, Southwest Division, NAVFAC, San Diego

Figure 11
Methane Concentrations and Temperatures for GMPs at the Fence Line
January 2019 - June 2021

Figures



Notes: Based on a Navy proposal approved by DTSC on October 20, 2008, monitoring has been discontinued at the following UCSF locations: GMP25 and GMP26. Monitoring at GMP23 and GMP24 will continue monthly, while GMP22 will be monitored quarterly (see Section 2.3 of the report text).
In addition to the results for scheduled monitoring events, data shown on this figure reflect follow-up monitoring for any exceedances.
GMPs with methane detections during the indicated interval are shown with legend entries in bold.

27 CCR Title 27 of the California Code of Regulations
GMP Gas monitoring probe
UCSF University of California, San Francisco

Hunters Point Naval Shipyard, San Francisco, CA
U.S. Navy, Southwest Division, NAVFAC, San Diego

Figure 12
Methane Concentrations and Temperatures for GMPs at the UCSF Compound
January 2019 - June 2021

TABLES

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TABLE 1: PERSONNEL AND EQUIPMENT
Landfill Gas Monitoring, Post-Removal Action, Parcel E-2 Industrial Landfill

PERSONNEL		
Name	**Responsibility**	**Company**
Derrick Coleman	Project Manager	INYA Inc.
EQUIPMENT		
Sampling Apparatus	**Manufacturer/Model**	**Purpose**
Landfill Gas Meter	RKI Eagle 2	Monitor methane, oxygen, carbon dioxide, and lower explosive limit
Photoionization Detector (10.6 electron-volt lamp)	Mini-RAE 2000 PGM-7600	Monitor Non-Methane Organic Compounds
Air Sampling Pump		Purge GMPs
Pressure Gauge	Magnehelic	Measure pressure in GMPs

TABLE 2: LANDFILL GAS MONITORING LOCATIONS
Landfill Gas Monitoring, Post-Removal Action, Parcel E-2 Industrial Landfill

Monitoring Location [1]	Description
Fence Line GMPs	GMP01A, GMP07A, GMP08A, GMP10, GMP11A, GMP20, and GMP21
UCSF Compound GMPs	GMP22, GMP23, and GMP24
Crisp Avenue GMPs	GMP32, GMP33, GMP34, and GMP35
Occupied Structure	Building 830 Crawlspace
On-Site Utilities	DP1 and DP2
Ambient Air	Light Pole, Fence Line (A), and Basketball Court (B)
Passive Vents	PV-01, PV-02[2], PV-03, PV-04, and PV-05
Extraction Wells[3]	EX-5, EX-6, EX-7, and EX-8
Groundwater Elevation Locations	GMP32, GMP33, GMP34, GMP35, IR01MW02B, IR01MW03A, IR01MW05A, IR01MW10A, IR01MW11A, IR01MW12A, IR01P04A, and IR76MW13A
Additional Monitoring Locations	IR01MW16A, IR01MW18A, IR01MW366A, IR01MWI-5

Notes:

[1] Based on a Navy proposal approved by the Department of Toxic Substances Control on October 20, 2008, monitoring was discontinued at the following locations, which therefore are not included in this table: GMP02A, GMP03, GMP04A, GMP05B, GMP06B, GMP09, GMP12, GMP25, and GMP26. Monitoring at GMP08A, GMP23, and GMP24 will continue monthly, while all other locations will be monitored quarterly (see Section 2.3).

[2] Active extraction point, not operating currently.

[3] Monitoring at extraction wells is required only if the control system is actively extracting from these locations; however, they also may be included as part of response action monitoring.

DP discharge point
GMP gas monitoring probe
IR Installation Restoration
MW monitoring well
PV passive vent
UCSF University of California, San Francisco

TABLE 3a: DAILY METEOROLOGICAL DATA, JANUARY 2021
Landfill Gas Monitoring, Post-Removal Action
Parcel E-2 Industrial Landfill

Date	Wind Speed (mph)	Wind Direction (degrees)	Air Temperature (°F)	Relative Humidity (%)	Daily Precipitation (inches)	Dew Point (°F)	Barometric Pressure (in. mercury)	Cumulative Precipitation (inches)
04/01/21	6.8	300	65.0	41	0.00	39	29.92	5.55
04/02/21	14.5	300	54.8	70	0.00	45	30.00	5.55
04/03/21	11.5	290	55.0	61	0.00	41	30.15	5.55
04/04/21	12.9	290	55.4	60	0.00	42	30.14	5.55
04/05/21	11.9	280	53.6	68	0.00	43	30.04	5.55
04/06/21	12.4	280	54.4	67	0.00	43	30.06	5.55
04/07/21	16.6	280	53.5	66	0.00	42	30.16	5.55
04/08/21	17.3	280	55.0	64	0.00	43	30.14	5.55
04/09/21	22.0	280	53.0	68	0.00	43	30.11	5.55
04/10/21	15.5	280	54.8	63	0.00	42	30.03	5.55
04/11/21	9.8	280	54.6	66	0.00	43	29.88	5.55
04/12/21	10.7	300	55.6	70	0.00	45	29.83	5.55
04/13/21	16.0	270	54.7	66	0.00	43	29.85	5.55
04/14/21	8.1	270	56.6	64	0.00	44	29.93	5.55
04/15/21	10.6	290	55.3	64	0.00	43	30.02	5.55
04/16/21	14.6	280	53.4	70	0.00	44	30.01	5.55
04/17/21	15.3	290	55.0	71	0.00	46	30.03	5.55
04/18/21	11.7	290	57.5	67	0.00	46	30.08	5.55
04/19/21	14.7	280	55.5	70	0.00	45	30.06	5.55
04/20/21	20.0	280	54.3	74	0.00	46	29.89	5.55
04/21/21	9.2	270	55.7	69	0.00	46	29.86	5.55
04/22/21	10.8	280	55.2	69	0.00	45	29.93	5.55
04/23/21	10.5	280	56.3	68	0.00	45	29.99	5.55
04/24/21	9.2	270	55.7	70	0.00s	45	29.99	5.55
04/25/21	10.0	210	55.0	71	T	46	29.88	5.55
04/26/21	14.7	280	55.0	63	0.00	42	29.91	5.55
04/27/21	11.9	280	57.9	61	Ts	44	30.01	5.55
04/28/21	10.2	290	61.8	60	0.00	46	30.15	5.55
04/29/21	15.9	290	57.3	69	0.00	47	30.19	5.55
04/30/21	15.8	280	56.3	74	0.00	48	30.11	5.55

Notes:
Daily meteorological data are averages of hourly data except for daily precipitation, which is the sum of hourly precipitation data, and cumulative precipitation which is the season-to-date total at the end of each day. Blank cells indicate not data was available.

°F degrees Fahrenheit
% percent
in. inches
mph miles per hour

TABLE 3b: DAILY METEOROLOGICAL DATA, FEBRUARY 2021
Landfill Gas Monitoring, Post-Removal Action
Parcel E-2 Industrial Landfill

Date	Wind Speed (mph)	Wind Direction (degrees)	Air Temperature (°F)	Relative Humidity (%)	Daily Precipitation (inches)	Dew Point (°F)	Barometric Pressure (in. mercury)	Cumulative Precipitation (inches)
05/01/21	21.1	280	55.6	78	T	49	29.99	5.55
05/02/21	21.2	280	57.6	67	0.00	46	29.91	5.55
05/03/21	12.7	280	61.9	60	0.00	46	29.91	5.55
05/04/21	15.2	290	60.9	63	0.00	48	29.93	5.55
05/05/21	13.3	290	57.3	72	0.00	48	29.92	5.55
05/06/21	17.6	280	55.5	74	0.00	47	30.04	5.55
05/07/21	19.1	280	57.1	64	0.00	44	30.01	5.55
05/08/21	14.6	280	63.4	50	0.00	42	29.98	5.55
05/09/21	17.6	280	61.4	58	0.00	45	29.90	5.55
05/10/21	11.0	290	63.7	58	0.00	46	29.85	5.55
05/11/21	11.9	300	59.2	69	0.00	48	29.88	5.55
05/12/21	12.6	300	56.7	76	0.00	49	29.98	5.55
05/13/21	11.8	300	56.6	73	0.00	48	30.01	5.55
05/14/21	16.1	260	55.0	74	T	47	29.94	5.55
05/15/21	10.0	270	56.4	72	T	47	29.88	5.55
05/16/21	10.2	270	57.9	68	0.00	47	29.93	5.55
05/17/21	14.7	270	57.0	69	0.00	47	30.04	5.55
05/18/21	18.1	280	57.8	67	0.00	46	30.04	5.55
05/19/21	30.2	280	55.9	63	0.00	43	29.96	5.55
05/20/21	21.1	280	56.2	57	0.00	41	30.00	5.55
05/21/21	17.8	270	56.7	61	0.00	43	29.98	5.55
05/22/21	10.5	270	57.3	66	0.00	46	30.04	5.55
05/23/21	14.5	280	56.8	70	0.00	47	30.12	5.55
05/24/21	19.0	280	57.2	72	0.00	48	30.10	5.55
05/25/21	18.7	270	58.4	72	0.00	49	30.06	5.55
05/26/21	14.7	270	57.8	67	0.00	47	30.03	5.55
05/27/21	19.3	270	60.3	67	0.00	49	30.06	5.55
05/28/21	13.1	270	58.7	69	0.00	48	29.99	5.55
05/29/21	14.6	280	55.8	75	0.00	48	29.94	5.55
05/30/21	11.6	300	60.7	65	0.00	49	29.87	5.55
05/31/21	10.6	300	64.0	63	0.00	50	29.87	5.55

Notes:
Daily meteorological data are averages of hourly data except for daily precipitation,
which is the sum of hourly precipitation data, and cumulative precipitation, which is the season-to-date total at the end of each day.

°F	degrees Fahrenheit
%	percent
in.	inches
mph	miles per hour

TABLE 3c: DAILY METEOROLOGICAL DATA, MARCH 2021

Landfill Gas Monitoring, Post-Removal Action, Parcel E-2 Industrial Landfill

Date	Wind Speed (mph)	Wind Direction (degrees)	Air Temperature (°F)	Relative Humidity (%)	Daily Precipitation (inches)	Dew Point (°F)	Barometric Pressure (in. mercury)	Cumulative Precipitation (inches)
06/01/21	13.3	300	60.5	73	0.00	51	29.91	5.55
06/02/21	13.8	290	58.8	72	0.00	50	29.88	5.55
06/03/21	12.1	310	61.9	67	0.00	51	29.83	5.55
06/04/21	12.7	280	60.2	69	0.00	50	29.92	5.55
06/05/21	11.2	300	63.2	58	0.00	48	29.87	5.55
06/06/21	16.8	280	62.0	57	0.00	46	29.82	5.55
06/07/21	22.8	270	59.5	63	0.00	46	29.88	5.55
06/08/21	16.6	270	59.5	64	0.00	47	30.04	5.55
06/09/21	15.7	270	59.7	63	0.00	47	30.14	5.55
06/10/21	15.8	280	60.4	63	0.00	47	30.19	5.55
06/11/21	11.5	290	64.4	61	0.00	50	30.06	5.55
06/12/21	12.5	280	67.2	74	0.00	58	29.95	5.55
06/13/21	10.2	270	67.5	72	0.00	58	29.94	5.55
06/14/21	13.9	280	65.5	72	0.00	56	30.03	5.55
06/15/21	19.9	280	64.8	62	0.57	51	30.06	6.12
06/16/21	11.8	290	69.4	54	0.00	51	29.92	6.12
06/17/21	11.6	300	70.5	53	0.00	52	29.76	6.12
06/18/21	11.3	300	68.8	56	0.00	52	29.70	6.12
06/19/21	9.5	320	66.3	64	0.00	53	29.72	6.12
06/20/21	9.9	330	64.6	68	0.00	53	29.81	6.12
06/21/21	7.6	200	66.3	64	0.00	53	29.90	6.12
06/22/21	11.6	220	67.8	61	0.00	54	29.88	6.12
06/23/21	10.6	230	67.5	61	0.00	53	29.91	6.12
06/24/21	13.6	290	65.1	65	0.00	53	30.00	6.12
06/25/21	13.3	290	62.9	71	0.00	53	29.98	6.12
06/26/21	15.5	300	63.1	72	0.00	54	29.89	6.12
06/27/21	14.4	290	63.1	73	0.00	54	29.81	6.12
06/28/21	16.1	270	62.8	74	0.00	54	29.80	6.12
06/29/21	15.7	280	64.2	72	0.00	55	29.79	6.12
06/30/21	14.2	270	64.8	70	0.00	55	29.86	6.12

Notes:

Daily meteorological data are averages of hourly data except for daily precipitation,
which is the sum of hourly precipitation data, and cumulative precipitation, which is the season-to-date total at the end of each day.

°F	degrees Fahrenheit
%	percent
in.	inches
mph	miles per hour
n/d	no data
T	Trace of rainfall (not measureable)

TABLE 4: MONTHLY METEOROLOGICAL SUMMARIES, JANUARY 2019 - JUNE 2021

Landfill Gas Monitoring, Post-Removal Action, Parcel E-2 Industrial Landfill

Date	Wind Speed (mph)	Wind Direction (degrees)	Air Temperature (°F)	Relative Humidity (%)	Monthly Precipitation (inches)	Dew Point (°F)	Barometric Pressure (in. mercury)	Cumulative Precipitation (inches)
January 2019	8	275	59	76	3.86	48	29.12	3.86
February 2019	10	240	59	78	5.97	48	30.01	9.83
March 2019	9	260	55	80	3.65	52	30.14	13.48
April 2019	9	245	61	79	0.41	50	30.09	13.89
May 2019	10	250	59	79	2.03	48	30.00	15.92
June 2019	10	270	66	76	0.00	52	29.94	15.92
July 2019	14	280	72	74	0.00	53	29.99	15.92
August 2019	13	275	76	73	0.00	56	29.97	15.92
September 2019	13	275	76	71	0.06	54	29.97	15.98
October 2019	20	240	74	42	0.00	43	30.05	15.98
November 2019	18	215	63	66	1.19	45	30.05	17.17
December 2019	16	150	58	76	3.78	47	30.12	20.95
January 2020	6	200	45	64	1.18	37	26.30	1.18
February 2020	8	245	50	57	0.00	37	27.00	1.18
March 2020	7	220	46	68	1.32	43	26.14	2.50
April 2020	12	258	58	70	1.36	46	30.02	3.86
May 2020	12	263	63	67	0.25	49	29.96	4.11
June 2020	13	283	65	67	0.00	51	29.92	4.11
July 2020	12	294	67	70	0.00	52	29.87	4.11
August 2020	12	294	67	72	0.05	55	29.90	4.16
September 2020	11	291	69	71	0.00	56	29.93	4.16
October 2020	8	267	67	65	0.00	50	29.96	4.16
November 2020	8	279	56	70	0.31	44	30.08	4.47
December 2020	6	254	53	72	1.39	43	30.15	5.86
January 2021	7	193	53	74	2.92	44	30.08	2.92
February 2021	9	278	54	67	1.25	43	30.14	4.17
March 2021	11	254	55	64	1.38	41	30.08	5.55
April 2021	13	281	56	66	0.00	44	30.01	5.55
May 2021	16	281	58	67	0.00	47	29.97	5.55
June 2021	14	281	64	66	0.57	52	29.91	6.12

Notes:

Monthly meteorological data are averages of daily measurements except for monthly precipitation, which is the sum of the daily precipitation data, and cumulative precipitation (based on a calendar-year season), which is the year-to-date total on the last day of each month.

°F	degrees Fahrenheit
%	percent
in.	inches
mph	miles per hour
n/d	no data

APPENDIX A

LANDFILL GAS AND WATER-LEVEL MONITORING LOGS

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TABLE A-1: LANDFILL GAS MONITORING LOG - APRIL 2021

Weather: Clear, cool Name: Chris McCormack

Sampling Location						RKI Eagle 2				PID			
Location ID	Description (for example, GMP, Well, Carbon, Hydrosil)	Date	Time	Temp (°F)	Barometric Pressure (in. Hg)	Methane (%)	CO_2 (%)	O_2 (%)	Percent of LEL	NMOCs (ppmv)	Bckgrd. NMOCs (ppmv)	Soil Gas Pressure (in. H_20)	Notes (e.g., active extraction, flow rate, probe damage, instrument issues)
GMP01A	Gas Monitoring Probe	4/6/21	12:00	63	30.07	4.7	26.1	0.0	94.0%	0.0	0.0	0.00	
GMP08A	Gas Monitoring Probe	4/6/21	11:53	62	30.07	0.0	6.6	4.2	0.0%	0.0	0.0	0.00	
GMP23	Gas Monitoring Probe	4/6/21	11:20	64	30.07	0.0	15.1	2.4	0.0%	0.0	0.0	0.00	
GMP24	Gas Monitoring Probe	4/6/21	11:30	60	30.07	0.1	16.3	0.0	2.0%	0.0	0.0	-0.04	
Light Pole	Ambient Conditions	4/6/21	11:48	60	30.07	0.0	0.0	20.9	0.0%	0.0	0.0	NA	
Fence Line (A)	Ambient Conditions	4/6/21	11:40	60	30.07	0.0	0.0	20.9	0.0%	0.0	0.0	NA	
Basketball Court (B)	Ambient Conditions	4/6/21	11:38	60	30.07	0.0	0.0	20.9	0.0%	0.0	0.0	NA	
830crawlspace	Structural Location	4/6/21	11:35	60	30.07	0.0	0.0	20.9	0.0%	0.0	0.0	NA	
East of DP1	Structural Location	4/6/21	11:44	60	30.07	0.0	0.0	20.9	0.0%	0.0	0.0	NA	

Legend:

%:	percent by volume in air	NA:	not applicable
°F:	degrees Fahrenheit	NMOC:	non-methane organic compound
CO_2:	carbon dioxide	O_2:	oxygen
RKI Eagle 2:	landfill gas meter	PID:	photoionization detector
in. Hg:	inches of mercury	ppmv:	parts per million by volume
in. H_20:	inches of water		
LEL:	lower explosive limit		

TABLE A-2: LANDFILL GAS MONITORING LOG - MAY 2021

Weather: Clear late AM, overcast early. Breezy, cool. Name: Chris McCormack

Sampling Location						RKI Eagle 2				PID			
Location ID	Description (for example, GMP, Well, Carbon, Hydrosil)	Date	Time	Temp (°F)	Barometric Pressure (in. Hg)	Methane (%)	CO_2 (%)	O_2 (%)	Percent of LEL	NMOCs (ppmv)	Bckgrd. NMOCs (ppmv)	Soil Gas Pressure (in. H_20)	Notes (e.g., active extraction, flow rate, probe damage, instrument issues)
GMP01A	Gas Monitoring Probe	5/13/21	11:51	64	30.05	0.4	28.6	0.6	8.0%	0.9-1.0	0.0	0.00	25 scfh
GMP08A	Gas Monitoring Probe	5/13/21	11:02	63	30.05	0.0	6.3	9.9	0.0%	0.0	0.0	0.00	24 scfh
GMP23	Gas Monitoring Probe	5/13/21	11:14	62	30.05	0.0	10.7	6.8	0.0%	0.0	0.0	0.00	23 scfh
GMP24	Gas Monitoring Probe	5/13/21	11:22	62	30.05	0.8	15.5	0.0	16.0%	0.0	0.0	0.00	22 scfh
Light Pole	Ambient Air	5/13/21	11:42	64	30.05	0.0	0.0	20.9	0.0%	0.0	0.0	NA	
Fence Line (A)	Ambient Air	5/13/21	11:35	65	30.05	0.0	0.0	20.9	0.0%	0.0	0.0	NA	
Basketball Court (B)	Ambient Air	5/13/21	11:31	65	30.05	0.0	0.0	20.9	0.0%	0.0	0.0	NA	
830crawlspace	Structural Location	5/13/21	11:28	63	30.05	0.0	0.0	20.9	0.0%	0.0	0.0	NA	
East of DP1	Structural Location	5/13/21	11:38	65	30.05	0.0	0.0	20.9	0.0%	0.0	0.0	NA	

Legend:

%:	percent by volume in air	NA:	not applicable
°F:	degrees Fahrenheit	NMOC:	non-methane organic compound
CO_2:	carbon dioxide	O_2:	oxygen
RKI Eagle 2	landfill gas meter	PID:	photoionization detector
in. Hg:	inches of mercury	ppmv:	parts per million by volume
in. H_20:	inches of water		
LEL:	lower explosive limit		

TABLE A-3: LANDFILL GAS MONITORING LOG - JUNE 2021

Weather: Clear, cool, breezy Name: Chris McCormack

Sampling Location						RKI Eagle 2				PID			
Location ID	Description (for example, GMP, Well, Carbon, Hydrosil)	Date	Time	Temp (°F)	Barometric Pressure (in. Hg)	Methane (%)	CO_2 (%)	O_2 (%)	Percent of LEL	NMOCs (ppmv)	Bckgrd. NMOCs (ppmv)	Soil Gas Pressure (in. H_20)	Notes (e.g., active extraction, flow rate, probe damage, instrument issues)
FENCE LINE													
GMP01A	Gas Monitoring Probe	6/10/2021	15:42	63	30.20	0.4	27.1	0.9	8	0.7	0.0	0.00	
GMP07A	Gas Monitoring Probe	6/10/2021	12:16	61	30.25	0.0	3.2	18.2	0	0.0	0.0	0.00	
GMP08A	Gas Monitoring Probe	6/10/2021	11:57	61	30.25	0.0	5.8	12.4	0	0.0	0.0	0.00	
GMP10	Gas Monitoring Probe	6/10/2021	--	--	--	--	--	--	--	--	--	--	Unable to reach
GMP11A	Gas Monitoring Probe	6/10/2021	15:49	63	30.20	0.0	8.7	17.7	0	0.0	0.0	0.00	
GMP20	Gas Monitoring Probe	6/10/2021	16:00	63	30.2	0.0	18.7	7.1	0	0.0	0.0	0.00	
GMP21	Gas Monitoring Probe	6/10/2021	--	--	--	--	--	--	--	--	--	--	Not found, buried?
UCSF COMPOUND													
GMP22	Gas Monitoring Probe	6/10/2021	11:13	61	30.25	0.1	4.7	16.4	1	0.0	0.0	0.00	
GMP23	Gas Monitoring Probe	6/10/2021	10:36	59	30.26	0.0	9.9	6.6	0	0.0	0.0	0.00	
GMP24	Gas Monitoring Probe	6/10/2021	10:45	59	30.26	0.0	0.3	18.1	0	0.0	0.0	0.00	
CRISP AVENUE LOCATIONS													
GMP32	Gas Monitoring Probe	6/10/2021	11:50	63	30.25	0.0	0.9	20.2	0	0.3	0.0	0.00	
GMP33	Gas Monitoring Probe	6/10/2021	11:43	61	30.25	0.0	1.0	20.0	0	0.0	0.0	0.00	
GMP34	Gas Monitoring Probe	6/10/2021	11:34	61	30.25	0.0	5.5	11.6	0	0.0	0.0	0.00	
GMP35	Gas Monitoring Probe	6/10/2021	11:26	61	30.25	0.0	1.0	18.7	0	0.0	0.0	0.00	
STRUCTURAL LOCATIONS													
830crawlspace	Bldg. 830 Ambient	6/10/2021	10:52	59	30.25	0.0	0.0	20.9	0	0.0	0.0	N/A	
DP1	Drainage Catch Basin	6/10/2021	11:01	61	30.25	0.0	0.0	20.9	0	0.0	0.0	N/A	
DP2	Drainage Catch Basin	6/10/2021	12:36	63	30.24	0.0	0.0	20.9	0	0.0	0.0	N/A	
Lightpole	Ambient Air	6/10/2021	11:08	61	30.25	0.0	0.0	20.9	0	0.0	0.0	N/A	
Fence Line (A)	Ambient Air	6/10/2021	10:57	61	30.25	0.0	0.0	20.9	0	0.0	0.0	N/A	
Basketball Court (B)	Ambient Air	6/10/2021	10:54	61	30.25	0.0	0.0	20.9	0	0.0	0.0	N/A	
Trench (C)	Ambient Air	6/10/2021	10:59	61	30.25	0.0	0.0	20.9	0	0.0	0.0	N/A	
CONTROL SYSTEM													
PV-01influent	Passive Sys. Influent	6/10/2021	15:36	63	30.21	65.5	35.7	0.0	1310	19.9	0.0	N/A	
PV-01carbon1	Passive Sys. 1st Carbon	6/10/2021	15:30	63	30.21	54.5	37.6	1.7	1090	1.4	0.0	N/A	
PV-01hydrosil	Passive Sys. Hydrosil	6/10/2021	15:28	63	30.21	0.0	0.0	20.9	0	0.4	0.0	N/A	
PV-02influent	Active Sys. Influent	6/10/2021	--	--	--	--	--	--	--	--	--	--	Active system not operational
PV-02carbon1	Active Sys. 1st Carbon	6/10/2021	--	--	--	--	--	--	--	--	--	--	Active system not operational
PV-02hydrosil	Active Sys. Hydrosil	6/10/2021	--	--	--	--	--	--	--	--	--	--	Active system not operational

TABLE A-3: LANDFILL GAS MONITORING LOG - JUNE 2021

Weather: Clear, cool, breezy

Name: Chris McCormack

Sampling Location						RKI Eagle 2				PID			
Location ID	Description (for example, GMP, Well, Carbon, Hydrosil)	Date	Time	Temp (°F)	Barometric Pressure (in. Hg)	Methane (%)	CO_2 (%)	O_2 (%)	Percent of LEL	NMOCs (ppmv)	Bckgrd. NMOCs (ppmv)	Soil Gas Pressure (in. H_20)	Notes (e.g., active extraction, flow rate, probe damage, instrument issues)
CONTROL SYSTEM (continued)													
PV-03influent	Passive Sys. Influent	6/10/2021	14:11	64	30.23	9.5	11.4	9.3	190	9.7	0.0	N/A	
PV-03carbon1	Passive Sys. 1st Carbon	6/10/2021	14:07	64	30.23	16.0	26.0	8.2	320	0.0	0.0	N/A	
PV-03hydrosil	Passive Sys. Hydrosil	6/10/2021	14:04	64	30.23	0.0	0.0	20.9	0	0.2	0.0	N/A	
PV-04influent	Passive Sys. Influent	6/10/2021	13:15	63	30.23	4.8	9.8	11.4	96	0.9	0.0	N/A	
PV-04carbon1	Passive Sys. 1st Carbon	6/10/2021	13:12	63	30.23	0.3	4.7	18.6	5	0.0	0.0	N/A	
PV-04hydrosil	Passive Sys. Hydrosil	6/10/2021	13:09	63	30.23	0.3	1.9	19.3	5	0.0	0.0	N/A	
PV-05influent	Passive Sys. Influent	6/10/2021	15:22	63	30.21	0.0	0.2	20.9	0	0.4	0.0	N/A	
PV-05carbon1	Passive Sys. 1st Carbon	6/10/2021	15:20	63	30.21	0.0	0.0	20.9	0	0.5	0.0	N/A	
PV-05hydrosil	Passive Sys. Hydrosil	6/10/2021	15:18	63	30.21	0.0	0.0	20.9	0	0.6	0.0	N/A	
OTHER MONITORING LOCATIONS													
IR01MW366A	Landfill Cap Well	6/10/2021	13:30	63	30.23	0.1	0.0	20.9	2	0.7	0.0	N/A	
IR01MWI-5	Landfill Cap Well	6/10/2021	13:41	63	30.23	67.5	37.6	0.0	1350	5.6	0.0	0.06	
IR01MW18A	Landfill Cap Well	6/10/2021	13:54	64	30.23	2.7	1.2	20.8	53	0.3	0.0	N/A	
IR01MW16A	Landfill Cap Well	6/10/2021	--	--	--	--	--	--	--	--	--	--	Well not located

Notes: Based on a Navy proposal approved by DTSC on 20 October 2008, monitoring has been discontinued at GMP02A, GMP03, GMP04A, GMP05B, GMP06B, GMP09, GMP12, GMP25, and GMP26. These locations are therefore not included in this table. GMP13, GMP14, GMP15, GMP16, GMP17, GMP18, GMP19, GMP27, GMP28, GMP29, GMP30, and GMP31 have been removed by trenching activities on Crisp Avenue, and were therefore not monitored. GMP10, GMP20, and IR01MW16A were inaccessible during this monitoring event due to ongoing site activities associated with the installation of the final remedy.

Legend:

%:	percent by volume in air	NA:	not applicable
°F:	degrees Fahrenheit	NMOC:	non-methane organic compound
CO_2:	carbon dioxide	O_2:	oxygen
RKI Eagle 2:	landfill gas meter	PID:	photoionization detector
in. Hg:	inches of mercury	ppmv:	parts per million by volume
in. H_20:	inches of water		
LEL:	lower explosive limit		

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TABLE A-4: WATER LEVEL MONITORING LOG - JUNE 2021

Weather: Clear, cool, and breezy Name: Chris McCormack

Location ID	Description	Date	Time	Top of Casing (feet above msl)	Water Level (feet below top of casing)	Groundwater Elevation (feet above mean sea level)
GMP32	Gas Monitoring Probe	6/10/21	11:47	14.02	10.03	3.99
GMP33	Gas Monitoring Probe	6/10/21	11:40	24.59	12.12	12.47
GMP34	Gas Monitoring Probe	6/10/21	11:32	22.28	15.23	7.05
GMP35	Gas Monitoring Probe	6/10/21	11:23	19.11	13.28	5.83
IR01MW02B	Monitoring Well	6/10/21	15:01	20.61	15.44	5.17
IR01MW03A	Monitoring Well	6/10/21	15:04	19.89	14.39	5.50
IR01MW05A	Monitoring Well	6/10/21	14:21	22.56	17.09	5.47
IR01MW10A	Monitoring Well	6/10/21	12:05	13.75	9.16	4.59
IR01MW11A	Monitoring Well	6/10/21	12:22	17.96	13.31	4.65
IR01MW12A	Monitoring Well	6/10/21	12:24	18.25	13.64	4.61
IR01P04A	Monitoring Well	6/10/21	15:06	21.61	N/A	--
IR76MW13A	Monitoring Well	6/10/21	10:14	19.69	15.06	4.63

Notes: IR74MW01A, GMP27, GMP28, GMP29, GMP30, and GMP31 have been removed by trenching activities on Crisp Avenue.
IR01P03AA and IR01P03AB have been abandoned.

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APPENDIX B

OTHER MONITORING RESULTS

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TABLE B-1: METHANE, NMOC, OXYGEN, AND CARBON DIOXIDE CONCENTRATIONS AT LANDFILL CAP WELLS

Landfill Gas Monitoring, Post-Removal Action
Parcel E-2 Industrial Landfill

Location[1]	Methane (% by volume) [3]	NMOCs (ppmv) [3]	Oxygen (% by volume) [3]	Carbon Dioxide (% by volume) [3]
June 10, 2021[2]				
IR01MW366A	0.1	0.7	20.9	0.0
IR01MWI-5	67.5	5.6	0.0	37.6
IR01MW18A	2.7	0.3	20.8	1.2
IR01MW16A[4]	--	--	--	--

Notes:

(1) The regulatory limit of 5% methane by volume does not apply to these monitoring wells, which are located on the landfill (locations are shown on Figure 2).

(2) Based on a Navy proposal approved by the Department of Toxic Substances Control on October 20, 2008, monitoring has been discontinued at the following locations: GMP02A, GMP03, GMP04A, GMP05B, GMP06B, GMP09, GMP12, GMP25, and GMP26. Monitoring at GMP08A, GMP23, and GMP24 will continue monthly, while all other locations, including the landfill cap wells reported in this table, will be monitored quarterly (see Section 2.3).

(3) Results are from the handheld equipment identified in Table 1.

(4) Location inaccessible due to ongoing construction activities associated with the implementation of the final remedy.

IR Installation Restoration
MW Monitoring well
NMOC Non-methane organic compound
ppmv parts per million by volume
% percent
-- No measurement taken

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