Final Five-Year Review Report
Naval Air Station Moffett Field Superfund Site
Installation Restoration (IR)
Landfill Sites 1 and 22

National Aeronautics and Space Administration
Ames Research Center
Moffett Field, CA

July 2020

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Prepared for:

NASA Ames Research Center
Environmental Management Division
Code JQ
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REVIEW AND APPROVAL

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Table of Contents

List of Figures (included as Appendix A)

List of Tables

List of Appendices

List of Acronyms & Abbreviations

µg/L	micrograms per liter
%/V	percent by volume
ARAR	applicable or relevant and appropriate requirement
AWQC	ambient water quality criteria
beta-BHC	beta-Hexachlorocyclohexane
BRAC	Base Realignment and Closure
BTEX	benzene, toluene, ethylbenzene, and xylene
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CCL	calculated concentration limit
CCR	California Code of Regulations
COCs	constituents of concern
CRQL	contract required quantitation limit
CY	calendar year
DCE	dichloroethene
DEH	Santa Clara County Department of Environmental Health
DTSC	California Department of Toxic Substances Control
EC	engineering control
ERT	Earth Resources Technology, Inc.
FS	Feasibility Study
FWENC	Foster Wheeler Environmental Corporation
FYR	Five-Year Review
GV	gas vent
GWMO	Groundwater Monitoring Optimization
HHRA	human health risk assessment
IC	institutional control
IR	Installation Restoration
LGMW	landfill gas monitoring well
mg/l	milligrams per liter
Moffett	Former Naval Air Station Moffett Field
MP	monitoring parameter
msl	mean sea level
NAS	Naval Air Station
NASA	National Aeronautics and Space Administration
Navy	Department of the Navy
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
OMMP	Operations, Maintenance, and Monitoring Plan
O&M	operations and maintenance
OTIE	Oneida Total Integrated Enterprises LLC
OU1	Moffett Federal Airfield Final Operable Unit 1
PCB	polychlorinated biphenyls
PCE	tetrachloroethene
POC	point-of-compliance
pH	hydrogen ion concentration
ppm	parts per million

PV	Planetary Ventures
RACR	Remedial Action Completion Report
RI	Remedial Investigation
RAO	remedial action objectives
Regional Water Board	San Francisco Bay Regional Water Quality Control Board
ROD	Record of Decision
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
SWAT	solid waste assessment test
SWRP	Storm Water Retention Pond
SVOCs	semi-volatile organic compounds
TCE	trichloroethene (also called trichloroethylene)
TDS	total dissolved solids
TPH	total petroleum hydrocarbons
TtFW	Tetra Tech FW, Inc.
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USS	United States Ship
VC	vinyl chloride
VOCs	volatile organic compounds

1 Introduction

On behalf of the National Aeronautics and Space Administration (NASA) Ames Research Center (Ames), Earth Resources Technology, Inc. (ERT), conducted this Five-Year Review (FYR) for Installation Restoration (IR) Sites 1 and 22 landfills located at Former Naval Air Station (NAS) Moffett Field (Moffett Field), near Mountain View, California, as required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section (§)121(c), as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The report has been prepared in accordance with the following guidance documents:

- United States Environmental Protection Agency (USEPA) *Comprehensive Five-Year Review Guidance* (USEPA, 2001);
- USEPA Recommended Evaluation of Institutional Controls: Supplement to Comprehensive Five-Year Review Guidance (USEPA, 2011); and
- USEPA Clarifying the Use of Protectiveness Determinations for CERCLA Five-Year Reviews (USEPA, 2012).

This FYR is required for IR Sites 1 and 22 because hazardous substances, pollutants, or contaminants remain at the sites above levels that allow for unlimited use and unrestricted exposure, and their Records of Decision (RODs) were signed after October 17, 1986 (the effective date of the Superfund Amendments and Reauthorization Act [SARA]). The waste at former Site 2 landfill was removed and consolidated with the Site 1 landfill waste. Former Site 2 landfill discussion included due to historical transfer of waste to Site 1.

1.1 Purpose of the Review

The purpose of this FYR is to evaluate the implementation and performance of the selected remedies at IR Sites 1 and 22, including evaluating whether the selected remedies are and will remain protective of human health and the environment. The report also identifies issues found during this FYR and offers recommendations to address identified issues.

1.2 FYR Authority

In accordance with CERCLA Section (§) 121 and the NCP, NASA is required to conduct the FYR for IR Sites 1 and 22. This FYR of IR Sites 1 and 22 summarizes the work completed by NASA in collaboration with regulatory agencies, including the USEPA and the California Regional Water Quality Control Board, San Francisco Bay Region (Regional Water Board). This FYR includes the calendar years 2015 through 2019, which is based on the Navy's previous FYR period (2010 through 2014) (Navy, 2016).

1.3 FYR Approach

This is the fifth FYR for IR Site 1 and the fourth FYR for IR Site 22. This report is the third FYR in which Sites 1 and 22 are combined in a FYR. A FYR for IR Sites 1 and 22 is required because: (1) ongoing and completed remedial actions will leave contaminants in place above concentrations that allow unlimited use and unrestricted exposure of the land, and (2) the RODs were signed on or after the effective date of the SARA (October 17, 1986). Table 1-1

summarizes the status of the actions at landfill Sites 1 and 22 within the CERCLA process at the former Moffett Field for which NASA is responsible.

Table 1-1
Current Status of Former Landfill IR Sites 1 & 22

CERCLA Operable Unit (OU)	IR Site Number	IR Site Name	Status
1	1	Runway Landfill	Fourth FYR in February 2015. Annual reporting and operations and maintenance (O&M) are ongoing.
	2	Site 2 (formally titled Golf Course Landfill as per OU1 ROD)	Clean Closed: Site 2 waste removed and consolidated with Site 1 landfill refuge.
NA	22	Site 22 Landfill	Third FYR in February 2015. Annual reporting and O&M are ongoing.

The FYR of IR Sites 1 and 22 included document and data reviews, site inspections, key stakeholder interviews, and regulatory agency comments. The methods, findings, conclusions, and recommendations identified during the review are presented in this report.

A Five-Year Review Summary form for each landfill is included on the following pages.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Naval Air Station Moffett Field Superfund Site		
EPA ID: CA2-1-70090078		
Region: 9	**State:** CA	**City/County:** Moffett Field/Santa Clara
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes IR Site 1 and IR Site 22	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: Other Federal Agency ***[If "Other Federal Agency", enter Agency name]*:** NASA Aeronautics and Space Administration		
Author name (Federal or State Project Manager): Garrett Turner		
Author affiliation: NASA Restoration Program Manager		
Review period: 8/1/2019 - 12/31/2019		
Date of site inspection: 10/3/2019		
Type of review: Statutory		
Review number: 5 for IR Site 1 and 4 for IR Site 22		
Triggering action date: 2/12/2015		
Due date *(five years after triggering action date)*: 2/12/2020		

2 Site Chronology

This section summarizes events, in chronological order, for the history of contaminant detection, characterization, and remediation for IR Sites 1 and 22 at the former Moffett Field. Table 2-1 and Table 2-2 present a summary of major events and key milestones for site investigations and actions at landfill Site 1/Site 2 and Site 22. Site background and remedial actions for each site are discussed further in Sections 3 and 4.

Table 2-1
Chronology of Significant Events for OU1 (IR Sites 1 and 2)

Event	Date
IR Site 2 landfill operational	1940s – 1952
IR Site 1 landfill operational	1963 – 1970s
Solid waste facility permit obtained from Santa Clara County for IR Site 1	1979
Confirmation study at Moffett Field	1986
Moffett Field placed on National Priorities List (NPL)	1987
Unexploded ordnance (UXO) removed from IR Site1 prior to the Remedial Investigation (RI) (IR Site 1 was used as a pistol range prior to 1988)	1988
Federal Facility Agreement (FFA) signed	August 1989
Phase I of the station-wide RI completed with types and concentrations of chemical contaminants at 19 sites identified	August 1990
Phase II of the station-wide RI initiated – RI/Feasibility Study (FS) process separated into six separate OUs	1990
OU 1 RI report	March 1993
Moffett Field was transferred to National Aeronautics and Space Administration (NASA), except for Moffett Community Housing, which was transferred to the United States Air Force (Air Force)	July 1994
Trenching performed at IR Site 2 to define landfill boundary	April 1996
Test pits excavated at IR Site 2 landfill	September 1996
OU 1 investigations: Additional groundwater investigations at IR Site 1 and radiological surveys at IR Sites 1 and 2	September 1996
USEPA concurrence letter for the consolidation of IR Site 2	July 1997
Remedial construction begins: IR Site 2 waste excavation and transfer/consolidation to IR Site 1 landfill	July 1997
OU 1 ROD for Sites 1 and 2. Transfer former Site 2 landfill waste to Site 1 landfill. Cap Site 1 landfill.	August 1997

Event	Date
Final IR Site 2 Groundwater Monitoring Plan Remedial Design	March 1998
IR Sites 1 and 2 remedial actions completed; final inspections of IR Sites 1 and 2 conducted	November 1998
IR Site 1 Landfill Closure Plan Remedial Design	December 1998
Begin Groundwater Monitoring at IR Sites 1 and 2. Methane gas at Site 1.	July 1999
USEPA IR Site 1 Inspection Report	November 1999
MOA signed between the Navy and NASA for institutional controls at OU 1.	November 1999
As-Built Report and RACR for IR Sites 1 and 2	September 2000
California Integrated Waste Management Board (CIWMB) IR Site 1 Closure Letter	March 2001
Final Site-Specific Construction Quality Control (CQC) Plan for IR Sites 1 and 2 Groundwater Monitoring and Maintenance	May 2000
Draft-Final Interim RACR for IR Sites 1 and 2	September 2001
Quarterly Groundwater Monitoring and Reporting for IR Site 1	January 2002 – November 2004
First Five-Year Review signed by the Navy	September 2002
USEPA Concurrence Letter to discontinue groundwater monitoring at IR Site 2	January 2003
Regional Water Board Concurrence Letter to discontinue groundwater monitoring at IR Site 2	February 2003
Final Technical Memorandum IR Site 1 Groundwater Evaluation Process	April 2004
Semiannual Groundwater Monitoring and Reporting for IR Site 1	January 2005 – present
Final IR Site 1 Post-Closure Long-Term Maintenance Plan	April 2005
Final IR Site 1 Post-Closure Long-Term Monitoring Plan	April 2005
Second Five-Year Review completed	September 2007
Third Five-Year Review completed	February 2010
Revised Draft Groundwater Monitoring Optimization Report for IR Site 1 Landfill	2014
Fourth Five-Year Review completed	February 2015
Fifth Five-Year Review completed	February 2020
Groundwater Monitoring/Landfill Gas Monitoring	Ongoing
Annual Groundwater Reports for IR Site 1	Ongoing

Notes:

CIWMB = California Integrated Waste Management Board; CQC = Construction Quality Control; FFA = Federal Facility Agreement; FS = Feasibility Study; IR = Installation Restoration; MOA = Memorandum of Agreement; NASA = National Aeronautics and Space Administration; NPL = National Priorities List; OMMP = Operations, Maintenance, and Monitoring Plan; OU = Operable Unit; RI = Remedial Investigation; RACR = Remedial Action Completion Report; ROD = Record of Decision; USEPA = United States Environmental Protection Agency; UXO = unexploded ordnance

Table 2-2
Chronology of Significant Events for IR Site 22

Event	Date
IR Site 22 landfill operational	1950 – 1967
IR Site 22 landfill covered by holes 6 and 7 of the Moffett Field Golf Course	1973
Confirmation study at Moffett Field	1986
Moffett Field placed on NPL	1987
Federal Facility Agreement signed	August 1989
Phase I of the station-wide RI completed with types and concentrations of chemical contaminants at 19 sites identified	August 1990
Phase II of the station-wide RI initiated – RI/FS process was separated into six separate OUs	1990
Moffett Field was transferred to NASA, except for Moffett Community Housing, which was transferred to the Air Force	July 1994
IR Site 22 investigations: soil sampling, groundwater sampling, landfill gas survey, exploratory trenching, and aquifer testing	1994 to 1997
FS for IR Site 22 completed	March 1999
ROD signed	June 2002
Final Remedial Design and Implementation Report for IR Site 22	December 2002
Construction activities at IR Site 22	January 2003 – August 2003
IR Site 22 portion of the Moffett Golf Course reopened	September 2003
Detection Monitoring Program for groundwater and landfill gas began at IR Site 22	November 2003
Remedial Action Report prepared for IR Site 22	December 2003
Final IR Site 22 Post-Construction Operations, Maintenance, and Monitoring Plan (OMMP)	September 2003
Final Remedial Action Report for IR Site 22	April 2004
Final IR Site 22 Post-Construction OMMP Addendum	November 2007
First Five-Year Review completed	February 2008
Site 22 MOA transferring lead-agency responsibility for Site 22 from Navy to NASA signed	September 2008
Second Five-Year Review completed	February 2010

Event	Date
Third Five-Year Review completed	February 2015
Fourth Five-Year Review completed	February 2020
Groundwater Monitoring and Reporting for IR Site 22	Ongoing
Santa Clara County DEH IR Site 22 Quarterly Reports	Ongoing

Notes:

DEH = Department of Environmental Health; FS = Feasibility Study; IR = Installation Restoration; MOA = Memorandum of Agreement; NASA = National Aeronautics and Space Administration; NPL = National Priorities List; OMMP = Operations, Maintenance, and Monitoring Plan; OU = Operable Unit; RI = Remedial Investigation; RACR = Remedial Action Completion Report; ROD = Record of Decision; USEPA = United States Environmental Protection Agency; UXO = unexploded ordnance

3 Background

This section describes potential threats posed to the public and environment that were identified when the RODs for IR Sites 1 and 22 were developed. For each site, general site conditions and all major activities before ROD signature are discussed. Background information, including physical characteristics, land and resource use, history of contamination, initial responses, and basis for taking action, is also summarized in Section 3. Because the sites are located in the same general vicinity, the sites share the same general physical characteristics and area land uses. Site 1 and 22 landfill figures are included in Appendix A.

NASA Ames is a federal aerospace facility located near the southern end of the San Francisco Bay and the northern end of Santa Clara County (Figure 1), approximately 40 miles south of San Francisco adjacent to the cities of Mountain View and Sunnyvale, California. NASA Ames consists of the Ames Campus and a portion of Moffett Field (Figure 1). Landfill Sites 1 and 22 are located on the northern most portion of the former Moffett Field (Figure 2) Moffett Field is bounded by United States Fish and Wildlife Service (USFWS) property (former salt evaporation ponds) to the north, a Lockheed Martin Aerospace Facility to the east, U.S. Highway 101 and residential areas to the south, and NASA Ames to the west.

Moffett Field's original purpose was to provide a home base for the airship United States Ship (USS) Macon. From the end of World War II until its closure, Moffett Field hosted development and use of several generations of land-based, anti-submarine warfare and maritime patrol aircraft. In 1987, Moffett Field was placed on the USEPA's National Priorities List (NPL). Post-Cold War defense cutbacks and related Base Realignment and Closure (BRAC) actions in the 1990s identified Moffett Field for closure. On July 1, 1994, Moffett Field was closed as an NAS and ownership transferred to NASA Ames Research Center. The former airfield is currently leased to Planetary Ventures (PV) and operated by AvPorts as an active airfield.

The San Francisco Bay Water Quality Control Plan (Basin Plan) of 2013 (Regional Water Board, 2013) identifies potential and beneficial uses of groundwater in the region. Moffett Field is located at the northern end of the Santa Clara Basin. For the Santa Clara Basin, all four beneficial uses of groundwater (municipal and domestic, industrial process, industrial service, and agricultural water supply) are listed in the Basin Plan as existing uses.

The following subsections summarize the historical environmental evaluations and response actions as performed by the Navy prior to NASA assuming the O&M and reporting responsibilities for the Sites 1 and 22 landfills (Navy, 2016).

3.1 IR Site 1 (Operable Unit [OU] 1)

This section discusses the site characteristics and history of IR Site 1 prior to the signing of the 1997 ROD for OU 1. IR Site 2 is discussed in this section because remedial actions at IR Site 2 affected IR Site 1 (ITC, 2000a).

3.1.1 Physical Characteristics

OU 1 consists of two inactive landfills, IR Site 1 landfill and former IR Site 2 landfill. The IR Site 2 landfill is now referred to as the former IR Site 2 landfill because the waste material was removed and transferred to IR Site 1 as part of remedy implementation. The IR Site 1 and former

IR Site 2 landfill are located in the northern portion of Moffett Field and make up OU 1 (see Figure 2).

IR Site 1 encompasses approximately 12 acres (Figure 3). The adjacent properties include USFWS property and Former Jagel Slough to the east, North Perimeter Road and Moffett Field runways to the south, undeveloped land to the southwest, and the NASA Storm Water Retention Pond (SWRP) (Northeast Basin) to the northwest. The landfill is surrounded by a fence, except for the northwest side, which is bordered by the SWRP. The landfill is flat on the west side (the Western Depression area) with an elevation of approximately 7 feet above mean sea level (msl). It is mounded on the eastern side (the Upper Waste Consolidation area) where the elevation is approximately 23 feet above msl at the apex. Two culverts drain surface water from the site toward the south and west.

At IR Site 2, records of landfill operation were not maintained, but the landfill operated from the 1940s until approximately 1952 (ITC, 1993). The landfill reportedly received domestic refuse, as well as wastes from maintenance and military operations, such as scrap equipment, paint and paint thinners, solvents, lacquer, oil, fuel filters, and sawdust contaminated with polychlorinated biphenyls (PCBs) (Navy, 1997). As per the IR Site 2 landfill ROD, approximately 23,000 cubic yards of refuse were transferred to the IR Site 1 landfill and consolidated with the IR Site 1 landfill contents. Three years of Site 2 landfill post-excavation monitoring showed that groundwater had not been adversely affected by these activities at the site, post which groundwater monitoring was discontinued with concurrence from USEPA and the Regional Water Board. No further action was required at the former IR Site 2 landfill.

Based on data obtained during the review period, depth to groundwater at IR Site 1 is between approximately 1 feet below msl in the northern portion of the landfill to approximately 4 feet below msl in the southern portion of the landfill. The southward gradient at IR Site 1 is opposite from the regional gradient because of pumping of the storm drainage system associated with Building 191 (located south of IR Site 1 and just north of IR Site 2) (T N & Associates, Inc. [TN&A], 2007). The Building 191 pump station influences groundwater gradients because the drainage system that feeds the pump station is below the water table in some areas.

A silty clay aquitard several feet thick exists below the Site 1 landfill and above the uppermost aquifer zone. The thickness of this aquitard varies and it is not known conclusively whether this aquitard is continuous beneath the landfill. The stratigraphy beneath the aquitard consists of silty sand or sand and gravel deposits separated by low-permeability silts and clays. Since the former landfill is relatively isolated from surrounding water bodies by low-permeability barriers, elevated water levels occur. Potential for flow from the landfill to the other bodies exists, but actual flow is limited or constrained by these barriers (Navy, 1997). Site 1 landfill surface features are presented on Figure 4, and a cross-section detail of the landfill cap biotic barrier on Figure 5.

3.1.2 Land and Resource Use

Land use at IR Sites 1 and 2 is specified in the NASA-prepared *Moffett Field Comprehensive Use Plan* (NASA, 1994). The plan states that the primary uses for this area are an airfield clearance zone and open space. The plan further states that access should be limited and the area

preserved in its natural state because of safety interests. No plans currently exist for this property to change ownership. The nearest residential area is located more than 1.5 miles to the south-southwest (upgradient).

The Regional Water Board defines the criteria for drinking water sources as groundwater with total dissolved solids (TDS) lower than 3,000 milligrams per liter (mg/L), and that can support a pumping yield of at least 200 gallons per day (California State Water Resources Control Board [SWRCB], 2006). Groundwater at IR Sites 1 and 2 is not currently used as a drinking water supply and it is not reasonably expected to be a drinking water supply in the future because it does not meet state standards for drinking water. Additionally, groundwater surrounding IR Sites 1 and 2 will not likely be extracted for future beneficial use because of problems (saltwater intrusion and land subsidence) that occurred during groundwater pumping in the past. No drinking water or production wells are in the area.

3.1.3 History of Contamination

IR Site 1 is a landfill that was operated from the mid-1960s until the late 1970s. Subsequently, the site was used as a pistol range. Detailed operation records for IR Site 1 were not maintained, but a solid waste facility permit obtained from Santa Clara County in 1979 states that the landfill operated as a sanitary landfill and that it received wastes such as cardboard, lawn cuttings, pruning, wood waste, and asbestos insulation wrapped in double- plastic bags. According to civilian and military personnel interviews, the landfill received domestic refuse, as well as waste from maintenance and military operations. Maintenance and military operations waste included scrap equipment, paint and paint thinners, solvents, lacquer, ash, asbestos, jet fuels, waste oil, fuel filters (containing fuel sludge, lead compounds, and rust), transformer oil and filters, and PCB-contaminated sawdust. Although no disposal records for the landfill exist and the extent of refuse has not been fully determined, a conservative estimate of the total refuse volume at IR Site 1 at the time was 423,000 cubic yards (Navy, 1997).

3.1.4 Initial Response

Site characterization at IR Sites 1 and 2 consisted of an IAS, confirmation study, solid waste assessment test (SWAT), air SWAT, RI, FS, and post-RIs (Tetra Tech EM, Inc. [TtEMI], 2001a).

Toluene, ethylbenzene, and xylenes were the most frequently detected volatile organic compounds (VOCs) in the landfill refuse. Other VOCs detected in landfill refuse include acetone, 2-butanone, and carbon disulfide. Semivolatile organic compounds (SVOCs) detected in landfill soil include bis (2-ethylhexyl) phthalate, butylbenzylphthalate, di-n-butylphthalate, di-n octylphthalate, naphthalene, phenol, and 4-methylphenol. PCBs and various inorganic constituents including aluminum, antimony, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, sodium, silver, and zinc were also detected in landfill soils (PRC, 1995).

VOCs consisting of acetone, 2-butanone, methylene chloride, carbon disulfide, and toluene were detected in landfill perimeter soils. The SVOCs bis (2-ethylhexyl) phthalate and 4- methylphenol were also detected. The same inorganic constituents detected in landfill refuse were also detected in the perimeter soils (PRC, 1995). Leachate sample results included 2-butanone, 4-

methylphenol, and benzene, toluene, ethylbenzene, and xylene (BTEX). Several inorganic constituents were detected in leachate samples. Aluminum, arsenic, barium, cobalt, chromium, iron, nickel, lead, vanadium, and zinc were consistently detected (more than 50 percent of samples) as total metals in leachate since 1992. Filtered metals sample results consistently included detections of aluminum, arsenic, barium, cobalt, chromium, iron, nickel, vanadium, and zinc (PRC, 1995a).

3.1.5 Basis for Taking Action

Low contaminant concentrations found in samples of leachate, surface debris, and boreholes at both sites supported use of the USEPA presumptive remedy (containment) for landfills (Navy, 1997). As per the USEPA, engineered containment would be used at landfills where the wastes posed a relatively low long-term threat and treatment would be impracticable (40 CFR 300.430[a][l][iii][B]). Subsequently, complete characterization of the landfill refuse was not necessary because containment does not require such information. OU 1 field investigations during the RI (ITC, 1993a) and FS (PRC, 1995a) incorporated this presumptive remedy approach and focused on hydrogeology, groundwater chemistry, and landfill gas composition to evaluate whether contamination from the landfills was migrating past landfill boundaries into the surroundings. Additional groundwater investigations at IR Site 1 and radiological surveys at IR Sites 1 and 2 were conducted in September 1996 (Navy, 1997).

Chemical data from groundwater samples collected in association with the RI and FS reports at the landfill perimeter indicated that the IR Site 1 landfill was not significantly impacting groundwater. Some chemicals had been detected infrequently and at low concentrations in samples collected from surrounding groundwater monitoring wells (PRC, 1995a). However, the data did not show any consistent patterns or trends that would indicate the presence of any leachate plumes emanating from the landfill. No contaminants (except acetone and carbon disulfide) had been detected during consecutive monitoring events from the same wells. Furthermore, no compounds were consecutively detected above detection limits in any one well or in any two consecutive monitoring events. The low hydraulic conductivity, high organic content associated with clays surrounding the landfill, and low contaminant source concentrations combined to restrict flow and limit contaminant migration (Navy, 1997). The radiological survey did not detect radioactive materials above background concentrations. The additional groundwater investigation at IR Site 1 did not indicate conditions significantly different from those reported in the OU 1 RI and FS reports (Navy, 1997).

A human health risk assessment (HHRA) was conducted for OU 1 as part of the RI even though quantified risk assessment results have limited use for landfills (ITC, 1993). Qualitatively, however, the following exposure pathways are associated with constituents in refuse and landfill gas and the remedial alternatives were developed considering these exposure pathways: ingestion of and dermal contact with surface soils, inhalation of particulate matter from wind- eroded surface soils, and inhalation or explosion of landfill gas. For groundwater, exposure pathways associated with human health are incomplete because the groundwater is not a current drinking water supply and it is not reasonably expected to be a drinking water supply in the future (Navy, 1997). The complete HHRA is discussed in the OU 1 RI report (ITC, 1993).

An ecological assessment conducted for OU 1 determined that exposure pathways for ecological receptors were incomplete based on previous groundwater analysis and containment of OU 1 wastes through use of the USEPA's presumptive remedy for landfills. Therefore, ecological risks from refuse were not quantified and the ecological assessment for OU 1 was streamlined. During the streamlined ecological assessment, field survey results found that no threatened and endangered species or special status species were known to inhabit IR Sites 1 and 2. The Navy prepared a replacement plan to address habitat of threatened and endangered species that were potentially located on adjacent property that would be lost during consolidation and capping activities.

According to the OU 1 ROD, the proposed landfill capping would also affect potential wetlands in the vicinity of IR Site 1. However, the Navy and regulatory agencies determined that a landfill cap was a necessary component of the remedy. Filling small areas of potential wetlands was required to cap the IR Site 1 landfill. Therefore, as part of the remedial design, the Navy met the substantive requirements of Nationwide Permit 38 through the U.S. Army Corps of Engineers. This decision allowed for approved fill material to be placed in wetlands if filling was associated with the remediation of hazardous and toxic waste. The regulatory agencies concurred with the OU 1 ROD in 1997 (Navy, 1997).

3.2 IR Site 22

This section discusses the site characteristics and history of IR Site 22 prior to the signing of the 2002 ROD.

3.2.1 Physical Characteristics

IR Site 22 is located in the northeastern corner of Moffett Field (see Figure 2). IR Site 22 covers approximately 9.4 acres (see Figure 6) and contains an estimated total refuse (waste) volume of 92,000 cubic yards. The refuse is believed to consist of primarily domestic waste, as confirmed through exploratory trenching (Navy, 2002a). IR Site 22 underlies the putting greens and fairways of holes 6 and 7 of the Moffett Field Golf Course, which is leased and operated by Planetary Ventures.

Adjacent properties include the North Patrol Road ditch and USFWS property to the north, Lockheed Martin facility to the east, and the remainder of the golf course to the south and west (see Figure 2). A channel on the northern edge of the landfill (IR Site 27), beyond North Patrol Road, drains surface water to the west.

The stratigraphy in the area of the IR Site 22 landfill consists predominantly of clay and silty clay with discontinuous sand and silt intervals. Because of the discontinuous sand and silt intervals, communication between groundwater and surface water is limited. There appears to be only limited communication between groundwater and the North Patrol Road ditch. Hydraulic communication between groundwater and the ditch is impeded by presence of a relatively low hydraulic conductivity clay/silty clay. Physical and chemical data indicate that communication between the perched landfill leachate and shallow groundwater is also limited due to the predominance of clay and clayey silt beneath and around the landfill (Navy, 2002). The Site 22 landfill biotic barrier detail is presented in the Figure 7 cross-section.

Regional groundwater flow in the vicinity of IR Site 22 is to the north toward San Francisco Bay. However, groundwater flow beneath IR Site 22 differs from the regional flow because pumping activities associated with Building 191 lower the water table west of the site as described in Section 3.1.1. As a result, groundwater flow from the western portion of IR Site 22 landfill is generally toward Building 191 (FWEC, 2003) during the spring (April). During fall (October), Site 22 groundwater generally exhibits a split flow of east to west in the western portion and southwest to northeast in the eastern portion (ERT, 2016). Based on data obtained during the review period, depth to groundwater at IR Site 22 ranges between approximately 2 and 4 feet below msl.

3.2.2 Land and Resource Use

Land use at IR Site 22 is specified in the Moffett Field Comprehensive Use Plan (NASA, 1994). Before completion of the remedy, observations associated with soil borings and trenching indicated that most of the landfill is covered by approximately 1.5 feet of soil; however, soil thickness in a few areas was less than 1 foot. The golf course has been maintained and operated for over 30 years, and no plans currently exist to change the land use of this area. Therefore, IR Site 22 likely will remain part of the golf course. The nearest residential area is located more than 1.5 miles to the southwest (upgradient).

Groundwater at IR Site 22 is considered not potable for human or animal consumption because it does not meet state standards for drinking water (Navy, 2002a). No local wells or known natural seeps or springs where water could be withdrawn for local consumption are present, and the shallow aquifer underlying IR Site 22 does not supply water to local or municipal wells. Groundwater at IR Site 22 is not and will not likely be used as a source of drinking water or for other beneficial use in the future (TtEC, 2007).

3.2.3 History of Contamination

IR Site 22 was used as an active landfill from 1950 through 1967. Because operating records do not exist for IR Site 22, the history of the landfill was compiled by studying aerial photographs and historical maps of the area and by interviewing base personnel. Base personnel reported that IR Site 22 was used as a municipal landfill after the landfill at IR Site 2 was closed. Visual characterization of waste excavated at IR Site 2 confirmed that IR Site 2 contained primarily domestic waste; therefore, it was expected (and later confirmed) that IR Site 22 also contained domestic waste. When the landfill was covered with soil, it was not intended as the “cap” that is required by current regulations, but was placed to allow the area to be landscaped and converted to a golf course. In 1973, IR Site 22 was converted into holes 6 and 7 of the Moffett Field Golf Course (Navy, 2002).

3.2.4 Initial Response

The IR Site 22 landfill was characterized in the Final Station-wide RI Report (PRC, 1996a) and the Additional Sites Investigation Phase II Draft Final Report (PRC, 1995d). In April 1998, an additional investigation was initiated to provide supplemental information about IR Site 22 and its surrounding area. Investigative activities conducted at the IR Site 22 landfill in 1994, 1995, and 1998 included soil sampling, groundwater sampling, a landfill gas survey, exploratory trenching, and aquifer testing (slug tests) (Navy, 2002a). Low contaminant concentrations found

in samples of leachate, groundwater, soil, and landfill gas at IR Site 22 supported use of the USEPA presumptive remedy (containment) for landfills (Navy, 2002).

Xylenes were the most frequently detected VOCs in the landfill refuse. SVOCs detected include bis (2-ethylhexyl) phthalate and benzo (b) fluoranthene. PCBs and various inorganic constituents including antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, thallium, and zinc (PRC, 1995a).

No VOCs were detected above contract required quantitation limits (CRQLs) in perimeter soils. Several SVOCs were detected, including bis (2-ethylhexyl) phthalate. PCBs were not detected in perimeter soils (PRC, 1995).

Leachate sample results included benzene, ethylbenzene, 1,2-dichloroethene (1,2-DCE), vinyl chloride (VC), tetrachloroethene (PCE), and xylene. Naphthalene was the only SVOC detected and PCBs were not detected in leachate samples. Inorganic constituents detected in leachate samples included aluminum, barium, iron, and vanadium (PRC, 1995).

The USEPA established that engineered containment would be used at landfills where the wastes posed a relatively low long-term threat and treatment would be impracticable (40 CFR 300.430[a][l][iii][B]). As a result, complete characterization of the landfill refuse was not necessary because containment does not require such information. IR Site 22 RI/FS field investigations incorporated this presumptive remedy approach and focused on hydrogeology, groundwater chemistry, soil chemistry, and landfill gas composition to evaluate whether contamination from the landfills was migrating past landfill boundaries (Navy, 2002).

Soil and groundwater samples were analyzed for VOCs, SVOCs, pesticides, PCBs, total petroleum hydrocarbons (TPH), and metals. Additionally, soil samples were analyzed for radioactivity. A landfill gas survey was conducted to determine whether landfill gas was escaping through the existing soil cover or migrating offsite (Navy, 2002).

3.2.5 Basis for Taking Action

The soil investigation revealed that the concentrations of contaminants detected in soil samples from boreholes within the landfill material were greater than concentrations detected in soil samples collected outside the landfill material. VOCs, in particular 2-butanone and acetone, were widely distributed within the soil samples collected from the landfill. A range of SVOCs, TPH, and pesticides were consistently detected in soil samples collected from boreholes within the landfill. Three PCBs, Aroclor 1242, Aroclor 1254, and Aroclor 1260, were repeatedly detected at various depths within the landfill soil samples. Inorganic constituents within the landfill were frequently detected at higher concentrations than in perimeter soil boring samples. Contaminant detections in soil samples from boreholes outside of the landfill were low level and sporadic. Analysis of soil samples for radioactivity revealed insignificant results (Navy, 2002a).

VOCs that were regularly detected in the groundwater from landfill leachate wells included chlorobenzene, benzene, ethylbenzene, and xylene. Only chlorobenzene was detected at concentrations above ambient water quality criteria (AWQC). One SVOC, diethylphthalate, was detected at a level above AWQC in the leachate samples. Other SVOCs detected frequently in

the landfill leachate include 1,4-dichlorobenzene, 2-methylnaphthalene, and naphthalene. Two pesticides detected in landfill leachate sample were detected infrequently and at low concentrations (Navy, 2002a).

Chemical analyses of groundwater samples from wells surrounding the landfill indicate sporadic detections of organic constituents in perimeter wells; these may have originated from the landfill because of the presence of groundwater within the refuse. TPH constituents were not detected more than one time, and neither VOCs nor SVOCs were detected at concentrations significantly above AWQC. Results from the analysis of groundwater samples did not indicate significant or consistent chemical releases from the landfill (Navy, 2002).

Nickel, lead, and zinc constituents were detected in both samples of landfill leachate and surrounding groundwater. The concentrations of metals detected in some perimeter groundwater wells exceeded AWQC, but the results were not significantly different from background concentrations (Navy, 2002).

The landfill gas survey found no indications of offsite migration of landfill gases, no detectable concentrations of non-methane hydrocarbons migrating to the atmosphere from the landfill, and no significant subsurface gas migration beyond the perimeter of the landfill (Navy, 2002).

As part of the additional investigation, exploratory trenches were excavated to further evaluate the vertical and horizontal extent of refuse within the landfill. Based on the results of the trenching, the estimated extent of the landfill was approximately 9.4 acres and the estimated refuse volume was approximately 92,000 cubic yards (Navy, 2002).

Based on the characterization of risks at the site, the response action selected in the ROD (Navy, 2002a) is necessary to protect the public health from actual or threatened releases of hazardous substances into the environment via the activities of burrowing animals at IR Site 22. Isolation/containment was used as a part of presumptive remedy for IR Site 22. The isolation/containment of the waste would deter animals from burrowing into the landfill, thereby reducing the potential for contact with refuse.

4 Remedial Response Actions

Section 4 discusses the initial plans, implementation history, status of the remedies, and relevant site activities from the time the RODs were signed to the present. Remedy selection, remedy implementation, remedy performance, O&M, and any changes to, or problems with, the components of the remedy will also be discussed in the following sections.

4.1 Remedy Selection

This section describes the remedial action objectives (RAOs) and the remedies selected for each site. RAOs were established to allow selection of remedies that achieve protection of human health and the environment and are consistent with continued use according to the NASA Ames Moffett Field Comprehensive Use Plan (NASA, 1994).

4.1.1 IR Site 1

The ROD did not identify RAOs. Rather, it stated that the remedy selected for OU 1 (IR Sites 1 and 2) met the statutory requirements of Section 121 of CERCLA (Navy, 1997). The statute requires that remedial actions:

- Protect human health and the environment.
- Comply with applicable or relevant and appropriate requirements (ARAR), unless a statutory waiver is justified.
- Are cost effective.
- Use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practical.
- Satisfy the preference for treatment that reduces toxicity, mobility, or volume as a principal element, or provide an explanation as to why this preference cannot be satisfied.

The ROD was signed by the Navy, USEPA and California Department of Toxic Substances Control (DTSC), and Regional Water Board in August 1997 (Navy, 1997). The selected remedy described in the ROD is as follows:

- Consolidate wastes from the IR Site 2 landfill into the IR Site 1 landfill.
- Place a cap and cover over the IR Site 1.
- Perform groundwater monitoring at IR Sites 1 and 2.
- Install a subsurface groundwater collection trench along the northern border of IR Site 1 to intercept potential future leachate migration before it reaches surface water.
- Perform landfill gas monitoring at IR Site 1.
- Install a passive gas-venting trench along the western boundary of IR Site 1 to prevent potential offsite, subsurface migration of landfill gases.
- Conduct post-closure maintenance activities at IR Site 1.
- Implement institutional controls (ICs) and engineering controls (ECs) such as fencing, signs, O&M of Building 191 pump station and drain and sub-drain system, and restrictions on cover disturbances.

4.1.2 IR Site 22

The RAO identified in the ROD was to protect human health and the environment by preventing contact with landfill refuse. The ROD for IR Site 22 was signed in 2002 by the Navy, USEPA,

and Regional Water Board (Navy, 2002). The major components of the selected response action are:

- Install a biotic barrier to prevent burrowing animals from uncovering the subsurface contamination.
- Manage surface water flow across the site to prevent ponding of water on the landfill cover and to improve precipitation runoff to reduce water infiltration into the subsurface.
- Implement ICs to maintain the integrity of the barrier and to prevent disturbances or excavation of waste materials.
- Monitor groundwater and gas in the vicinity of the site.

For IC implementation, the ROD documents commitment to the following requirements as elements of the selected response action for the IR Site 22 landfill (Navy, 2002):

- Protection of the structural aspects of the landfill cap (biotic barrier).
- Prohibition of alterations of the drainage patterns or modification of surface contours.
- Establishment of specific boundaries for the extent of the landfill.
- Prohibition of extraction of groundwater from the site.
- Prohibition of residential land use.
- Requirement of regulatory approval for consideration of alternative land uses.
- Indication of parties responsible for ongoing operations, maintenance, and monitoring activities for the site.
- Requirement of annual reporting to the USEPA regarding the implementation, monitoring, and efficacy of the ICs.

4.2 Remedy Implementation

The main goals of the remedies were to clean up constituents of concern (COCs) to levels specified in RODs and prevent human and ecological exposure to contamination. The following sections discuss the steps taken following the finalization of each ROD through the present, to implement the remedies for IR Sites 1 and 22.

4.2.1 IR Site 1

Construction of the remedy began in July 1997 and was completed in November. Details regarding implementation of the selected remedy are documented in the Draft Final Interim Remedial Action Report, IR Site 1 and Site 2 Landfill Closures (TtEMI, 2001) and the As-Built Report and Remedial Action Completion Report (RACR), IR Site I and IR Site 2 Landfill Closures (ITC, 2000). As presented in Section 3.1.1, Site 1 landfill surface features and a cross-section detail of the landfill cap biotic barrier are shown on Figure 4 and Figure 5, respectively.

Groundwater Monitoring

To comply with the remedy as specified in the ROD (Navy, 1997), a long-term groundwater monitoring plan was developed. Groundwater monitoring well construction details are shown on Figure 8. Groundwater sampling was performed on a quarterly basis at IR Site 1 from January 2002 to November 2004 in accordance with Appendix E of the IR Site 1 Landfill Final Closure Plan and Post-Closure Maintenance Plan (TtEMI, 1998). Beginning in January 2005, the groundwater monitoring schedule was amended to semiannual in accordance with the Final IR Site 1 Landfill Post-Closure Long-Term Monitoring Plan (TtFW, 2005).

Target analytes at IR Site 1 were identified in the Final Technical Memorandum, IR Site 1 Groundwater Evaluation Process (TtFW, 2004a) and include COCs and monitoring parameters (MPs). Based on the available historical information of site operations, potential and known waste materials received, potential degradation products, and groundwater sampling results, the COCs at the IR Site 1 Landfill include dissolved metals, PCBs, pesticides, VOCs, and SVOCs.

MPs include physical and analytical parameters that are subsets of the COCs. The analytical MPs were selected based on California Code of Regulations (CCR) Title 27 criteria, including frequency of detections, mobility and persistence in the environment, potential degradation products, toxicity to potential aquatic receptors, and reported operational history of the landfill. The analytical MPs include select metals, VOCs, pesticides, and SVOCs. The objective was to select a subset of the COCs that, if a release from the landfill occurred, would be representative and detected in the groundwater monitoring wells (TtFW, 2004a).

Samples were collected on a semi-annual basis in accordance the Final Sampling and Analysis Plan (SAP) Addendum for Post-Closure Monitoring (IR Site 1) and Groundwater Monitoring (IR Site 2) (FWEC, 2001a) and the Final IR Site 1 Landfill Post- Closure Long-Term Monitoring Plan (TtFW, 2005). The samples were analyzed by the following methods:

- Dissolved metals by EPA Method 200.8/6020
- VOCs by EPA Method 8260B
- SVOCs by EPA Method 8270C (through April 2018, then once every five years)
- Pesticides by EPA Method 8081A (through April 2018, then once every five years)

It is noted here that the Regional Water Board and EPA jointly approved modification of the semi-annual sampling to only include dissolved metals and VOCs beginning in October 2018 (E. Wells, 2018). Groundwater sampling for MPs occurs semiannually, while groundwater sampling for the complete list of COCs occurs once every five years.

COC and MP concentrations are compared with their respective calculated concentration limits (CCLs) (TtFW, 2004b). CCLs were developed based on ecological screening criteria and site-specific attenuation factors for groundwater. If analytical results are less than the CCLs, no release from the landfill is presumed and no additional evaluation is required. If CCLs are exceeded, additional evaluation of upgradient and downgradient data is necessary to evaluate whether there has been a release from the landfill. If upgradient concentrations are higher than downgradient concentrations, most likely there was no release from the landfill. If downgradient concentrations are higher than upgradient concentrations, additional sampling events will be performed and results will be evaluated to assess whether there has been a release from the landfill (TtFW, 2004a).

The following groundwater monitoring wells and collection trench wells are sampled during each event (see Figure 3): W1-1R, W1-5, W1-8, W1-12R, W1-14, W1-15, W1-16, W1-19, W1-22 (collection trench well), W1-23 (collection trench well), and W1-24. Based on the groundwater flow direction, wells W1-5, W1-8, and W1-12R are classified as upgradient or background wells and are not influenced by the IR Site 1 landfill. The remaining wells, with the exception of the collection trench wells, have been classified as downgradient wells. The wells in the collection trench are not part of the point of compliance (POC) wells but are sampled at the

same frequency as the monitoring wells as required by the OU 1 ROD (Trevet, 2014). As a result, analytical data from the collection trench wells are not evaluated in the same manner as groundwater monitoring well data.

According to the Final IR Site 1 Landfill Post-Closure Long-Term Monitoring Plan (TtFW, 2005), wells W1-7, W1-20, and W1-6 are not sampled because they are either screened in the lower portion of the A aquifer or are not applicable based on location. Only wells screened in the upper portion of the A aquifer are sampled at IR Site 1. After review of screening depths and well locations, it appeared that well W1-7 was not sampled because it is screened in the lower portion of the A aquifer. W1-20 is also not sampled based on location because it is located near well W1-15, which is already included in the sampling program. W1-6 is not sampled based on a combination of screening depth and location. W1-6 is screened in both the upper and lower portions of the A aquifer, and it is located near well W1-15.

In 2013, fieldwork for a Groundwater Monitoring Optimization (GWMO) Study was completed at IR Site 1 through evaluation of groundwater monitoring data, leachate collection trench and trench wells, and metal COCs in soil, sediment, surface water and groundwater (Trevet, 2014). The results of the study found elevated barium concentrations above the CCL of 40 micrograms (µg/L) in all seven of the groundwater samples collected from temporary wells installed along the eastern and northern edges of the Site 1 Landfill (upgradient from the Site 1). Barium concentrations in these samples ranged from 44.9 µg/L to 2,260 µg/L. Copper concentrations were above the CCL of 5.15 µg/L in five of the groundwater samples from the temporary wells installed along the northern edge of the Site 1 Landfill. Copper concentrations in these samples ranged from 7.90 µg/L to 22.3 µg/L. These elevated groundwater samples indicate that ambient concentrations of barium and copper are present immediately upgradient from the Site 1 Landfill (Trevet, 2014).

Because of the elevated barium and copper concentrations detected above their associated CCLs in the groundwater samples from the upgradient temporary wells, coupled with the consistently elevated (above CCLs) barium and copper concentrations in upgradient permanent wells W1-5 and W1-12R, the GWMO indicates that barium and copper concentrations above the established CCLs of 40 µg/L and 5.15 µg/L in the site monitoring wells are not indicative of potential landfill impacts to the surrounding groundwater. The GWMO Report indicated that due to existing site conditions, the CCLs established for barium and copper may not be appropriate screening criteria (Trevet, 2014). Historically reported data indicate that the levels of barium and copper in the Site 1 monitor wells are likely associated with upgradient groundwater concentrations (Trevet, 2016). Application of a revised CCL barium screening level for the three downgradient-monitor wells (W1-1R, W1-15, and W1-19) was presented, utilizing the 95% upper confidence limit of historical barium concentrations in these three wells (Trevet, 2016).

Shallow groundwater flow direction is confirmed to be primarily from the north to south across the IR Site 1 landfill based on groundwater elevation data collected from 2004 through 2019. This flow direction is opposite from the likely regional groundwater gradient of south to north toward San Francisco Bay because of the stormwater drainage system pumping at Building 191, located southeast of the landfill.

Landfill Gas Monitoring

Landfill gas (methane) monitoring is performed in accordance with the IR Site 1 Landfill Final Closure Plan and Post-Closure Maintenance Plan (TtEMI, 1998), the Post-Closure Monitoring (IR Site 1) and Groundwater Monitoring (IR Site 2) SAP (ITC, 2000), Final SAP Addendum (FWEC, 2001), and the Final IR Site 1 Landfill Post-Closure Long-Term Monitoring Plan (TtFW, 2005).

The IR Site 1 gas monitoring network consists of 19 gas vents (GVs) (GV-1 through GV-19), four landfill gas monitoring wells (LGMWs) (LGMW1-1 through LGMW1-4), and 21 monitoring locations located around the perimeter of the site (P-1 through P-21). Figure 9 shows the locations of the IR Site 1 landfill methane gas monitoring locations, while Figure 10 shows the landfill gas monitoring well construction detail and Figure 11 shows the landfill gas vent well construction detail.

Landfill gas is monitored to confirm that concentrations remain below 5 percent by volume (%/V) in air at the site boundary. An exceedance of the criterion will be considered verified if concentrations for an individual landfill gas monitoring well or a perimeter surface monitoring location are above this concentration for any two out of three consecutive quarters. If methane concentrations are confirmed, the USEPA, Regional Water Board, and Santa Clara County DEH will be notified.

Institutional Controls

ICs are non-engineered controls such as administrative and legal controls. ICs in conjunction with monitoring, maintenance, and inspection of the ECs are designed to help minimize impacts to the remedy and to protect the integrity of the remedy.

An MOA between the Navy and NASA Ames Research Center was required by the ROD to establish ICs for IR Site 1. In November 1999, the MOA was executed and formally established the roles and responsibilities of the Navy and NASA with regard to the ICs in ensuring protectiveness of the remedy (Navy, 1999). NASA incorporated ICs required by the ROD and MOA into its land use planning document, the NASA Ames Environmental Resources Document (ERD) (NASA, 2015) and the NASA Ames Land Use Controls Implementation and Monitoring Plan (NASA, 2017).

NASA conducts periodic site visits and quarterly inspections as part of IC implementation measures. To meet the annual reporting requirement to the USEPA and Regional Water Board, NASA details the effectiveness of IC monitoring and implementation in the landfills annual report.

NASA incorporated the remedy protection measures for the landfill remedy in its land use and operation plans. As part of the NASA Ames Procedural Requirements, the Environmental Management Division (EMD) maintains copies of environmental records, including those of the IR Site 1 landfill remedy. The EMD reviews plans from personnel, tenants, and contractors for proposed field activities with the intent of preventing disturbances to the landfill remedy.

NASA continues to maintain and operate the Building 191 pumping station as part of its stormwater drainage and conveyance system. Operation of the pump station prevents major flooding at the landfill during storm events. The pump station also influences groundwater flow at the landfill.

The IR Site 1 landfill is not planned for property transfer. Monitoring and inspection of the engineered controls allow the effectiveness of ICs to be evaluated. The ICs are effective overall. Additional information on ICs is provided in the Draft Final Interim Remedial Action Report, IR Site 1 and IR Site 2 Landfill Closure (TtEMI, 2001).

Vapor Intrusion Mitigation

Since there are no building structures located on the Site 1 Landfill, vapor intrusion mitigation measures are not required.

4.2.2 IR Site 22

Construction of the remedy began in January 2003 and was completed August 2003. Details regarding the implementation of the selected remedy are documented in the Final Remedial Action Report for IR Site 22 Landfill (TtFW, 2004b).

Landfill Cover

While not specifically referred to as an EC in the ROD, installation of the IR Site 22 landfill cover is an EC because the intent was to construct a barrier that prevents human exposure to landfill contents. The Site 22 landfill cover consists (from bottom to top) of a 6-inch foundation layer, a biotic barrier composed of a 12-inch layer of 4- to 8-inch cobblestone capped with a concrete and sand slurry mix, a 6-inch coarse granular 3/8-inch pea gravel drainage layer, an 8-ounce geotextile fabric layer, and an 8-inch topsoil layer capped with a 4-inch layer of sand (see Figure 7) (FWEC, 2003).

Tree wells were installed following the placement of the biotic barrier and prior to the placement of the irrigation system. Tree wells consist of a 6-foot-diameter plastic liner extending from the final ground surface into the foundation layer. They were installed to allow trees to be planted at the golf course without jeopardizing the integrity of the biotic barrier (TtFW, 2004b). A subsurface drainage system was installed above the biotic barrier to redirect water that infiltrates the upper layers toward the northern and southern boundaries of the IR Site 22 landfill. On the northern side of the site, surface runoff and subsurface water discharge to the new drainage swale, which ultimately flows into the North Patrol Road ditch through two 1- foot-diameter culverts. On the southern side of the site, surface runoff and subsurface water are directed to existing water hazards outside of the landfill limits. Completed topography directs sheet-flow water in the same directions, and toward the east (FWEC, 2003).

Groundwater Monitoring

To comply with the remedy as specified in the ROD (Navy, 2002), a long-term groundwater monitoring plan was developed. Groundwater sampling and water level monitoring are performed on a semiannual basis at IR Site 22 in accordance with the Final Post-Construction OMMP (FWEC, 2003a) and the OMMP Addendum (TtEC, 2007). The groundwater monitoring network consists of 10 wells screened in the upper portion of the A aquifer and located

upgradient and downgradient of the landfill (see Figure 6). Samples are collected using low-flow sampling methodology (flow rates less than 500 milliliters per minute) with a low-flow pump and disposable tubing. The samples were analyzed for the following parameters:

- VOCs by USEPA Method 8260B
- SVOCs by USEPA Method 8270C (until October 2018, then every five years)
- Pesticides by USEPA Method 8081A (until October 2018, then every five years)

It is noted here that the Regional Water Board and EPA jointly approved modification of the semi-annual sampling to only include VOCs beginning in October 2018, with a full suite of COC analysis every five years (E. Wells, 2018).

The ROD identified COCs (VOCs, SVOCs, and pesticides) and required development of CCLs for COCs as part of the groundwater monitoring program (Navy, 2002a). Analytical MPs are a subset of the COCs at IR Site 22. The MPs are cis-1,2-DCE, chloroform, TCE, and xylenes. The VOCs selected as MPs were based on the frequency of detection and/or properties of each compound, with those selected that would most likely be present in the groundwater (TtEC, 2007).

The CCLs were proposed in the OMMP Addendum (TtEC, 2007) based on exposure pathways and potential groundwater use at the site, and were developed using AWQC and other appropriate surface water screening criteria to be protective of aquatic organisms. The CCLs are used in the evaluation of groundwater data collected from the monitoring wells at IR Site 22.

The data evaluation process follows the requirements of the ROD and the ARARs identified in the ROD. Regularly scheduled groundwater sampling data of the MPs will be compared with the respective CCLs to assess whether there is an exceedance. If downgradient analytical data are lower than or equal to the respective CCLs, no further action will be necessary. If the concentration of a downgradient analyte is greater than its CCL, a statistical evaluation will be required to assess whether a release has occurred. The evaluation process is described further in the OMMP Addendum (TtEC, 2007).

According to the OMMP Addendum, monitoring wells WGC2-8, WGC2-9, WGC2-10, and WGC2-11 are downgradient POC wells; WGC2-4 and WGC2-13 are upgradient wells; and WGC2-6 and WGC2-12 are the reference wells. Reference wells are useful for assessing groundwater conditions relative to the site, but do not contain groundwater that will flow under the landfill. Wells WGC2-1 and WGC2-5 are cross-gradient wells and may receive groundwater from offsite. The groundwater from these monitoring wells does not impact groundwater under the landfill, nor does the landfill impact groundwater within these wells. The OMMP Addendum states that these wells would not be monitored for water quality. Thus, even though they're sampled, they are not useful for determining whether a release from the landfill has occurred (TtEC, 2007).

Landfill Gas Monitoring

Methane monitoring at IR Site 22 was conducted in accordance with the OMMP (FWEC, 2003a) and the OMMP Addendum (TtEC, 2007) to protect public health and safety, and the

environment by demonstrating that methane migration is not occurring in the vadose zone. Figure 10 shows the landfill gas monitoring well construction detail and Figure 11 shows the landfill gas vent well construction detail. The IR Site 22 methane monitoring network consists of four LGMWs (LGMW-1, LGMW-2, LGMW-3, and LGMW-4), 15 tree wells methane monitoring points (TW-2, -5, -9, -13, -15, -19, -21, -26, -30, -38, -40, -42, -49, -52, and -54), and 13 monitoring locations around the perimeter of the site (P1 through P13) (see Figure 12).

No methane detections occurred during the first two rounds of measurements when all 56 tree wells within the cap area were evaluated. As a result, the tree wells selected for monitoring are located randomly throughout the landfill cap area. The perimeter monitoring locations are spaced approximately 250 feet apart along the boundary of the landfill cap (FWEC, 2003).

Methane is monitored to confirm that concentrations of methane remain below 5 %/V in air at the site boundary. An exceedance of the criterion will be considered verified if methane concentrations for an individual landfill gas monitoring well, a tree well located at the boundary (TW-2, TW-42, TW-49, or TW-54), or a perimeter surface monitoring station are above 5 %/V for any two out of three consecutive quarters. If methane concentrations are confirmed, the USEPA, Regional Water Board, and Santa Clara County DEH will be notified.

Institutional Controls

A MOA between the Navy and NASA Ames Research Center was required by the ROD to establish ICs for IR Site 22 (Navy, 2008). To be fully protective of human health and the environment, NASA has incorporated ICs required by the ROD into its planning documents.

NASA conducts periodic site visits and quarterly inspections as part of IC implementation measures. To meet the annual reporting requirement to the USEPA and Regional Water Board, NASA details the effectiveness of IC monitoring and implementation in landfills annual report. The monitoring strategy, which describes the required monitoring activities, schedules, and specific reporting requirements for IR Site 22, is addressed through the OMMP (FWEC, 2003), and the OMMP Addendum (TtEC, 2007).

NASA Ames incorporated the remedy protection measures for the landfill remedy in its land use and operation plans (NASA, 2015). As part of the NASA Ames Procedural Requirements, the EMD maintains copies of environmental records, including those of the IR Site 22 landfill remedy. The EMD reviews plans from personnel, tenants, and contractors for proposed field activities with the intent of preventing disturbances to the landfill remedy.

NASA Ames continues to maintain and operate the Building 191 pumping station as part of its stormwater drainage and conveyance system. Operation of the pump station prevents major flooding at the landfill during storm events. The pump station also influences groundwater flow at the landfill.

NASA's Facilities Group has incorporated LUCs for IR Site 22 into its permitting process and lease provisions. These requirements are also being incorporated into NASA's ERD to include language regarding NASA's responsibilities identified in the IR Site 22 MOA.

The IR Site 22 landfill is not planned for property transfer. Monitoring and inspection of the engineered controls allow the effectiveness of ICs to be evaluated. The ICs are effective overall. Additional information on ICs is provided in the Final Remedial Action Report for IR Site 22 Landfill (TtFW, 2004b).

Vapor Intrusion Mitigation

Since there are not building structures located on the Site 22 Landfill, vapor intrusion mitigation measures are not required.

4.3 Systems Operations/O&M

This section presents system operations, O&M requirements, activities to date, and any system problems.

4.3.1 IR Site 1

Since 2005, landfill inspections have been performed as prescribed by the IR Site 1 Landfill Post-Closure Long-Term Monitoring Plan (TtFW, 2005). Maintenance activities are performed based on the findings of the inspections.

Methane measurements, water level measurements, and groundwater samples were collected at IR Site 1 on a quarterly basis from January 2002 to November 2004; however, as per regulatory agency approval, monitoring has been performed on a semiannual basis beginning in January 2005. Section 7.1 provides a technical assessment of the landfill gas, water level, and groundwater sampling results.

Annual reports are submitted to the USEPA and the Regional Water Board. Each annual report summarizes the Site 1 landfill background information, maintenance activities, methods and procedures for monitoring and sampling, groundwater level and analytical data, and gas sampling data.

The Santa Clara County DEH inspects IR Site 1 quarterly to check the integrity of the landfill cover and any other related issues of concern. As indicated by DEH quarterly inspection reports, burrowing animal activity was identified as a concern at IR Site 1. Ground squirrel and gopher burrowing mitigation currently involves collapsing and backfilling the burrows. No burrowing owls or other non- target, special status species have ever been identified or encountered at the IR Site 1 Landfill. Recent quarterly inspections by DEH did not document any deficiencies as result of the ongoing landfill maintenance; the IR Site 1 landfill cover is intact and functional as intended.

No other significant problems or deficiencies were noted. NASA assumed the O&M and reporting of the Site 1 landfill O&M in October 2016; however, completed quarterly inspection reports for 2015 through 2019 are included in Appendix B.

Maintenance activities performed in conjunction with routine inspections at IR Site 1 are as follows:

- **Landfill Cover Integrity:** Activities include inspecting vegetation cover, animal burrowing, erosion, fissures, breaches, and manmade disturbance (if present).

- **Fencing Integrity:** Activities include checking for breaks in fabric, curled fabric at the ground surface, fabric detached from fence posts, loose barbed wire at the fence top, and disturbed fence posts.
- **Signage Integrity:** Activities include checking for fallen or missing signs, sign legibility, and graffiti.
- **Drainage Systems Integrity:** Activities include checking for slumping and vegetation in drainage channels, and existence of or damage to drop-in or pipe inlet guards.
- **Vegetation Monitor and Control:** Activities include mowing and related vegetation controls.

4.3.2 IR Site 22

O&M activities at IR Site 22 are described and performed in accordance with the OMMP (FWEC, 2003a) and the OMMP Addendum (TtEC, 2007).

Groundwater sampling, water level monitoring, landfill gas monitoring, and landfill inspections are performed on a semiannual basis at IR Site 22. Section 7.2.1 provides a technical assessment of the sampling results. Annual reports are submitted to the USEPA and the Regional Water Board. Each annual report summarizes IR Site 22 background information, maintenance activities, methods and procedures for monitoring and sampling, gas sampling data, groundwater level data, and groundwater analytical data.

The Santa Clara County DEH inspects IR Site 22 quarterly to check the integrity of the landfill cover. The IR Site 22 inspection log was revised to include specific monitoring line item for rodent burrow quantity and conditions.

Fumigant has been applied occasionally when necessary. Ongoing monitoring of burrows is conducted by golf course maintenance staff, with NASA support as requested. The current operator of the golf course, O.B. Sports, subcontracts ongoing burrowing animal control to H.T. Harvey. Ongoing animal control includes fumigant application as necessary, one-way door installation/exclusion along with burrow collapse and backfill post exclusion.

Recommendations were made by DEH to eliminate a low area on the western edge of the Site 22 landfill cap. Re-contouring of the golf course had created a low area at the western end of the landfill, where water was accumulating. However, this low area was backfilled, which eliminated the water ponding. The IR Site 22 landfill cover is intact and functional.

No other significant problems or deficiencies were noted in the DEH inspections. Quarterly inspection reports for 2015 through 2019, and DEH Site Inspection Reports for that same period are included in Appendix B.

Quarterly maintenance activities performed at IR Site 22 are as follows:

- **Landfill Cover Integrity:** Activities include inspecting vegetation cover, animal burrowing, erosion, fissures, breaches, and manmade disturbance, if present.

- **Drainage Systems Integrity:** Activities include checking for slumping or vegetation in drainage channels, vegetation and soil accumulation in drop-ins and pipe inlets, and existence of or damage to drop-in or pipe inlet guards.

- **Vegetation Monitor and Control:** Activities include mowing and related vegetation controls. The vegetation at IR Site 22 is maintained by the golf course management.

5 Progress Since Last Review

This section summarizes the progress of the remedy implementation at IR Sites 1 and 22, which includes the protectiveness determinations and statements from the last FYR as well as the recommendations from the last FYR and the current status of those recommendations.

5.1 Progress for IR Sites 1

This section includes the protectiveness determinations and statements from the last FYR as well as the recommendations from the last FYR and the current status of those recommendations.

Table 5-1
Protectiveness Determinations/Statements from the 2015 FYR

Site	Protectiveness Determination	Protectiveness Statement
1	Protective	The remedy for IR Site 1 is currently protective of human health and the environment because potential exposure pathways are incomplete, groundwater contaminant concentrations are stable, landfill gas is not migrating from the landfill, and the landfill cover is functioning as intended.
22	Protective	The remedy for IR Site 22 is currently protective of human health and the environment because potential exposure pathways are incomplete, groundwater contaminant concentrations are stable, landfill gas is not migrating from the landfill, and the biotic barrier is functioning as intended.

Table 5-2
Status of Recommendations from the 2015 FYR

Site	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
1	Burrowing animal control	Continue burrowing animal control	Ongoing	Monthly site inspections; one-way door installations followed by burrow collapse; burrow fumigation as appropriate; quarterly County inspections.	Not applicable (ongoing)
1	Barium and copper exceedances of the respective calculated concentration limits (CCLs) in groundwater	Evaluate barium and copper groundwater CCL exceedances	Completed	Evaluation of barium and copper groundwater exceedances complete. Revised CCLs utilized to determine compliance with CCL limits.	12/1/2016
1	Land Use Controls (LUCs)	Ensure LUCs are completed and documented.	Ongoing	Completed quarterly LUC inspections. LUC inspection forms included in annual LUC report to regulatory agencies.	Not applicable (ongoing)
22	Burrowing animal control	Continue burrowing animal control	Ongoing	Quarterly County inspections; burrow fumigation as appropriate.	Not applicable (ongoing)
22	Land Use Controls (LUCs)	Ensure LUCs are completed and documented.	Ongoing	Completed quarterly LUC inspections. LUC inspection forms included in annual LUC report to regulatory agencies.	Not applicable (ongoing)

6 Five-Year Review Process

This section provides a description of activities during the FYR process for IR Sites 1 and 22 and a summary of the findings of each step in the process where appropriate. This FYR was conducted between August 2019 and December 2019.

The Five-Year Review process at each of the two landfill sites addressed in this report consisted of document reviews, data reviews, site inspections and protectiveness determinations.

6.1 Document Review

This Five-Year Review consisted of a review of relevant documents, including previous Five-Year Reviews, RODs, annual reports, technical memorandum, groundwater and methane data, monitoring and maintenance plans, and O&M records.

6.2 Data Review

Data collected over the Five-Year Review reporting period were reviewed for each site to evaluate regulatory agency and ROD compliance. The data reviewed from 2015 through 2019 (OTIE. 2015; ERT. 2016/2017/2018/2019) for IR Sites 1 and 22 included methane measurement data, water level measurement data, and groundwater chemistry. Data collection activities occurred in April and October each year during this FYR period. Depth-to-water and methane measurements data plus groundwater analytical results are included in the 2015 through 2019 annual Site 1 and 22 landfill reports. A summary of these results are presented in the following sections.

6.2.1 IR Site 1 Groundwater Gradient Data

Depth to groundwater measurements were collected at IR Site 1 in April and October each calendar year. The predominant groundwater flow direction during this FYR period was to the southwest. Groundwater elevation exhibits seasonal trends, with the highest water levels occurring at the end of the wet season and the lowest levels occurring at the end of the dry season. Site 1 groundwater levels were consistent with previous historical groundwater elevation trends, showing a general, near-flat long-term trend. The groundwater gradient in April and October each year were as follows:

- 0.00080 ft/ft in April 2015 and 0.00080 ft/ft in October 2015
- 0.00077 ft/ft in April 2016 and 0.00076 ft/ft in October 2016
- 0.00078 ft/ft in April 2017 and 0.00062 ft/ft in October 2017
- 0.00095 ft/ft in April 2018 and 0.00056 ft/ft in October 2018
- 0.00083 ft/ft in April 2019 and 0.00055 ft/ft in October 2019

6.2.2 IR Site 1 Groundwater Chemistry

Water samples are routinely collected from nine groundwater monitoring wells and two collection trench wells at IR Site 1 (see Figure 3). As discussed in Section 4.2.1, IR Site 1 groundwater samples were analyzed by the following methods:

- Dissolved metals by EPA Method 200.8/6020
- VOCs by EPA Method 8260B
- SVOCs by EPA Method 8270C (through April 2018, then once every five years)
- Pesticides by EPA Method 8081A (through April 2018, then once every five years)

The Regional Water Board and EPA jointly approved modification of the semi-annual sampling to only include dissolved metals and VOCs beginning in October 2018, with a full suite of COCs being analyzed every five (5) years (E. Wells, 2018).

Site 1 metals data for this FYR period is included in Appendix C, with groundwater concentration graphs included in Appendix D (Figures D-1 through D-38) which provides groundwater concentration graphs where COCs were detected at least five times from 2008 through 2019. Consistent with previous analyses, the graphical concentration data were visually evaluated for trends in increasing, decreasing or relatively consistent (flat) concentrations. COC detections per year were as follows:

Calendar Year (CY) 2015

Arsenic, barium, and cobalt were detected in at least one sample collected from every groundwater monitoring well and the two collection trench wells at Site 1 in 2015. Copper was detected in at least one sample collected from three groundwater monitoring wells and two collection trench wells. Copper was not detected in groundwater samples collected from six monitoring wells: W1-5, W1-8, W1-14, W1-15, W1-16 and W1-24. Each reported dissolved metal has at least three historically detected concentrations (2008 through 2019) in samples from every Site 1 groundwater monitoring well, with the exception of copper (see Appendix C).

Arsenic and cobalt concentrations generally exhibited a flat to slightly fluctuating trend. Arsenic and cobalt were detected in samples from all monitoring wells and collection trench wells. None of the samples from the monitoring wells exceeded the arsenic CCL of 89.64 µg/L and cobalt CCL of 230 µg/L.

Barium concentrations generally show a flat trend, in groundwater samples collected from six wells (W1-1R, W1-5, W1-8, W1-12R, and W1-19). Groundwater samples from monitoring wells W1-14, W1-15, W1-16, and W1-24 show a slightly fluctuating trend. Barium concentrations in water samples collected from collection trench wells W1-22 and W1-23 are fluctuating.

The barium CCL of 40 µg/L was exceeded in samples from every monitoring well. However, these exceedances either occurred in samples from a background well, or were less than the maximum historical background value (653 µg/L, recorded in well W1-5 during the July 2003 sampling event), except well W1-24 (880 µg/L). As per GWMO Report, background metal levels (barium and copper) could be a source of elevated metal values in the landfill monitoring wells and collection trench (Trevet, 2014). Barium detected in the monitoring well groundwater samples is most likely associated with groundwater migrating onto the landfill site.

Copper concentrations exhibited a flat to slightly fluctuating trend in groundwater samples collected from three groundwater monitoring well (W1-1R, W1-12R, and W1-19). Water samples from collection trench well (W1-22) show a flat to slightly decreasing trend for copper.

Water samples from collection trench well (W1-23) show a flat to slightly fluctuating trend for copper. Six monitoring wells (W1-5, W1-8, W1-14, W1-15, W1-16, and W1-24) either had no detected copper concentrations in 2015 or less than three historically detected copper concentrations (2008 through 2015); therefore, no trends could be established for these wells.

The copper CCL of 5.15 µg/L was exceeded in the sample from two monitoring wells W1-1R (5.9 µg/L) and W1-12R (6.6 µg/L), and collection trench well W1-23. These exceedances were, however, less than the maximum historical background value (19.3 µg/L recorded in well W1-12R during the October 2003 sampling event).

During the April 2015 sampling event, metals were detected in samples from collection trench wells W1-22 and W1-23. Arsenic and cobalt concentrations detected in both trench wells were below their respective CCLs. The barium concentrations detected in collection trench wells W1-22 and W1-23 exceeded the CCL, however, were less than the maximum historical background value (653 µg/L, recorded in well W1-5 during the July 2003 sampling event). The copper concentration detected in collection trench well W1-22 was below the CCL. The copper concentration detected in collection trench well W1-23 exceeded the CCL, however, it was below the maximum historical background value (19.3 µg/L recorded in well W1-12R during the October 2003 sampling event. Further, analytical results from collection trench wells are not considered representative of chemical concentrations for the shallow aquifer.

During the October 2015 sampling event, all dissolved metal MPs were detected in the sample from collection trench well W1-23. Arsenic and cobalt concentrations detected in both trench wells were below their respective CCLs. The barium and copper concentrations detected in collection trench well W1-23 exceeded their respective CCLs, however they were below the maximum historical background values (barium-653 µg/L in well W1-5, and copper-19.3 µg/L well W1-12R). The barium concentration detected in W1-22 was above the CCL and the maximum historical background value, however, it was significantly lower than the maximum historical value detected in W1-22 (3,600 µg/L) during October 2007 sampling event. Additionally, analytical results from collection trench wells are not considered representative of chemical concentrations for the shallow aquifer.

No SVOCs and VOCs were detected in groundwater samples collected in 2015. Very low concentration of pesticides were detected in two monitoring wells and one trench well: W1-15, beta-BHC (beta-Hexachlorocyclohexane) (0.01J µg/L); W1-1R, heptachlor (0.02J µg/L); and W1-23, beta-BHC (0.01J µg/L), during the October 2015 event. Pesticides, VOCs and SVOCs detected concentrations did not meet the minimum data point requirement, thus no trends for these COCs are provided.

CY 2016

Arsenic, barium, and cobalt were detected in all Site 1 groundwater monitoring wells and the two collection-trench wells in both April and October 2016 sampling events. Copper was detected in one collection-trench well in April, and four (4) monitor wells and one (1) collection-trench well in October.

Appendix D (Figures D-1 through D-38) provides groundwater concentration graphs for COCs with at least one detected concentration in 2016 and a total of at least three historically detected concentrations (2008 through 2016). Consistent with previous analyses, the graphical concentration data was visually evaluated for trends in increasing, decreasing or relatively consistent (flat) concentrations.

Arsenic 2016 concentrations (Figures D-1 through D-11) are similar to previous years, with concentrations ranging from 3.4 µg/L in W1-1R to 20 µg/L in W1-16, and were all well below the arsenic CCL of 89.64 µg/L.

Barium concentrations in the 2016 samples (Figures D-12 through D-22) plot within the same range as previous years. Barium concentrations ranged from 56 µg/L in monitor well W1-12R to 530 µg/L in monitor well W1-24, concentrations consistent with historical concentration trends. Collection-trench wells, which are not representative of Site 1 groundwater, contained barium concentrations ranging from 110 µg/L in W1-23 to 940 µg/L in W1-22, well within historical concentration ranges.

The maximum barium concentrations in downgradient, point-of-compliance (POC) monitoring wells W1-1R, W1-15 and W1-19 were below the revised CCLs for these wells: W1-1R at 80 µg/L (CCL = 98 µg/L); W1-15 at 210 µg/L (CCL = 212 µg/L); and W1-19 at 86 µg/L (CCL = 107 µg/L). These barium concentrations are also well below the 2,260 µg/L concentration detected in a temporary upgradient well installed as part of the 2014 GWMO study (Trevet, 2014). Historically reported data indicate that the levels of barium and copper in the Site 1 monitor wells are likely associated with upgradient groundwater concentrations (Trevet, 2014). Application of a revised CCL barium screening level for the three downgradient-monitor wells (W1-1R, W1-15, and W1-19) was presented, utilizing the 95% upper confidence limit of historical barium concentrations in these three wells (Trevet, 2016).

Cobalt concentrations (Figures D-23 through D-33) were below the 230 µg/L CCL in all Site 1 monitor wells and are within historical concentrations.

Copper concentrations (Figures D-34 through D-38) in groundwater monitoring wells W1-1R, W1-12R, and W1-19 show no discernable upward or downward concentration trend. Copper was not detected in Site 1 groundwater monitor wells in April. Copper was detected in October in groundwater monitoring wells W1-1R at 5.6 µg/L, W1-12R at 3.8 µg/L, W1-19 at 7 µg/L and in a duplicate sample in W1-8 at 13 µg/L. The copper CCL of 5.15 µg/L was exceeded in three of these wells; however, these concentrations were below the historical maximum background copper concentration of 22.3 µg/L (Trevet, 2014). Copper was not detected above the laboratory detection limit in samples from collection-trench well W1-22, while collection-trench well W1-23 had copper concentrations in 2016 at 18 µg/L in April and 19 µg/L in October, similar to previous years. Copper was not detected in 2016 nor historically in monitoring wells W1-5, W1-14, W1-15, W1-16, and W1-24; therefore, concentration trends were not generated for these wells. Due to the fact that copper has been detected only once in monitoring well W1-8, a concentration verses time graph was also not generated for this upgradient well.

Pesticides were not detected in the Site 1 groundwater monitoring wells. Trace concentrations of beta-BHC and heptachlor were detected in both collection-trench wells at concentrations below the respective CCLs. Since these wells are not representative of Site 1 groundwater and only trace concentrations were detected, concentration graphs were not generated for these samples.

SVOCs or VOCs were not detected in groundwater samples collected in 2016. Due to the absence of detected analytes, monitor well concentration trend graphs were not generated for pesticides, VOCs or SVOCs.

CY 2017

In April, arsenic, barium, cobalt and copper were detected in all Site 1 groundwater monitoring wells and one collection trench well. Cobalt was not detected in collection trench well W1-23. In October, arsenic and barium were detected in all monitoring wells. Arsenic was also detected in one collection trench well (W1-22), and barium was detected in both collection trench wells. Cobalt was detected in one monitor well (W1-1R), and copper was detected in collection trench well W1-23.

Appendix D (Figures D-1 through D-38) provides groundwater concentration graphs for COCs with at least one detected concentration in 2017 and a total of at least three historically detected concentrations (2008 through 2017). Consistent with previous analyses, the graphical concentration data was visually evaluated for trends in increasing, decreasing or relatively consistent (flat) concentrations.

Arsenic concentrations (Figures D-1 through D-11) detected in April 2017 were elevated compared to previous years, with concentrations ranging from 190 µg/L in W1-1R to 320 µg/L in W1-1R; however, the October arsenic concentrations were similar to previous years with concentrations ranging from 11 µg/L in W1-1R to 18 µg/L in W1-12R, all well below the arsenic CCL of 89.64 µg/L. The elevated April arsenic concentrations may be due to insufficient sample filtering in the field and are not considered representative of site arsenic concentrations.

Barium concentrations in the April samples (Figures D-12 through D-22) were also elevated compared to previous years, with concentrations ranging from 60 µg/L in monitor well W1-1R to 1100 µg/L in monitor well W1-16; however, the October barium concentrations were similar to previous years with concentrations ranging from 58 µg/L in W1-22R to 530 µg/L in W1-24. Barium concentrations in samples from the collection trench wells were 140 µg/L in W1-23 and 580 µg/L in W1-22, well within historical concentration ranges.

The barium concentrations in downgradient, POC monitoring wells W1- 1R, W1-15 and W1-19 were below the revised CCLs for these wells: W1-1R at 67 µg/L (CCL = 72.27 µg/L); W1-15 at 110 µg/L (CCL = 186.45 µg/L); and W1-19 at 32 µg/L (CCL = 90.93 µg/L).

These barium concentrations are also well below the 2,260 µg/L concentration detected in a temporary upgradient well installed as part of the 2014 GWMO study (Trevet, 2014). Historically reported data indicate that the levels of barium and copper in the Site 1 monitor wells are likely associated with upgradient groundwater concentrations (Trevet, 2016). A

revised CCL barium screening level for the three downgradient-monitor wells (W1-1R, W1-15, and W1-19), was applied that utilizes the 95% upper confidence limit of historical barium concentrations in these three wells (Trevet, 2016).

Cobalt concentrations (Figures D-23 through D-33) were below the 230 µg/L CCL in all Site 1 monitor wells and are within historical concentrations.

Copper concentrations (Figures D-34 through D-38) detected in all Site 1 groundwater monitoring wells and collection trench wells samples in April 2017 were elevated compared to previous years, with concentrations ranging from 190 µg/L in W1-1R to 410 µg/L in W1-19. Similar to the arsenic and barium concentrations, the elevated copper concentrations may be due to insufficient sample filtering in the field and are not representative of site arsenic concentrations. Copper concentrations in the October samples are similar to previous years, with concentrations ranging from non-detect to 4.6 µg/L in W1-12R, and were all below the copper CCL of 5.15 µg/L. These concentrations were also below the historical maximum background copper concentration of 22.3 µg/L (Trevet, 2016). Copper was detected in both collection trench wells, W1-22 and W1-23, at 180 µg/L and 110 µg/L, respectively, in April at non-detect and 29 µg/L, respectively, in October. Due to the limited number of historical copper detections in monitoring wells W1-5, W1-14, W1-15, W1-16, and W1-24, concentration trends were not generated for these wells. Because copper has been detected historically only twice in monitoring well W1-8, a concentration verses time graph was also not generated for this up-gradient well.

Pesticides were not detected in any samples from groundwater monitoring wells and collection trench wells in 2017, and concentration graphs were not generated for these parameters.

No SVOCs or VOCs were detected in groundwater samples collected in 2017, and concentration trend graphs were not generated for these parameters.

CY 2018

Arsenic was detected in April in one collection trench well, barium was detected in all site wells, cobalt was not detected in any site wells, and copper was detected in two site groundwater monitoring wells and one collection trench well. Arsenic was not detected in October in any site wells, barium was detected in all monitoring wells, cobalt was detected in one site well, and copper was detected in two site groundwater monitoring wells and both collection trench wells.

Arsenic concentrations (Figures D-1 through D-11) detected in April and October 2018 were similar to previous years. Concentrations were non-detect in all site wells except in collection trench well W1-23 at 55 µg/L in April.

Both April and October barium concentrations were similar to previous years, with barium concentrations in the April samples (Figures D-12 through D-22) ranging from 45 µg/L in down-gradient monitor well W1-1R to 1,300 µg/L in up-gradient monitor well W1-16, while October barium concentrations ranged from 58 µg/L in W1-1R to 500 µg/L in W1-16. Barium concentrations in April from collection trench wells were 36 µg/L in W1-23 and 990 µg/L in W1-22. October samples from the collection trench wells were 33 µg/L in W1-23 and 1,100 µg/L in W1-22, well within historical concentration ranges.

The barium concentrations in downgradient, POC monitoring wells W1- 1R and W1-19 were below the revised CCLs for these wells in both April and October, respectively: W1-1R at 45 µg/L and 36 µg/L (CCL = 68.30 µg/L); and W1-19 at 70 µg/L and 44 µg/L (CCL = 86.60 µg/L). POC well W1-15 barium was elevated in April at 210 µg/L; barium was, however, detected in October at 120 µg/L (below the CCL of 181.28 µg/L). These barium concentrations are also well below the 2,260 µg/L concentration detected in a temporary upgradient well installed as part of the 2014 GWMO study (Trevet, 2014). A revised CCL barium screening level for the three downgradient-monitor wells (W1-1R, W1-15, and W1-19), was applied that utilizes the 95% upper confidence limit of historical barium concentrations in these three wells (Trevet, 2016).

Cobalt concentrations (Figures D-23 through D-33) were below the 230 µg/L CCL in all Site 1 monitor wells and are within historical concentrations.

Copper concentrations (Figures D-34 through D-38) detected in all Site 1 groundwater monitoring wells are similar to previous years, with concentrations ranging from non-detect to 8.7 µg/L in W1-1 in April. These concentrations were below the historical maximum background copper concentration of 22.3 µg/L (Trevet, 2016). Copper was also detected in collection trench well W1-23 at 46 µg/L in April, while copper was detected in October in collection trench wells W1-22 at 8.8 µg/L, and W1-23 at 74 µg/L. Due to the limited number of historical copper detections in monitoring wells W1-5, W1-8, W1-14, W1-15, W1-16, and W1-24, concentration trends were not generated for these wells.

CY 2019

Arsenic was detected in April in one landfill well and one collection trench well, barium was detected in all site wells and both collection trench wells, cobalt was detected in one site well, and copper was detected in six site wells and one collection trench well. Arsenic was detected in October in six site wells and one collection trench well, barium was detected in all monitoring wells and both collection trench wells, cobalt was detected in two site wells, and copper was detected in one site well and one collection trench well.

Arsenic concentrations (Figures D-1 through D-11) detected in April and October 2019 were similar to previous years. Arsenic was detected in April and October in well W1-16 at 11 µg/L and 12 µg/L respectively, and in collection trench well W1-23 at 15 µg/L and 11 µg/L respectively. Arsenic was either non-detect or present at concentrations below 7.2 µg/L where detected in the other site wells and one collection trench well.

Both April and October barium concentrations were similar to previous years, with barium concentrations in the April samples (Figures D-12 through D-22) ranging from 49 µg/L in monitor well W1-1R to 640 µg/L in monitor well W1-16, while October barium concentrations ranged from 43 µg/L in W1-12R to 610 µg/L in W1-24. Barium concentrations in April from collection trench wells were 37 µg/L in W1-23 and 810 µg/L in W1-22. October samples from the collection trench wells were 62 µg/L in W1-23 and 1,000 µg/L in W1-22, well within historical concentration ranges.

The barium concentrations in downgradient, point-of-compliance (POC) monitoring wells W1-1R and W1-19 were below the revised CCLs for these wells in both April and October: W1-1R

at 56 µg/L and 45 µg/L (CCL = 66.93 µg/L); and W1-19 at 74 µg/L and 66 µg/L (CCL = 85.19 µg/L). POC well W1-15 barium was slightly elevated in April at 200 µg/L; barium was, however, detected in October at 180 µg/L (below the CCL of 183.35 µg/L). These barium concentrations are also well below the 2,260 µg/L concentration detected in a temporary upgradient well installed as part of the 2014 GWMO study (Trevet, 2014). A revised CCL barium screening level for the three downgradient-monitor wells (W1-1R, W1-15, and W1-19), was applied that utilizes the 95% upper confidence limit of historical barium concentrations in these three wells (Trevet, 2016).

Where detected, cobalt concentrations (Figures D-23 through D-33) were below the 230 µg/L CCL in all Site 1 monitor wells and are within historical concentrations.

Copper concentrations (Figures D-34 through D-38) detected in all Site 1 groundwater monitoring wells are similar to previous years, with concentrations ranging from non-detect to 9.8 µg/L in W1-8. These concentrations were below the historical maximum background copper concentration of 22.3 µg/L (Trevet, 2016). Copper was also detected in collection trench well W1-23 at 29 µg/L in April and at 25 µg/L in October. Due to the limited number of historical copper detections in monitoring wells W1-5, W1-8, W1-14, W1-15, W1-16, and W1-24, concentration trends were not generated for these wells.

6.2.3 IR Site 1 Methane Monitoring

As part of landfill maintenance activities, landfill gas measurements are routinely obtained from 19 passive gas vent wells within the landfill and 4 LGMWs on the perimeter of the landfill. Surface methane monitoring was also performed at 21 surface locations on the perimeter of the site at 150-foot intervals. Site 1 methane monitoring locations are shown on Figure 9.

Methane was detected at interior landfill GV wells; however, none of the landfill gas monitoring wells (LGMW1-1 through LGMW1-4) and surface locations along the perimeter of IR Site 1 landfill showed concentrations of methane above the concentration limit of 5 %/V specified in 27 CCR §20921(a)(2) and as specified in the OU 1 ROD (Navy, 1997). Based on these data, offsite methane migration above the 5 %/V concentration limit was not indicated during this FYR period (OTIE, 2015; ERT, 2016/2017/2018/2019).

6.2.4 IR Site 22 Groundwater Gradient Data

Depth to groundwater measurements were collected were collected from the 10 perimeter monitoring wells at IR Site 22 in April and October each calendar year. Groundwater elevation exhibits seasonal trends, with the highest water levels occurring at the end of the wet season and the lowest levels occurring at the end of the dry season. Site 22 water levels were also consistent with historical groundwater elevation trends. The predominant groundwater flow direction was to the west/southwest during this FYR period. The groundwater gradient in April and October each year were as follows:

- 0.00090 ft/ft in April 2015 and 0.00050 ft/ft in October 2015
- 0.00087 ft/ft in April 2016 and 0.00150 ft/ft in October 2016
- 0.00250 ft/ft in April 2017 and 0.00140 ft/ft in October 2017
- 0.00190 ft/ft in April 2018 and 0.00060 ft/ft in October 2018

- 0.00113 ft/ft in April 2019 and 0.00012 ft/ft in October 2019

6.2.5 IR Site 22 Groundwater Chemistry

Groundwater samples are routinely collected from 10 perimeter monitoring wells at IR Site 22 (see Figure 6) on a semiannual basis. As discussed in Section 4.2.2, IR Site 22 groundwater samples were analyzed by the following methods:

- VOCs by USEP Method 8260B,
- pesticides by USEPA Method 8081A
- SVOCs by USEPA Method 8270C.

The Regional Water Board and EPA jointly approved modification of the semi-annual sampling to include only VOCs beginning in October 2018, with a full suite of COC analyzed every five (5) years (E. Well, 2018).

As shown in the Site 22 groundwater concentration graphs (Appendix D; Figures D-39 and 40) provides groundwater concentration graphs where COCs were detected at least five times from 2008 through 2019. Consistent with previous analyses, the graphical concentration data were visually evaluated for trends in increasing, decreasing or relatively consistent (flat) concentrations. COC detections per year were as follows:

CY 2015

TCE was detected in groundwater monitoring wells WGC2-8 (0.4J µg/L), WGC2-9 (1.0/1.0 µg/L and 1.5J/1.6J µg/L), and WGC2-10 (3.8J µg/L). Chloroform was detected in wells WGC2-08 (0.1J µg/L and 0.7 µg/L) and WGC2-11 (0.2J µg/L). Cis-1,2-DCE was detected in well WGC2-9 (0.2J/0.2J µg/L and 0.5J/0.5J µg/L). Toluene was detected in well WGC2-5 (0.1J µg/L). Aforementioned detections of TCE, chloroform, cis-1,2-DCE and toluene, were below their respective CCLs. Monitoring wells with chloroform, cis-1,2-DCE, and toluene, detections in 2015 did not have at least three historical detections for these VOCs (2008 through 2015), therefore, data graphs were not prepared. The TCE concentrations reported for samples from wells WGC2-8 (0.4J µg/L) and WGC2-9 (1.0 µg/L and 1.6J µg/L) during 2015 were consistent with the concentrations reported for previous years. All concentrations were considerably below the CCL of 8.8 µg/L.

Toluene was detected at 0.1J µg/L in well WGC2-5.

Chloroform at 0.2J µg/L was detected in well WGC2-11, and at 0.7 µg/L in well WGC2-8.

No pesticide was detected in the samples collected in April 2015.

The SVOC, Bis (2-ethylhexyl) phthalate, was detected below the CCL in well WGC2-13 (3.3 µg/L).

The above detections were significantly below the CCLs: chloroform (3.5 µg/L), cis-1,2-DCE (68 µg/L), TCE (8.8 µg/L), bis-(2-ethylhexyl) phthalate (30 µg/L), and toluene (500,000 µg/L),

No other COCs were detected above their respective CCLs in any samples collected the 2015 sampling events.

CY 2016

Appendix D (Figures D-39 and Figure D-40) provides groundwater monitoring point data graphs that were prepared for the two (2) sampled monitoring wells that had at least one detected concentration in 2016 and a total of at least three historically detected concentrations (2008 through 2016). Groundwater concentration trends for Site 22 MPs were determined by visually evaluating the graphs for increasing, decreasing, or relatively consistent/flat concentration trends. Based on the 2016 monitoring and historical results, graphs were generated only for TCE.

Pesticides were not detected in either April or October at the Site 22 landfill in 2016.

TCE detections in April and October samples from groundwater monitoring wells WGC2-08 (0.9 µg/L and 1.1 µg/L) and WGC2-9 (0.6/0.7 µg/L and 0.5J/0.5J µg/L) (Figures D-39 and D-40, respectively) during 2016 were consistent with the concentrations reported for previous years. All TCE concentrations were considerably below the CCL of 8.8 µg/L.

Detected concentrations of chloroform, cis-1,2-DCE, and toluene were below their respective CCLs. Chloroform was detected in well WGC2-09 at 0.2 µg/L and 0.2 µg/L; Cis-1,2-DCE was detected in wells WGC2-08 at 0.2 µg/L and WGC2-9 at 0.2 µg/L; and toluene was detected in well WGC2-5 (0.1 µg/L).

Monitoring wells with chloroform, cis-1,2-DCE, and toluene detections in 2016 did not have at least three historical detections for these VOCs (2008 through 2016), therefore, data graphs were not prepared for these wells.

Bis (2-ethylhexyl) phthalate was detected in wells WGC2-09 (2.2 µg/L and 12 µg/L), WGC2-10 (1.9 µg/L) and WGC2-12 (2.2 µg/L), all below the respective CCL. None of these wells had sufficient historical concentrations for generation of graphs.

CY 2017

Appendix D (Figures D-39 and Figure D-40) provides groundwater monitoring point data graphs that were prepared for the two sampled monitoring wells that had at least one detected concentration in 2017 and a total of at least three historically detected concentrations (2008 through 2017). Groundwater concentration trends for Site 22 MPs were determined by visually evaluating the graphs for increasing, decreasing, or relatively consistent/flat concentration trends. Based on the 2017 monitoring and historical results, graphs were generated only for TCE.

Pesticides were not detected in any samples collected in 2017.

TCE concentrations in samples collected in April and October from groundwater monitoring wells WGC2-08 (0.80 µg/L and 0.76 µg/L) and WGC2-9 (0.74 µg/L and 0.40 µg/L) (Figures D-39 and D-40, respectively) were consistent with the concentrations reported for previous years. All TCE concentrations were considerably below the CCL of 8.8 µg/L.

Chloroform and cis-1,2-DCE were detected at concentrations below their respective CCLs. Chloroform was detected in well WGC2-09 at 0.23 µg/L in April and at 0.20 µg/L in October and cis-1,2-DCE was detected in well WGC2-08 at 0.20 µg/L in April.

Monitoring wells with chloroform, cis-1,2-DCE, and toluene detections in 2017 did not have at least three historical detections for these VOCs (2008 through 2017), therefore, data graphs were not prepared for these wells.

Bis (2-ethylhexyl) phthalate was detected in well WGC2-09 at 1.3 µg/L in April and at 1.6 µg/L in October below the CCL of 30 µg/L. None of these wells had sufficient historical concentrations for generation of graphs.

CY 2018

Appendix D (Figures D-39 and Figure D-40) provides groundwater monitoring point data graphs that were prepared for the two sampled monitoring wells where the COC TCE was detected historically a sufficient number of times from 2008 through 2018 to generate concentration graphs. All other COC concentrations were historically non-detect to estimated. Based on historical and recent analytical results, only TCE graphs were generated. Groundwater concentration trends for Site 22 TCE concentrations were determined by visually evaluating the graphs for increasing, decreasing, or relatively consistent/flat concentration trends.

TCE concentrations in samples collected in April and October from groundwater monitoring wells WGC2-08 (1 µg/L and 0.86 µg/L) and WGC2-9 (ND and 0.44 µg/L) (Figures D-39 and D-40, respectively) were consistent with the concentrations reported for previous years. Where detected, TCE concentrations were considerably below the CCL of 8.8 µg/L.

Benzene, chloroform, PCE and toluene were detected at concentrations below their respective CCLs. Benzene was detected in well WGC2-05 at 0.19 µg/L in October. Chloroform was detected in well WGC2-09 at 1.2 µg/L in April and at 0.28 µg/L in October, with one additional detection in well WGC2-01 at 2.6 µg/L in October; PCE was detected in well WGC2-08 at 0.59 µg/L in April; and toluene was detected in wells WGC2-05 and WGC2-06 at 0.33 ug/L and 0.13 ug/L in October.

CY 2019

Appendix D (Figures D-39 and Figure D-40) provides groundwater monitoring point data graphs that were prepared for the two sampled monitoring wells where the COC trichloroethene (TCE) was detected historically a sufficient number of times from 2008 through 2019 to generate concentration graphs. All other COC concentrations were historically non-detect to estimated. Based on historical and recent analytical results, only TCE graphs were generated. Groundwater concentration trends for Site 22 TCE concentrations were determined by visually evaluating the graphs for increasing, decreasing, or relatively consistent/flat concentration trends.

TCE was detected in October only, with a detected concentration of 1.2 µg/L in monitor well WGC2-08 and at 0.71 µg/L/0.76 µg/L in well WGC2-09, both of which are considerably below the TCE CCL of 8.8 µg/L. These concentrations are consistent with the concentrations reported for previous years.

Benzene, PCE and toluene were not detected in either April or October. Cis-1, 2 DCE was detected in only October at 0.19 µg/L in WGC2-09 and at 0.76 µg/L in well WGC2-13; 2-Butanone at 9.5 µg/L in WGC2-4 in April; Chloroform at 0.63 µg/L in WGC2-09 in April; Acetone at 6.7 µg/L in WGC2-05 in October; and methylene chloride at 0.49 µg/L in WGC2-06 in April.

6.2.6 IR Site 22 Methane Monitoring

As part of landfill maintenance activities, landfill gas measurements are performed semiannually from 15 tree wells, 4 LGMWs on the perimeter of the landfill, and an additional 13 perimeter methane monitoring locations. Methane monitoring locations are shown on Figure 12. Methane was detected periodically at select landfill-gas monitoring wells from 2015 through 2019, but not at the tree wells or perimeter surface monitoring locations. Measured concentrations of methane was not detected above the concentration limit of 5 %/V, indicating that migration of landfill gas did not occur during this FYR period (OTIE, 2015; ERT, 2016/2017/2018/2019).

6.3 Site Inspections

The site inspections were conducted for this review on October 3, 2019. The purpose of the site inspections was to review and document current site conditions and evaluate visual evidence regarding implementation of the remedial actions at each site. This effort included noting current land use, points of access, and access requirements for each site; presence and location of fencing; and locations and conditions of monitoring wells and other aspects of the remedies. The checklists filled out during the inspections are in included in Appendix B. Photographs selected to show the Sites 1 and 22 conditions noted during the site inspections over the FYR period are included in Appendix E.

6.3.1 IR Site 1 Inspections

Access to IR Site 1 is initially controlled by the main security checkpoints for Moffett Field. In addition, IR Site 1 Former Landfill is enclosed within a chain-link fence, except for the northwest side which is bordered by a SWRP. There are currently two locked gates that need to be accessed for authorized entry onto the Site. Unauthorized entrance to the Site can be accessed by way of the SWRP when it is dry or from the Moffett Field Bay Trail at the northeast end of the site where the fence ends.

Locations of some groundwater and landfill gas monitoring wells, gas vents, the gas-venting trench, and the groundwater collection trench were confirmed during the last site inspection for well locations and maintenance which took place on 10/3/19. See Figure 3 for Site 1 feature locations and the Site 1 Landfill General Operation and Maintenance Checklist.

Recent efforts to control ground squirrel and gopher activities initiated during 2018 were documented and have been successful as reported in the DEH quarterly inspection reports for 2019. A skunk burrow was observed during a site visit on Thursday July 18, 2019. This burrow was collapsed and backfilled on July 23, 2019. During burrowing animal exclusion/burrow collapse efforts on August 29, 2019, a fabric breach of approximately 4 – 6 inches in diameter was observed during ground squirrel burrow exclusion and collapse efforts. This location was flagged for repair efforts pending receipt of original replacement fabric. Additionally, during

burrow collapse/backfill, grass or weed roots have not been observed to extend to the one foot depth of the geotextile layer.

Based upon ongoing landfill maintenance, coupled with NASA's responsiveness to DEH's findings, the IR Site 1 landfill cover is functioning as designed.

6.3.2 IR Site 22 Inspections

Access to IR Site22 is initially controlled by the main security checkpoints for Moffett Field. Because of its use as a golf course, the site itself is unfenced.

Locations of Site 22 groundwater and landfill gas monitoring wells were confirmed during the last site inspection for well location and maintenance which took place on 10/3/19. See Figure 6 for Site 22 feature locations and the Site 22 Landfill General Operation and Maintenance Checklist. NASA addresses well maintenance issues as noted during quarterly site inspections.

Burrowing animal holes have been noted at this site in the past; however, because the cap under the soil cover is cobblestone with poured concrete, site burrowing is not affecting the cap. As per an existing lease agreement with the current Golf Course management company, the burrowing animal issue is being controlled by golf course maintenance staff. Only minor evidence of burrowing was observed during the recent site inspections. The Golf Course management company was invited to the site inspections and was interviewed for this Five-Year Review.

No activity was noted at IR Site 22 that would be considered inconsistent with use as a closed landfill or golf course. Based upon successful ongoing landfill maintenance, coupled with NASA's responsiveness to DEH's findings, the IR Site 22 landfill cover is intact and functioning as designed (ERT, 2018).

7 Technical Assessment

In accordance with USEPA guidance on FYRs (USEPA, 2001), the technical assessment conducted to determine whether the remedies for IR Sites 1 and 22 are protective of human health and the environment focused on responses to the following three questions:

***Question A**: Is the remedy functioning as intended by the decision documents?*
The USEPA's guidance document (USEPA, 2001) for FYRs identifies several areas to be considered in evaluating whether the remedy selected in the ROD is functioning as designed (USEPA, 2001). Areas of consideration for the Sites 1 and 22 landfills include:

- Remedial Action Performance
  - Is the remedy operating and functioning as designed?
  - Are cleanup levels being achieved?
  - Is containment effective?
  - Do opportunities exist to improve the performance and/or reduce costs of monitoring sampling?

- System Operations/O&M
  - Will the current O&M activities maintain the effectiveness of the remedy?
  - Are there frequent changes indicating a potential issue affecting protectiveness?
  - Are there large variance in O&M costs that could indicate a potential remedy problem?

- Implementation of ICs and Other Measures – Are these functioning as planned?
  - Are ICs in place and proving to be effective in preventing exposure?
  - Are access controls in place that are providing prevention of exposure?
  - Are other actions necessary to ensure that immediate threats have been addressed

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid? The FYR guidance document identifies several areas to be considered in evaluating whether the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection remain valid (USEPA, 2001). Areas of consideration include changes in standards, changes in exposure pathways, changes in toxicity and other contaminant characteristics, changes in risk assessment methods, and expected progress toward meeting RAOs.

***Question C:** Has any other information come to light that could call into question the protectiveness of the remedy?* Examples of new information include newly exposed ecological risks, previously unconsidered unidentified risks from natural disasters (for example, flooding), or land use changes.

Each of these questions is addressed in the following subsections, building on the information and data summaries presented previously. The discussion presented here is a framework for the

protectiveness determination that explains the conclusions of the review.

7.1 IR Site 1 Technical Assessment

This section provides a technical assessment for IR Site 1 by discussing and answering each of the three questions used to evaluate the protectiveness of the remedy. A summary is provided at the end of the section.

7.1.1 Question A:

Is the remedy functioning as intended by the decision documents? Yes (see following).

7.1.1.1 Remedial Action Performance

The review of documents, ARARs, risk assumptions, and results of the site inspection indicate that the IR Site 1 cover is functioning as intended in the 1997 ROD (Navy, 1997). The construction of a landfill cover, installation of the gas-venting trench and subsurface groundwater collection trench, groundwater and gas monitoring wells, use of ICs, and post-closure maintenance have met the statutory requirements of CERCLA § 121. The constructed landfill cover is an effective barrier that minimizes potential human and ecological exposure.

The gas vents installed at the site continue to provide for efficient and safe discharge of methane to the atmosphere. During the semi-annual April and October monitoring events, concentrations of methane gas within landfill gas wells and perimeter surface monitoring locations were detected (measured in parts per million [ppm] or %/V), consistent with historical concentrations. The results indicate that migration of landfill gas is not occurring. The remedy conforms with ARARs.

The groundwater collection trench on the north side of the landfill was installed to provide immediate protection for the adjacent SWRP (Navy, 1997). Two collection wells are screened in the trench should it become necessary to pump water from the trench. Groundwater is monitored on a routine basis as previously discussed in Section 4.2.1.

Groundwater samples indicate that elevated concentrations of barium and copper are present immediately upgradient from IR Site 1 (Trevet, 2014). The elevated barium and copper concentrations detected above their associated CCLs in groundwater samples collected from the upgradient temporary wells, coupled with the consistently elevated (above CCLs) barium and copper concentrations in upgradient permanent wells W1-5 and W1-12R indicate that due to existing ambient site conditions, the CCLs established for barium and copper may not be appropriate screening criteria (Trevet, 2014). A revised CCL barium screening level for the three downgradient-monitor wells (W1-1R, W1-15, and W1-19), is applied that utilizes the 95% upper confidence limit of historical barium concentrations in these three wells (Trevet, 2016).

System Operations and O&M

There are no continuous active operating systems associated with IR Site 1. O&M activities are performed in accordance with the IR *Site 1 Landfill Final Closure Plan and Post-Closure Maintenance Plan* (TtEMI, 1998a), the *Final Site-Specific Contractor Quality Control Plan for IR Sites 1 and 2 Groundwater Monitoring and Maintenance* (FWEC, 2001b), and the *Final IR*

Site 1 Landfill Post-Closure Long-Term Maintenance Plan (TtFW, 2005). The remedy is cost-effective and uses permanent solutions.

Ground squirrel and gopher control activities are performed according to the Final California Ground Squirrel Management Plan for the IR Site 1 Landfill and HAWP (FWEC, 2002). The mitigation activities include backfilling active burrows throughout the landfill, and applying fumigant to control gophers. Fumigant was applied several times during 2018 and early 2019.

Ground squirrel and gopher burrows have been observed into the first vegetative layer of the landfill cover, which serves as a soil cap for plant growth. One skunk burrow into the vegetative layer (but not into the underlying geotextile fabric) has also been observed The deeper layers of the cover prevent (1) animal or human contact with the waste, (2) water infiltration into the waste, and (3) the escape of landfill gas. Typically, observed burrow depths range from 3 to 10 inches bgs and range from 2 to 4 inches in outer diameter. The method used to assess burrowing animal impact(s) to the integrity of the landfill cover, including the geotextile fabrics, requires inspection personnel to look for gravel, geotextile fabric, landfill waste, or other debris in the holes and on the ground surface adjacent to the holes. There is evidence that a squirrel burrow had penetrated beyond the first vegetative layer and through the geotextile fabric in one small area (~4 to 6-inch in diameter), but did not burrow into the underlying clay layer. This was discovered during regular burrow collapsing. This location was backfilled and compacted and the area monitored on a bi-weekly basis and a repair was scheduled for 2020.

During documented inspections, personnel have observed the following:

- No hole diameters exceeding 6 inches
- No presence of gravel, landfill waste, and other debris in holes and on adjacent ground surfaces
- Burrowing animal white wash and pellets adjacent to holes and ground surfaces

Based on the preceding remedy evaluation, current O&M activities at IR Site 1 maintain the effectiveness of the response actions.

7.1.1.2 Cost of O&M

An increase in the level of burrowing animal activity in 2018-2019 and an increased restriction in access to the site by airfield lessee Planetary Ventures. The increased site access restriction requires issuance of a “cyber key” each time Site 1 access is required. This involves a stop at the Airfield Control tower building to be issued and return a specific cyber key for each Site 1 visit. Frequently, the issued cyber key will experience a “low battery” issue such that a return trip to the Control tower is required, thus extending the time needed to access Site 1. This is a change from conditions when NASA Ames had not leased out the airfield. Additional labor hours were therefore required during 2018 and 2019. Concerted efforts to reduce the burrowing animal site impacts appear to have been effective; however, additional labor will be required to ensure that burrowing activity is kept at a minimum. With this additional concerted effort, the burrowing animal impact to the site will be minimized. Overall, there is nothing that indicates a potential remedy problem.

Included below is a table of the combined annual O&M costs for IR Site 1 and IR Site 22 landfills.

Table 7-1
Annual Landfills Operations and Maintenance Costs

IR Sites 1 & 22	Annual O&M Expenditure ($)
2015 (Navy)	NA
2016 (Navy)	NA
2017 (NASA)	120,920
2018 (NASA)	153,136
2019 (NASA)	181,799

Note: The NASA O&M costs for both Site 1 and Site 22 include 2017 through 2019 only since NASA assumed responsibility for O&M and reporting on 10/1/16. NASA O&M costs reflect additional labor and subcontractor efforts to control increased seasonal burrowing animal activities as compared to historical Navy "fixed-price" O&M cost contract. NASA O&M costs also reflect annual labor rate increases. The landfills annual O&M costs are not tracked separately.

7.1.1.3 Engineering and Institutional Controls

IR Site 1 has a locked fence surrounding three sides of the landfill (the SWRP is on the northwest side of the site). NASA has instituted ICs for the site, and continues the O&M of the Building 191 pump station and associated drainage system. No plans currently exist for the IR Site 1 property to change ownership. The ECs and ICs are serving their intended purpose of limiting human and ecological exposure to landfill contaminants. NASA meets its annual reporting requirements by submitting annual reports for the IR Site 1 landfill to the USEPA and Regional Water Board. The annual reports address the effectiveness of monitoring and implementation of ICs.

7.1.2 Question B:

Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection still valid? Yes, except for the barium and copper in groundwater.

7.1.2.1 Changes in Standards

A groundwater optimization study was conducted in 2014 due the detections of barium and copper in groundwater monitoring wells that exceed their respective CCLs (Trevet, 2014). As presented in Section 4.2.1, the 2014 GWMO Report indicates that due to existing site conditions, the CCLs established for barium and copper may not be appropriate screening criteria (Trevet, 2014). Historically reported data indicate that the levels of barium and copper in the Site 1 monitor wells are likely associated with upgradient groundwater concentrations (Trevet, 2016). Application of a revised CCL barium screening level for the three downgradient-monitor wells

(W1-1R, W1-15, and W1-19) utilizing the 95% upper confidence limit of historical barium concentrations in these three wells was approved in 2016 (Trevet, 2016) and applied beginning in 2017.

7.1.2.2 Changes in Toxicity and Other Contaminant Characteristics

Toxicity factors for COCs at IR Site 1 that could affect the protectiveness of the remedy have not changed. Contaminant characteristics have not changed in a way that could affect the protectiveness of the remedy.

7.1.2.3 Changes in Risk Assessment Methods

The landfill is covered with an engineered landfill cap, thereby minimizing the human and ecological contact exposure pathway. Due to no changes occurring to the protectiveness of the remedy, changes to the risk assessment method have not occurred.

7.1.2.4 Changes in Exposure Pathway

Land use at IR Site 1 has not changed since the last FYR (2010-2014); nor is it expected to change in the near future. Land use at Moffett Field and in the immediate vicinity has not changed; nor is it expected to change in the near future.

No changes to physical site conditions that could affect exposure pathways or the protectiveness of the remedy have occurred. No new contaminants or contaminant sources originating from IR Site 1 have been identified or detected during monitoring. No toxic byproducts have been generated as a result of remedy implementation.

The evaluation of risk was limited to ingestion or dermal contact with soils, inhalation of wind-eroded surface soils, and inhalation or explosion of landfill gas (Navy, 1997). This assessment of risks to human health posed by IR Site 1 is limited to exposure to soil or soil gas because groundwater is not and will not likely be used in the future as a source of drinking water or for other beneficial use due to low yield and high TDS (Navy, 1997). Landfill gas has not been detected at the boundaries of the landfill above the site action limit throughout the FYR reporting period. Because there are no buildings at the site, the vapor intrusion pathway is incomplete. Physical site conditions have not changed; therefore, there have been no changes in the potential exposure pathways.

7.1.2.5 Expected Progress Towards Meeting RAOs

As discussed in Section 4.1.1, the ROD for OU 1 did not list RAOs. However, numerical remedial goals were later developed as CCLs in the Final Technical Memorandum, IR Site 1 Groundwater Evaluation Process (TtFW, 2004a). IR Site 1 CCLs are discussed in Sections 4.2.1 and 7.1.2.1 (Trevet, 2014 & 2016). Based on an analysis of the groundwater analytical data, there have been no releases from the IR Site 1 landfill during this FYR reporting period.

7.1.3 Question C:

Has any other information come to light that could call into question the protectiveness of the remedy? No.

All ecological risks have been adequately addressed. There have been no impacts from natural disasters over the review period. However, because of the low elevation and proximity to San Francisco Bay, water level rise from high tide and/or storm events could have future impacts on the protectiveness of the remedy at IR Site 1.

Although the extent of water level rise is uncertain, extreme high tides accompanied by wind storms and heavy wave action are likely to occur over the life of the landfills. Wind and wave action from the combination of abnormally severe storms and increased tidal surge could cause remedy failure and should be considered in future planning.

The Building 191 pump station currently provides flood protection for the entire northern portion of Moffett Field, with a main pump in Building 191 and three additional auxiliary pumps. NASA installed an auxiliary pump next to Building 191 after NASA took ownership of Moffett Field. In accordance with the Final IR Site 1 Landfill Post Closure Long-Term Maintenance Plan (TtFW, 2005e), NASA inspects the landfill cover for erosion quarterly.

Evaluation of the performance of the selected remedy indicates that the landfill cover is functioning as intended and the remedy is currently protective of human health and the environment. The Site 1 landfill cover is inspected quarterly by NASA and the Santa Clara DEH, and the landfill is inspected after significant events such as flooding; however, flooding is not deemed to be a threat to future protectiveness of the remedy at this time. Land use of the site has not changed and no land use changes are currently being considered. The possibility exists for the adjacent property to become open to the public, at which time the issues of land use, security, access, and exposure will be addressed.

No additional information has been identified that suggests that the remedy for IR Site 1 may not be protective of human health and the environment.

7.1.4 IR Site 1 Technical Assessment Summary

Based on the data reviewed, Santa Clara County DEH interview (see Appendix F), and the site inspections, the cover at IR Site 1 is functioning as intended by the ROD (Navy, 1997). There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy. ARARs cited in the ROD have been met Navy, 1997). There is no other information that calls into question the protectiveness of the remedy.

7.2 IR Site 22 Technical Assessment

This section provides a technical assessment for IR Site 22 by presenting and answering each of the three questions used to determine protectiveness of the remedy. A summary is provided at the end of the section.

7.2.1 Question A:

Is the remedy functioning as intended by the decision documents? Yes (see following).

7.2.1.1 Remedial Action Performance

The review of documents, ARARs, risk assumptions, and the results of the site inspection

indicate that the IR Site 22 cover is functioning as intended by the ROD (Navy, 2002). The construction of a biotic barrier, installation of groundwater and gas monitoring wells, use of ICs, and post-closure maintenance have met the statutory requirements of CERCLA §121. The constructed biotic barrier is an effective barrier that minimizes potential human and ecological exposures.

7.2.1.2 System Operations and O&M

There are no continuous operating systems associated with IR Site 22. O&M activities are performed in accordance with the OMMP (FWEC, 2003) and Final OMMP Addendum (TtEC, 2007). The remedy is cost-effective and uses permanent solutions. See Table 7-1 for O&M costs.

No major problems were identified at the site during the reporting period except for ground squirrels and gophers burrowing into the landfill cover top soil. Observed burrow depths have ranged from 3 to 10 inches bgs, but have not penetrated into the debris. These burrows ranged from 3 to 4 inches in diameter. The method used to assess burrowing animal impacts to the integrity of the landfill cover, including the geotextile fabrics, requires inspection personnel to look for gravel, geotextile fabric, landfill waste, or other debris in the holes and on the ground surface adjacent to the holes.

During documented inspections, personnel have observed any of the following:

- No hole diameters exceeding 4 inches
- No signs that holes have been enlarged at the surface
- No presence of gravel, geotextile fabric, landfill waste, or other debris in holes or on adjacent ground surfaces
- No burrowing owl white wash or pellets in holes or on adjacent ground surfaces

During recent inspections by NASA and Santa Clara DEH, it was observed that burrowing activity had become negligible because golf course maintenance crews were effectively controlling their activities. Fumigant was used at Site 22 from 2016 through 2017.

Current O&M activities at IR Site 22 maintain the effectiveness of the response actions. Based on existing O&M requirements and activities during this FYR period, there are no additional costs indicating a potential remedy problem.

7.2.1.3 Engineering and Institutional Controls

IR Site 22 is located on the active Moffett Field Golf Course. Construction of the IR Site 22 biotic barrier was completed in 2003 in accordance with the Final Remedial Design and Implementation Work Plan for IR Site 22 Landfill (FWEC, 2002). ECs and ICs for IR Site 22 are specified in the IR Site 22 ROD (Navy, 2002). NASA conducts required maintenance activities to maintain the integrity of the landfill cover on an ongoing basis.

NASA has included provisions in its ERD which are designed to maintain the integrity of the landfill cap and prevent human and ecological exposure to landfill wastes. NASA has instituted

ICs for the site, and continues the O&M of the Building 191 pump station and associated drainage system (ERT, 2018). NASA meets its annual reporting requirements to the USEPA and Regional Water Board by submitting annual reports for the IR Site 22 Landfill. The annual reports address the effectiveness of monitoring and implementation of ICs. The monitoring strategy, which describes the required monitoring activities, schedules, and specific reporting requirements for IR Site 22, is addressed through the OMMP (FWEC, 2003), and the OMMP Addendum (TtEC, 2007).

No plans currently exist for the IR Site 22 property to change ownership. The ECs and ICs are serving their intended purpose of limiting human and ecological exposure to landfill contaminants. NASA meets its annual reporting requirements by submitting annual reports for the IR Site 22 landfill to the USEPA and Regional Water Board. The annual reports address the effectiveness of monitoring and implementation of ICs.

7.2.2 Question B:

Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid? Yes.

7.2.2.1 Changes in Standards

No newly promulgate standards or changes to existing standards, significantly impact the remedy selected.

7.2.2.2 Changes in Toxicity and Other Contaminant Characteristics

Toxicity factors for COCs at IR Site 22 that could affect the protectiveness of the remedy have not changed. Contaminant characteristics have not changed in a way that could affect the protectiveness of the remedy.

7.2.2.3 Changes in Risk Assessment Methods

The analysis of risks to human health posed by IR Site 22 is limited to exposure to soil or soil gas because groundwater is not and will not likely be used in the future as a source of drinking water or for other beneficial use due to high TDS content (TtEC, 2007). Therefore, the evaluation of risk is limited to ingestion or dermal contact with soils, inhalation of wind-eroded surface soils, and inhalation or explosion of landfill gas (Navy, 2002a). The landfill has been covered, thereby minimizing the human and ecological contact exposure pathway. Landfill gas has been detected at low quantities within the landfill area throughout the FYR period. There were therefore no changes required in the risk assessment method.

7.2.2.4 Changes in Exposure Pathways

No changes to physical site conditions that could affect exposure pathways or the protectiveness of the remedy have occurred. No new contaminants or contaminant sources originating from IR Site 22 have been identified or detected during monitoring. Because there are no buildings at the site, the vapor intrusion pathway is incomplete. No toxic byproducts have been generated as a result of remedy implementation.

Land use at IR Site 22 has not changed since the last FYR (2010-2014); nor is it expected to

change in the near future. Land use at Moffett Field and in the immediate vicinity has not changed; nor is it expected to change in the near future.

7.2.2.5 Expected Progress toward Meeting RAOs

The primary RAO is to protect human health by preventing contact with landfill refuse. This RAO is currently being met, and it is anticipated that the RAO will continue to be met in the near future.

7.2.3 Question C:

Has any other information come to light that could call into question the protectiveness of the remedy? No.

All ecological risks have been adequately addressed. There have been no impacts from natural disasters during the review period. However, because of its low elevation and proximity to San Francisco Bay, sea level rise from global warming could have future impacts on the protectiveness of the remedy at IR Site 22.

The land use of the site has not changed and no land use changes are being considered. No additional information suggests that the remedy for IR Site 22 may not be protective of human health and the environment.

7.2.4 IR Site 22 Technical Assessment Summary

The review of documents, Santa Clara County DEH and the golf course operator OB Sports interviews (see Appendix F), ARARs, and the results of the site inspections indicate that the IR Site 22 landfill cover is an effective barrier for minimizing potential human and ecological exposure. No changes in the physical conditions of the sites would affect the protectiveness of the remedy. To ensure future protectiveness, NASA has incorporated the ICs into its ERD. No other information calls into question the protectiveness of the remedy.

8 Issues, Recommendations, Follow-Up Actions

This section presents issues, recommendations, and follow-up actions for IR Sites 1 and 22 at the former Moffett Field.

8.1 IR Site 1

IR Site 1 has no issues or recommendations and no follow-up actions are needed.

In addition, the following are recommendations that were identified during the Five-Year Review and may improve the performance of the remedy, but do not affect current protectiveness, future protectiveness, or both:

- Perform landfill inspections on a quarterly basis to ensure that any burrows discovered from burrowing animals are backfilled to prevent exposing landfill wastes. NASA will consider application of fumigant, if necessary, to control burrowing gophers and ground squirrels at IR Site 1. Any fumigant application will be in accordance with proper procedures to avoid or minimize impacts to all non-target species.
- Calculate a revised barium CCL screening level for the three downgradient POC monitoring wells (W1-1R, W1-15, and W1-19) on an annual basis utilizing the 95% upper confidence limit of historical barium concentrations in these wells. Historically reported data indicate that the levels of barium in the Site 1 monitor wells are likely associated with the higher, up-gradient groundwater concentrations (Trevet, 2016). This CCL analysis provides evidence that elevated barium concentrations are not indicative of potential landfill impacts to the surrounding groundwater.
- Enforcing land use restrictions by not allowing any activities that would compromise the integrity of the landfill cap at Site 1. ICs have been incorporated into NASA's ERD (NASA, 2015). A schedule for reporting on the status and efficacy of ICs has been developed and provided to the regulatory agencies (NASA, 2017). Furthermore, in the event of a future conveyance of the property, NASA will notify subsequent landowners of any restrictions in land use.
- Evaluate potential sea level rise effects on the Site 1 remedy when considering future planning.

8.2 IR Site 22

IR Site 22 has no issues or recommendations and no follow-up actions are needed.

In addition, the following are recommendations that were identified during the Five-Year Review and may improve the performance of the remedy, but do not affect current protectiveness, future protectiveness, or both:

- Enforce land use restrictions by not allowing any activities that would compromise the integrity of the landfill cap at Site 22. ICs have been incorporated into NASA's ERD (NASA, 2015). A schedule for reporting on the status and efficacy of ICs has been developed and provided to the regulatory agencies (NASA, 2017). Furthermore, in the event of a future conveyance of the property, NASA will notify subsequent landowners of any restrictions in land use.
- Performing landfill inspections on a quarterly basis to ensure that any burrows discovered from burrowing animals are backfilled to prevent exposing landfill wastes. NASA will consider application of fumigant, if necessary, to control burrowing gophers and ground squirrels at IR Site 22. Any fumigant application will be in accordance with proper procedures to avoid or minimize impacts to all non-target species.
- Evaluate potential sea level rise effects on the Site 22 remedy when considering future planning.

9 Protectiveness Statement

IR Site 1: The remedy for IR Site 1 is protective of human health and the environment.

Engineering and institutional controls have addressed all exposure pathways that could result in unacceptable risks at the site. Groundwater contaminant concentrations are stable, landfill gas is not migrating from the landfill, and the landfill cover is functioning as intended, as confirmed by semiannual groundwater and landfill gas monitoring and quarterly inspections of institutional and engineering controls.

IR Site 22: The remedy for IR Site 22 is protective of human health and the environment.

Engineering and institutional controls have addressed all exposure pathways that could result in unacceptable risks at the site. Groundwater contaminant concentrations are stable, landfill gas is not migrating from the landfill, and the landfill cover is functioning as intended, as confirmed by semiannual groundwater and landfill gas monitoring and quarterly inspections of institutional and engineering controls.

10 Next Review

The next FYR for IR Sites 1 and 22 at the former Moffett Field will be due February 12, 2025. Consecutive FYRs will be required for IR Sites 1 and 22 as long as contamination remains that does not allow for unlimited use and unrestricted exposure.

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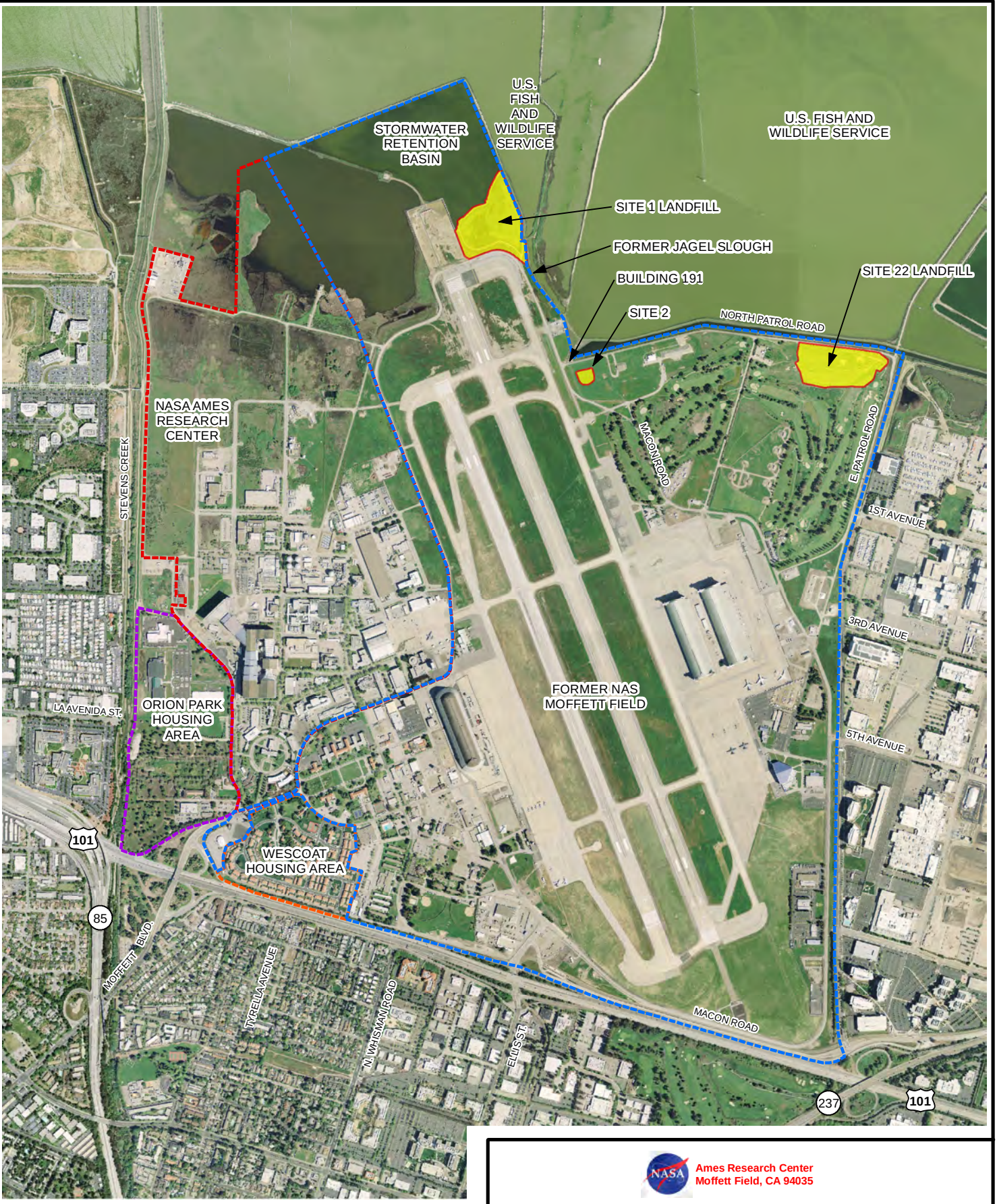
Appendix A

Site 1 and Site 22 Figures

Figure 1
Location Map of NASA Ames



NAS Naval Air Station
NASA National Aeronautics and Space Administration

Ames Research Center
Moffett Field, CA 94035

FIGURE 2

LOCATION MAP OF NAVY LANDFILL SITE 1 AND SITE 22

\\Stratos\JQ\Restoration\Navy Sites 1 & 22\NAVY LANDFILLS 2016\GIS MAPS & FIGURES\Figure 02_Combined_IJD02.mxd

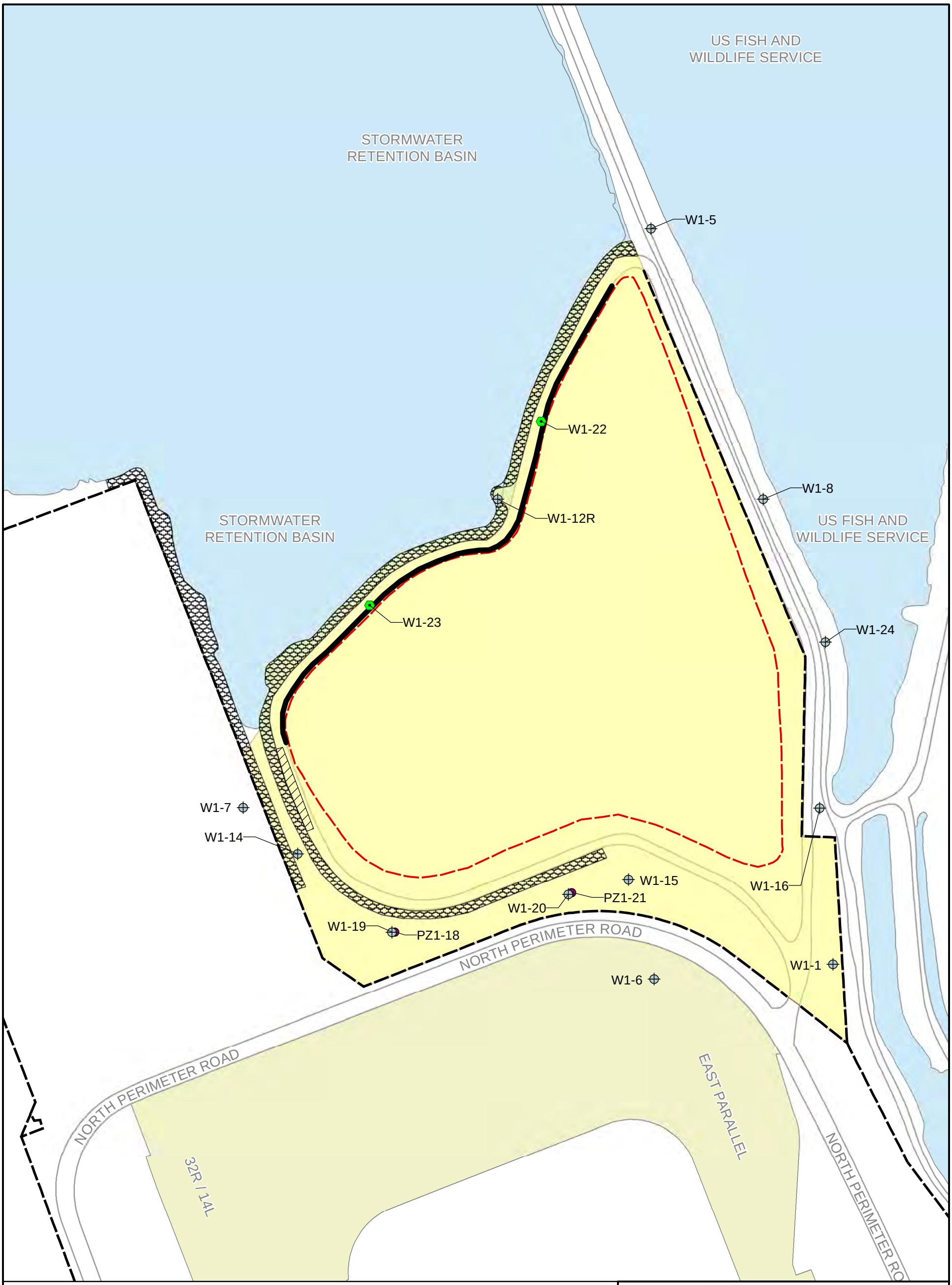


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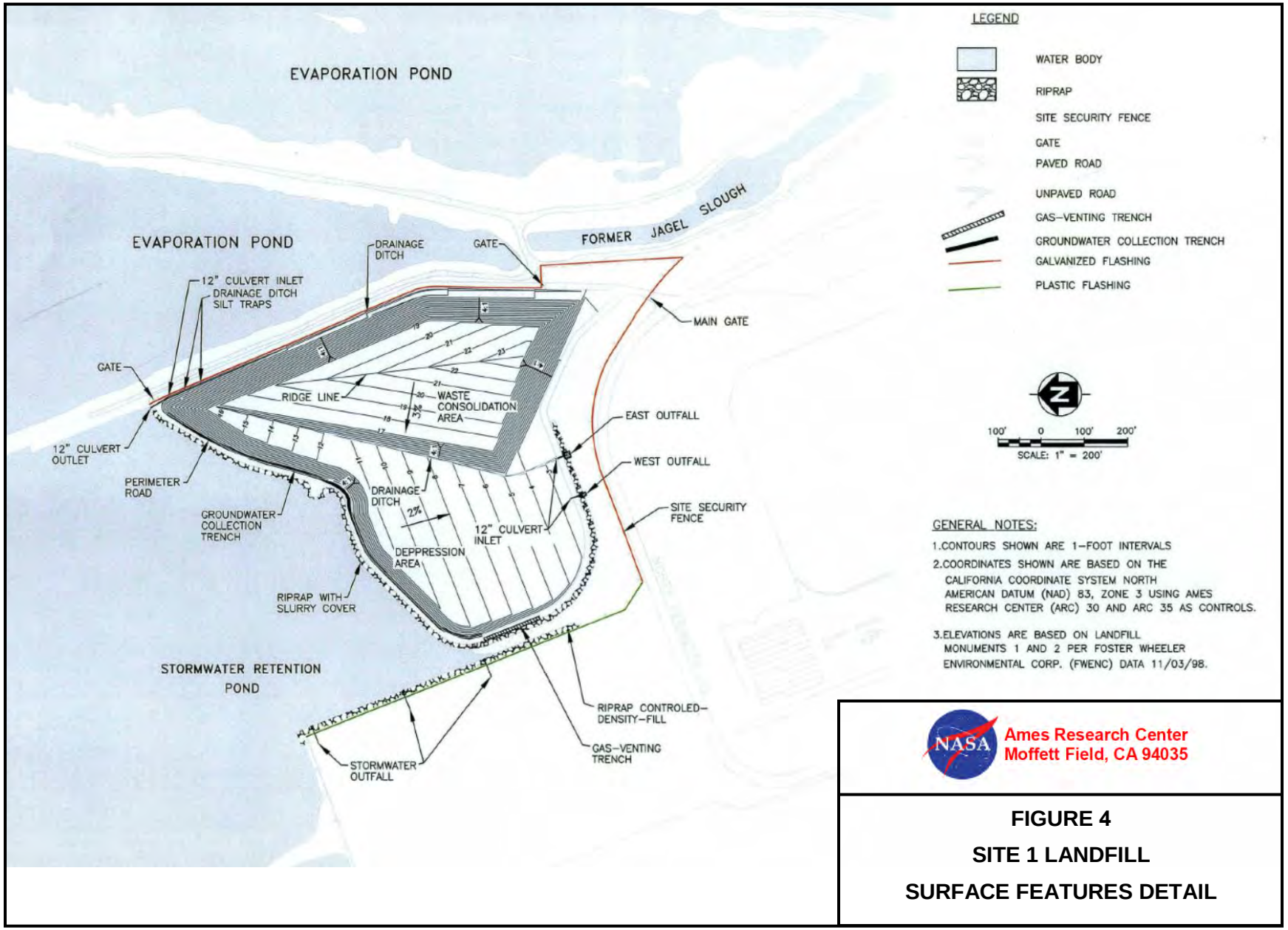
FIGURE 3
SITE 1 LANDFILL

GROUNDWATER LEVEL MEASUREMENT AND MONITORING LOCATIONS



GENERAL NOTES:

1. CONTOURS SHOWN ARE 1-FOOT INTERVALS
2. COORDINATES SHOWN ARE BASED ON THE CALIFORNIA COORDINATE SYSTEM NORTH AMERICAN DATUM (NAD) 83, ZONE 3 USING AMES RESEARCH CENTER (ARC) 30 AND ARC 35 AS CONTROLS.
3. ELEVATIONS ARE BASED ON LANDFILL MONUMENTS 1 AND 2 PER FOSTER WHEELER ENVIRONMENTAL CORP. (FWENC) DATA 11/03/98.

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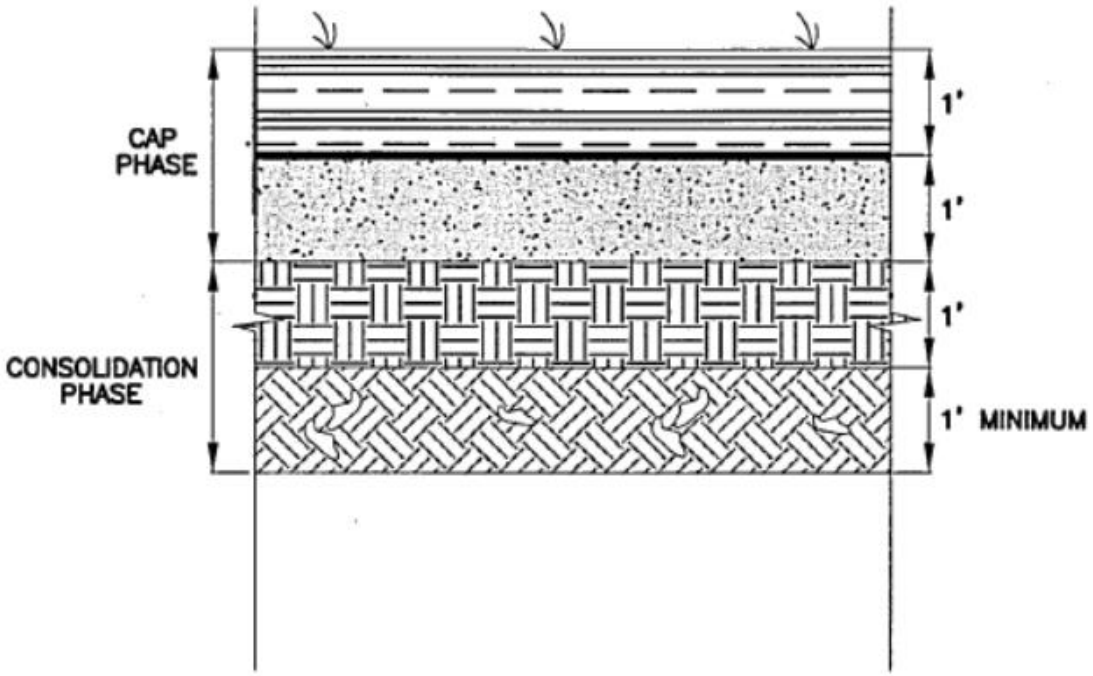
FIGURE 4

SITE 1 LANDFILL

SURFACE FEATURES DETAIL



LEGEND

VEGETATIVE COVER

BIOTIC BARRIER (10 OZ/YD^2 NON-WOVEN GEOTEXTILE)

LOW PERMEABILITY CLAY LAYER (PALO ALTO CLAY. 1x10^{-6} CM/SEC)

UPPER FOUNDATION LAYER

LOWER FOUNDATION LAYER

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FIGURE 5

SITE 1 LANDFILL CAP

BIOTIC BARRIER

CROSS-SECTION DETAIL

US FISH AND
WILDLIFE SERVICE

US FISH AND
WILDLIFE SERVICE

NORTHERN CHANNEL

NORTHERN CHANNEL

NORTH PATROL ROAD

NORTH PATROL ROAD DITCH

NORTH PATROL ROAD

NORTH PATROL ROAD DITCH

WGC2-5

WGC2-4

WGC2-8

WGC2-9

WGC2-10

WGC2-12

WGC2-6

WGC2-11

WGC2-1

WGC2-13

GOLF COURSE
WATER HAZARD

GOLF COURSE
WATER HAZARD

GOLF COURSE
WATER HAZARD

GOLF COURSE
WATER HAZARD

EAST PATROL ROAD

PATROL ROAD DITCH

PATROL ROAD DITCH

Site 22

Groundwater Monitoring Well Location

Estimated Extent of Refuse

Former NAS Moffett Field Boundary

Road

Water/Wetland

Paved

N

0 75 150 300

Feet

NASA

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Moffett Field, CA 94035

FIGURE 6
SITE 22 LANDFILL

GROUNDWATER LEVEL MEASUREMENT AND MONITORING LOCATIONS

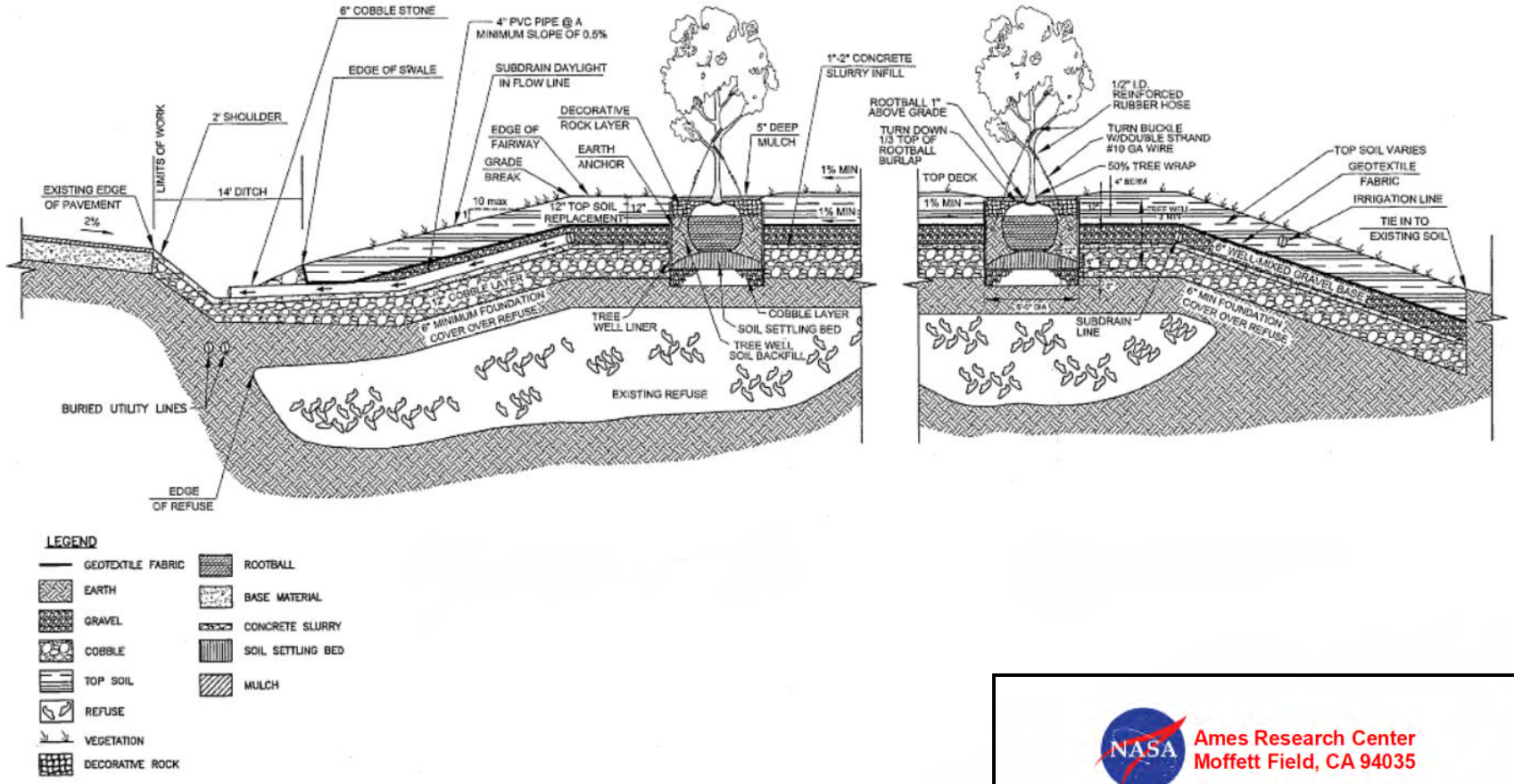

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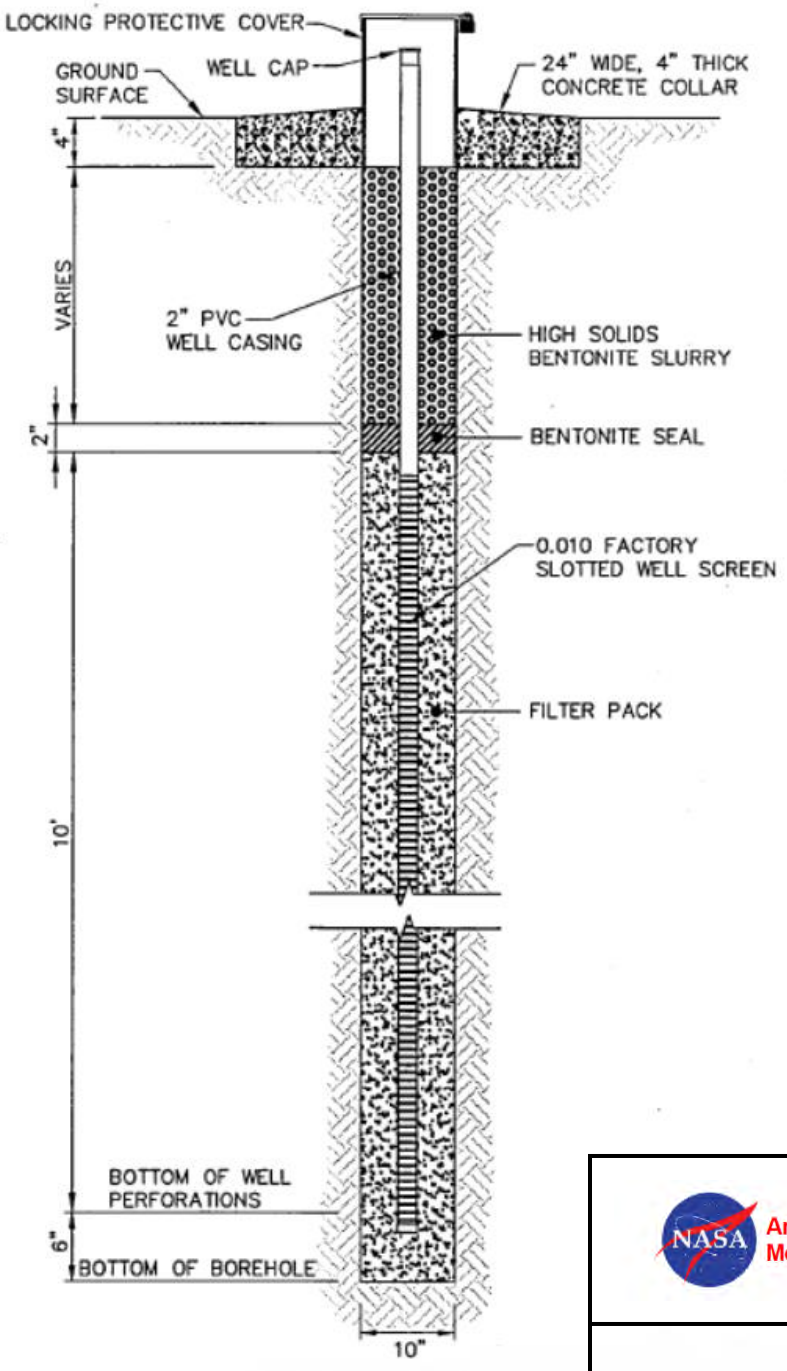
FIGURE 7

SITE 22 LANDFILL CAP

BIOTIC BARRIER

CROSS-SECTION DETAIL



NOTES:

1. WELL W1–1 IS A SURFACE COMPLETION.

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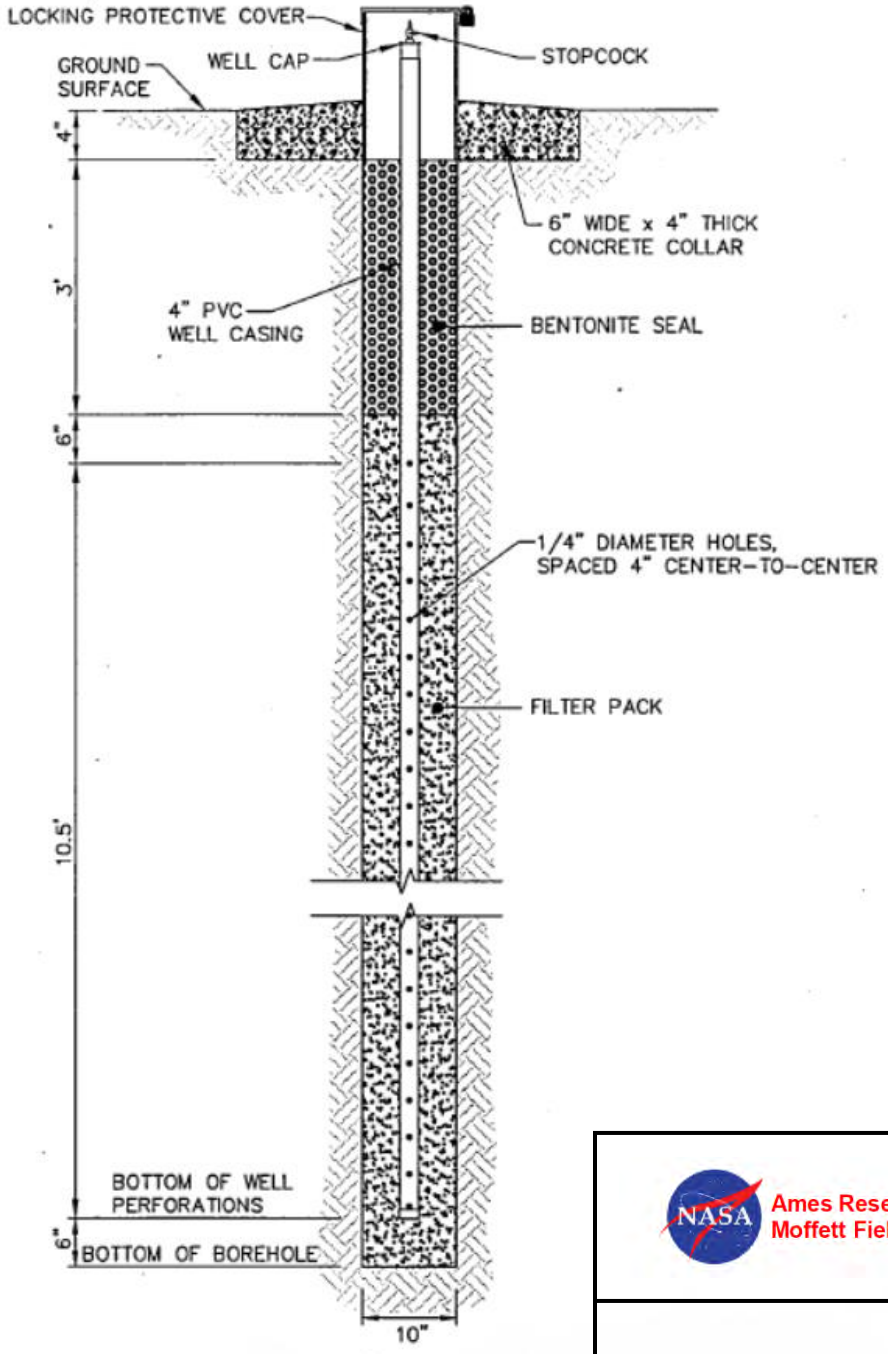
FIGURE 8

LANDFILL GROUNDWATER MONITORING WELL CONSTRUCTION DETAIL


US FISH AND WILDLIFE SERVICE
STORMWATER RETENTION BASIN
LGMW1-4
P-21
P-20
GV-8
P-1
GV-12
GV-7
P-2
P-19
STORMWATER RETENTION BASIN
US FISH AND WILDLIFE SERVICE
GV-13
GV-11
GV-5
P-18
GV-6
P-3
GV-17
P-4
GV-14
GV-10
GV-3
GV-4
P-17
GV-16
P-5
P-16
GV-18
GV-9
GV-19
GV-2
LGMW1-3
GV-1
GV-15
P-15
P-6
P-11
P-14
P-12
LGMW1-1
P-7
NORTH PERIMETER ROAD
P-13
P-10
LGMW1-2
P-8
P-9
NORTH PERIMETER ROAD
EAST PARALLEL
32R / 14L
NORTH PERIMETER RO
Site 1
Approximate Perimeter Landfill Gas Monitoring Location
Landfill Gas Monitoring Well
Approximate Gas Vent Location
Riprap
Gas Venting Trench
Runway
Water/Wetland
Estimated Extent of Refuse
Site Security Fence
Groundwater Collection Trench
Road
N
0
75
150
300
Feet
NASA
Ames Research Center
Moffett Field, CA 94035
FIGURE 9
SITE 1 LANDFILL
METHANE MONITORING LOCATIONS



NOTES:

1. LGMW1-4 HAS 2" PVC CASING
2. PROTECTIVE CASING RANGE IN HEIGHT FROM 1'4" TO 3'5".

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FIGURE 10

LANDFILL GAS MONITORING WELL CONSTRUCTION DETAIL

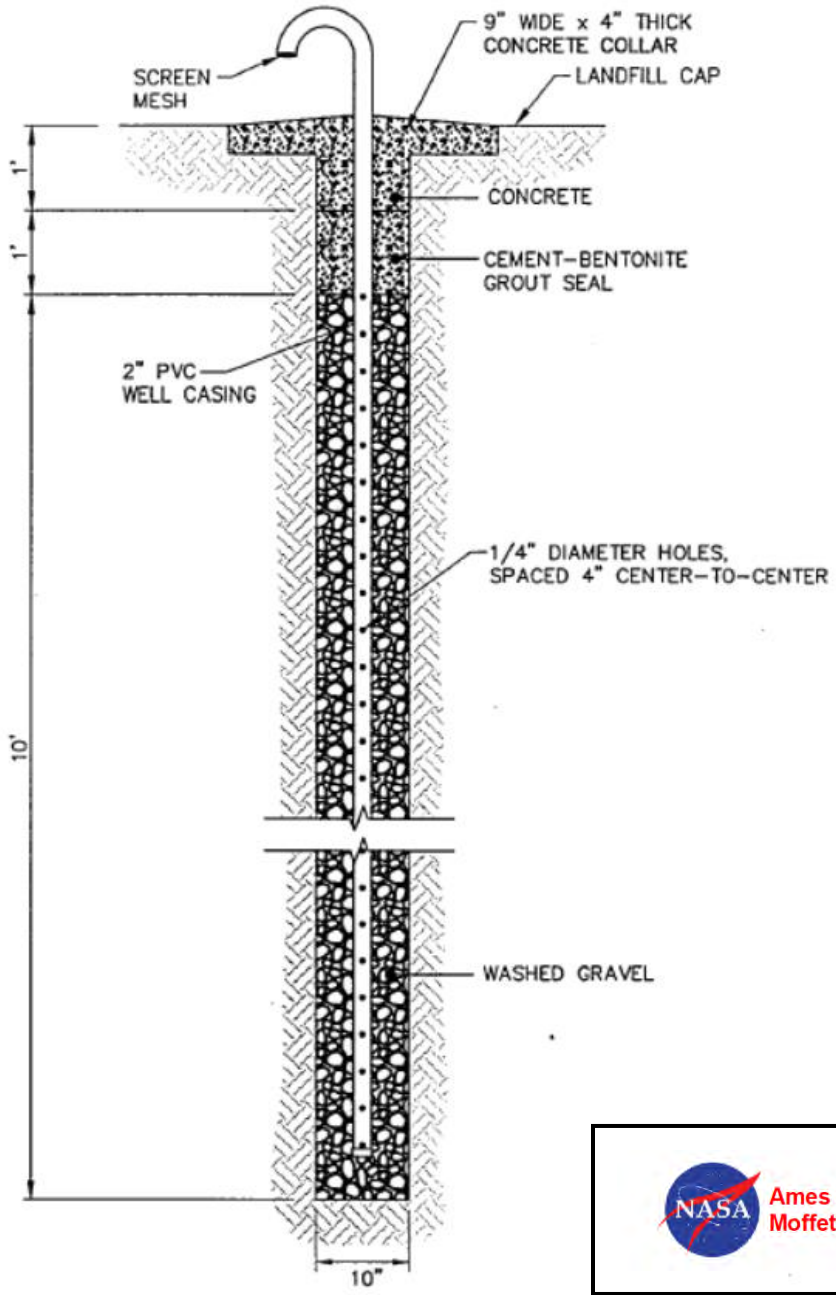

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FIGURE 11

LANDFILL GAS VENT WELL CONSTRUCTION DETAIL

US FISH AND
WILDLIFE SERVICE

US FISH AND
WILDLIFE SERVICE

FUEL PIER BRIDGE

NORTH PATROL ROAD DITCH

NORTHERN CHANNEL

NORTH PATROL ROAD

NORTHERN CHANNEL

NORTH PATROL ROAD DITCH

NORTH PATROL ROAD

P9 P10 P11 P12 P13 P1 P2 P3 P4 P5 P6 P7 P8

LGMW-1 LGMW-2 LGMW-3 LGMW-4

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56

GOLF COURSE
WATER HAZARD

GOLF COURSE
WATER HAZARD

GOLF COURSE
WATER HAZARD

GOLF COURSE
WATER HAZARD

EAST PATROL ROAD

PATROL ROAD DITCH

PATROL ROAD DITCH

Site 22

Estimated Extent of Refuse

Former NAS Moffett Field Boundary

Road

Water/Wetland

Paved

Perimeter Methane Monitoring Point

Landfill Gas Monitoring Well

Tree Well

Tree Well Methane Monitoring Point

0 75 150 300

Feet

N

NASA

Ames Research Center
Moffett Field, CA 94035

FIGURE 12
SITE 22 LANDFILL

METHANE MONITORING LOCATIONS

Appendix B

Site Inspection Reports and Santa Clara County DEH Inspection Checklists

2015

General Site Inspection Reports and Santa Clara County Inspection Reports

General Site Inspection Reports

Site 1

TABLE 4-1

SITE 1 LANDFILL GENERAL INSPECTION CHECKLIST AND FREQUENCY

2/17/2015
S. Sharma.

Item	Frequency[a]	Condition			Comments
		Good	Needs Maintenance	N/A	
General Site Conditions					
- Perimeter Road	Semiannual	✓			
- Landfill signs	Semiannual	✓			
- Inspect for nesting owls and burrowing animals	Semiannual	✓			No nesting owl present
- Security fencing and gates	Semiannual	✓			
- Riprap	Semiannual				
- Raptor perches	Semiannual			✓	Discussing removal
Landfill Cap					
- Iso-settlement and surveying landfill settlement markers	Every 5 Years[b]				
- Erosion	Semiannual	✓			
- Visual observations of settling (i.e., cracking, sloughing)	Semiannual	✓			
- Vegetation control and restoration	Semiannual	✓			Vegetation growth is about 12 feet. mowing in Summer
- Cap breaching	Semiannual	✓			channel need remov
- Water drainage	Semiannual	✓			Tumbleweed from dozing
Landfill Gas Vents					
- Riser condition (i.e., paint, integrity)	Semiannual	✓			
- Identification tag present	Semiannual	✓			
- Concrete collar condition	Semiannual	✓			
- Screen condition	Semiannual	✓			
Landfill Gas Monitoring Wells					
- Riser condition (i.e., paint, integrity)	Semiannual	✓			
- Identification tag present	Semiannual	✓			
- Traffic protection (i.e., bollards)	Semiannual	✓			
- Concrete collar condition	Semiannual	✓			
- Well cap integrity	Semiannual	✓			
- Water drainage	Semiannual	✓			
- Well locks	Semiannual	✓			
Collection Trench Wells					
- Concrete collar condition	Semiannual	✓			
- Protective cover condition	Semiannual	✓			
- Identification number legibility	Semiannual	✓			

2/17/2015

TABLE 4-1

SITE 1 LANDFILL GENERAL INSPECTION CHECKLIST AND FREQUENCY

Item	Frequency[a]	Condition			Comments
		Good	Needs Maintenance	N/A	
- Well cap integrity	Semiannual	✓			
- Water drainage	Semiannual	✓			
- Well locks	Semiannual	✓			
Groundwater Monitoring Wells and Piezometers					
- Riser condition (i.e., paint, integrity, cover)	Semiannual	✓			
- Identification number legibility					
- Concrete collar condition	Semiannual	✓			
- Traffic protection (i.e., bollards)	Semiannual	✓			
- Well cap integrity	Semiannual	✓			
- Water drainage	Semiannual	✓			
- Well locks	Semiannual	✓			
Stormwater Runoff Control					
- Water drainage	Semiannual	✓			
- Culvert and trench drainage	Semiannual	✓			
- Riprap	Semiannual	✓			
- Erosion	Semiannual	✓			
- Settlement	Semiannual	✓			

Notes:

(a) Frequency indicates minimum requirements. Semiannual inspections will be conducted in March and September, except for the stormwater runoff control, which will be inspected before the October reainy season ane in May at the end of the rainy season. Inspections also are required after significant storm events and as needed.

(b) Every 5 years from the previous surveying and iso-settlement mapping.

Abbreviations and Acronyms:

N/A - not applicable

TABLE 4-1

SITE 1 LANDFILL GENERAL INSPECTION CHECKLIST AND FREQUENCY

4/21/15 S. Shramm

Item	Frequency[a]	Condition			Comments
		Good	Needs Maintenance	N/A	
General Site Conditions					
- Perimeter Road	Semiannual	—			
- Landfill signs	Semiannual	—			
- Inspect for nesting owls and burrowing animals *	Semiannual	—			No nesting Owls present
- Security fencing and gates	Semiannual	—			
- Riprap	Semiannual	—			
- Raptor perches	Semiannual			—	Raptors removal is being scheduled. in May-June 2015.
Landfill Cap					
- Iso-settlement and surveying landfill settlement markers	Every 5 Years[b]				
- Erosion	Semiannual	—			
- Visual observations of settling (i.e., cracking, sloughing)	Semiannual	—			
- Vegetation control and restoration	Semiannual	—			vegetation is 3-4 feet high. Mowing scheduled in May-June.
- Cap breaching	Semiannual	—			
- Water drainage	Semiannual	—			
Landfill Gas Vents					
- Riser condition (i.e., paint, integrity)	Semiannual	—			
- Identification tag present	Semiannual	—			
- Concrete collar condition	Semiannual	—			
- Screen condition	Semiannual	—			
Landfill Gas Monitoring Wells					
- Riser condition (i.e., paint, integrity)	Semiannual	—			
- Identification tag present	Semiannual	—			
- Traffic protection (i.e., bollards)	Semiannual	—			
- Concrete collar condition	Semiannual	—			
- Well cap integrity	Semiannual	—			
- Water drainage	Semiannual	—			
- Well locks	Semiannual	—			
Collection Trench Wells					
- Concrete collar condition	Semiannual	—			
- Protective cover condition	Semiannual	—			
- Identification number legibility	Semiannual	—			

* Minimal gopher activity was observed. Traps are being employed to control gopher activity. No fumitorin has been applied since April 2014.

4/21/15

TABLE 4-1

SITE 1 LANDFILL GENERAL INSPECTION CHECKLIST AND FREQUENCY

Item	Frequency[a]	Condition			Comments
		Good	Needs Maintenance	N/A	
- Well cap integrity	Semiannual	/			
- Water drainage	Semiannual	/			
- Well locks	Semiannual	/			
Groundwater Monitoring Wells and Piezometers					
- Riser condition (i.e., paint, integrity, cover)	Semiannual	/			
- Identification number legibility					
- Concrete collar condition	Semiannual	/			
- Traffic protection (i.e., bollards)	Semiannual	/			
- Well cap integrity	Semiannual	/			
- Water drainage	Semiannual	/			
- Well locks	Semiannual	/			
Stormwater Runoff Control					
- Water drainage	Semiannual	/			
- Culvert and trench drainage	Semiannual	/			
- Riprap	Semiannual	/			
- Erosion	Semiannual	/			
- Settlement	Semiannual	/			

Notes:

(a) Frequency indicates minimum requirements. Semiannual inspections will be conducted in March and September, except for the stormwater runoff control, which will be inspected before the October reainy season ane in May at the end of the rainy season. Inspections also are required after significant storm events and as needed.

(b) Every 5 years from the previous surveying and iso-settlement mapping.

Abbreviations and Acronyms:

N/A - not applicable

TABLE 4-1

7/14/15 S. Sharma

SITE 1 LANDFILL GENERAL INSPECTION CHECKLIST AND FREQUENCY

Item	Frequency[a]	Condition			Comments
		Good	Needs Maintenance	N/A	
General Site Conditions					
- Perimeter Road	Semiannual	—			
- Landfill signs	Semiannual	—			
- Inspect for nesting owls and burrowing animals *	Semiannual	—			No nesting owls present.
- Security fencing and gates	Semiannual	—			
- Riprap	Semiannual	—			
- Raptor perches	Semiannual	~~—~~ SS		—	Raptor perches were removed in June.
Landfill Cap					
- Iso-settlement and surveying landfill settlement markers	Every 5 Years[b]				
- Erosion	Semiannual	—			
- Visual observations of settling (i.e., cracking, sloughing)	Semiannual	—			
- Vegetation control and restoration	Semiannual	—			mowing performed in June 2015.
- Cap breaching	Semiannual	—			
- Water drainage	Semiannual	—			
Landfill Gas Vents					
- Riser condition (i.e., paint, integrity)	Semiannual	—			
- Identification tag present	Semiannual	—			
- Concrete collar condition	Semiannual	—			
- Screen condition	Semiannual	—			
Landfill Gas Monitoring Wells					
- Riser condition (i.e., paint, integrity)	Semiannual	—			
- Identification tag present	Semiannual	—			
- Traffic protection (i.e., bollards)	Semiannual	—			
- Concrete collar condition	Semiannual	—			
- Well cap integrity	Semiannual	—			
- Water drainage	Semiannual	—			
- Well locks	Semiannual	—			
Collection Trench Wells					
- Concrete collar condition	Semiannual	—			
- Protective cover condition	Semiannual	—			
- Identification number legibility	Semiannual	—			

* 1) Minimal gopher activity is being controlled by flagging active burrows, monitoring, traps, and backfilling burrows (inactive).

2) Ground squirrel activity at fencing area next to the east slope is being controlled by flagging burrows, monitoring & backfilling inactive burrows.

TABLE 4-1

SITE 1 LANDFILL GENERAL INSPECTION CHECKLIST AND FREQUENCY

Item	Frequency[a]	Condition			Comments
		Good	Needs Maintenance	N/A	
- Well cap integrity	Semiannual	✓			
- Water drainage	Semiannual	✓			
- Well locks	Semiannual	✓			
Groundwater Monitoring Wells and Piezometers					
- Riser condition (i.e., paint, integrity, cover)	Semiannual	✓			
- Identification number legibility					
- Concrete collar condition	Semiannual	✓			
- Traffic protection (i.e., bollards)	Semiannual	✓			
- Well cap integrity	Semiannual	✓			
- Water drainage	Semiannual	✓			
- Well locks	Semiannual	✓			
Stormwater Runoff Control					
- Water drainage	Semiannual	✓			
- Culvert and trench drainage	Semiannual	✓			
- Riprap	Semiannual	✓			
- Erosion	Semiannual	✓			
- Settlement	Semiannual	✓			

Notes:

(a) Frequency indicates minimum requirements. Semiannual inspections will be conducted in March and September, except for the stormwater runoff control, which will be inspected before the October reainy season ane in May at the end of the rainy season. Inspections also are required after significant storm events and as needed.

(b) Every 5 years from the previous surveying and iso-settlement mapping.

Abbreviations and Acronyms:

N/A - not applicable

TABLE 4-1

11/16/15
S. Thompson.

SITE 1 LANDFILL GENERAL INSPECTION CHECKLIST AND FREQUENCY

Item	Frequency[a]	Condition			Comments
		Good	Needs Maintenance	N/A	
General Site Conditions					
- Perimeter Road	Semiannual	✓			
- Landfill signs	Semiannual	✓			
- Inspect for nesting owls and burrowing animals *	Semiannual	✓			No owls were present
- Security fencing and gates	Semiannual	✓			
- Riprap	Semiannual	✓			
- Raptor perches	Semiannual			✓	Remove concrete blocks of removed perches.
Landfill Cap					
- Iso-settlement and surveying landfill settlement markers	Every 5 Years[b]	✓			
- Erosion	Semiannual	✓			
- Visual observations of settling (i.e., cracking, sloughing)	Semiannual	✓			Backfill gaps at bollards to prevent rodent habitat
- Vegetation control and restoration	Semiannual	✓			Growth observed post rain.
- Cap breaching	Semiannual	✓			
- Water drainage	Semiannual	✓			
Landfill Gas Vents					
- Riser condition (i.e., paint, integrity)	Semiannual	✓			
- Identification tag present	Semiannual	✓			
- Concrete collar condition	Semiannual	✓			
- Screen condition	Semiannual	✓			
Landfill Gas Monitoring Wells					
- Riser condition (i.e., paint, integrity)	Semiannual	✓			
- Identification tag present	Semiannual	✓			
- Traffic protection (i.e., bollards)	Semiannual	✓			
- Concrete collar condition	Semiannual	✓			
- Well cap integrity	Semiannual	✓			
- Water drainage	Semiannual	✓			
- Well locks	Semiannual	✓			
Collection Trench Wells					
- Concrete collar condition	Semiannual	✓			
- Protective cover condition	Semiannual	✓			
- Identification number legibility	Semiannual	✓			

* 1) Some shallow holes indicative of raccoon activity were noticed.
2) Some gopher activity was noticed next to fence on the southern edge. Burrows are flagged and will be backfilled if found inactive during subsequent inspection.

TABLE 4-1

SITE 1 LANDFILL GENERAL INSPECTION CHECKLIST AND FREQUENCY

Item	Frequency[a]	Condition			Comments
		Good	Needs Maintenance	N/A	
- Well cap integrity	Semiannual	✓			
- Water drainage	Semiannual	✓			
- Well locks	Semiannual	✓			
Groundwater Monitoring Wells and Piezometers					
- Riser condition (i.e., paint, integrity, cover)	Semiannual	✓			
- Identification number legibility					
- Concrete collar condition	Semiannual	✓			
- Traffic protection (i.e., bollards)	Semiannual	✓			
- Well cap integrity	Semiannual	✓			
- Water drainage	Semiannual	✓			
- Well locks	Semiannual	✓			
Stormwater Runoff Control					
- Water drainage	Semiannual	✓			
- Culvert and trench drainage	Semiannual	✓			
- Riprap	Semiannual	✓			
- Erosion	Semiannual	✓			
- Settlement	Semiannual	✓			

Notes:

(a) Frequency indicates minimum requirements. Semiannual inspections will be conducted in March and September, except for the stormwater runoff control, which will be inspected before the October reainy season ane in May at the end of the rainy season. Inspections also are required after significant storm events and as needed.

(b) Every 5 years from the previous surveying and iso-settlement mapping.

Abbreviations and Acronyms:

N/A - not applicable

General Site Inspection Reports

Site 22

TABLE F.3-4

IR SITE 22 LANDFILL GENERAL OPERATIONS AND MAINTENANCE INSPECTION CHECKLIST

Inspection Date: 7/17/15 Inspector: SS

Site	Item	Condition: Good	Condition: Needs Maintenance	N/A	Comments
22	**General Site**				
	- water drainage	✓			Ponding at Landfill edge from irrigation.
	- culvert/trench drainage	✓			
	- warning/instruction signs	✓			
	- inspect for nesting owls	✓			NO owls present
	Landfill Cover				
	- erosion	✓			
	- settling	✓			
	- cracking	✓			
	- rodent burrows	✓			ongoing maintenance
	- vegetation restoration	✓			
	- tree wells	✓			
	- water drainage	✓			
	Landfill Gas Monitoring Wells				
	- well cap integrity	✓			
	- water drainage	✓			
	- concrete collar condition	✓			
	- locks	✓			
	Groundwater Monitoring Wells				
	- well cap integrity	✓			
	- water drainage	✓			
	- concrete collar condition	✓			
	- locks	✓			
	Stormwater Runoff Control				
	- water drainage	✓			
	- culvert/trench drainage	✓			
	- settlement	✓			
	- erosion	✓			

Abbreviations and Acronyms:

N/A - Not applicable

TABLE F.3-4

IR SITE 22 LANDFILL GENERAL OPERATIONS AND MAINTENANCE INSPECTION CHECKLIST

Inspection Date: 4/21/15 **Inspector:** SS

Site	Item	Condition			Comments
		Good	Needs Maintenance	N/A	
22	**General Site**				
	- water drainage *	✓			Ponding at Landfill edge and near LGMW-1.
	- culvert/trench drainage	✓			
	- warning/instruction signs	✓			
	- inspect for nesting owls	✓			No owls present
	Landfill Cover				
	- erosion	✓			
	- settling	✓			
	- cracking	✓			
	- rodent burrows	✓			on going maintenance
	- vegetation restoration	✓			
	- tree wells	✓			
	- water drainage	✓			
	Landfill Gas Monitoring Wells				
	- well cap integrity	✓			
	- water drainage	✓			
	- concrete collar condition	✓			
	- locks	✓			
	Groundwater Monitoring Wells				
	- well cap integrity	✓			
	- water drainage	✓			
	- concrete collar condition	✓			
	- locks	✓			
	Stormwater Runoff Control				
	- water drainage	✓			
	- culvert/trench drainage	✓			
	- settlement	✓			
	- erosion	✓			

* 1) Ponding at the edge of the Landfill due to irrigation run-off was noticed. More fill needs to be placed.
2) Ponding observed in the drainage channel near LGMW-1. More fills needs to be placed.
Navy will contact NASA (golf course is managed by Planetary Ventures a google subsidiary).

Abbreviations and Acronyms:

N/A - Not applicable

TABLE F.3-4

IR SITE 22 LANDFILL GENERAL OPERATIONS AND MAINTENANCE INSPECTION CHECKLIST

Inspection Date: 7/14/15 Inspector: SS.

Site	Item	Condition: Good	Condition: Needs Maintenance	Condition: N/A	Comments
22	**General Site**				
	- water drainage *	—			Ponding at Landfill edge and near LAMW-1.
	- culvert/trench drainage	—			
	- warning/instruction signs	—			
	- inspect for nesting owls	—			No owls present
	Landfill Cover				
	- erosion	—			
	- settling	—			
	- cracking	—			
	- rodent burrows	—			On going maintenance.
	- vegetation restoration	—			
	- tree wells	—			
	- water drainage	—			
	Landfill Gas Monitoring Wells				
	- well cap integrity	—			
	- water drainage	—			
	- concrete collar condition	—			
	- locks	—			
	Groundwater Monitoring Wells				
	- well cap integrity	—			
	- water drainage	—			
	- concrete collar condition	—			
	- locks	—			
	Stormwater Runoff Control				
	- water drainage	—			
	- culvert/trench drainage	—			
	- settlement	—			
	- erosion	—			

* 1) Ponding at the Landfill edge due to irrigation run-off observed. More fill needs to be placed.

2) Ponding in the drainage channel near LAMW-1 was obsered- More fill needs to be placed.

Abbreviations and Acronyms:
N/A - Not applicable

Note — Only course is under Planetary Ventures (google subsidiary) Only course maintenance responsibilities are in transition.

TABLE F.3-4

IR SITE 22 LANDFILL GENERAL OPERATIONS AND MAINTENANCE INSPECTION CHECKLIST

Inspection Date: 11/16/15 Inspector: S. Thompson

Site	Item	Condition: Good	Condition: Needs Maintenance	N/A	Comments
22	**General Site**				
	- water drainage *	—			Ponding near edge of LCAMW-1 -
	- culvert/trench drainage	—			
	- warning/instruction signs	—			
	- inspect for nesting owls	—			No owls present
	Landfill Cover				
	- erosion	—			
	- settling	—			
	- cracking	—			
	- rodent burrows	—			on going maintenance
	- vegetation restoration	—			
	- tree wells	—			
	- water drainage	—			
	Landfill Gas Monitoring Wells				
	- well cap integrity	—			
	- water drainage	—			
	- concrete collar condition	—			
	- locks	✓	✓		Two wells bolt attachment tabs need repair.
	Groundwater Monitoring Wells				
	- well cap integrity	—			
	- water drainage	—			
	- concrete collar condition	—			
	- locks				
	Stormwater Runoff Control				
	- water drainage	—			
	- culvert/trench drainage	—			
	- settlement	—			
	- erosion	—			

* 1) Ponding at the Landfill edge due to irrigation run-off was obsered. More fill needs to be placed.

2) Ponding in the drainage channel near LAMW-1 was observed. More fill needs to be placed.

3) Bolt attachment tabs at two Landfill gas monitoring wells were stripped, they need repair.

Abbreviations and Acronyms:
N/A - Not applicable

Santa Clara Country Landfill Inspection Reports

CalRecycle

Closed Disposal Site Inspection Report (188)

Enforcement Agency:	County of Santa Clara				
SWIS Facility File Number (99-xx-9999)		Inspection Date		Program Code	
43-AA-0005		2/17/2015		LEA Periodic	
Time In	10:00am	Time Out	11:30am	Inspection Time	

Facility Name	Received By
NAS Moffett Field Closed Landfills	Gary Munekawa - Navy
Facility Location	**Owner Name**
Northern Area Of Field; Adjacent To Bay, Mountain View 94089	US Navy
Inspector	**Also Present (Name)**
Quan Mai, REHS, LEA	G.Munekawa; S.Sharma-OTIE; M.McColloch-Blaine Tech

THE ABOVE FACILITY WAS INSPECTED FOR COMPLIANCE WITH APPLICABLE SECTIONS OF THE DIVISION 30 OF THE PUBLIC RESOURCES CODE (PRC) AND TITLE 14 AND TITLE 27 CALIFORNIA CODE OF REGULATIONS (CCR)

X	**No Violations or Areas of Concern**

V	A	Regulations

Inspection Report Comments:

SITE 1 LANDFILL:
1. Since the last inspection, rain events have promoted the growth of vegetation on the landfill with vegetative cover reaching 1-2 feet in height. Mowing of this vegetation is scheduled for late June.

2. Due to the thick vegetation on the landfill, burrows, if any, were not observed during the inspection. According to OTIE, gopher activity has been minimal in the past year; therefore, no fumitoxin was applied in the burrows for the last 4-5 months. Instead, burrows are monitored for 10 days and then back-filled with soil if there is no evidence of wildlife activity.

3. Ponding was not observed on the landfill during the time of inspection. However, a few tumbleweeds were noted growing in the drainage channel by the perimeter fencing next to the east slope. Remove tumbleweeds from drainage channels so as to not impede the natural course of drainage which could lead to ponding.

4. The dilapidated raptor perches that were installed many years ago to assist in vermin control will be removed from the landfill, tentatively during the month of March.

5. Vents and probes were not tested at this site during the inspection.

SITE 22 LANDFILL:
1. Ponding at the edge of the landfill normally caused by run-off from irrigation was not observed.

2. Gopher activity on this landfill area is ongoing and golf course personnel continue to employ control methods. A number of gopher burrows were noted during the inspection; however, due to the concrete layer over the cap these burrows do not affect the integrity of the landfill.

3. Methane readings were not taken at this site during the inspection. Ground water levels were checked at each monitoring well with the following reported depth-to-water readings (DTW): 7-inches at LGMW-1, 8-inches at LGMW-2, 8-inches at LGMW-3, 2.66 feet at LGMW-4. OTIE reported that LGMW-3 (in the road), initially recorded at 8-inches, was purged at 8:15am with a resulting DTW reading of 3.68 feet. At 11:15am the DTW reading was recorded at 3.02 feet. Well flooding does not appear to be occurring at this monitoring well. Rather, the occasional rise in ground water is likely due to increased pressure caused by the high tide from the surrounding bay.

DOCUMENTS RECEIVED SINCE LAST QUARTERLY INSPECTION: None

CalRecycle

Closed Disposal Site Inspection Report (188)

Enforcement Agency:	County of Santa Clara				
SWIS Facility File Number (99-xx-9999)		Inspection Date		Program Code	
43-AA-0005		4/21/2015		LEA Periodic	
Time In	10:30am	Time Out	12:00pm	Inspection Time	

Facility Name	Received By
NAS Moffett Field Closed Landfills	Gary Munekawa - Navy
Facility Location	**Owner Name**
Northern Area Of Field; Adjacent To Bay, Mountain View 94089	US Navy
Inspector	**Also Present (Name)**
Quan Mai, REHS, LEA	G.Munekawa; S.Sharma-OTIE; W.Jones-Blaine Tech

THE ABOVE FACILITY WAS INSPECTED FOR COMPLIANCE WITH APPLICABLE SECTIONS OF THE DIVISION 30 OF THE PUBLIC RESOURCES CODE (PRC) AND TITLE 14 AND TITLE 27 CALIFORNIA CODE OF REGULATIONS (CCR)

X	**No Violations or Areas of Concern**

V	A	Regulations

Inspection Report Comments:

SITE 1 LANDFILL:
1. Vegetative cover on the landfill is now at about 3-4 feet in height. Weather-permitting, mowing of this vegetation is scheduled for some time between mid-May and mid-June.

2. Due to the thick vegetation on the landfill, burrows, if any, were not observed during the inspection. According to OTIE, two traps were set during the period of 3/20/15-4/11/15 to monitor gopher activity. During this time, only one trap was observed containing the remains of a gopher (skeleton). Since gopher activity remains at a minimal, the application of fumitoxin in burrows has not been used for approximately 1 year. Instead, traps are being employed and any burrows discovered are monitored for 10 days and then back-filled with soil if there is no evidence of wildlife activity.

3. The tumbleweeds have been removed from the drainage channel by the perimeter fencing next to the east slope. OTIE will continue to routinely monitor this area (every 2 weeks) and will remove any obstructions that could impede the natural course of drainage which could lead to ponding.

4. The dilapidated raptor perches that were installed many years ago to assist in vermin control will be removed from the landfill, tentatively during the month of May or June when mowing of the vegetation takes place.

5. Vents and probes were not tested at this site during the inspection.

SITE 22 LANDFILL:
1. As of April 1, 2015 this site (golf course) is now under the oversight of Planetary Explorations, a subsidiary of Google. Responsibilities for maintenance of this site are in transition.

2. Ponding at the edge of the landfill caused by run-off from irrigation was observed by the LEA. More fill needs to be added or the area needs to be graded to divert run-off to the ditch.

3. Ponding was also observed in the channel at the edge of the landfill near monitoring well LGMW-1. This ponding is also likely to be caused by run-off from irrigation. Fill needs to be added to this area or the channel needs to be graded to divert run-off to the drain.

4. Gopher activity on this landfill area is ongoing and golf course personnel continue to employ control methods. Only a few gopher and ground squirrel burrows were noted during the inspection; however, due to the concrete layer over the cap these burrows do not affect the integrity of the landfill.

5. Methane readings were not taken at this site during the inspection. Ground water levels were checked at each monitoring well and were observed to be low. LGMW-3 (in the road) was observed to be at approximately 12-18 inches below the top of the pipe.

DOCUMENTS RECEIVED SINCE LAST QUARTERLY INSPECTION: Gas monitoring sampling reports (April)

CalRecycle

Closed Disposal Site Inspection Report (188)

Enforcement Agency:	County of Santa Clara				
SWIS Facility File Number (99-xx-9999)		Inspection Date		Program Code	
43-AA-0005		7/14/2015		LEA Periodic	
Time In	10:00am	Time Out	12:30am	Inspection Time	

Facility Name	Received By
NAS Moffett Field Closed Landfills	Gary Munekawa - Navy
Facility Location	**Owner Name**
Northern Area Of Field; Adjacent To Bay, Mountain View 94089	
Inspector	**Also Present (Name)**
Quan Mai, REHS, LEA; Jaji Murage, REHS, LEA	G.Munekawa; S.Sharma-OTIE; W.Jones-Blaine Tech

THE ABOVE FACILITY WAS INSPECTED FOR COMPLIANCE WITH APPLICABLE SECTIONS OF THE DIVISION 30 OF THE PUBLIC RESOURCES CODE (PRC) AND TITLE 14 AND TITLE 27 CALIFORNIA CODE OF REGULATIONS (CCR)

X **No Violations or Areas of Concern**

V	A	Regulations

Inspection Report Comments:

SITE 1 LANDFILL:
1. Mowing of the overgrown vegetative cover on the landfill took place on June 22, 2015. The dilapidated raptor perches that were installed many years ago to assist in vermin control were also removed by the same company during the mowing of vegetation.

2. Very few burrows were observed on the landfill during the inspection. Burrows are still being monitored by OTIE for 10 days and then back-filled with soil if there is no evidence of wildlife activity. No traps have been set since the last inspection. According to OTIE, traps are only set when there is evidence of wildlife activity. Since gopher activity remains at a minimal, the application of fumitoxin in burrows has not been used for approximately 1 year.

3. No evidence of ponding or tumbleweeds was observed on the landfill. Continue to routinely monitor the drainage channel by the perimeter fencing next to the east slope and remove any obstructions that could impede the natural course of drainage during rain events.

4. Continue to monitor the perimeter fencing next to the east slope for intrusion holes made by ground squirrels to access the site. During the time of inspection, only one intrusion hole was observed at the bottom of the perimeter fencing near the northern end. Patch up these holes when they are discovered to decrease ground squirrel activity on the landfill.

5. Vents and probes were not tested at this site during the inspection.

SITE 22 LANDFILL:
1. Since April 1, 2015 this site (golf course) has been under the oversight of Planetary Ventures, a subsidiary of Google. Responsibilities for maintenance of this site are still in transition.

2. Evidence of ponding at the edge of the landfill caused by run-off from irrigation was observed by the LEA. More fill needs to be added or the area needs to be graded to divert run-off to the ditch.

3. At the time of inspection, ponding was not observed in the channel at the edge of the landfill near monitoring well LMW-1. The occasional ponding observed in this location is also likely to be caused by run-off from irrigation. Fill needs to be added to this area or the channel needs to be graded to divert run-off to the drain.

4. Gopher activity on this landfill area is ongoing and golf course personnel continue to employ control methods. Only a few gopher and ground squirrel burrows were noted during the inspection; however, due to the concrete layer over the cap these burrows do not affect the integrity of the landfill.

5. Methane readings were not taken at this site during the inspection. Ground water levels were checked at each monitoring well and were observed to be low.

DOCUMENTS RECEIVED SINCE LAST QUARTERLY INSPECTION: None

CalRecycle

Closed Disposal Site Inspection Report (188)

Enforcement Agency:	County of Santa Clara				
SWIS Facility File Number (99-xx-9999)		Inspection Date		Program Code	
43-AA-0005		11/16/2015		LEA Periodic	
Time In	10:00AM	Time Out	11:45AM	Inspection Time	

Facility Name	Received By
NAS Moffett Field Closed Landfills	
Facility Location	**Owner Name**
Northern Area Of Field; Adjacent To Bay, Mountain View 94089	
Inspector	**Also Present (Name)**
Jaji Murage R.E.H.S., LEA	G.Munekawa; S.Thompson-OTIE; G.Roberts-Blaine Tech

THE ABOVE FACILITY WAS INSPECTED FOR COMPLIANCE WITH APPLICABLE SECTIONS OF THE DIVISION 30 OF THE PUBLIC RESOURCES CODE (PRC) AND TITLE 14 AND TITLE 27 CALIFORNIA CODE OF REGULATIONS (CCR)

X	**No Violations or Areas of Concern**

V	A	Regulations

Inspection Report Comments:

SITE 1 LANDFILL:

1. Vegetative cover was observed well managed. Due to recent heavy rains, new vegetative growth was observed site-wide. The LEA recommends removal of cement block debris. The debris was left over when the raptor perches that the blocks used to anchor, were removed. The debris tends to create safe habitat for unwelcome rodents.

2. Some burrows were observed in the area adjacent to the fence on the southern edge of the landfill during the inspection. The burrows were flagged and being monitored by personnel from Oneida Total Integrated Enterprises (OTIE), the contractor. The plan is to back-fill the burrows with soil if there is no evidence of wildlife activity. Additionally, the contractor stated that a number of shallow holes had been observed on the surface of the landfill. The holes appear to have been created by raccoons foraging for food.

3. No evidence of ponding was observed on the landfill.

4. Inspect the protective bollards at the top of the landfill and backfill any differential settlement that is discovered to prevent creation of rodent habitat or pathway for rainwater intrusion.

5. Landfill gas vents and probes were not tested at this site during the inspection.

SITE 22 LANDFILL:

1. Ponding was observed at the edge of the landfill along the roadway(See photo). Install a drainage swale or add fill to eliminate the low areas.

2. Due to the recent rainfall, ponding was observed in the channel at the edge of the landfill near monitoring well LGMW-1. Fill needs to be added to this area or the channel needs to be graded to divert run-off to the drain. The contractor from Blaine Tech reported that some of the bolt attachment tabs at LGMW-1 and LGMW-2 were stripped. Please ensure that the well covers remain watertight.

3. Rodent activity on this landfill area is ongoing and golf course personnel continue to employ control methods.

4. Methane readings were not taken at this site during the inspection. Ground water levels were checked at each monitoring well and were observed to be low.

DOCUMENTS RECEIVED SINCE LAST QUARTERLY INSPECTION: Gas monitoring sampling reports (October)

2016

General Site Inspection Reports and Santa Clara County Inspection Reports

General Site Inspection Reports

Site 1

TABLE 4-1

SITE 1 LANDFILL GENERAL INSPECTION CHECKLIST AND FREQUENCY

3/20/2016
Scott Thompson

Item	Frequency[a]	Condition			Comments
		Good	Needs Maintenance	N/A	
General Site Conditions					
- Perimeter Road	Semiannual	✓			
- Landfill signs	Semiannual	✓			
- Inspect for nesting owls and burrowing animals	Semiannual	✓			No nesting owl present
- Security fencing and gates	Semiannual	✓			
- Riprap	Semiannual	✓			
- Raptor perches	Semiannual	—	—	NA	Removed
Landfill Cap					
- Iso-settlement and surveying landfill settlement markers	Every 5 Years[b]				
- Erosion	Semiannual	—			
- Visual observations of settling (i.e., cracking, sloughing)	Semiannual	—			
- Vegetation control and restoration	Semiannual	—			1-2 feet tall vegetation - mowing in sum
- Cap breaching	Semiannual	—			
- Water drainage	Semiannual	—			Continue monitoring/removal of weed in cha
Landfill Gas Vents					
- Riser condition (i.e., paint, integrity)	Semiannual	—			
- Identification tag present	Semiannual	—			
- Concrete collar condition	Semiannual	✓			
- Screen condition	Semiannual	—			
Landfill Gas Monitoring Wells					
- Riser condition (i.e., paint, integrity)	Semiannual	—			
- Identification tag present	Semiannual	—			
- Traffic protection (i.e., bollards)	Semiannual	—			
- Concrete collar condition	Semiannual	—			
- Well cap integrity	Semiannual	—			
- Water drainage	Semiannual	—			
- Well locks	Semiannual	—			
Collection Trench Wells					
- Concrete collar condition	Semiannual	—			
- Protective cover condition	Semiannual	—			
- Identification number legibility	Semiannual	—			

TABLE 4-1

SITE 1 LANDFILL GENERAL INSPECTION CHECKLIST AND FREQUENCY

Item	Frequency[a]	Condition			Comments
		Good	Needs Maintenance	N/A	
- Well cap integrity	Semiannual	✓			
- Water drainage	Semiannual	✓			
- Well locks	Semiannual	✓			
Groundwater Monitoring Wells and Piezometers					
- Riser condition (i.e., paint, integrity, cover)	Semiannual	✓			
- Identification number legibility					
- Concrete collar condition	Semiannual	✓			
- Traffic protection (i.e., bollards)	Semiannual	✓			
- Well cap integrity	Semiannual	✓			
- Water drainage	Semiannual	✓			
- Well locks	Semiannual	✓			
Stormwater Runoff Control					
- Water drainage	Semiannual	✓			
- Culvert and trench drainage	Semiannual	✓			
- Riprap	Semiannual	✓			
- Erosion	Semiannual	✓			
- Settlement	Semiannual	✓			

Notes:

(a) Frequency indicates minimum requirements. Semiannual inspections will be conducted in March and September, except for the stormwater runoff control, which will be inspected before the October reainy season ane in May at the end of the rainy season. Inspections also are required after significant storm events and as needed.

(b) Every 5 years from the previous surveying and iso-settlement mapping.

Abbreviations and Acronyms:

N/A - not applicable

Scott Thompson
5/23/16

TABLE 4-1

SITE 1 LANDFILL GENERAL INSPECTION CHECKLIST AND FREQUENCY

Item	Frequency[a]	Condition			Comments
		Good	Needs Maintenance	N/A	
General Site Conditions					
- Perimeter Road	Semiannual	✓			
- Landfill signs	Semiannual	✓			
- Inspect for nesting owls and burrowing animals	Semiannual	✓			No nesting owl present
- Security fencing and gates	Semiannual				
- Riprap	Semiannual				
- Raptor perches	Semiannual			NA	Removed
Landfill Cap					
- Iso-settlement and surveying landfill settlement markers	Every 5 Years[b]				
- Erosion	Semiannual	✓			
- Visual observations of settling (i.e., cracking, sloughing)	Semiannual	✓			
- Vegetation control and restoration	Semiannual	✓			3-5 feet tall vegetation. Mowing in Summ
- Cap breaching	Semiannual	✓			
- Water drainage	Semiannual	✓			Continue monitoring/removal of wee in chann
Landfill Gas Vents					
- Riser condition (i.e., paint, integrity)	Semiannual	✓			
- Identification tag present	Semiannual	✓			
- Concrete collar condition	Semiannual	✓			
- Screen condition	Semiannual	✓			
Landfill Gas Monitoring Wells					
- Riser condition (i.e., paint, integrity)	Semiannual	✓			
- Identification tag present	Semiannual	✓			
- Traffic protection (i.e., bollards)	Semiannual	✓			
- Concrete collar condition	Semiannual	✓			
- Well cap integrity	Semiannual	✓			
- Water drainage	Semiannual	✓			
- Well locks	Semiannual	✓			
Collection Trench Wells					
- Concrete collar condition	Semiannual	✓			
- Protective cover condition	Semiannual	✓			
- Identification number legibility	Semiannual	✓			

TABLE 4-1

SITE 1 LANDFILL GENERAL INSPECTION CHECKLIST AND FREQUENCY

Item	Frequency[a]	Condition			Comments
		Good	Needs Maintenance	N/A	
- Well cap integrity	Semiannual	✓			
- Water drainage	Semiannual	✓			
- Well locks	Semiannual	✓			
Groundwater Monitoring Wells and Piezometers					
- Riser condition (i.e., paint, integrity, cover)	Semiannual	✓			
- Identification number legibility					
- Concrete collar condition	Semiannual	✓			
- Traffic protection (i.e., bollards)	Semiannual	✓			
- Well cap integrity	Semiannual	✓			
- Water drainage	Semiannual	✓			
- Well locks	Semiannual	✓			
Stormwater Runoff Control					
- Water drainage	Semiannual	✓			
- Culvert and trench drainage	Semiannual	✓			
- Riprap	Semiannual	✓			
- Erosion	Semiannual	✓			
- Settlement	Semiannual	✓			

Notes:

(a) Frequency indicates minimum requirements. Semiannual inspections will be conducted in March and September, except for the stormwater runoff control, which will be inspected before the October reainy season ane in May at the end of the rainy season. Inspections also are required after significant storm events and as needed.

(b) Every 5 years from the previous surveying and iso-settlement mapping.

Abbreviations and Acronyms:

N/A - not applicable

Scott Thompson
9/23/16

TABLE 4-1

SITE 1 LANDFILL GENERAL INSPECTION CHECKLIST AND FREQUENCY

Item	Frequency[a]	Condition			Comments
		Good	Needs Maintenance	N/A	
General Site Conditions					
- Perimeter Road	Semiannual	—			
- Landfill signs	Semiannual	—			
- Inspect for nesting owls and burrowing animals	Semiannual	—			No nesting owls.
- Security fencing and gates	Semiannual	—			Gopher holes observed a
- Riprap	Semiannual	—			
- Raptor perches	Semiannual	—	—	NA	Removed.
Landfill Cap					
- Iso-settlement and surveying landfill settlement markers	Every 5 Years[b]				
- Erosion	Semiannual	—			
- Visual observations of settling (i.e., cracking, sloughing)	Semiannual	—			
- Vegetation control and restoration	Semiannual	✓			Vegetation mowed in July.
- Cap breaching	Semiannual	—			
- Water drainage	Semiannual	✓			Continue monitoring/remove
Landfill Gas Vents					
- Riser condition (i.e., paint, integrity)	Semiannual	—			
- Identification tag present	Semiannual	—			
- Concrete collar condition	Semiannual	—			
- Screen condition	Semiannual	✓			
Landfill Gas Monitoring Wells					
- Riser condition (i.e., paint, integrity)	Semiannual	—			
- Identification tag present	Semiannual	—			
- Traffic protection (i.e., bollards)	Semiannual	✓			
- Concrete collar condition	Semiannual	✓			
- Well cap integrity	Semiannual	✓			
- Water drainage	Semiannual	—			
- Well locks	Semiannual	✓			
Collection Trench Wells					
- Concrete collar condition	Semiannual	—			
- Protective cover condition	Semiannual	✓			
- Identification number legibility	Semiannual	✓			

Many Perimeter fencin Fill hol

Circles of vegeta observe weeds chann

TABLE 4-1

SITE 1 LANDFILL GENERAL INSPECTION CHECKLIST AND FREQUENCY

Item	Frequency[a]	Condition			Comments
		Good	Needs Maintenance	N/A	
- Well cap integrity	Semiannual	—			
- Water drainage	Semiannual	—			
- Well locks	Semiannual	—			
Groundwater Monitoring Wells and Piezometers					
- Riser condition (i.e., paint, integrity, cover)	Semiannual	—			
- Identification number legibility					
- Concrete collar condition	Semiannual	—			
- Traffic protection (i.e., bollards)	Semiannual	—			
- Well cap integrity	Semiannual	—			
- Water drainage	Semiannual	—			
- Well locks	Semiannual	—			
Stormwater Runoff Control					
- Water drainage	Semiannual	—			
- Culvert and trench drainage	Semiannual	—			
- Riprap	Semiannual	—			
- Erosion	Semiannual	—			
- Settlement	Semiannual	—			

Notes:

(a) Frequency indicates minimum requirements. Semiannual inspections will be conducted in March and September, except for the stormwater runoff control, which will be inspected before the October reainy season ane in May at the end of the rainy season. Inspections also are required after significant storm events and as needed.

(b) Every 5 years from the previous surveying and iso-settlement mapping.

Abbreviations and Acronyms:

N/A - not applicable

General Site Inspection Reports

Site 22

TABLE F.3-4

IR SITE 22 LANDFILL GENERAL OPERATIONS AND MAINTENANCE INSPECTION CHECKLIST

Inspection Date: 3/20/2016 Inspector: Scott Thompson.

Site	Item	Condition: Good	Condition: Needs Maintenance	N/A	Comments
22	**General Site**				
	- water drainage	✓			Ponding at northwestern edge.
	- culvert/trench drainage	✓			Ponding in the channel.
	- warning/instruction signs	✓			
	- inspect for nesting owls	✓			No owls present.
	Landfill Cover				
	- erosion	✓			
	- settling	✓			
	- cracking	✓			
	- rodent burrows	✓			on-going maintenance
	- vegetation restoration	✓			
	- tree wells	✓			
	- water drainage	✓			
	Landfill Gas Monitoring Wells				
	- well cap integrity	✓			LAMW-2 cap has a hole, repair needed.
	- water drainage	✓			
	- concrete collar condition	✓			
	- locks	✓			
	Groundwater Monitoring Wells				
	- well cap integrity	✓			
	- water drainage	✓			
	- concrete collar condition	✓			
	- locks	✓			
	Stormwater Runoff Control				
	- water drainage	✓			
	- culvert/trench drainage	✓			
	- settlement	✓			
	- erosion	✓			

Abbreviations and Acronyms:

N/A - Not applicable

TABLE F.3-4

IR SITE 22 LANDFILL GENERAL OPERATIONS AND MAINTENANCE INSPECTION CHECKLIST

Inspection Date: 5/23/16 Inspector: Scott Thompson

Site	Item	Condition: Good	Condition: Needs Maintenance	N/A	Comments
22	**General Site**				
	- water drainage	—			Ponding at northwestern edge-
	- culvert/trench drainage	—			Ponding in channel
	- warning/instruction signs	—			
	- inspect for nesting owls	—			No owl present
	Landfill Cover				
	- erosion				gravel/dirt path in some areas is worn- Fill should be added-
	- settling	—			
	- cracking	—			
	- rodent burrows	✓			on going maintenance
	- vegetation restoration	—			
	- tree wells	—			
	- water drainage	—			
	Landfill Gas Monitoring Wells				
	- well cap integrity	—			LAMW-2 cap has hole, needs repair or replacement.
	- water drainage	—			
	- concrete collar condition	—			
	- locks	—			
	Groundwater Monitoring Wells				
	- well cap integrity	—			
	- water drainage	—			
	- concrete collar condition	—			
	- locks	—			
	Stormwater Runoff Control				
	- water drainage	—			
	- culvert/trench drainage	—			
	- settlement	—			
	- erosion	—			

Abbreviations and Acronyms:

N/A - Not applicable

TABLE F.3-4

IR SITE 22 LANDFILL GENERAL OPERATIONS AND MAINTENANCE INSPECTION CHECKLIST

Inspection Date: 9/23/16 Inspector: Scott Thompson.

Site	Item	Condition: Good	Condition: Needs Maintenance	Condition: N/A	Comments
22	**General Site**				
	- water drainage	✓			Ponding at northwestern edge- Fill needed.
	- culvert/trench drainage	✓			Ponding in channel- grade channel to divert run-off.
	- warning/instruction signs	✓			
	- inspect for nesting owls	✓			
					No owls present
	Landfill Cover				
	- erosion	✓			dirt/gravel path worn in some areas- Fill should be added.
	- settling	✓			
	- cracking	✓			
	- rodent burrows	✓			on-going maintenance
	- vegetation restoration	✓			
	- tree wells	✓			
	- water drainage	✓			
	Landfill Gas Monitoring Wells				
	- well cap integrity	✓			
	- water drainage	✓			
	- concrete collar condition	✓			
	- locks	✓			
	Groundwater Monitoring Wells				
	- well cap integrity	✓			
	- water drainage	✓			
	- concrete collar condition	✓			
	- locks	✓			
	Stormwater Runoff Control				
	- water drainage	✓			
	- culvert/trench drainage	✓			
	- settlement	✓			
	- erosion	✓			
		✓			

Abbreviations and Acronyms:

N/A - Not applicable

Santa Clara Country Landfill Inspection Reports

Closed Disposal Site Inspection Report (188)

Enforcement Agency:	County of Santa Clara

SWIS Facility File Number (99-xx-9999)	Inspection Date	Program Code
43-AA-0005	3/21/2016	LEA Periodic

Time In	10:00am	Time Out	12:30pm	Inspection Time	

Facility Name	Received By
NAS Moffett Field Closed Landfills	Gary Munekawa - Navy
Facility Location	**Owner Name**
Northern Area Of Field; Adjacent To Bay, Mountain View 94089	
Inspector	**Also Present (Name)**
Quan Mai, REHS, LEA	G.Munekawa; S.Sharma,S.Thompson; L.Metz,C.Alderete

THE ABOVE FACILITY WAS INSPECTED FOR COMPLIANCE WITH APPLICABLE SECTIONS OF DIVISION 30 OF PUBLIC RESOURCES CODE (PRC) AND TITLE 14 AND TITLE 27 CALIFORNIA CODE OF REGULATIONS (CCR)

X	**No Violations or Areas of Concern**

Inspection Report Comments:

SITE 1 LANDFILL:
1. Due to recent heavy rains, thick vegetative growth from 1-3 feet in height was observed on the landfill. Annual removal of the vegetation, by means of mowing, is slated to occur during the last two weeks of June (weather permitting). In the meantime, continued monitoring of the drainage channels is occurring and any obstructions found in the channels are removed.

2. According to the contractor, OTIE, minimal squirrel activity has been observed on the landfill. Reportedly, only one active gopher is left. Burrows are still being monitored and back-filled with soil if there is no evidence of wildlife activity, and traps are set when there is evidence of wildlife activity. No fumitoxin has been applied to burrows since April 2014.

3. The LEA observed large animal feces at the base of the landfill on the west slope, an indication that a larger animal is present. During the last inspection, the contractor had stated that a number of shallow holes had been observed on the surface of the landfill. The holes appear to have been created by raccoons foraging for food.

4. The cement block debris, left over from the removal of the raptor perches, has been removed.

5. Due to thick vegetative growth along the perimeter fencing next to the east slope, no holes made by ground squirrels to access the site were visible.

SITE 22 LANDFILL:
1. At the time of inspection, ponding at the edge of the northwestern side of the landfill was not observed. However, depression spots were noted where ponding would normally occur from irrigation runoff. Install a drainage swale or add fill to eliminate the low areas.

2. Due to recent rainfall, and possibly in conjunction with irrigation runoff, ponding was observed in the channel at the edge of the landfill near monitoring well LGMW-1. Fill needs to be added to this area or the channel needs to be graded to divert run-off to the drain.

3. Ponding was also observed at the edge of the landfill along the roadway near LGMW-3. Fill needs to be added to this area as well.

4. The well cover on LGMW-2 appears to have been modified and now has a sizable hole next to the bolt attachment. Install a new well cover to prevent flooding.

5. Ground water levels were checked at each monitoring well and were observed to be low.

6. Gopher activity on this landfill area is ongoing and golf course personnel continue to employ control methods. Only a few gopher and ground squirrel burrows were noted during the inspection.

DOCUMENTS RECEIVED SINCE LAST QUARTERLY INSPECTION: None

Closed Disposal Site Inspection Report (188)

Enforcement Agency:	County of Santa Clara

SWIS Facility File Number (99-xx-9999)	Inspection Date	Program Code
43-AA-0005	5/23/2016	LEA Periodic

Time In	10:10am	Time Out	12:15pm	Inspection Time	

Facility Name	Received By
NAS Moffett Field Closed Landfills	Gary Munekawa - Navy
Facility Location	**Owner Name**
Northern Area Of Field; Adjacent To Bay, Mountain View 94089	
Inspector	**Also Present (Name)**
Quan Mai, REHS, LEA	G.Munekawa; S.Thompson (OTIE); L.Metz (NASA)

THE ABOVE FACILITY WAS INSPECTED FOR COMPLIANCE WITH APPLICABLE SECTIONS OF DIVISION 30 OF PUBLIC RESOURCES CODE (PRC) AND TITLE 14 AND TITLE 27 CALIFORNIA CODE OF REGULATIONS (CCR)

X	**No Violations or Areas of Concern**

Inspection Report Comments:

SITE 1 LANDFILL:
1. The thick vegetative growth on the landfill has reached 3-5 feet in height. Annual removal of the vegetation, by means of mowing, is still slated to occur during the last two weeks of June (weather permitting). Continue to monitor the drainage channels and remove any obstructions found in the channels.

2. Due to the thick vegetation on the landfill, burrows, if any, were not observed during the inspection. Reportedly, both ground squirrel and gopher activity remain minimal. Traps continue to be deployed and burrows will continue to be monitored and back-filled with soil if there is no evidence of wildlife activity.

3. Large animal feces near the base of the landfill was once again observed by the LEA. Reportedly, there was a recent fox siting on the landfill.

4. Due to thick vegetative growth along the perimeter fencing next to the east slope, no holes made by ground squirrels to access the site were visible.

SITE 22 LANDFILL:
1. Evidence of ponding from irrigation runoff was observed at the edge of the northwestern side of the landfill. Add fill to eliminate the low areas or consider turning off the sprinkler head in this area.

2. Possibly due to irrigation runoff, evidence of ponding was also observed in the channel at the edge of the landfill near monitoring well LGMW-1. Fill needs to be added to this area or the channel needs to be graded to divert run-off to the drain.

3. Several areas of the gravel/dirt path along the golf course were observed to be worn, exposing the geotextile cover underneath. Replace gravel/dirt fill in these areas to eliminate ponding.

4. The well cover on LGMW-2 still needs to be repaired or replaced. The cover has a sizable hole next to the bolt attachment. Repair or replace the well cover in a timely manner to prevent flooding.

5. Ground water levels were checked at each monitoring well and were observed to be low.

6. Gopher activity on this landfill area is ongoing and golf course personnel continue to employ control methods. Only a few gopher and ground squirrel burrows were noted during the inspection.

DOCUMENTS RECEIVED SINCE LAST QUARTERLY INSPECTION: None

Closed Disposal Site Inspection Report (188)

Enforcement Agency:	County of Santa Clara

SWIS Facility File Number (99-xx-9999)	Inspection Date	Program Code
43-AA-0005	9/23/2016	LEA Periodic

Time In	10:30am	Time Out	12:45pm	Inspection Time	

Facility Name	Received By
NAS Moffett Field Closed Landfills	Wilson Doctor - Navy
Facility Location	**Owner Name**
Northern Area Of Field; Adjacent To Bay, Mountain View 94089	
Inspector	**Also Present (Name)**
Quan Mai, REHS, LEA	S.Sharma, S.Thompson (OTIE); L.Metz, K.Finch (NASA

THE ABOVE FACILITY WAS INSPECTED FOR COMPLIANCE WITH APPLICABLE SECTIONS OF DIVISION 30 OF PUBLIC RESOURCES CODE (PRC) AND TITLE 14 AND TITLE 27 CALIFORNIA CODE OF REGULATIONS (CCR)

X	**No Violations or Areas of Concern**

Inspection Report Comments:

SITE 1 LANDFILL:
1. Mowing of vegetative growth on the landfill occurred during the first and second weeks of July. At approximately 6 inches in height, good vegetative cover was observed on the landfill. At the time of inspection no obstructions were observed in the drainage channels. Continue to monitor the drainage channels and remove any obstructions found in the channels.

2. Reportedly, gopher activity on the landfill has ceased while ground squirrel activity remains minimal. According to the contractor OTIE, traps for gophers have not been set for at least two months. At the time of inspection, numerous shallow holes approximately 1-2 inches deep were observed on the landfill, primarily on the slopes and base of the landfill. It is speculated that these holes were made by larger animals foraging for food. Continue to monitor any discovered burrows and back-fill with soil if there is no evidence of wildlife activity.

3. A couple of holes made by ground squirrels to access the site were observed along the perimeter fencing next to the east slope. Continue to enclose these openings to limit wildlife access to the landfill.

SITE 22 LANDFILL:
1. According to NASA, which plans to replace the Navy in responsibilities for overseeing Sites 1 & 22 starting October 1, 2016, adjustments to the sprinkler system and sprinkler head located at the edge of the northwestern side of the landfill have been made to resolve the ponding issue caused from irrigation runoff. However, at the time of inspection, evidence of ponding was still observed at the edge of the landfill. Consider removing or turning off the sprinkler head in this area. Ultimately, winterization measures, such as adding fill to eliminate the low areas, will need to be implemented to prevent ponding/flooding during rain events.

2. Possibly due to irrigation runoff, evidence of ponding was again observed in the channel at the edge of the landfill near monitoring well LGMW-1. According to NASA, this area may have originally been a water hazard for the golf course and was filled in years later. Add fill to this area to eliminate ponding or grade the channel to divert run-off to the drain.

3. Several worn areas of the gravel/dirt path along the golf course were again observed during the inspection. Replace gravel/dirt fill in these areas to eliminate holes and ponding.

4. The well cover on LGMW-2 has been replaced.

5. Ground water levels were checked at each monitoring well and were observed to be low.

6. Gopher and ground squirrel activity on this landfill area are ongoing and golf course personnel continue to employ control methods. Reportedly, the inverted T-shaped bait stations previously used by golf course personnel were removed approximately 6-7 months ago. During the inspection, a few gopher holes and numerous ground squirrel burrows were observed.

DOCUMENTS RECEIVED SINCE LAST QUARTERLY INSPECTION: None

Closed Disposal Site Inspection Report (188)

Enforcement Agency:	County of Santa Clara

SWIS Facility File Number (99-xx-9999)	Inspection Date	Program Code
43-AA-0005	11/28/2016	LEA Periodic

Time In	2:00pm	Time Out	4:15pm	Inspection Time	

Facility Name	Received By
NAS Moffett Field Closed Landfills	Kimberly Finch - NASA
Facility Location	**Owner Name**
Northern Area Of Field; Adjacent To Bay, Mountain View 94089	NASA - Earth Resources Technology (ERT)
Inspector	**Also Present (Name)**
Quan Mai, REHS, LEA	L.Metz, C.Alderete (NASA); N.Oztek, B.Dew (PV)

THE ABOVE FACILITY WAS INSPECTED FOR COMPLIANCE WITH APPLICABLE SECTIONS OF DIVISION 30 OF PUBLIC RESOURCES CODE (PRC) AND TITLE 14 AND TITLE 27 CALIFORNIA CODE OF REGULATIONS (CCR)

X	**No Violations or Areas of Concern**

Inspection Report Comments:

SITE 1 LANDFILL:
1. As of October 1, 2016, NASA has officially assumed responsibilities from the Navy for overseeing Sites 1 & 22.

2. Good vegetative cover was observed on the landfill. However, a trail of tire ruts made by an unknown vehicle was observed on the base of the south slope leading up to the top of the landfill. According to the operator, this area is restricted and only personnel at Planetary Ventures (a subsidiary of Google) has the access keys. The operator will be investigating this incident with Planetary Ventures. Repairs to the landfill cover will need to be made to prevent ponding and erosion.

3. Continue to monitor the drainage channels and remove any obstructions, such as tumbleweeds, found in the channels.

4. At the time of inspection, numerous burrows were observed on the landfill, primarily on the slopes and base of the landfill. According to the operator, they are currently in discussions with the CA Department of Fish & Wildlife on the possible use of various traps and fumigation for ground squirrel control. Reportedly, there are, however, some concerns with the use of traps and fumigation affecting the Salt Marsh Harvest Mouse, a Federal Endangered Species, and Burrowing Owls, a Species of Concern. To protect the Salt Marsh Harvest Mouse, all burrows within 100 feet of pickle weed are currently being monitored and probed. Burrows discovered outside of 100 feet of pickle weed are being back-filled with soil if there is no evidence of wildlife activity.

5. A couple of holes made by ground squirrels to access the site were observed along the perimeter fencing next to the east slope. Continue to repair these openings to limit wildlife access to the landfill.

6. Despite recent rain activity, no ponding issues were observed at this time.

SITE 22 LANDFILL:
1. Due to recent rain events, ponded water was observed at the edge of the northwestern side of the landfill (photos). As of April 1, 2015, this site is under the oversight of Planetary Ventures (PV). Nihal Oztek and Bryce Dew, representing PV, were present during the inspection to assess the issues with ponding. Winterization measures, such as adding fill to eliminate low spots or installing a drainage swale, were discussed to address the ongoing issues of ponding/flooding that occur at this site, especially during rain events.

2. During this inspection, a site map of the landfill was reviewed and it was determined that the flooding that occurs in the channel near monitoring well LGMW-1 is located approximately 50 feet away from the footprint of anticipated waste. According to the operator, the water flow is also parallel to the waste in the westward direction. Therefore, ponding in this area is no longer a concern since there are no impacts to the landfill.

3. Several worn areas of the gravel/dirt path along the golf course were again observed during the inspection (photo). Replace gravel/dirt fill in these areas to eliminate holes and ponding.

4. LGMW-1 and LGMW-4 were both flooded. The rubber gasket on the well covers needs to be replaced to prevent water intrusion inside the monitoring wells.

5. Remove abandoned tree planter boxes to eliminate habitat for squirrels.

6. Gopher and ground squirrel activity on this landfill area are ongoing and golf course personnel continue to employ control methods. Reportedly, golfers are intentionally causing damage to cages and freeing trapped squirrels.

7. Ponded water was observed in the channel at the edge of the northern side of the landfill near LGMW-3 (photo). Water appears to be draining but at a very slow rate. Improve drainage in this area to prevent water from ponding.

DOCUMENTS RECEIVED SINCE LAST QUARTERLY INSPECTION: Gas monitoring sampling reports (April)

2017

General Site Inspection Reports and Santa Clara County Inspection Reports

General Site Inspection Reports

Site 1

SITE ~~22~~ 1 - Operations, Maintenance, and Monitoring Activities Log	
DATE	1/26/17 (HEAVY RAIN FROM 1/15 TO 1/23)
TIME	10:40
PERSONNEL	CHRIS ALDERETE, LUKE METZ
WEATHER	60°F
CONDITIONS	CLEAR SUNNY
SURFACE COVER	6" - 12" GRASS HEIGHT
DRAINAGE	PONDING IN SOUTH OF ROAD AND SOUTHERN TOE OF CAP SLOPE
EROSION	Ok
BURROWS	NEEDS ONGOING ATTENTION
PHOTOGRAPHS	
COMMENTS	

~~IIII~~ ~~IIII~~ III

GOPHER GUY IS NEEDED AT SITE 1 BEFORE CURRENT POPULATION MULTIPLYS

SITE 1 - Operations, Maintenance, and Monitoring Activities Log	
DATE	2/23/17 ☆ MAJOR STORM FROM 2/19 - 2/21
TIME	10:22 ON 11:30 OFF
STAFF	CA QM LM
WEATHER	
CONDITIONS	
SURFACE COVER	OK
DRAINAGE	• PONDING ALONG EAST TOE OF SLOPE. DRAINAGE TO A HIGH SPOT. NEED TO CLEAR/DIG A BETTER DRAINAGE PATH IN SPOTS ALONG NORTH EAST TOE OF SLOPE. APPROX 5" DEEP IN SOME AREAS.
EROSION • NO EROSION IDENTIFIED.	• SQUIRREL BURROW ALONG FENCE LINE SHOWS WATER TABLE TO BE VERY HIGH. CAUSE FOR PONDING. • SOGGY SURFACE AND PONDING ALONG SOUTHEAST TOE OF SLOPE AS WELL.
BURROWS	
FENCING/SIGNAGE	In place (Y) or N BASE OF FENCING NEEDS BURROW CONTROL / MAINTENANCE
PHOTOGRAPHS	____ Photos were taken. Saved here:
COMMENTS	191 pump station status: RUNNING / FULLY OPERATIONAL

SITE 1 - Operations, Maintenance, and Monitoring Activities Log	
DATE	7-27-17
TIME	11AM CYBER KEY NOT WORKING. CALLED BASE OPS TO OPEN GATE HZ
STAFF	LUKE METZ, QUAN MAI + 3 TRAINEES RYAN, SALLY & RYAN
WEATHER	WARM CLEAR
CONDITIONS	FAIR
SURFACE COVER	VEGETATION IS HIGH. MOWING AND WEEDEATING SCHEDULED FOR AUG 1ST.
DRAINAGE	DRY
EROSION	NA
BURROWS	ONGOING / NEEDS MAINTENANCE
FENCING/SIGNAGE	In place: (Y) or N
PHOTOGRAPHS	____ Photos were taken. Saved here:
COMMENTS	191 pump station status: OPERATIONAL

ASK CHRIS ABOUT FUMIGATION AND IF CDFW APPROVED

SQUIRREL HOLES NOTICED ALONG SIDE OF WEST ROAD + GOFER ACTIVITY

SITE 1 - Operations, Maintenance, and Monitoring Activities Log	
DATE	9/7/2017
TIME	1030am
STAFF	Luke Metz (Leidos), Chris Alderete (Leidos), Quan Mai (County),
WEATHER	65°F OVERCAST
CONDITIONS	GOOD, DRY
SURFACE COVER	MOWING TOOK PLACE AUG 1 CURRENTLY (3-6 INCHES IN HEIGHT)
DRAINAGE	DRAINAGE CHANNEL NEEDS MAINTENANCE
EROSION	NO VISIBLE EROSION
BURROWS	A FEW BURROWS OBSERVED. CONTINUING TO USE 1 WAY DOORS AND PROBE W/IN 50FT OF PICKLEWEED
FENCING/SIGNAGE	GOOD
PHOTOGRAPHS	
COMMENTS	CLEAR DRAINAGE CHANNEL

SITE 1 - Operations, Maintenance, and Monitoring Activities Log	
DATE	11-28-17
TIME	10 AM
STAFF	LUKE METZ (LEIDOS), CHRIS ALDERETE (LEIDOS), QUAN MAI (COUNTY), EMINA
WEATHER	CLEAR SUNNY 60°F
CONDITIONS	
SURFACE COVER	6" GRASS GREENING AND BEGINNIG TO GROW. SOME CUT GRASS IS LEFT BEHIND FROM MOWING.
DRAINAGE	NO PONDING OR SATURATED AREAS. SOME DRIED GRASS BLOCKING DRAINAGE OUTFALL.
EROSION	NO EROSION OBSERVED
BURROWS	GOPHER BURROWS SHOWING INCREASED PRESENCE. NO GOPHERS OR SQUIRRELS OBSERVED.
FENCING/SIGNAGE	In place (Y) or N
PHOTOGRAPHS	____ Photos were taken. Saved here:
COMMENTS	191 pump station status: OPERATIONAL

General Site Inspection Reports

Site 22

SITE 22 - Operations, Maintenance, and Monitoring Activities Log	
DATE	2/23/17 MAJOR RAIN STORM FROM 2/18 - 2/21
TIME	ON 11:32
PERSONNEL	CA QM LM
WEATHER	CLEAR SUNNY 50°F
CONDITIONS	SATURATED SURFACES AFTER HEAVY RAINS PRIOR TO INSPECTION
SURFACE COVER	TOPSOIL, GRASS, AND VEGETATION ARE IN GOOD CONDITION. NO INDICATION OF COVER COMPROMISE.
DRAINAGE	PONDING
EROSION	OK
BURROWS	ONGOING FUMIGATION EFFORTS BY OB SPORTS / PV
PHOTOGRAPHS	11 Photos were taken; Saved here:
COMMENTS	

SITE 22 - Operations, Maintenance, and Monitoring Activities Log	
DATE	7-27-17
TIME	12:30
PERSONNEL	LUKE METZ QUAN MAI + 3 TRAINEES RYAN, SALLY + RYAN
WEATHER	
CONDITIONS	GOOD / FAIR
SURFACE COVER	CART PATH NEEDS MAINT
DRAINAGE	NEEDS MAINTENANCE
EROSION	OK / NA
BURROWS	NO USABLE BURROWS OR ANIMALS
PHOTOGRAPHS	___ Photos were taken; Saved here:
COMMENTS	CART MAINTENANCE PATH WELL MAINT GASKETS FOR BOLTS & BOXES

SITE 22 - Operations, Maintenance, and Monitoring Activities Log	
DATE	9/7/17
TIME	12:00 PM
PERSONNEL	Luke Metz (Leidos), Chris Alderete (Leidos), Quan Mai (County),
WEATHER	65°F
CONDITIONS	GOOD/ DRY
SURFACE COVER	~~MOWING TOOK PLACE AUG 2017.~~
DRAINAGE	NEEDS MAINTENANCE
EROSION	NO VISIBLE EROSION
BURROWS	SQUIRREL & GOPHER POPULATIONS APPEAR TO BE UNDER CONTROL
PHOTOGRAPHS	
COMMENTS	191 Pump Station Status: OPERATIONAL 2 TREE STUMPS OBSERVED

SITE 22 - Operations, Maintenance, and Monitoring Activities Log	
DATE	11-28-17
TIME	
PERSONNEL	LUKE METZ, CHRIS ALDERETE, QUAN MAI
WEATHER	CLEAR SUNNY 70°F
CONDITIONS	
SURFACE COVER	GOOD CONDITION, WELL MAINTAINED.
DRAINAGE	SWALE DRAWS SLOWLY (ALONG N. PERIMETER ROAD) FILL ADDED TO LOW SPOT (NORTHWEST CORNER)
EROSION	CART PATH SURFACE COULD USE MORE GRAVEL
BURROWS	3 BURROWS OBSERVED (SQUIRREL)
State or Federally listed Species Observed	NONE
PHOTOGRAPHS	___ Photos were taken; Saved here: "
COMMENTS	HIGH PRESENCE OF MUSHROOMS AFTER RECENT RAIN ~~AND~~ FOLLOWED BY WARM TEMPS.

Santa Clara Country Landfill Inspection Reports

Closed Disposal Site Inspection Report (188)

Enforcement Agency:	County of Santa Clara

SWIS Facility File Number (99-xx-9999)	Inspection Date	Program Code
43-AA-0005	3/23/2017	LEA Periodic

Time In	9:45am	Time Out	12:35pm	Inspection Time	

Facility Name	Received By
NAS Moffett Field Closed Landfills	Kimberly Finch - NASA
Facility Location	**Owner Name**
Northern Area Of Field; Adjacent To Bay, Mountain View 94089	NASA - Earth Resources Technology (ERT)
Inspector	**Also Present (Name)**
Quan Mai, REHS, LEA	Luke Metz, Chris Alderete - NASA ERT

THE ABOVE FACILITY WAS INSPECTED FOR COMPLIANCE WITH APPLICABLE SECTIONS OF DIVISION 30 OF PUBLIC RESOURCES CODE (PRC) AND TITLE 14 AND TITLE 27 CALIFORNIA CODE OF REGULATIONS (CCR)

X	**No Violations or Areas of Concern**

Inspection Report Comments:

SITE 1 LANDFILL:
1. At approximately 1-foot in height, good vegetative cover was observed on the landfill.

2. At the time of inspection, numerous burrows were again observed on the landfill, primarily on the slopes and base of the landfill. According to the operator, burrows within 100 feet of pickle weed are being monitored and probed to protect the Salt Marsh Harvest Mouse, a Federal Endangered Species. However, this process is very time consuming as it takes approximately 1 ½ hours to monitor and probe each burrow. It is estimated that there are 75 burrows located on the landfill. Burrows discovered outside of 100 feet of pickle weed are being fumigated and back-filled with soil if there is no evidence of wildlife activity.

3. A couple of holes made by ground squirrels to access the site were observed along the perimeter fencing next to the east slope. Continue to repair these openings to limit wildlife access to the landfill. These holes were also observed to be inundated with water, which according to the operator, could indicate a high water table.

4. Due to recent heavy rain events, ponding was observed on the east slope (photo). Add fill to low spots to eliminate ponding. The channel along the perimeter fencing next to the east slope was also observed to be blocked by tall vegetation and some high spots that impede the natural course of drainage. Possibly due to the high water table, up to approximately 6 inches of water was observed to be ponded in some areas. The operator stated that the tall vegetation and high spots will be removed to improve drainage.

5. Located approximately 10-15 feet away from the perimeter fencing, the relatively flat area at the base of the south-east slope was heavily saturated with water causing the ground to be soggy and some ponding to occur (photos). Monitor this area for low spots and add fill or regrade to eliminate ponding.

SITE 22 LANDFILL:
1. Due to recent rain events, ponded water was again observed at the edge of the northwestern side of the landfill (photos). According to the operator, they are in discussions with Planetary Ventures (PV) regarding who is responsible for making the necessary repairs. Reportedly, PV has deferred the responsibilities to NASA as the condition existed before PV assumed oversight of the site in April 1, 2015.

2. The worn areas of the gravel/dirt path along the golf course have been repaired.

3. LGMW-1, LGMW-2, LGMW-3 and LGMW-4 were all observed with water reaching approximately 2 inches from the top of the pipe, indicating a high water table. The rubber gasket on the well covers of LGMW-1 and LGMW-4 still need to be replaced to prevent water intrusion inside the monitoring wells.

4. Add fill to abandoned tree planter boxes to eliminate habitat for squirrels.

5. According to the operator, one-way doors and traps are being placed inside gopher and ground squirrel burrows on the greens and fairways (up to the rough) of the golf course. After 48 hours, the traps are removed and fumigation is applied to the burrows.

6. Ponded water was again observed in the channel at the edge of the northern side of the landfill near LGMW-3 (photo). Water continues to drain at a very slow rate. Improve drainage in this area to prevent water from ponding.

DOCUMENTS RECEIVED SINCE LAST QUARTERLY INSPECTION: None

Closed Disposal Site Inspection Report (188)

Enforcement Agency:	County of Santa Clara

SWIS Facility File Number (99-xx-9999)	Inspection Date	Program Code
43-AA-0005	7/27/2017	LEA Periodic

Time In	10:30am	Time Out	2:00pm	Inspection Time	

Facility Name	Received By
NAS Moffett Field Closed Landfills	Kimberly Finch - NASA
Facility Location	**Owner Name**
Northern Area Of Field; Adjacent To Bay, Mountain View 94089	NASA - Earth Resources Technology (ERT)
Inspector	**Also Present (Name)**
Quan Mai, REHS, LEA	S.Lee, R.Fox, R.McEnery (LEA); Luke Metz - NASA ER

THE ABOVE FACILITY WAS INSPECTED FOR COMPLIANCE WITH APPLICABLE SECTIONS OF DIVISION 30 OF PUBLIC RESOURCES CODE (PRC) AND TITLE 14 AND TITLE 27 CALIFORNIA CODE OF REGULATIONS (CCR)

X	No Violations or Areas of Concern

Inspection Report Comments:

SITE 1 LANDFILL:

1. Vegetation on the landfill has reached 3-5 feet in height. Reportedly, mowing of the vegetation has been scheduled to take place on Tuesday, August 1, 2017.

2. Due to the dense vegetation on the landfill, only a few holes and burrows made by ground squirrels, gophers, and other animals were visible at the time of inspection.

3. No issues with ponding were observed on the landfill. Continue to monitor drainage channels and remove any obstructions, such as tumbleweeds and tall vegetation, found in the channels.

SITE 22 LANDFILL:

1. Ponded water from irrigation runoff was again observed at the edge of the northwestern side of the landfill. According to the operator, it has been determined that NASA is the responsible party for making any necessary repairs to Site 22 landfill.

2. The rubber gasket on the well covers of LGMW-1 and LGMW-4 still need to be replaced to prevent water intrusion inside the monitoring wells. LGMW-4 was observed flooded with irrigation water.

3. Ground water levels were checked at each monitoring well and were observed to be relatively low at approximately 2-3 feet below surface.

4. Gopher activity on this landfill area is ongoing and golf course personnel continue to employ control methods. Reportedly, live trapping is no longer being done onsite since golfers were intentionally causing damage to the cages and freeing trapped squirrels. Only a few gopher and ground squirrel burrows were observed during the inspection.

5. Continue to monitor and make necessary repairs to worn areas of the gravel/dirt path along the golf course.

6. A material, rubbery and felt-like in texture, was observed exposed on the gravel/dirt path just past Hole 3 on the golf course (photo). The operator will investigate if the material is the geotextile cover or if the material was laid for weed control.

7. Ponded water from irrigation runoff was again observed in the channel at the edge of the northern side of the landfill near LGMW-3.

DOCUMENTS RECEIVED SINCE LAST QUARTERLY INSPECTION: None

Closed Disposal Site Inspection Report (188)

Enforcement Agency:	County of Santa Clara

SWIS Facility File Number (99-xx-9999)	Inspection Date	Program Code
43-AA-0005	9/7/2017	LEA Periodic

Time In	10:45am	Time Out	1:45pm	Inspection Time	

Facility Name	Received By
NAS Moffett Field Closed Landfills	Kimberly Finch - NASA
Facility Location	**Owner Name**
Northern Area Of Field; Adjacent To Bay, Mountain View 94089	NASA - Earth Resources Technology (ERT)
Inspector	**Also Present (Name)**
Quan Mai, REHS, LEA	Luke Metz, Chris Alderete - NASA ERT

THE ABOVE FACILITY WAS INSPECTED FOR COMPLIANCE WITH APPLICABLE SECTIONS OF DIVISION 30 OF PUBLIC RESOURCES CODE (PRC) AND TITLE 14 AND TITLE 27 CALIFORNIA CODE OF REGULATIONS (CCR)

X	**No Violations or Areas of Concern**

Inspection Report Comments:

SITE 1 LANDFILL:

1. Mowing of the vegetation on the landfill occurred on August 1, 2017. At approximately 6 inches in height, good vegetation was observed on the landfill.

2. Holes and burrows made by ground squirrels, gophers, and other animals were visible at the time of inspection. Reportedly, there has not been any use of fumigation; methods of wildlife trapping and the probing of burrows continues to be employed on the landfill. If wildlife activity cannot be controlled, fumigation may be applied in the near future to burrows located outside 50-feet of pickleweed.

3. Continue to monitor drainage channels and remove any obstructions, such as tumbleweeds and tall vegetation, found in the channels. Prepare for the upcoming wet weather season by implementing winterization measures such as adding fill to low spots on the landfill to prevent ponding.

SITE 22 LANDFILL:

1. The ground located at the edge of the northwestern side of the landfill was again observed to be saturated from irrigation runoff. Necessary repairs need to be made to prepare for the upcoming wet weather season to prevent ponding, which was observed in this area over the last two years during the 3rd quarter inspection of this site.

2. The rubber gasket on the well covers of LGMW-1 and LGMW-4 still need to be replaced to prevent water intrusion inside the monitoring wells. LGMW-4 was observed flooded with irrigation water.

3. Gopher and ground squirrel activity on this landfill area is ongoing and golf course personnel continue to employ control methods. Reportedly, CO_2 fumigant is being applied to burrows located outside 50-feet of pickleweed and live trapping is being done by both golf course personnel and NASA along the edge of the landfill due to its proximity to pickleweed.

4. Repairs to the worn-out areas of the cart path have been completed. Continue to monitor and make necessary repairs to worn areas of the gravel/dirt path along the golf course.

5. During the previous inspection, a material, rubbery and felt-like in texture, was observed exposed on the dirt/gravel path just past Hole 3. According to the operator, an investigation was conducted and reportedly, the material is used on the cart path for vegetation and weed control. The material is not found anywhere else off of the cart path. Repairs have been made in areas where the material was exposed; sand and gravel have been laid on top of the material.

6. Minor ponding was again observed in the channel at the edge of the northern side of the landfill near LGMW-3. The operator will investigate if the ponding is due to irrigation runoff or from high ground water levels.

DOCUMENTS RECEIVED SINCE LAST QUARTERLY INSPECTION: None

Closed Disposal Site Inspection Report (188)

Enforcement Agency:	County of Santa Clara

SWIS Facility File Number (99-xx-9999)	Inspection Date	Program Code
43-AA-0005	11/28/2017	LEA Periodic

Time In	10:20am	Time Out	12:40pm	Inspection Time	

Facility Name	Received By
NAS Moffett Field Closed Landfills	Kimberely Finch - NASA
Facility Location	**Owner Name**
Northern Area Of Field; Adjacent To Bay, Mountain View 94089	NASA
Inspector	**Also Present (Name)**
Quan Mai, REHS, LEA	L.Metz, C.Alderete - NASA ERT; E.Zanacic - NASA

THE ABOVE FACILITY WAS INSPECTED FOR COMPLIANCE WITH APPLICABLE SECTIONS OF DIVISION 30 OF PUBLIC RESOURCES CODE (PRC) AND TITLE 14 AND TITLE 27 CALIFORNIA CODE OF REGULATIONS (CCR)

X	**No Violations or Areas of Concern**

Inspection Report Comments:

SITE 1 LANDFILL:

1. Good vegetative cover was observed on the landfill.

2. A few holes and burrows made by ground squirrels, gophers, and other animals were visible at the time of inspection. Gopher burrows were observed predominantly at the top of the landfill. Methods of wildlife trapping and the probing of burrows continue to be employed on the landfill.

3. Continue to monitor drainage channels and remove any obstructions, such as tumbleweeds and tall vegetation, found in the channels.

4. Ponding was not observed on the landfill at the time of inspection.

SITE 22 LANDFILL:

1. Due to recent light rain activity, ponding was observed at the edge of the northwestern side of the landfill (photos). In preparation for heavier rain events, necessary repairs, such as adding fill to the area, need to be made to prevent flooding.

2. The rubber gasket on the well covers of LGMW-1 and LGMW-4 still need to be replaced to prevent water intrusion inside the monitoring wells.

3. A few holes and burrows made by ground squirrels and gophers were observed at the time of inspection. Golf course personnel are continuing to employ control methods.

4. Continue to monitor and make necessary repairs to worn areas of the gravel/dirt path along the golf course.

5. According to the operator, irrigation on the landfill has been reduced and diverted away from the channel located at the edge of the northern side of the landfill near LGMW-3. However, at the time of inspection, minor ponding was again observed in the channel (photo). The ponding may have resulted from recent rain activity and repairs need to be made to improve drainage in the channel.

DOCUMENTS RECEIVED SINCE LAST QUARTERLY INSPECTION: None

2018

General Site Inspection Reports and Santa Clara County Inspection Reports

General Site Inspection Reports

Site 1

SITE 1 - Operations, Maintenance, and Monitoring Activities Log	
DATE	2/7/18
TIME	11 AM
STAFF	CHRIS ALDERETE, QUAN MAI, MIKE NINOKATA
WEATHER	WARM, CLEAR 75°F SUNNY
CONDITIONS	
SURFACE COVER	GRASS 6-12" VEGITATION
DRAINAGE	NO SATURATED AREAS PREVIOUS RAIN MID JANUARY - 0.2 INCHES
EROSION	NO SIGN OF EROSION - GRAVEL ROAD LOOKS GOOD, NO LOW SPOTS/DEPRESSIONS
BURROWS	
FENCING/SIGNAGE	In place: Y or N
PHOTOGRAPHS	____ Photos were taken. Saved here:
COMMENTS	191 pump station status: TURKEY VULTURES (ON AIRFIELD) PELICANS (ON WATER)

SITE ~~22~~ - Operations, Maintenance, and Monitoring Activities Log	
DATE	5/23/18
TIME	10:00
PERSONNEL	ERT / NASA + COUNTY
WEATHER	65°F OVERCAST
CONDITIONS	
SURFACE COVER	VEGETATION IS HIGH - RADDISH & MUSTARD GRASS UP TO 7' TALL
DRAINAGE	DRAINAGE OUTFALLS UNOBSTRUCTED. NO SATURATION OR PONDING ON SITE.
EROSION	NO EROSION NOTICABLE
BURROWS	ACTIVELY USING 1 WAY DOORS IN SOME SPOTS NORTH SLOPE & SOUTH ROAD. BURROWING ANIMALS UNDER CONTROL
State or Federally listed Species Observed	WHITE TAILED KITES (3)
PHOTOGRAPHS	0 Photos were taken; Saved here:
COMMENTS	

SITE 1 - Operations, Maintenance, and Monitoring Activities Log	
DATE	8/14/18
TIME	9:45
STAFF	LUKE METZ CHRIS ALDRETE
WEATHER	OVERCAST 65°F
CONDITIONS	
SURFACE COVER	RECENTLY MOWED. CUT GRASS/THATCH REMAINS ON SURFACE.
DRAINAGE	GOOD. NO PONDING OR SATURATION
EROSION	NO EROSION OBSERVED
BURROWS	4 SQUIRREL 5 GOPHER THE THATCH APPEARS TO BE A DETERANT (TEMPORARILY)
FENCING/SIGNAGE	In place (Y) or N GOOD
PHOTOGRAPHS	____ Photos were taken. Saved here:
COMMENTS	191 pump station status: OPERATIONAL 1 JACKRABBIT 1 CLIFF SWALLOW 1 RAVEN 1 BLACK PHOEBE

SITE 1 - Operations, Maintenance, and Monitoring Activities Log	
DATE	8/21/18
TIME	10
STAFF	Jaji Murage & Roel Meregillano (county) Chris Alderete, Luke Metz, Garrett Turner, Lauren
WEATHER	Overcast
CONDITIONS	
SURFACE COVER	
DRAINAGE	
EROSION	Question from county regarding settlement monitoring with, where, frequency
BURROWS	
FENCING/SIGNAGE	In place: Y or N
PHOTOGRAPHS	____ Photos were taken. Saved here:
COMMENTS Animal sightings	191 pump station status: Cliff swallows 4 squirrels Crows (4)

SITE 1 - Operations, Maintenance, and Monitoring Activities Log	
DATE	12/11/18
TIME	10:30AM
STAFF	LUKE METZ, CHRIS ALDERETE, SALLY & ROEL (SANTA CLARA COUNTY)
WEATHER	~~RAINING~~ CLOUDY / OVERCAST
CONDITIONS	
SURFACE COVER	GOOD CONDITION
DRAINAGE	ALL DRAINAGE CHANNELS ARE CLEAR OF DEBRIS
EROSION	NO RUTTS, NO SLOUGHING, NO OTHER SIGNS OF EROSION.
BURROWS GOPHERS SQUIRRELS	7 33 PRESENCE OF BURROWS IS HIGH. FUMIGATION IS SCHEDULED TO BEGIN THIS WEEK.
FENCING/SIGNAGE	In place: (Y) or N
COMMENTS	191 pump station status: OPERATIONAL AND IN GOOD CONDITION NO SPECIES OF CONCERN WERE OBSERVED AT THIS SITE VISIT.

SITE 1 LANDFILL GENERAL INSPECTION CHECKLIST AND FREQUENCY 12/12/18

Item	Frequency[a]	Condition			Comments
		Good	Needs Maintenance	N/A	
General Site Conditions					
- Perimeter Road	Semiannual	✓			
- Landfill signs	Semiannual	✓			
- Inspect for nesting owls and burrowing animals	Semiannual	✓	✓		FUMIGATION TODAY
- Security fencing and gates	Semiannual	✓			
- Riprap	Semiannual	✓			SQUIRREL BURROWS IN RIPRAP
- Raptor perches	Semiannual			✓	
Landfill Cap					
- Iso-settlement and surveying landfill settlement markers	Every 5 Years[b]	✓			
- Erosion	Semiannual	✓			
- Visual observations of settling (i.e., cracking, sloughing)	Semiannual	✓			
- Vegetation control and restoration	Semiannual	✓			
- Cap breaching	Semiannual	✓			
- Water drainage	Semiannual	✓			
Landfill Gas Vents					
- Riser condition (i.e., paint, integrity)	Semiannual	✓			
- Identification tag present	Semiannual	✓			
- Concrete collar condition	Semiannual	✓			
- Screen condition	Semiannual	✓			
Landfill Gas Monitoring Wells					
- Riser condition (i.e., paint, integrity)	Semiannual	✓			
- Identification tag present	Semiannual	✓			
- Traffic protection (i.e., bollards)	Semiannual	✓			
- Concrete collar condition	Semiannual	✓			
- Well cap integrity	Semiannual	✓			
- Water drainage	Semiannual	✓			
- Well locks	Semiannual	✓			
Collection Trench Wells					
- Concrete collar condition	Semiannual	✓			
- Protective cover condition	Semiannual	✓			
- Identification number legibility	Semiannual	✓			

SITE 1 LANDFILL GENERAL INSPECTION CHECKLIST AND FREQUENCY

Item	Frequency[a]	Condition			Comments
		Good	Needs Maintenance	N/A	
- Well cap integrity	Semiannual	✓			
- Water drainage	Semiannual	✓			
- Well locks	Semiannual	✓			
Groundwater Monitoring Wells and Piezometers					
- Riser condition (i.e., paint, integrity, cover)	Semiannual	✓			
- Identification number legibility					
- Concrete collar condition	Semiannual	✓			
- Traffic protection (i.e., bollards)	Semiannual	✓			
- Well cap integrity	Semiannual	✓			
- Water drainage	Semiannual		✓		
- Well locks	Semiannual		✓		
Stormwater Runoff Control					
- Water drainage	Semiannual	✓			
- Culvert and trench drainage	Semiannual	✓			
- Riprap	Semiannual		✓		
- Erosion	Semiannual	✓			
- Settlement	Semiannual	✓			

Notes:

(a) Frequency indicates minimum requirements. Semiannual inspections will be conducted in March and September, except for the stormwater runoff control, which will be inspected before the October reainy season ane in May at the end of the rainy season. Inspections also are required after significant storm events and as needed.

(b) Every 5 years from the previous surveying and iso-settlement mapping.

Abbreviations and Acronyms:

N/A - not applicable

General Site Inspection Reports

Site 22

SITE 22 - Operations, Maintenance, and Monitoring Activities Log	
DATE	2/7/18
TIME	12:30 PM
PERSONNEL	QUAN MAI (COUNTY), LUKE METZ (ERT) CHRIS ALDERETE (ERT) MIKE NINOKATA (ERT)
WEATHER	WARM SUNNY 75°F
CONDITIONS	
SURFACE COVER	GOOD CONDITION / WELL MAINTAINED GRASS & CART PATH TRECS
DRAINAGE	NO PONDING OR SATURATED AREAS EXCEPT FOR NORTHEAST DRAINAGE SWALE.
EROSION	NO VISIBLE EROSION IDENTIFIED / OBSERVED
BURROWS	BURROWS - 0
State or Federally listed Species Observed	
PHOTOGRAPHS	___ Photos were taken; Saved here:
COMMENTS	GASKETS ADDED TO LGMWS - 1, 3 & 4

SITE 4 - Operations, Maintenance, and Monitoring Activities Log	
DATE	5-23-18
TIME	11:00
STAFF	ERT / NASA + COUNTY
WEATHER	65°F OVERCAST
CONDITIONS	
SURFACE COVER	WELL MAINTAINED
DRAINAGE	PONDING FROM IRRIGATION CART PATH NEEDS GRAVEL
EROSION	NO EROSION OBSERVED
BURROWS	WELL UNDER CONTROL
FENCING/SIGNAGE	In place (Y) or N
PHOTOGRAPHS	4 Photos were taken. Saved here:
COMMENTS	191 pump station status: OPERATIONAL

SITE 22 - Operations, Maintenance, and Monitoring Activities Log	
DATE	8/21/18
TIME	10:50
PERSONNEL	Luke Metz & Chris Alderete + Garrett Turner (NASA) + County
WEATHER	Overcast 70°F
CONDITIONS	
SURFACE COVER	Well maintained
DRAINAGE	Some ponding in drainage channel (north east portion)
EROSION	
BURROWS	Squirrels only observed on east portion of CAT (2 burrows, 1 squirrel observed)
State or Federally listed Species Observed	None
PHOTOGRAPHS	0 Photos were taken; Saved here:
COMMENTS	

SITE 22 - Operations, Maintenance, and Monitoring Activities Log	
DATE	Dec 11 2018
TIME	11:45
PERSONNEL	Luke Metz, Chris Aldelete, Garrett Turner (NASA), Sally Lee (SCL), ~~Merchand~~ Koel (SCL)
WEATHER	Cloudy/Overcast
CONDITIONS	
SURFACE COVER	~~Ponding At~~ Cap surface is well maintained. No burrows observed.
DRAINAGE	Ponding in the northwest low spot just outside cap footprint. Standing water in drainage chanel along perimeter road
EROSION	No sign of erosion. Cart path requires ongoing maint.
BURROWS	No burrows observed
State or Federally listed Species Observed	None
COMMENTS	LGMW-2, 3 and 4 needed ~~ne~~ gaskets repositioned or replaced.

IR SITE 22 LANDFILL GENERAL OPERATIONS AND MAINTENANCE INSPECTION CHECKLIST

Inspection Date: 12/12/18 Inspector: LM

Site	Item	Condition: Good	Condition: Needs Maintenance	N/A	Comments
22	**General Site**				
	- water drainage		X		WORK IN PROGRESS
	- culvert/trench drainage		X		LOOKING INTO MULCH FILL
	- warning/instruction signs	X			
	- inspect for nesting owls	X			
	Landfill Cover				
	- erosion	X			
	- settling	X			
	- cracking	X			
	- rodent burrows	X			
	- vegetation restoration	X			
	- tree wells	X			
	- water drainage	X			
	Landfill Gas Monitoring Wells				
	- well cap integrity	X			
	- water drainage		X		GASKETS NEED ATTENTION
	- concrete collar condition	X	X		
	- locks		X		REPLACING IN 2019
	Groundwater Monitoring Wells				
	- well cap integrity	X			
	- water drainage	X			
	- concrete collar condition		X		WGC2-6 NEEDS REPAIR
	- locks		X		REPLACING IN 2019
	Stormwater Runoff Control				
	- water drainage		X		ON GOING / WORK IN PROGRESS
	- culvert/trench drainage		X		"
	- settlement	X			
	- erosion	X			

Abbreviations and Acronyms:

N/A - Not applicable

Santa Clara Country Landfill Inspection Reports

Closed Disposal Site Inspection Report (188)

Enforcement Agency:	County of Santa Clara

SWIS Facility File Number (99-xx-9999)	Inspection Date	Program Code
43-AA-0005	2/7/2018	LEA Periodic

Time In	11:00am	Time Out	1:30pm	Inspection Time	

Facility Name	Received By
NAS Moffett Field Closed Landfills	Kimberely Finch - NASA
Facility Location	**Owner Name**
Northern Area Of Field; Adjacent To Bay, Mountain View 94089	NASA
Inspector	**Also Present (Name)**
Quan Mai, REHS, LEA	L.Metz, C.Alderete, M.Ninokata - NASA ERT

THE ABOVE FACILITY WAS INSPECTED FOR COMPLIANCE WITH APPLICABLE SECTIONS OF DIVISION 30 OF PUBLIC RESOURCES CODE (PRC) AND TITLE 14 AND TITLE 27 CALIFORNIA CODE OF REGULATIONS (CCR)

X	**No Violations or Areas of Concern**

Inspection Report Comments:

SITE 1 LANDFILL:

1. At approximately 6 inches in height, good vegetative cover was observed on the landfill.

2. Very few holes and burrows, primarily on the west side of the landfill, were visible at the time of inspection. Reportedly, the operator is in the process of hiring a pest control company and the use of fumigation may be implemented in the coming months. However, one-way doors will still be utilized first before fumigation is applied to the burrows.

3. Continue to remove any obstructions, such as tumbleweeds and tall vegetation, found in the drainage channels to prevent ponding.

4. Ponding was not observed on the landfill at the time of inspection.

SITE 22 LANDFILL:

1. Dirt fill is currently being added to the area where ponding tends to occur at the edge of the northwestern side of the landfill (photos). Reportedly, maintenance of some tee-off holes on the golf course is occurring and dug up dirt from this project is being utilized as fill to fix the on-going ponding issue. Operator will evaluate the effectiveness of the added fill to this area during the next rain event. No ponding was observed at the time of inspection.

2. The rubber gasket on the well covers of LGMW-1 and LGMW-4 has been replaced. Water intrusion inside the monitoring wells has been reduced.

3. Continue to monitor and make necessary repairs to worn areas of the gravel/dirt path along the golf course.

4. The overall condition of the site was observed to be very well maintained and managed. No ground squirrels or gophers were observed at the time of inspection.

DOCUMENTS RECEIVED SINCE LAST QUARTERLY INSPECTION:
2017 Landfill Gas Monitoring Reports for Sites 1 & 22

Closed Disposal Site Inspection Report (188)

Enforcement Agency:	Local Inspection ID:
County of Santa Clara	

SWIS Facility File Number (99-xx-9999)	Inspection Date	Program Code
43-AA-0005	5/23/2018	LEA Periodic

Time In	9:45AM	Time Out	11:30AM	Inspection Time	

Facility Name	Received By
NAS Moffett Field Closed Landfills	
Facility Location	**Owner Name**
Northern Area Of Field; Adjacent To Bay, Mountain View 94089	
Inspector	**Also Present (Name)**
J. Murage, Sovann Uch, REHS LEA	Luke Metz, Christopher S. Alderete (NASA)

THE ABOVE FACILITY WAS INSPECTED FOR COMPLIANCE WITH APPLICABLE SECTIONS OF DIVISION 30 OF PUBLIC RESOURCES CODE (PRC) AND TITLE 14 AND TITLE 27 CALIFORNIA CODE OF REGULATIONS (CCR)

X	**No Violations or Areas of Concern**

Inspection Report Comments:

SITE 1 LANDFILL:

1. Tall vegetation, including radishes and mustard, was observed on the landfill. Mowing, usually conducted in early summer, will soon be conducted.
2. Very few holes and burrows, primarily on the west side of the landfill, were visible at the time of inspection. One-way doors are being utilized to manage burrowing rodents and protect the burrowing owl habitat (see photo). Fumigation has not been conducted since the last inspection.
3. Ensure that any obstructions, such as tumbleweeds and tall vegetation, found in the drainage channels are removed, to prevent ponding.
4. Ponding was not observed on the landfill at the time of inspection.

SITE 22 LANDFILL:

1. The operator reported that this site has been leased to Google, who will oversee operations.
2. Some ponding was observed in a low area at the edge of the northwestern side of the landfill prone to ponding from the golf course irrigation system (see photo). This area had recently been repaired. Ponding, from sprinklers, was also observed at various locations on the fairway and the gravel/dirt path along the golf course (see photos). Continue to monitor and make necessary repairs to low areas on the golf course, preferably utilizing gravel or base rock, which does not easily create ruts when golf carts are driven over it.

3. According to the operator, after the replacement of rubber gaskets inside the monitoring wells LGMW-1 and LGMW-4, water intrusion has been reduced.

4. The overall condition of the site was observed to be well maintained and managed. Only one ground squirrel was observed at the time of inspection.

DOCUMENTS RECEIVED SINCE LAST QUARTERLY INSPECTION:
None.

Closed Disposal Site Inspection Report (188)

Enforcement Agency:	Local Inspection ID:
County of Santa Clara	

SWIS Facility File Number (99-xx-9999)	Inspection Date	Program Code
43-AA-0005	8/21/2018	LEA Periodic

Time In	10:00AM	Time Out	11:30AM	Inspection Time	

Facility Name	Received By
NAS Moffett Field Closed Landfills	
Facility Location	**Owner Name**
Northern Area Of Field; Adjacent To Bay, Mountain View 94089	
Inspector	**Also Present (Name)**
Jaji Murage, Roel Meregillano R.E.H.S., LEA	Luke Metz, Christopher S. Alderete (NASA)

THE ABOVE FACILITY WAS INSPECTED FOR COMPLIANCE WITH APPLICABLE SECTIONS OF DIVISION 30 OF PUBLIC RESOURCES CODE (PRC) AND TITLE 14 AND TITLE 27 CALIFORNIA CODE OF REGULATIONS (CCR)

X	**No Violations or Areas of Concern**

Inspection Report Comments:

SITE 1 LANDFILL:

1. Vegetation was observed well managed. Mowing was conducted in July.

2. Very few holes and burrows (mainly gopher), were visible at the time of inspection. One-way doors are being utilized to manage burrowing rodents and protect the burrowing owl habitat.

3. No evidence of differential settlement was observed on the landfill at the time of inspection.

SITE 22 LANDFILL:

1. Some ponding was observed in a low area at the edge of the northwestern side of the landfill prone to ponding from the golf course irrigation system. Ponding from sprinklers, was also observed on the gravel/dirt path along the golf course and along the road in some low areas of the cobblestone drainage swale. Continue to monitor and make necessary repairs to low areas on the golf course, preferably utilizing gravel or base rock.

2. The overall condition of the site was observed to be well maintained and managed.

DOCUMENTS RECEIVED SINCE LAST QUARTERLY INSPECTION: None.

Closed Disposal Site Inspection Report (188)

Enforcement Agency:				Local Inspection ID:	
County of Santa Clara					
SWIS Facility File Number (99-xx-9999)		**Inspection Date**		**Program Code**	
43-AA-0005		**12/11/2018**		**LEA Periodic**	
Time In	10:00AM	**Time Out**	12:00PM	**Inspection Time**	
Facility Name				**Received By**	
NAS Moffett Field Closed Landfills					
Facility Location				**Owner Name**	
Northern Area Of Field; Adjacent To Bay, Mountain View 94089					
Inspector				**Also Present (Name)**	
Sally Lee, Roel Meregillano, REHS, LEA				Luke Metz, Christopher S. Alderete, Garrett Turner	

THE ABOVE FACILITY WAS INSPECTED FOR COMPLIANCE WITH APPLICABLE SECTIONS OF DIVISION 30 OF PUBLIC RESOURCES CODE (PRC) AND TITLE 14 AND TITLE 27 CALIFORNIA CODE OF REGULATIONS (CCR)

X	**No Violations or Areas of Concern**

Inspection Report Comments:

SITE 1 LANDFILL:

1. Annual mowing was conducted in July 2018. Vegetation was observed well managed.
2. A few holes and burrows were visible at the time of inspection. One-way doors have been installed at active burrow openings to control the burrowing rodents and protect the burrowing owl habitat. Fumigation has been scheduled for the following week.
3. Ponding was not observed on the landfill at the time of inspection.

SITE 22 LANDFILL:

1. Some ponding was observed in a low area at the edge of the northwestern side of the landfill prone to ponding from the golf course irrigation system. Ponding from sprinklers, was also observed on the gravel/dirt path along the golf course and along the road in some low areas of the cobblestone drainage swale. Continue to monitor and make necessary repairs to low areas on the golf course, preferably utilizing gravel or base rock.
2. Observed water intrusion inside gas probe perimeter monitoring wells LGMW-2, LGMW-3, and LGMW-4. The rubber gasket in LGMW-4 was loose. Continue to monitor the wells to minimize water intrusion.

Documents received since last quarterly inspection: none

2019

General Site Inspection Reports and Santa Clara County Inspection Reports

General Site Inspection Reports

Site 1

TABLE 4-1

SITE 1 LANDFILL GENERAL INSPECTION CHECKLIST AND FREQUENCY

3/11/19

Item	Frequency[a]	Condition			Comments
		Good	Needs Maintenance	N/A	
General Site Conditions					
- Perimeter Road	Semiannual	✓			
- Landfill signs	Semiannual	✓			
- Inspect for nesting owls and burrowing animals	Semiannual	✓			
- Security fencing and gates	Semiannual	✓			
- Riprap	Semiannual	✓			
- Raptor perches	Semiannual			✓	BURROWS PRESENT
Landfill Cap					
- Iso-settlement and surveying landfill settlement markers	Every 5 Years[b]	✓			DUE 2020
- Erosion	Semiannual	✓			
- Visual observations of settling (i.e., cracking, sloughing)	Semiannual	✓			
- Vegetation control and restoration	Semiannual	✓			1 FOOT TO 18" HIGH
- Cap breaching	Semiannual	✓			
- Water drainage	Semiannual	✓			
Landfill Gas Vents					
- Riser condition (i.e., paint, integrity)	Semiannual	✓			
- Identification tag present	Semiannual	✓			
- Concrete collar condition	Semiannual	✓			
- Screen condition	Semiannual	✓			
Landfill Gas Monitoring Wells					
- Riser condition (i.e., paint, integrity)	Semiannual	✓			
- Identification tag present	Semiannual	✓			
- Traffic protection (i.e., bollards)	Semiannual	✓			
- Concrete collar condition	Semiannual	✓			
- Well cap integrity	Semiannual	✓			
- Water drainage	Semiannual	✓			
- Well locks	Semiannual	✓			
Collection Trench Wells					
- Concrete collar condition	Semiannual	✓			
- Protective cover condition	Semiannual	✓			
- Identification number legibility	Semiannual	✓			

TABLE 4-1

SITE 1 LANDFILL GENERAL INSPECTION CHECKLIST AND FREQUENCY

Item	Frequency[a]	Condition			Comments
		Good	Needs Maintenance	N/A	
- Well cap integrity	Semiannual	✓			
- Water drainage	Semiannual	✓			
- Well locks	Semiannual	✓			
Groundwater Monitoring Wells and Piezometers					
- Riser condition (i.e., paint, integrity, cover)	Semiannual	✓			
- Identification number legibility					
- Concrete collar condition	Semiannual	✓			
- Traffic protection (i.e., bollards)	Semiannual	✓			
- Well cap integrity	Semiannual	✓			
- Water drainage	Semiannual	✓			
- Well locks	Semiannual		✓		
Stormwater Runoff Control			✓		
- Water drainage	Semiannual	✓			
- Culvert and trench drainage	Semiannual	✓			
- Riprap	Semiannual		✓		
- Erosion	Semiannual	✓			
- Settlement	Semiannual	✓			

Notes:

(a) Frequency indicates minimum requirements. Semiannual inspections will be conducted in March and September, except for the stormwater runoff control, which will be inspected before the October reainy season ane in May at the end of the rainy season. Inspections also are required after significant storm events and as needed.

(b) Every 5 years from the previous surveying and iso-settlement mapping.

Abbreviations and Acronyms:
N/A - not applicable

TABLE 4-1

SITE 1 LANDFILL GENERAL INSPECTION CHECKLIST AND FREQUENCY 6/11/19

Item	Frequency[a]	Condition			Comments
		Good	Needs Maintenance	N/A	
General Site Conditions					
- Perimeter Road	Semiannual	✓			
- Landfill signs	Semiannual	✓			
- Inspect for nesting owls and burrowing animals	Semiannual	✓			ONGOING MAINTENANCE
- Security fencing and gates	Semiannual	✓			
- Riprap	Semiannual	✓			SOME BURROWS PRESENT
- Raptor perches	Semiannual			✓	
Landfill Cap					
- Iso-settlement and surveying landfill settlement markers	Every 5 Years[b]	✓			
- Erosion	Semiannual	✓			
- Visual observations of settling (i.e., cracking, sloughing)	Semiannual	✓			
- Vegetation control and restoration	Semiannual		✓		VEG HIGH / MOWING SERVICE REQUEST
- Cap breaching	Semiannual	✓			IN PROGRESS.
- Water drainage	Semiannual	✓			
Landfill Gas Vents					
- Riser condition (i.e., paint, integrity)	Semiannual	✓			
- Identification tag present	Semiannual	✓			
- Concrete collar condition	Semiannual	✓			
- Screen condition	Semiannual	✓			
Landfill Gas Monitoring Wells					
- Riser condition (i.e., paint, integrity)	Semiannual	✓			
- Identification tag present	Semiannual	✓			
- Traffic protection (i.e., bollards)	Semiannual	✓			
- Concrete collar condition	Semiannual	✓			
- Well cap integrity	Semiannual	✓			
- Water drainage	Semiannual	✓			
- Well locks	Semiannual	✓			
Collection Trench Wells					
- Concrete collar condition	Semiannual	✓			
- Protective cover condition	Semiannual	✓			
- Identification number legibility	Semiannual	✓			

TABLE 4-1

SITE 1 LANDFILL GENERAL INSPECTION CHECKLIST AND FREQUENCY

Item	Frequency[a]	Condition			Comments
		Good	Needs Maintenance	N/A	
- Well cap integrity	Semiannual	✓			
- Water drainage	Semiannual	✓			
- Well locks	Semiannual	✓			
Groundwater Monitoring Wells and Piezometers					
- Riser condition (i.e., paint, integrity, cover)	Semiannual	✓			
- Identification number legibility					
- Concrete collar condition	Semiannual	✓			
- Traffic protection (i.e., bollards)	Semiannual	✓			
- Well cap integrity	Semiannual	✓			
- Water drainage	Semiannual	✓			
- Well locks	Semiannual	✓			
Stormwater Runoff Control					
- Water drainage	Semiannual	✓			
- Culvert and trench drainage	Semiannual	✓			
- Riprap	Semiannual	✓			
- Erosion	Semiannual	✓			
- Settlement	Semiannual	✓			

Notes:

(a) Frequency indicates minimum requirements. Semiannual inspections will be conducted in March and September, except for the stormwater runoff control, which will be inspected before the October reainy season ane in May at the end of the rainy season. Inspections also are required after significant storm events and as needed.

(b) Every 5 years from the previous surveying and iso-settlement mapping.

Abbreviations and Acronyms:

N/A - not applicable

TABLE 4-1

SITE 1 LANDFILL GENERAL INSPECTION CHECKLIST AND FREQUENCY

7/29/19

Item	Frequency[a]	Condition			Comments
		Good	Needs Maintenance	N/A	
General Site Conditions					
- Perimeter Road	Semiannual	✓			
- Landfill signs	Semiannual	✓			
- Inspect for nesting owls and burrowing animals	Semiannual		✓		
- Security fencing and gates	Semiannual	✓			
- Riprap	Semiannual		✓		
- Raptor perches	Semiannual			✓	
Landfill Cap					
- Iso-settlement and surveying landfill settlement markers	Every 5 Years[b]			✓	
- Erosion	Semiannual	✓			
- Visual observations of settling (i.e., cracking, sloughing)	Semiannual	✓			
- Vegetation control and restoration	Semiannual	✓			MOWING ON 7/31/19
- Cap breaching	Semiannual	✓			
- Water drainage	Semiannual	✓			
Landfill Gas Vents					
- Riser condition (i.e., paint, integrity)	Semiannual	✓			
- Identification tag present	Semiannual	✓			
- Concrete collar condition	Semiannual	✓			
- Screen condition	Semiannual	✓			
Landfill Gas Monitoring Wells					
- Riser condition (i.e., paint, integrity)	Semiannual	✓			
- Identification tag present	Semiannual	✓			
- Traffic protection (i.e., bollards)	Semiannual	✓			
- Concrete collar condition	Semiannual	✓			
- Well cap integrity	Semiannual	✓			
- Water drainage	Semiannual	✓			
- Well locks	Semiannual	✓			
Collection Trench Wells					
- Concrete collar condition	Semiannual	✓			
- Protective cover condition	Semiannual	✓			
- Identification number legibility	Semiannual	✓			

TABLE 4-1

SITE 1 LANDFILL GENERAL INSPECTION CHECKLIST AND FREQUENCY

Item	Frequency[a]	Condition			Comments
		Good	Needs Maintenance	N/A	
- Well cap integrity	Semiannual	✓			
- Water drainage	Semiannual	✓			
- Well locks	Semiannual	✓			
Groundwater Monitoring Wells and Piezometers					
- Riser condition (i.e., paint, integrity, cover)	Semiannual	✓			
- Identification number legibility		✓			
- Concrete collar condition	Semiannual	✓			
- Traffic protection (i.e., bollards)	Semiannual	✓			
- Well cap integrity	Semiannual	✓			
- Water drainage	Semiannual	✓			
- Well locks	Semiannual	✓			
Stormwater Runoff Control					
- Water drainage	Semiannual	✓			
- Culvert and trench drainage	Semiannual	✓			
- Riprap	Semiannual	✓			
- Erosion	Semiannual	✓			
- Settlement	Semiannual	✓			

Notes:

(a) Frequency indicates minimum requirements. Semiannual inspections will be conducted in March and September, except for the stormwater runoff control, which will be inspected before the October reainy season ane in May at the end of the rainy season. Inspections also are required after significant storm events and as needed.

(b) Every 5 years from the previous surveying and iso-settlement mapping.

Abbreviations and Acronyms:

N/A - not applicable

TABLE 4-1

SITE 1 LANDFILL GENERAL INSPECTION CHECKLIST AND FREQUENCY 10/3/19

Item	Frequency[a]	Condition			Comments
		Good	Needs Maintenance	N/A	
General Site Conditions					
- Perimeter Road	Semiannual	X			
- Landfill signs	Semiannual				
- Inspect for nesting owls and burrowing animals	Semiannual	X			
- Security fencing and gates	Semiannual				
- Riprap	Semiannual	X			
- Raptor perches	Semiannual			X	SOME BURROWS PRESENT
Landfill Cap					
- Iso-settlement and surveying landfill settlement markers	Every 5 Years[b]	X			
- Erosion	Semiannual	X			
- Visual observations of settling (i.e., cracking, sloughing)	Semiannual	X			
- Vegetation control and restoration	Semiannual	X			0-6 INCHES
- Cap breaching	Semiannual	X			
- Water drainage	Semiannual	X			
Landfill Gas Vents					
- Riser condition (i.e., paint, integrity)	Semiannual	X			
- Identification tag present	Semiannual	X			
- Concrete collar condition	Semiannual		X		GV-11 LOOSE COLLAR
- Screen condition	Semiannual	X			
Landfill Gas Monitoring Wells					
- Riser condition (i.e., paint, integrity)	Semiannual	X			
- Identification tag present	Semiannual	X			
- Traffic protection (i.e., bollards)	Semiannual	X			
- Concrete collar condition	Semiannual	X			
- Well cap integrity	Semiannual	X			
- Water drainage	Semiannual	X			
- Well locks	Semiannual	X			
Collection Trench Wells					
- Concrete collar condition	Semiannual	X			
- Protective cover condition	Semiannual	X			
- Identification number legibility	Semiannual	X			

TABLE 4-1

SITE 1 LANDFILL GENERAL INSPECTION CHECKLIST AND FREQUENCY

OCT 3 2019

Item	Frequency[a]	Condition			Comments
		Good	Needs Maintenance	N/A	
- Well cap integrity	Semiannual	X			
- Water drainage	Semiannual	X			
- Well locks	Semiannual	X			
Groundwater Monitoring Wells and Piezometers					
- Riser condition (i.e., paint, integrity, cover)	Semiannual	X			
- Identification number legibility		X			
- Concrete collar condition	Semiannual	X			
- Traffic protection (i.e., bollards)	Semiannual	X			
- Well cap integrity	Semiannual	X			
- Water drainage	Semiannual	X			
- Well locks	Semiannual	X			
Stormwater Runoff Control					
- Water drainage	Semiannual	X			
- Culvert and trench drainage	Semiannual	X			
- Riprap	Semiannual	X			
- Erosion	Semiannual	X			OCCASIONALLY FIND BURROWS
- Settlement	Semiannual	X			

Notes:

(a) Frequency indicates minimum requirements. Semiannual inspections will be conducted in March and September, except for the stormwater runoff control, which will be inspected before the October reainy season ane in May at the end of the rainy season. Inspections also are required after significant storm events and as needed.

(b) Every 5 years from the previous surveying and iso-settlement mapping.

Abbreviations and Acronyms:
N/A - not applicable

General Site Inspection Reports

Site 22

IR SITE 22 LANDFILL GENERAL OPERATIONS AND MAINTENANCE INSPECTION CHECKLIST

Inspection Date: 3/11/19 Inspector: LM

Site	Item	Condition			Comments
		Good	Needs Maintenance	N/A	
22	**General Site**				
	- water drainage	✓			
	- culvert/trench drainage	✓			
	- warning/instruction signs	✓			
	- inspect for nesting owls	✓			
	Landfill Cover				
	- erosion	✓			
	- settling	✓			
	- cracking	✓			
	- rodent burrows	✓			NO FUMIGATION
	- vegetation restoration	✓			NO BURROWS PRESENT
	- tree wells	✓			
	- water drainage	✓			
	Landfill Gas Monitoring Wells				
	- well cap integrity	X			
	- water drainage		X		LGMW-2
	- concrete collar condition	X			
	- locks	X			
	Groundwater Monitoring Wells				
	- well cap integrity	X			
	- water drainage	X			
	- concrete collar condition		X		WGC2-6
	- locks	X			
	Stormwater Runoff Control				
	- water drainage	X			
	- culvert/trench drainage	X			
	- settlement	X			
	- erosion	X			

Abbreviations and Acronyms:

N/A - Not applicable

IR SITE 22 LANDFILL GENERAL OPERATIONS AND MAINTENANCE INSPECTION CHECKLIST

Inspection Date: 6/11/19 Inspector: LM

Site	Item	Condition: Good	Condition: Needs Maintenance	N/A	Comments
22	**General Site**				
	- water drainage	X			
	- culvert/trench drainage	X			
	- warning/instruction signs	X			
	- inspect for nesting owls	X			
	Landfill Cover				
	- erosion	X			
	- settling	X			
	- cracking	X			
	- rodent burrows	X			
	- vegetation restoration	X			
	- tree wells	X			
	- water drainage	X			
	Landfill Gas Monitoring Wells				
	- well cap integrity	X			
	- water drainage	X			LGMW-2 FIXED 6/11
	- concrete collar condition	X			
	- locks	X			
	Groundwater Monitoring Wells				
	- well cap integrity	X			
	- water drainage	X			
	- concrete collar condition		X		WGC2-6
	- locks	X			
	Stormwater Runoff Control				
	- water drainage	X			
	- culvert/trench drainage	X			
	- settlement	X			
	- erosion	X			

Abbreviations and Acronyms:

N/A - Not applicable

IR SITE 22 LANDFILL GENERAL OPERATIONS AND MAINTENANCE INSPECTION CHECKLIST

Inspection Date: 7/29/19 Inspector: CM

Site	Item	Condition: Good	Condition: Needs Maintenance	N/A	Comments
22	**General Site**				
	- water drainage	X			
	- culvert/trench drainage	X			
	- warning/instruction signs	X			
	- inspect for nesting owls	X			
	Landfill Cover				
	- erosion	X			
	- settling	X			
	- cracking	X			
	- rodent burrows	X			
	- vegetation restoration	X			
	- tree wells	X			
	- water drainage	X			
	Landfill Gas Monitoring Wells				
	- well cap integrity	X			
	- water drainage	X			
	- concrete collar condition	X			
	- locks	X			
	Groundwater Monitoring Wells				
	- well cap integrity	X			
	- water drainage	X			
	- concrete collar condition		X		WGC2-CO
	- locks	X			
	Stormwater Runoff Control				
	- water drainage	X			
	- culvert/trench drainage	X			
	- settlement	X			
	- erosion	X			

Abbreviations and Acronyms:

N/A - Not applicable

IR SITE 22 LANDFILL GENERAL OPERATIONS AND MAINTENANCE INSPECTION CHECKLIST

Inspection Date: 10/3/19 Inspector: LM

Site	Item	Condition: Good	Condition: Needs Maintenance	N/A	Comments
22	**General Site**				
	- water drainage	X			
	- culvert/trench drainage	X			
	- warning/instruction signs	X			
	- inspect for nesting owls	X			
	Landfill Cover				
	- erosion	X			
	- settling	X			
	- cracking	X			
	- rodent burrows		3 BURROWS		NOTIFY PV/OB SPORTS 10/22
	- vegetation restoration	X			
	- tree wells	X			
	- water drainage	X			
	Landfill Gas Monitoring Wells				
	- well cap integrity	X			
	- water drainage	X			
	- concrete collar condition	X			
	- locks	X			
	Groundwater Monitoring Wells				
	- well cap integrity	X			
	- water drainage		X		WGC2-8 & WGC2-11
	- concrete collar condition		X		WGC2-6
	- locks	X			
	Stormwater Runoff Control				
	- water drainage	X			
	- culvert/trench drainage	X			
	- settlement	X			
	- erosion	X			

Abbreviations and Acronyms:

N/A - Not applicable

Santa Clara Country Landfill Inspection Reports

Closed Disposal Site Inspection Report (188)

Enforcement Agency:				Local Inspection ID:	
County of Santa Clara					
SWIS Facility File Number (99-xx-9999)		**Inspection Date**		**Program Code**	
43-AA-0005		**2/14/2019**		**LEA Periodic**	
Time In	1000	**Time Out**	1200	**Inspection Time**	
Facility Name				**Received By**	
NAS Moffett Field Closed Landfills					
Facility Location				**Owner Name**	
Northern Area Of Field; Adjacent To Bay, Mountain View 94089					
Inspector				**Also Present (Name)**	
Sally Lee, County of Santa Clara LEA				Luke Metz, Christopher S. Alderete	

THE ABOVE FACILITY WAS INSPECTED FOR COMPLIANCE WITH APPLICABLE SECTIONS OF DIVISION 30 OF PUBLIC RESOURCES CODE (PRC) AND TITLE 14 AND TITLE 27 CALIFORNIA CODE OF REGULATIONS (CCR)

X	**No Violations or Areas of Concern**

Inspection Report Comments:

SITE 1 LANDFILL:

1. Fumigation for squirrels and gopher are ongoing. Areas outside the bench road will be fumigated as well. Additionally, one-way entry doors are installed on several burrow openings to prevent further burrowing on the landfill.
2. Drainage channels at Site 1 are functioning properly.
3. Ponding was not observed on the landfill at the time of inspection.

SITE 22 LANDFILL:

1. Methane monitoring anticipated for April 2019.
2. Ponding issues observed at golf course. One ponding was not affecting the landfill; however, it is affecting the functionality of landfill gas monitor well (LGMW-2). The well was completely filled with water. Repair the rubber gasket and closely monitor the water intrusion condition to minimize water from getting inside the landfill gas monitor wells.

Documents received since last quarterly inspection: none

Closed Disposal Site Inspection Report (188)

Enforcement Agency:				Local Inspection ID:	
County of Santa Clara					
SWIS Facility File Number (99-xx-9999)		**Inspection Date**		**Program Code**	
43-AA-0005		**6/13/2019**		**LEA Periodic**	
Time In	1000	**Time Out**	1200	**Inspection Time**	
Facility Name				**Received By**	
NAS Moffett Field Closed Landfills					
Facility Location				**Owner Name**	
Northern Area Of Field; Adjacent To Bay, Mountain View 94089					
Inspector				**Also Present (Name)**	
Sally Lee, County of Santa Clara LEA				Luke Metz, Christopher S Alderete	

THE ABOVE FACILITY WAS INSPECTED FOR COMPLIANCE WITH APPLICABLE SECTIONS OF DIVISION 30 OF PUBLIC RESOURCES CODE (PRC) AND TITLE 14 AND TITLE 27 CALIFORNIA CODE OF REGULATIONS (CCR)

X	**No Violations or Areas of Concern**

Inspection Report Comments:

SITE 1 LANDFILL:
1. To control burrow animals, the site installs one-way doors in the burrow openings and maintains them for 48 hours. Once it's confirmed that no burrowing animals are found inside, the tunnels are collapsed. Fumigation for squirrels and gophers is conducted on an as-needed basis. The most recent fumigation was conducted on February 21, 2019. Observed one burrow opening at the time of inspection.
2. Drainage channels at the bottom of eastern slope at Site 1 are functioning properly.
3. Ponding was not observed on the landfill at the time of inspection.
4. Mowing of vegetation on the site is scheduled to be conducted at the end of June 2019.

SITE 22 LANDFILL:
1. Methane monitoring was conducted in April 2019. The next sampling is scheduled for September 2019.
2. No ponding issues observed at the time of inspection. No water intrusion observed in any of the four landfill gas monitoring wells.

Documents received since last quarterly inspection: Methane Gas Monitoring Data for both Site 1 and Site 22. All results were shown to be in compliance.

Closed Disposal Site Inspection Report (188)

Enforcement Agency:	Local Inspection ID:
County of Santa Clara	

SWIS Facility File Number (99-xx-9999)	Inspection Date	Program Code
43-AA-0005	8/21/2019	LEA Periodic

Time In	1000	Time Out	1130	Inspection Time	

Facility Name	Received By
NAS Moffett Field Closed Landfills	
Facility Location	**Owner Name**
Northern Area Of Field; Adjacent To Bay, Mountain View 94089	
Inspector	**Also Present (Name)**
Sally Lee, County of Santa Clara LEA	Luke Metz, Christopher S. Alderete

THE ABOVE FACILITY WAS INSPECTED FOR COMPLIANCE WITH APPLICABLE SECTIONS OF DIVISION 30 OF PUBLIC RESOURCES CODE (PRC) AND TITLE 14 AND TITLE 27 CALIFORNIA CODE OF REGULATIONS (CCR)

X	**No Violations or Areas of Concern**

Inspection Report Comments:

SITE 1 LANDFILL:

1. Increased burrowing animal activities observed at the south side of the site. The site has installed 49 one-way doors in the burrow openings yesterday. Biologist will return to the site after 48 hours to identify the true activities and collapse the burrows. Fumigation for squirrels and gophers is conducted on an as-needed basis. The most recent fumigation was conducted on February 21, 2019. Monitoring and one-way door installation is conducted on a monthly basis. Observed several burrow openings at the time of inspection.
2. Ponding was not observed on the landfill at the time of inspection.
3. Annual mowing of vegetation on the site was completed on July 31, 2019.

SITE 22 LANDFILL:
1. Methane monitoring was conducted in April 2019. The next sampling is scheduled for September 2019.
2. No ponding issues observed at the time of inspection. No water intrusion was observed in any of the four landfill gas monitoring wells.

Documents received since last quarterly inspection: None

Appendix C

Site 1 FYR Metals Concentrations

Site 1 Landfill
Metals Concentrations

Well ID	Chemical	Units	Apr-15		Oct-15		Apr-16		Oct-16		Apr-17		Oct-17		Apr-18		Oct-18		Apr-19		Oct-19	
W1-1R	Arsenic	ug/L	2.9		2.7		3.4		11		190		11		50	U	10	U	10	U	2.7	
	Barium	ug/L	76		70		69		67		60		26		45		36		56		45	
	Cobalt	ug/L	13		10		22		27		19		9.8		38	U	15		10		10	
	Copper	ug/L	5.9		4		0.5	U	5.6		190		3.2	U	8.7		6.4	U	7.6		3.2	U
W1-5	Arsenic	ug/L	4.1		4.5		8.3		9.4		180		10	U	50		10		10	U	1.9	U
	Barium	ug/L	230		470		380		460		350		190		220		210		340		370	
	Cobalt	ug/L	1.7		1.4		4.9		2.2		4.2		7.6	U	38		15		7.6	U	7.6	U
	Copper	ug/L	1	U	0.5	U	0.5	U	0.5		300		3.2	U	5		6.4	U	5.4		3.2	U
W1-8	Arsenic	ug/L	2.4		2.3		5.1		17		200		13		50	U	10	U	10	U	2.7	U
	Barium	ug/L	120		110		120		150		110		60		120		86		230		180	
	Cobalt	ug/L	2.7		2.7		2.8		3.6		5		7.6	U	38	U	15	U	7.6	U	7.6	U
	Copper	ug/L	0.82	U	0.5	U	0.5	U	13		310		3.2	U	21		6.4	U	9.8		3.2	U
W1-12R	Arsenic	ug/L	2.1		1.6		3.7		12		na		18		50	U	10	U	10	U	2.7	U
	Barium	ug/L	57		31		56		58		na		25		50		23		49		43	
	Cobalt	ug/L	11		5.4		10		9.4		na		7.6	U	38	U	15	U	7.6	U	7.6	U
	Copper	ug/L	6.6		2		0.5	U	3.8		na		4.6		5.3		6.4	U	8.9		12	U
W1-14	Arsenic	ug/L	9		8.6		11		19		230		10		50	U	10	U	10		7.2	U
	Barium	ug/L	200		200		220		200		360		180		300	U	130		310		180	
	Cobalt	ug/L	9.3		6.6		8.3		11		5.1		7.6	U	38		15	U	7.6		7.6	U
	Copper	ug/L	0.52	U	0.5	U	0.5	U	0.5	U	340		3.2	U	5	U	6.4	U	3.2		3.2	U
W1-15	Arsenic	ug/L	4.1		6		6.1		14		260		13		50	U	10	U	10	U	2.7	
	Barium	ug/L	230		150		210		200		210		110		210		120		200		180	
	Cobalt	ug/L	1.7		1.9		3		3		5.2		7.6	U	38	U	15	U	7.6	U	7.6	U
	Copper	ug/L	1	U	0.5	U	0.5	U	0.5	U	370		3.2	U	5	U	6.4	U	3.2	U	3.2	U
W1-16	Arsenic	ug/L	12		12		13		20		290		13		50	U	10	U	11		12	
	Barium	ug/L	370		310		280		400		1100		310		1300		500		640		580	
	Cobalt	ug/L	10		11		13		13		5.4		7.6	U	38	U	15	U	7.6	U	7.6	U
	Copper	ug/L	1	U	0.5	U	0.5	U	0.5	U	350		3.2	U	5	U	6.4	U	3.3		3.2	U
W1-19	Arsenic	ug/L	5.2		5.5		6.2		15		310		14		50	U	10	U	10	U	5.7	
	Barium	ug/L	90		76		81		86		83		32		70		44		74		66	
	Cobalt	ug/L	14		13		13		15		15		7.6	U	38	U	15	U	7.6	U	8.1	
	Copper	ug/L	1.7		0.5	U	0.5	U	0.5	U	410		3.2	U	5	U	7.6		3.2	U	6.4	
W1-22	Arsenic	ug/L	13		2.9		3.5		7.5		170		13		50	U	10	U	10	U	2.7	U
	Barium	ug/L	180		1900		940		580		200		150		990		1100		810		1000	
	Cobalt	ug/L	4.7		3.4		3.6		4		5.4		7.6	U	38	U	15	U	7.6	U	7.6	U
	Copper	ug/L	1.7		0.5	U	0.5	U	0.5	U	180		3.2	U	5	U	8.8		3.2	U	3.2	U
W1-23	Arsenic	ug/L	8.2		5.8		10		17		170		10	U	55		30		15		11	
	Barium	ug/L	130		130		110		140		200		31		36		33		37		62	
	Cobalt	ug/L	2.4		3.7		2.1		4.9		5.4		7.6	U	38	U	15	U	7.6	U	7.6	U
	Copper	ug/L	29		16		18		19		180		29		46		74		29		25	
W1-24	Arsenic	ug/L	7.1		7.4		12		19		310		13		50	U	10	U	10	U	5.5	
	Barium	ug/L	880		410		460		530		410		280		410		440		570		610	
	Cobalt	ug/L	1.1		3.6		7.3		3.7		8.3		7.6	U	38	U	15	U	7.6	U	7.6	U
	Copper	ug/L	1	U	0.5	U	0.5U	U	0.5	U	350		3.2	U	5	U	7.3		3.2	U	3.2	U

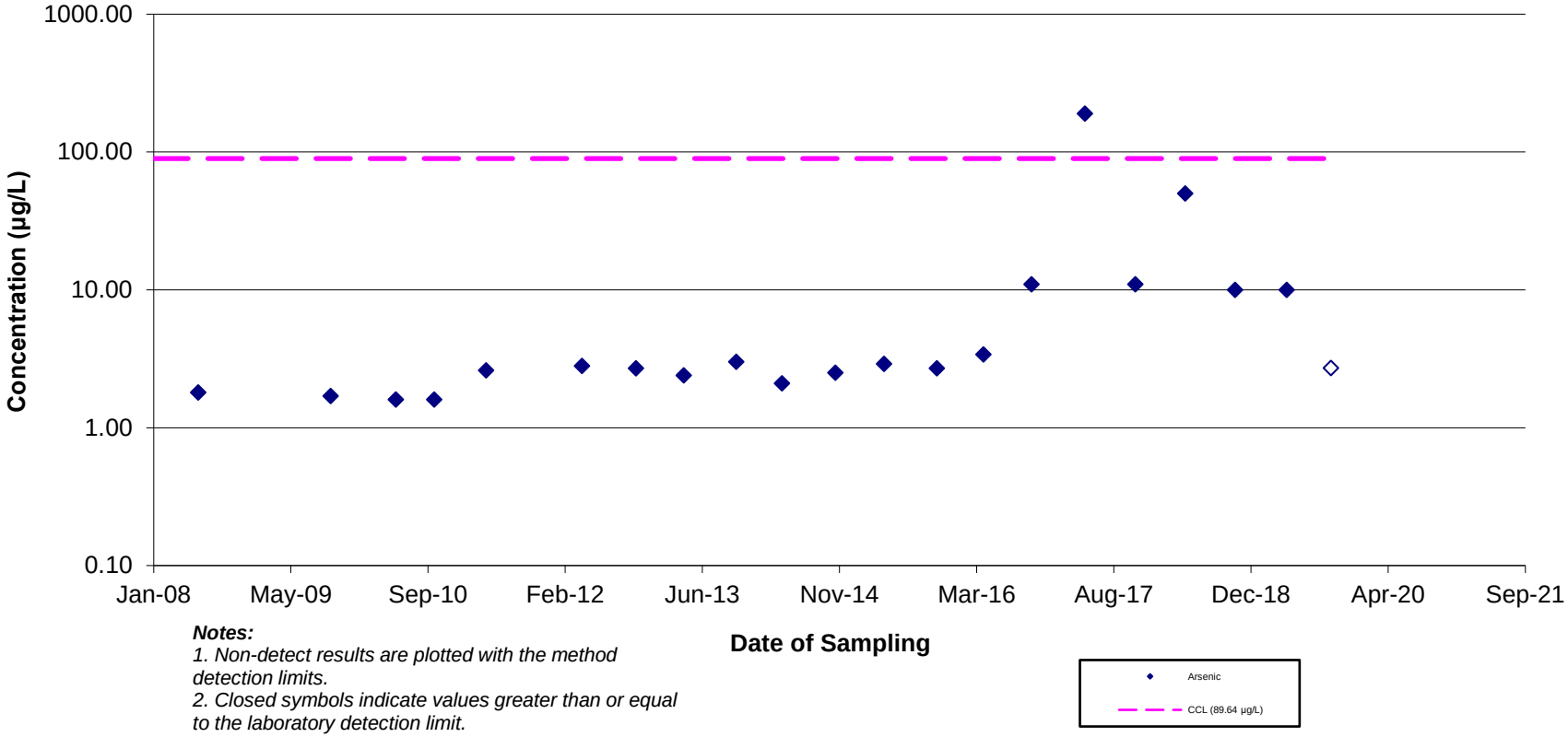
Note: U = not detected at method reporting limit.

Appendix D

Site 1 and Site 22 Time vs Concentration Graphs

Figure D-1

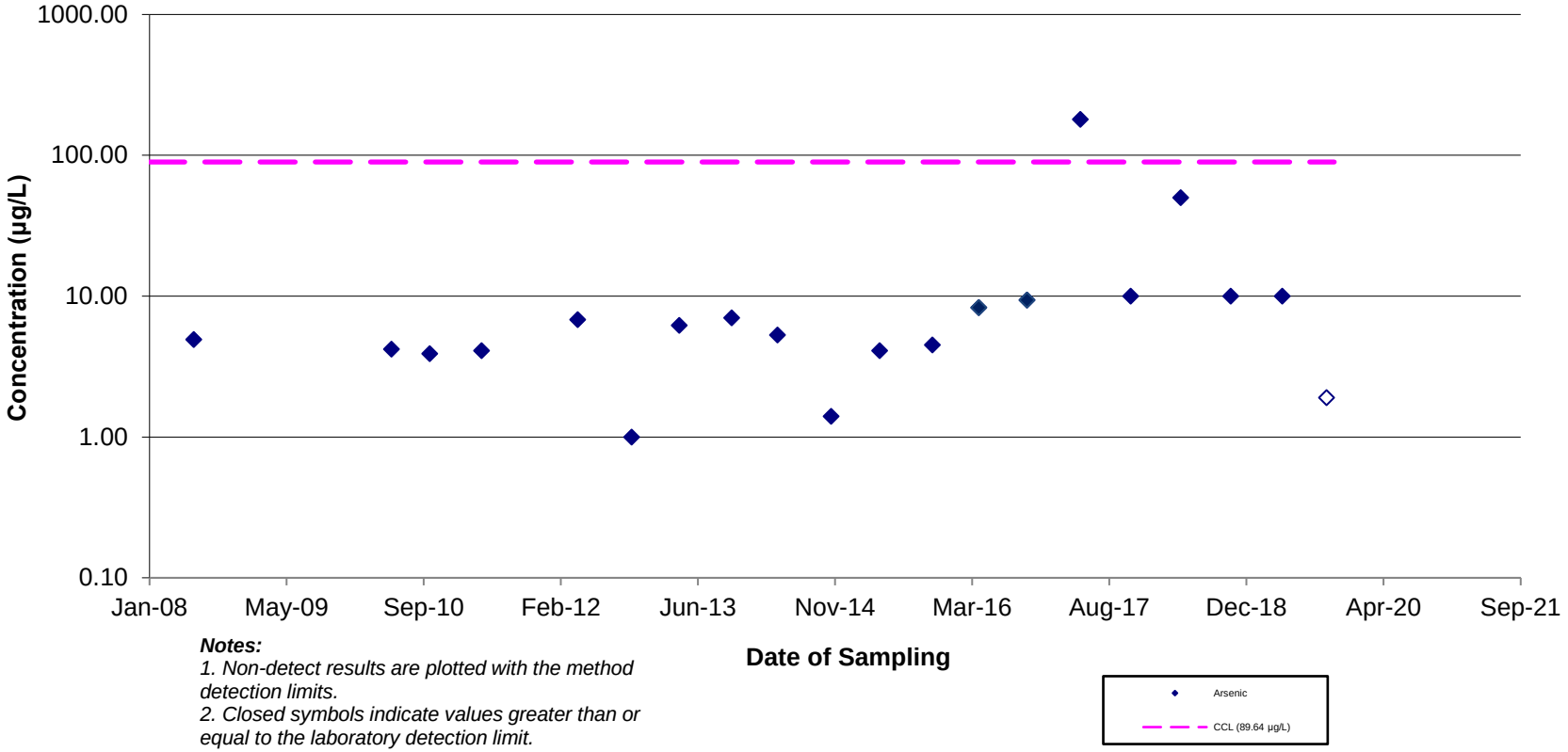
Site 1 Dissolved Arsenic Concentrations
Downgradient Monitoring Well W1-1R



Notes:
1. Non-detect results are plotted with the method detection limits.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-2

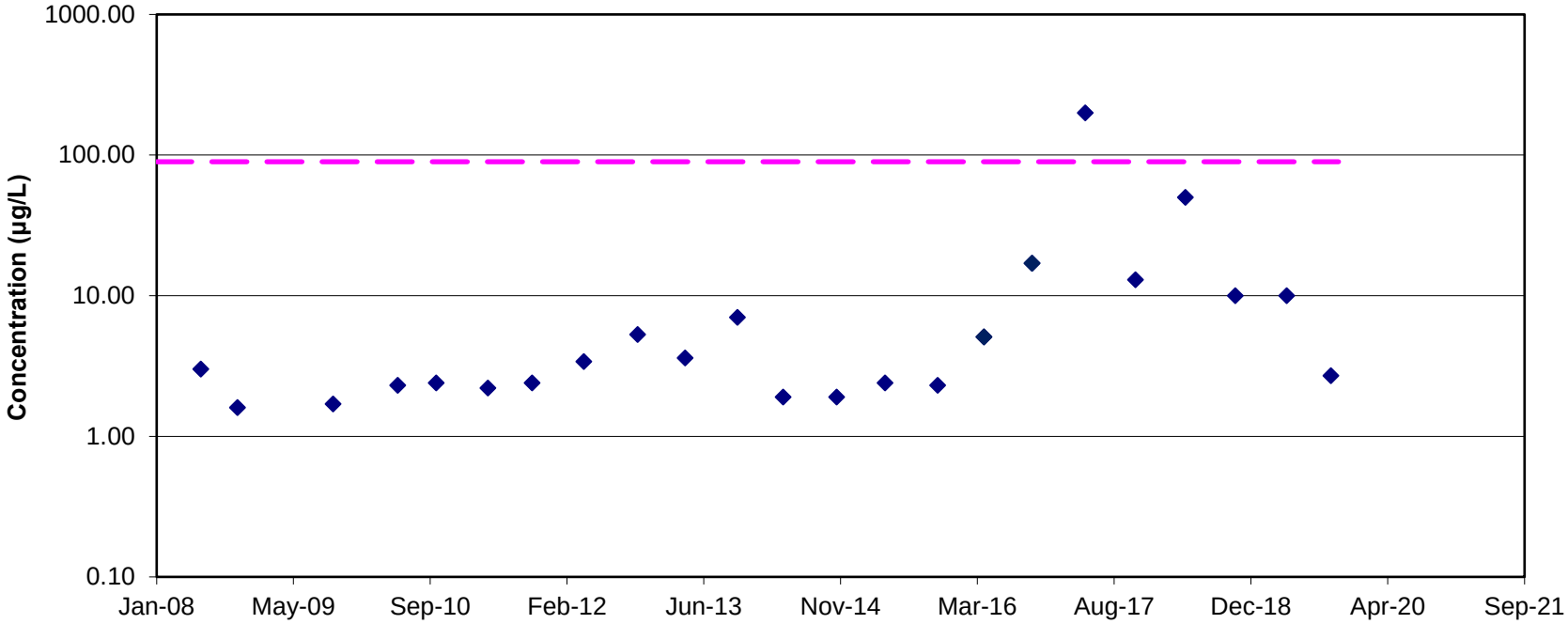
Site 1 Dissolved Arsenic Concentrations
Upgradient Monitoring Well W1-5



Notes:
1. Non-detect results are plotted with the method detection limits.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-3

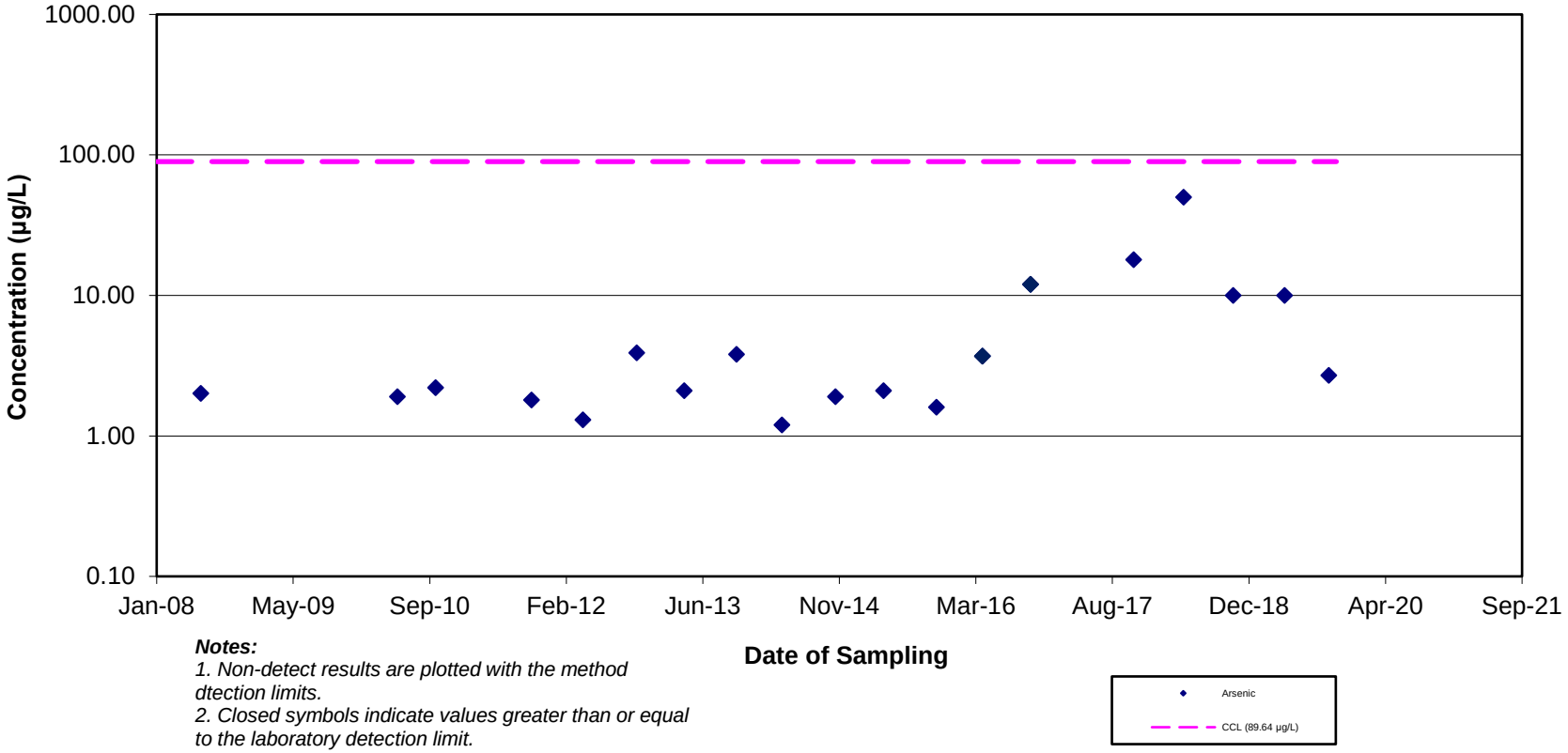
Site 1 Dissolved Arsenic Concentrations
Upgradient Monitoring Well W1-8



Notes:
1. Non-detect results are plotted with the method detection limits.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-4

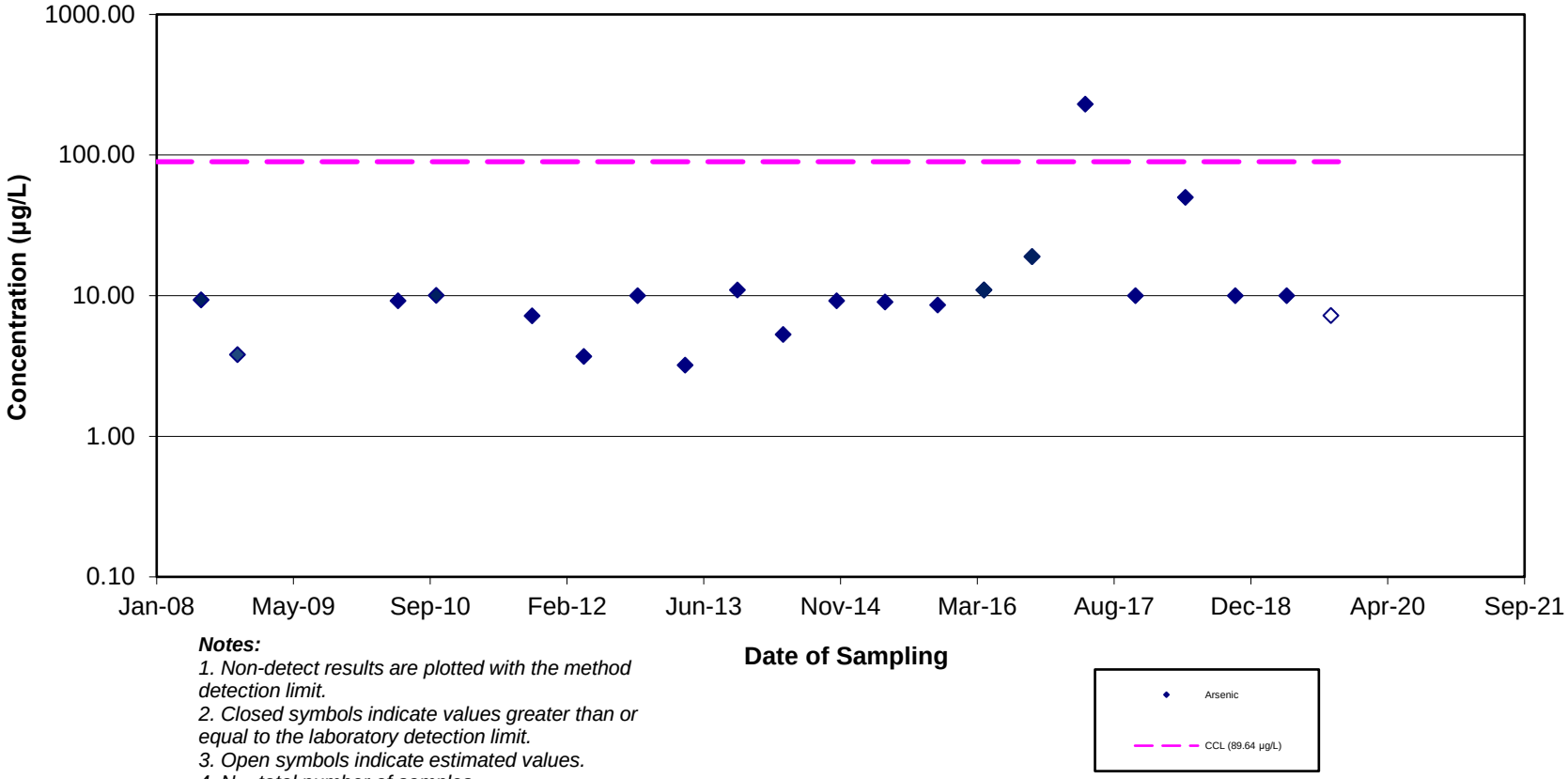
Site 1 Dissolved Arsenic Concentrations
Upgradient Monitoring Well W1-12R



Notes:
1. Non-detect results are plotted with the method dtection limits.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-5

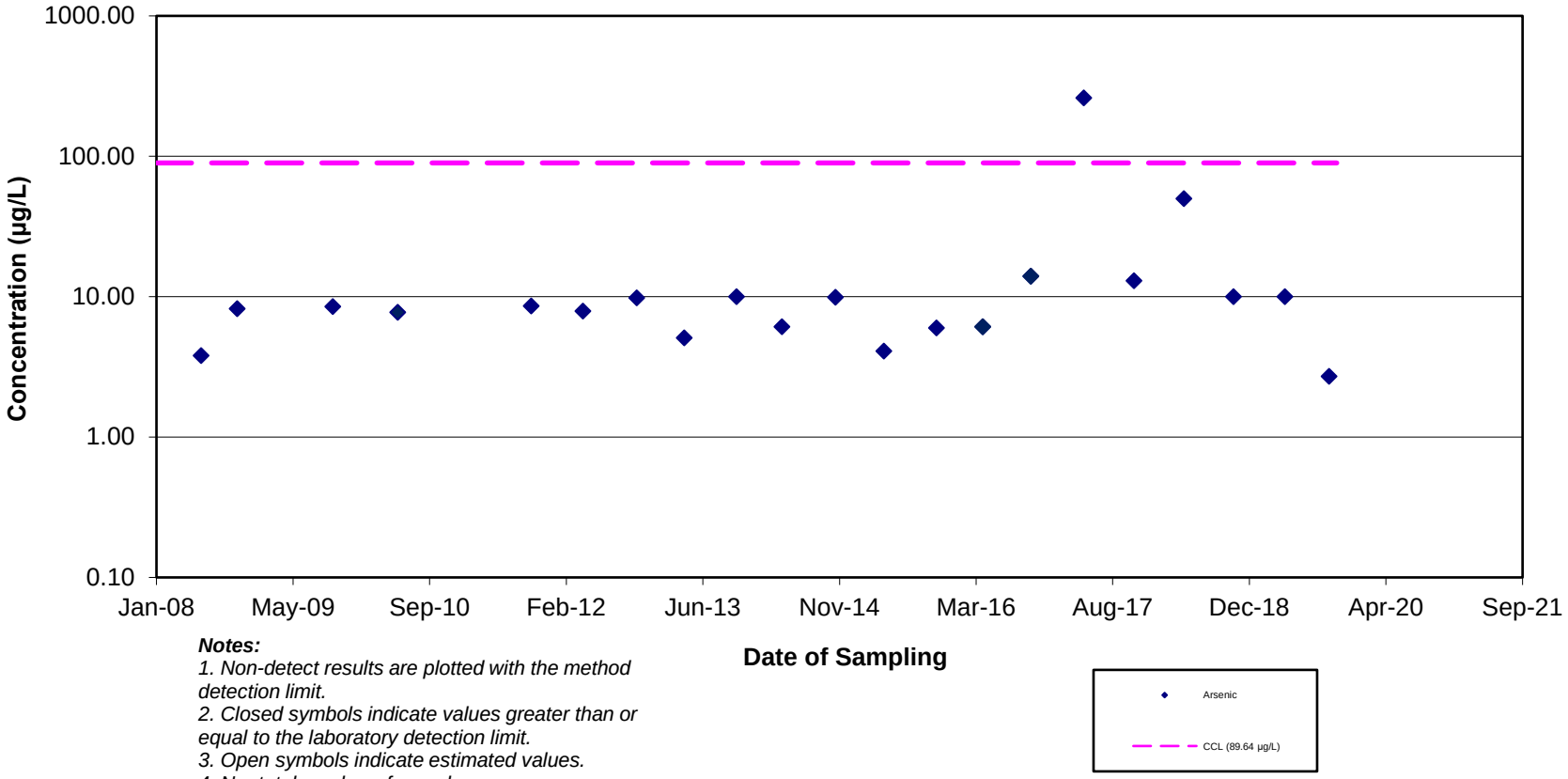
Site 1 Dissolved Arsenic Concentrations
Cross-gradient Monitoring Well W1-14



Notes:
1. Non-detect results are plotted with the method detection limit.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-6

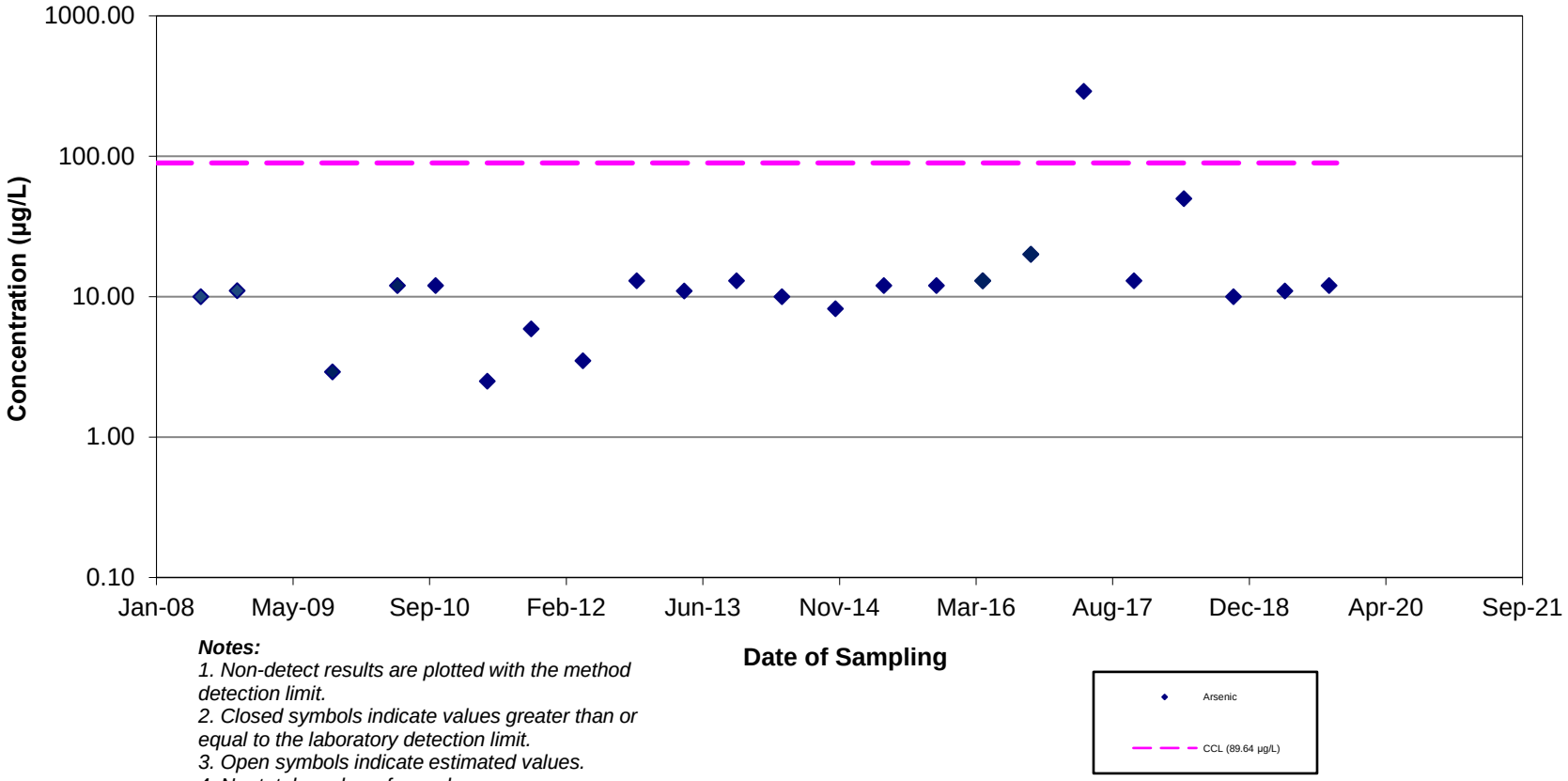
Site 1 Dissolved Arsenic Concentrations
Downgradient Monitoring Well W1-15



Notes:
1. Non-detect results are plotted with the method detection limit.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-7

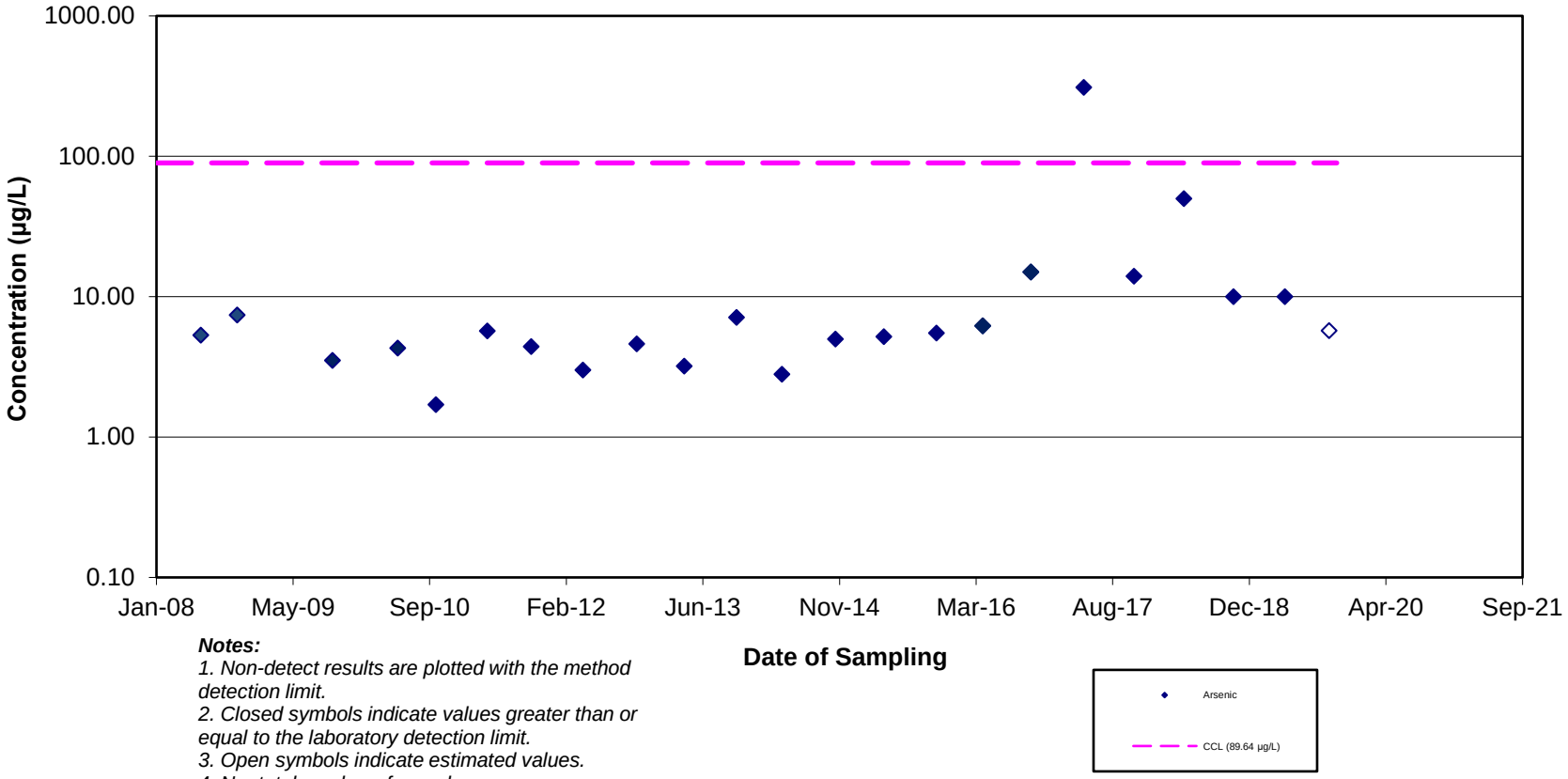
Site 1 Dissolved Arsenic Concentrations
Cross-gradient Monitoring Well W1-16



Notes:
1. Non-detect results are plotted with the method detection limit.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-8

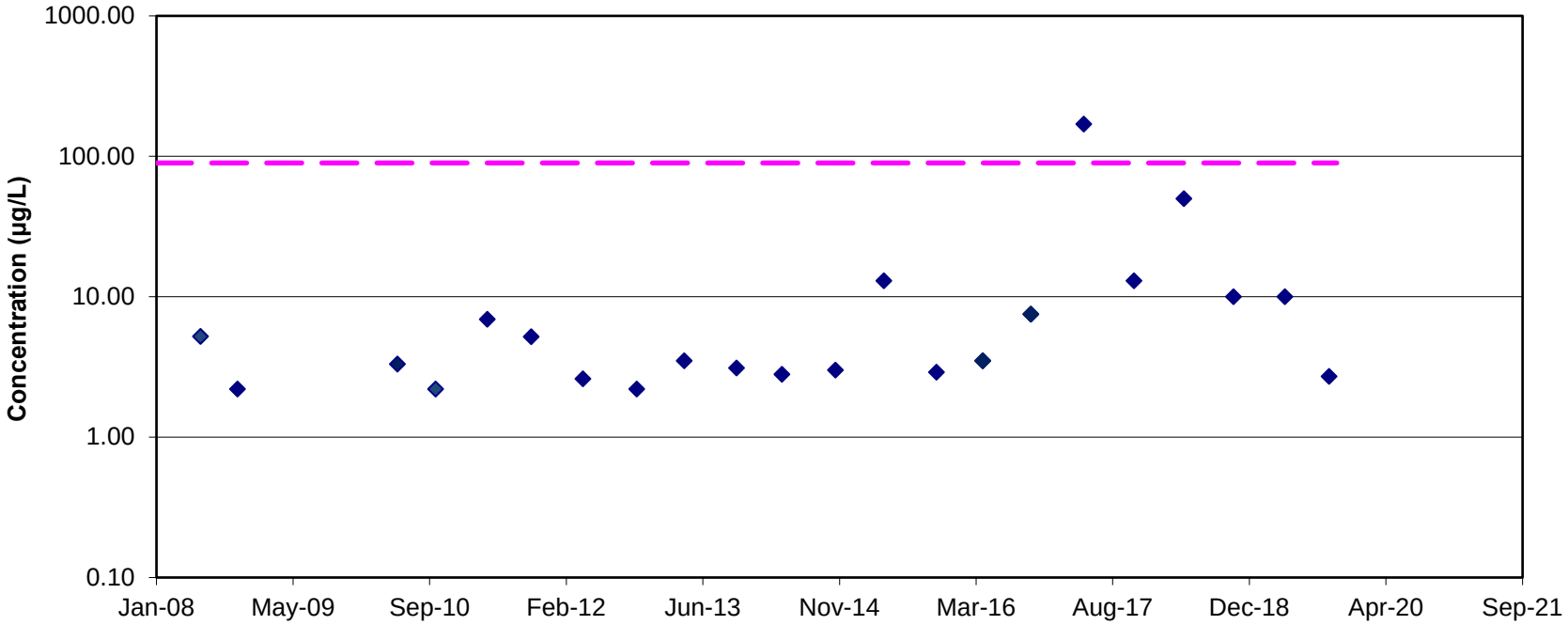
Site 1 Dissolved Arsenic Concentrations
Downgradient Monitoring Well W1-19



Notes:
1. Non-detect results are plotted with the method detection limit.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-9

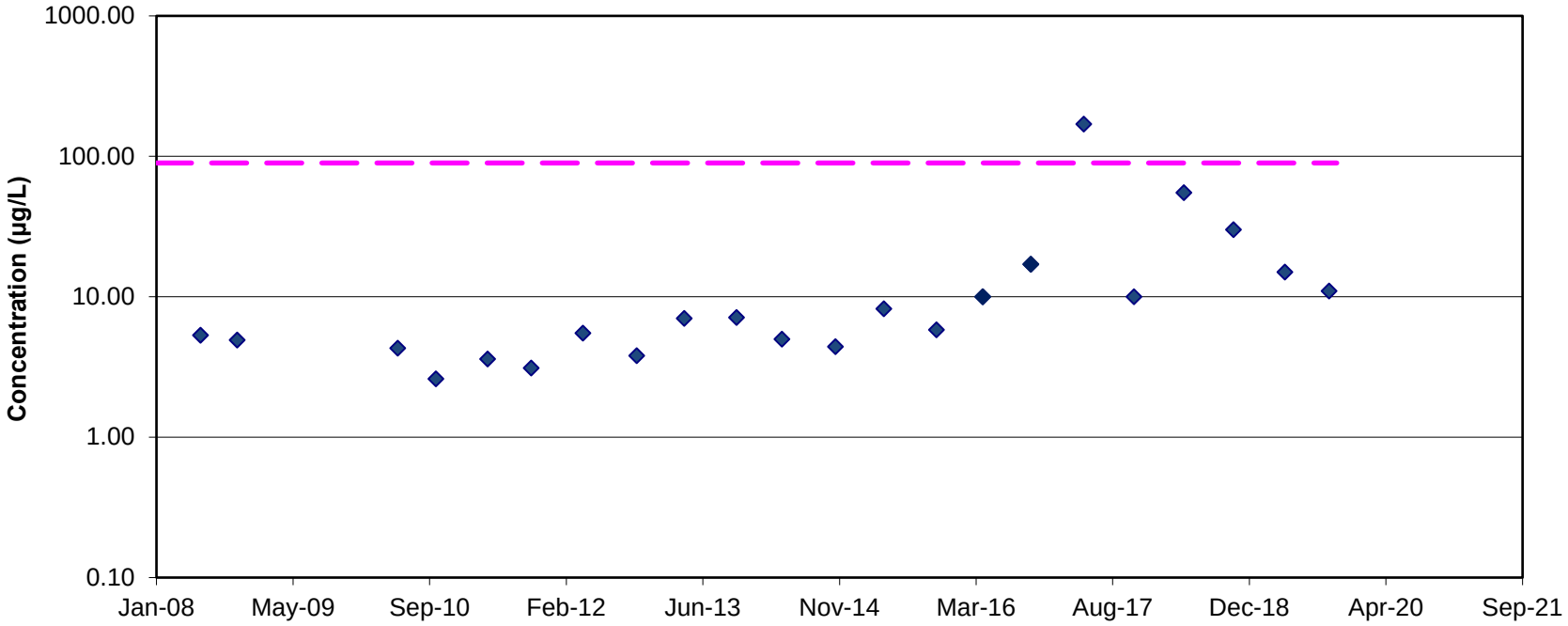
Site 1 Dissolved Arsenic Concentrations
Collection Trench Well W1-22



Notes:
1. Non-detect results are plotted with the method detection limit.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-10

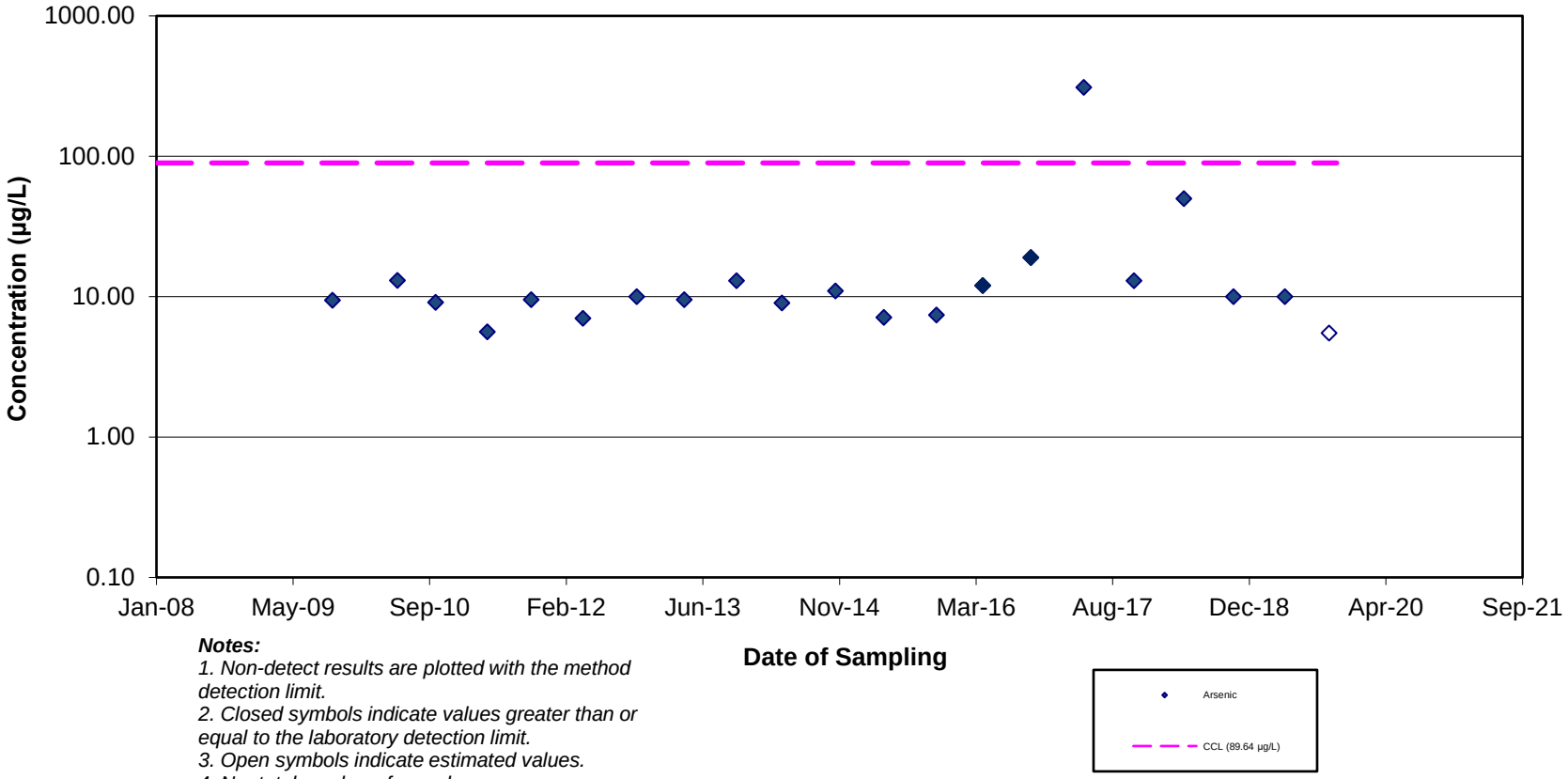
Site 1 Dissolved Arsenic Concentrations
Collection Trench Well W1-23



Notes:
1. Non-detect results are plotted with the method detection limit.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-11

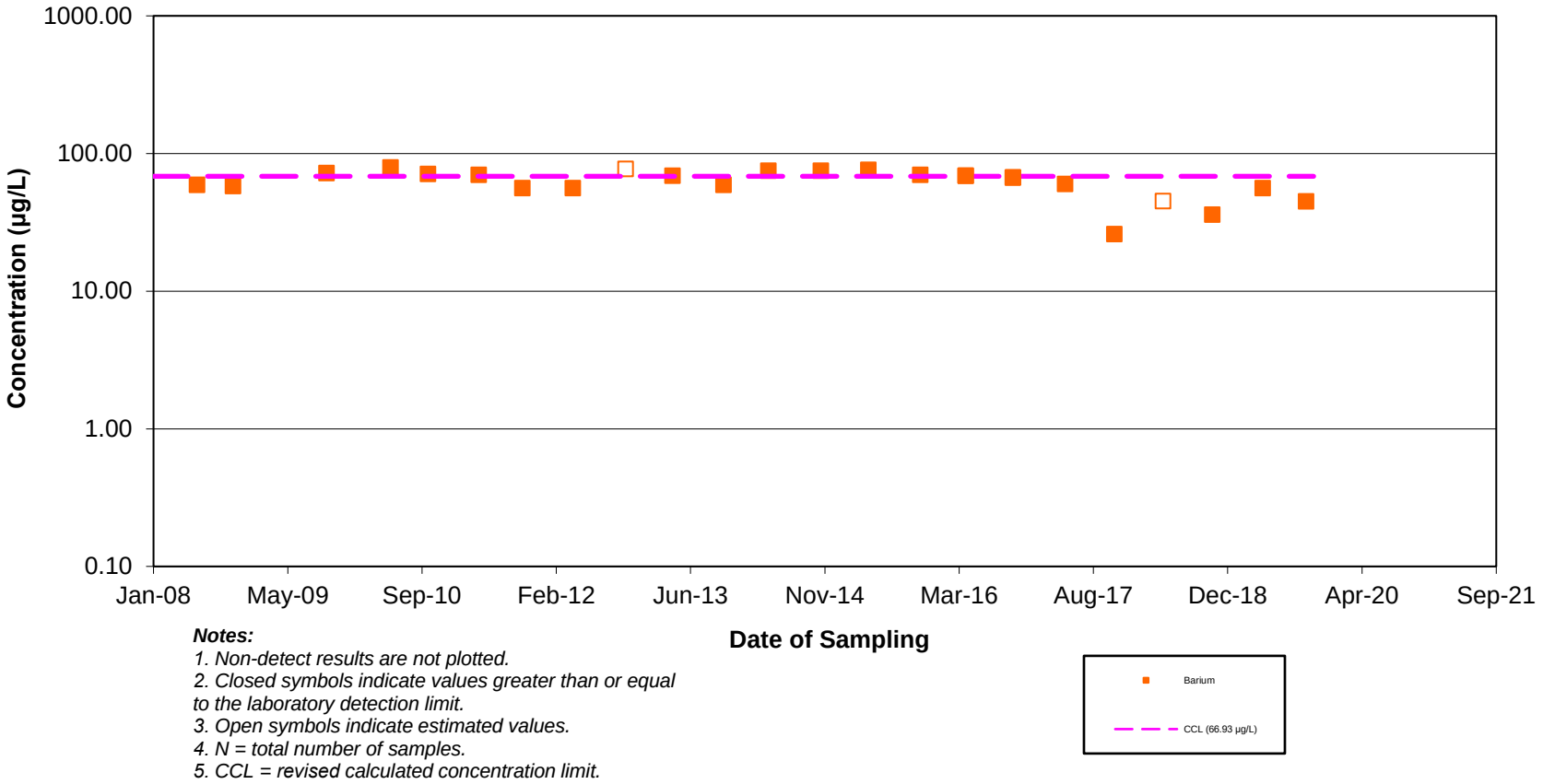
Site 1 Dissolved Arsenic Concentrations
Cross-gradient Monitoring Well W1-24



Notes:
1. Non-detect results are plotted with the method detection limit.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-12

Site 1 Dissolved Barium Concentrations
Downgradient Monitoring Well W1-1R

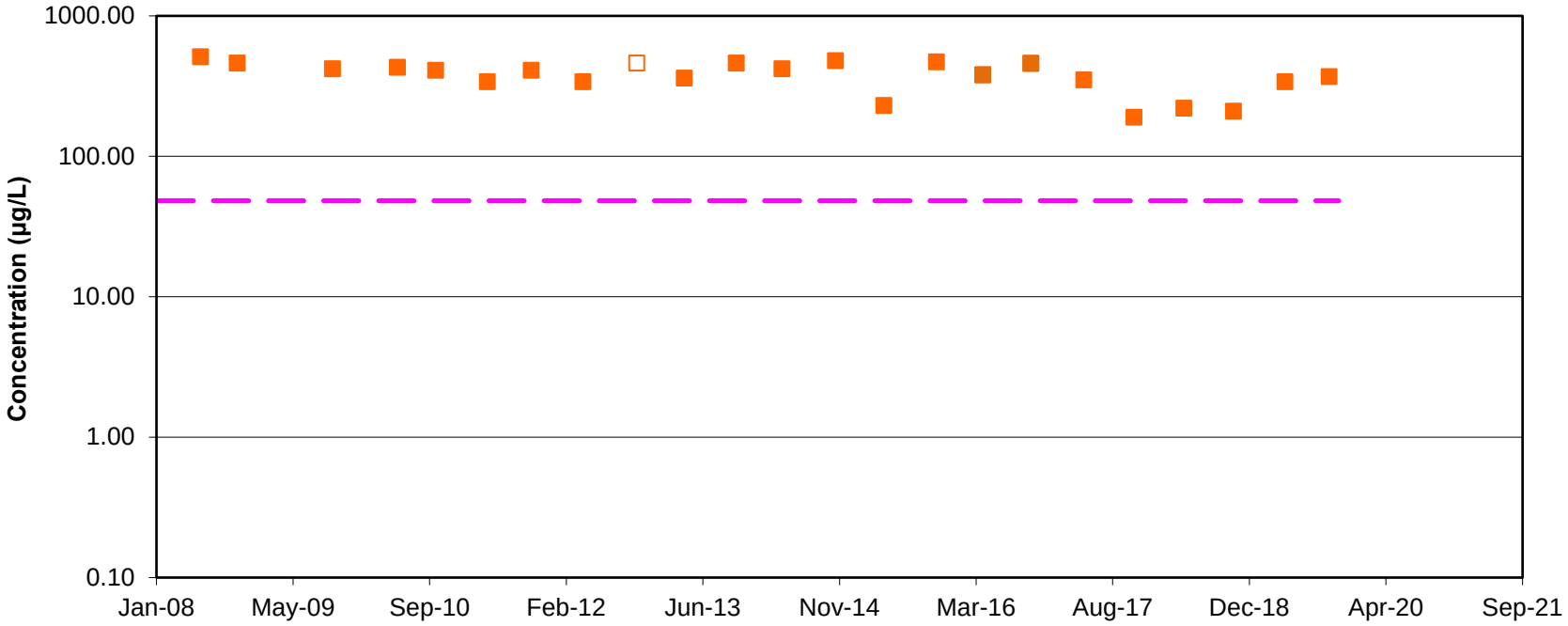


Notes:

1. Non-detect results are not plotted.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = revised calculated concentration limit.

Figure D-13

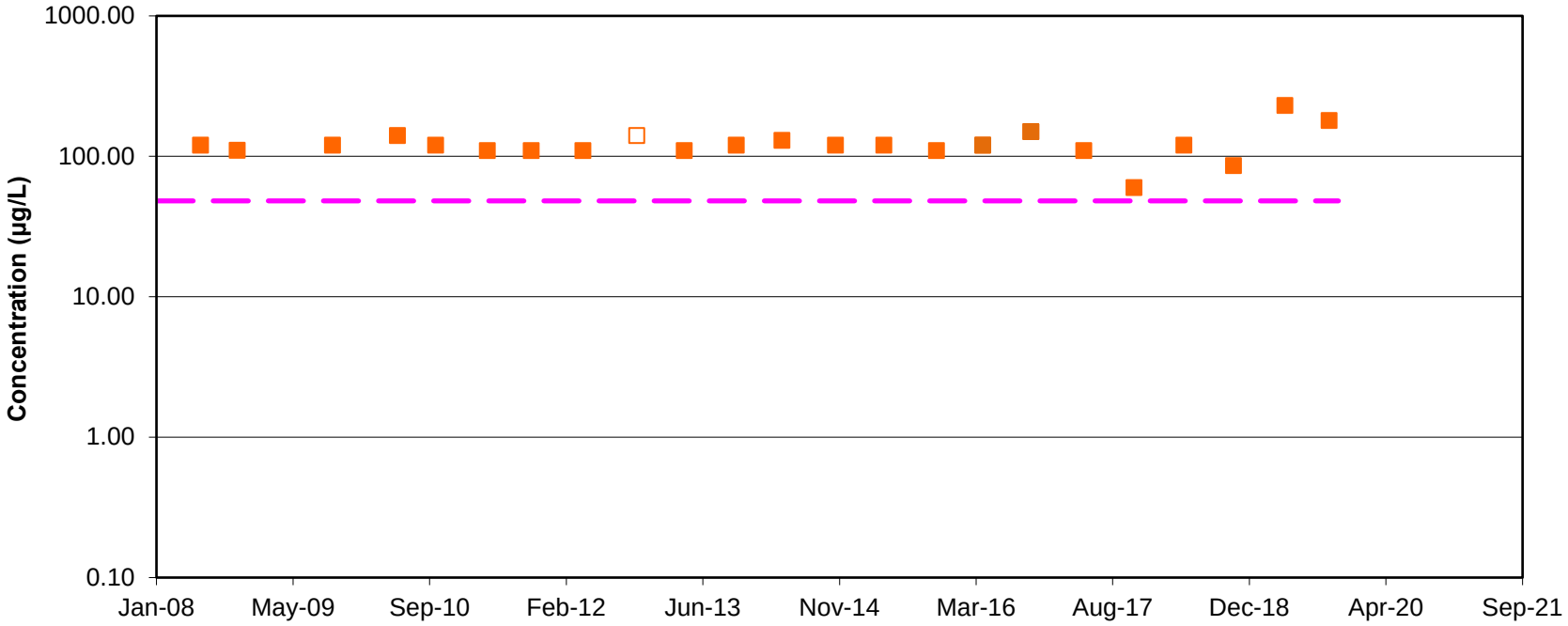
Site 1 Dissolved Barium Concentrations
Upgradient Monitoring Well W1-5



Notes:
1. Non-detect results are not plotted.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-14

Site 1 Dissolved Barium Concentrations
Upgradient Monitoring Well W1-8

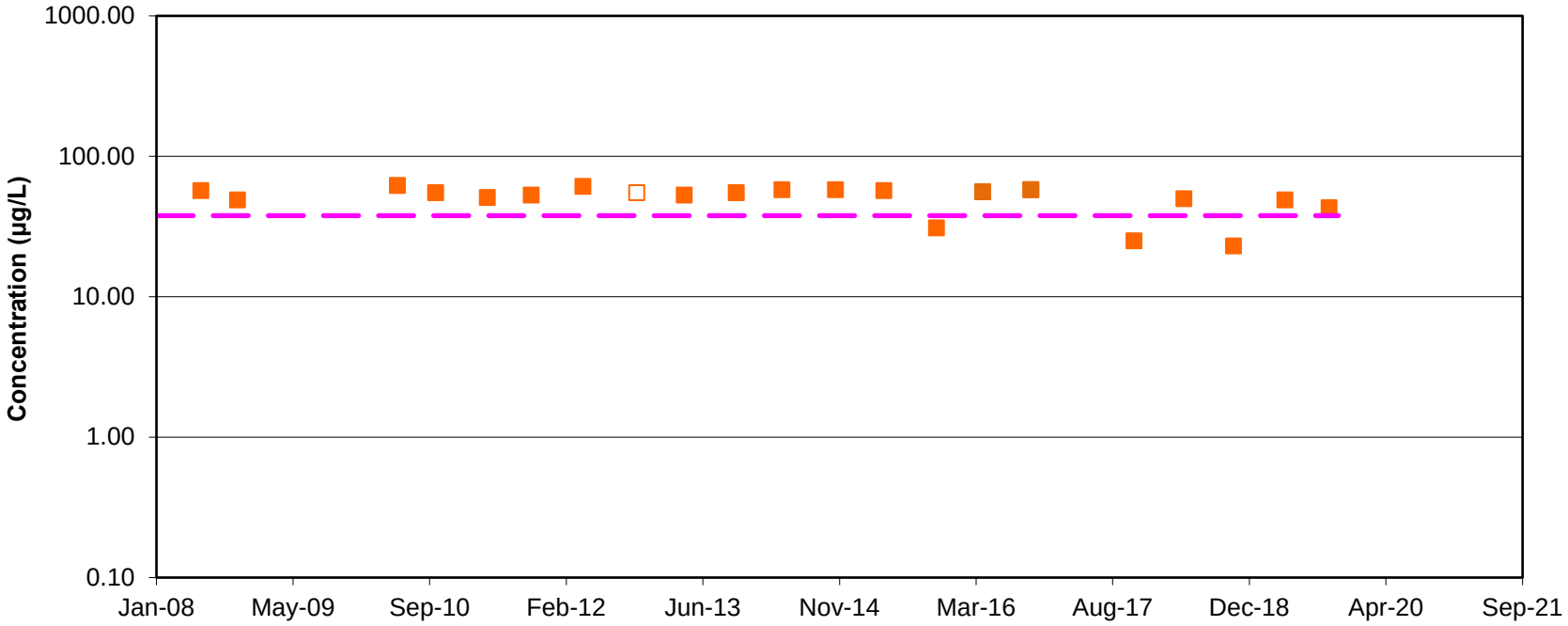


Notes:

1. Non-detect results are not plotted.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-15

Site 1 Dissolved Barium Concentrations
Upgradient Monitoring Well W1-12R

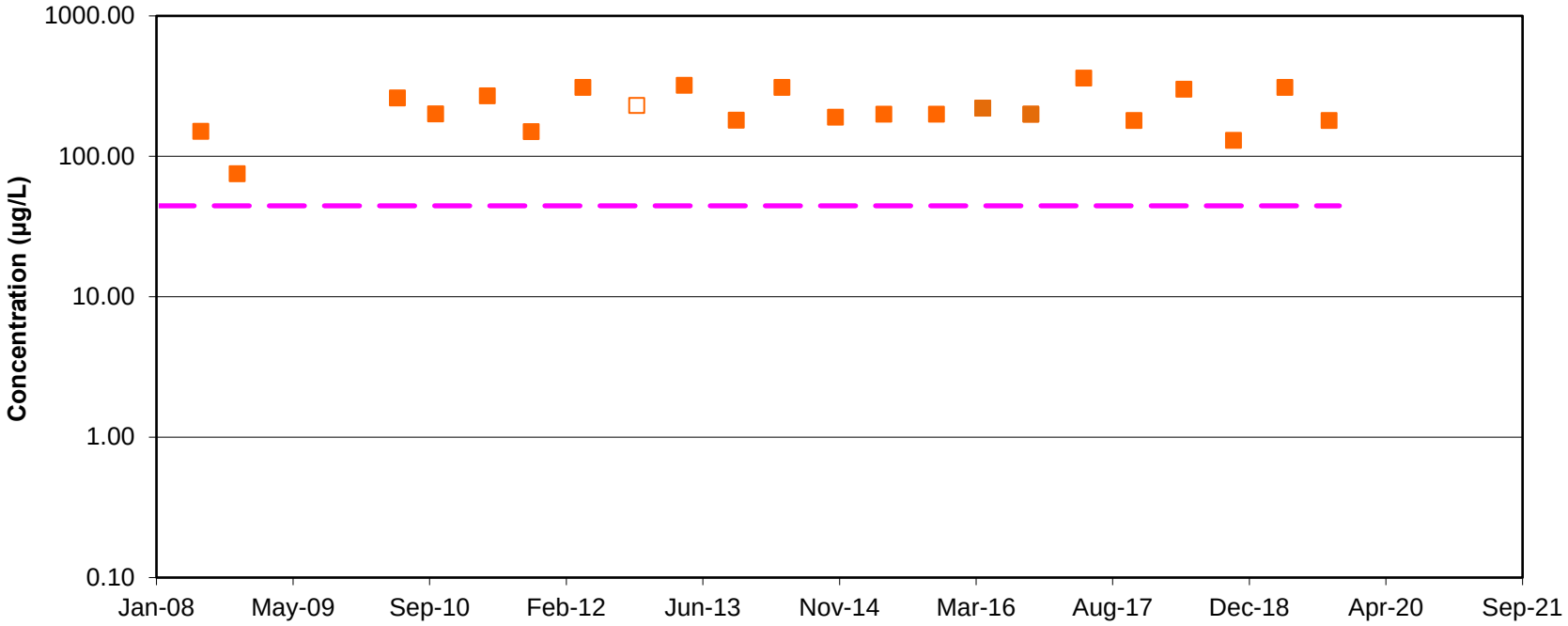


Notes:

1. Non-detect results are not plotted.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-16

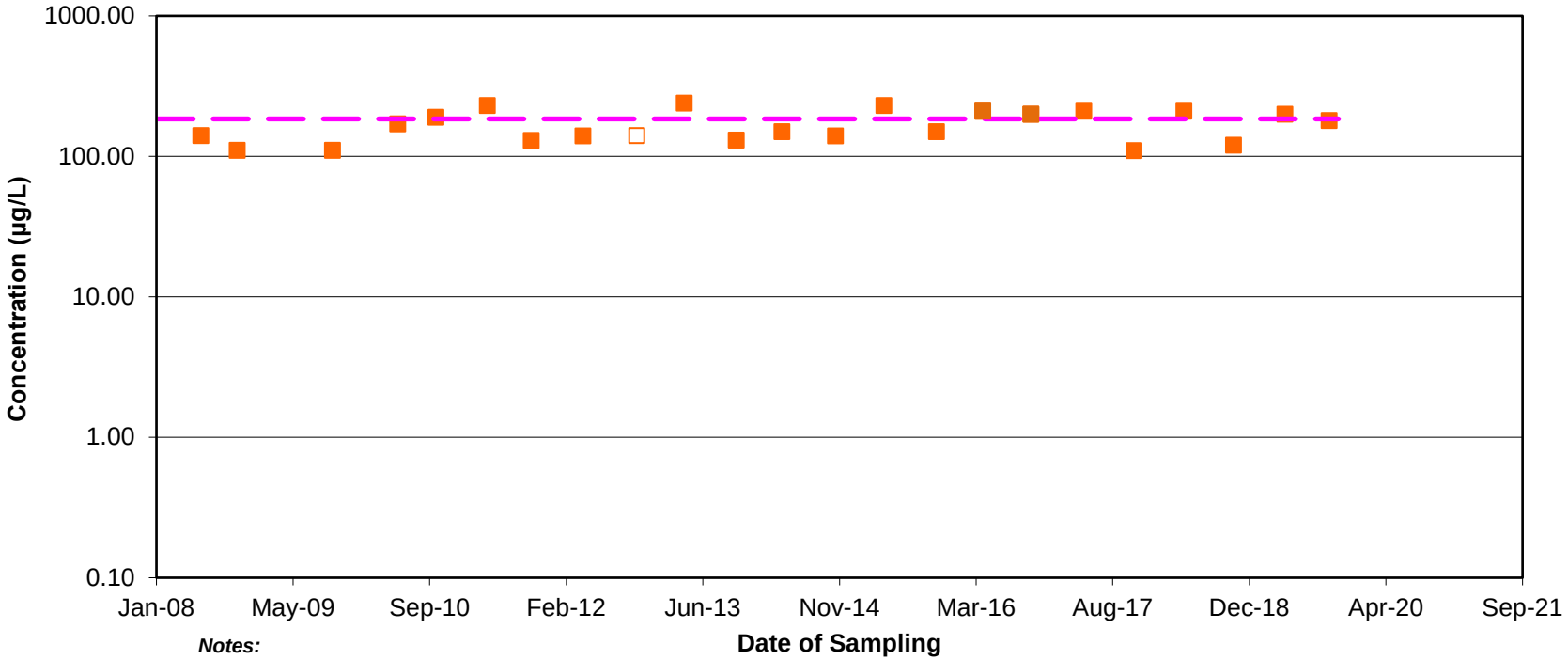
Site 1 Dissolved Barium Concentrations
Cross-gradient Monitoring Well W1-14



Notes:
1. Non-detect results are not plotted.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-17

Site 1 Dissolved Barium Concentrations
Downgradient Monitoring Well W1-15

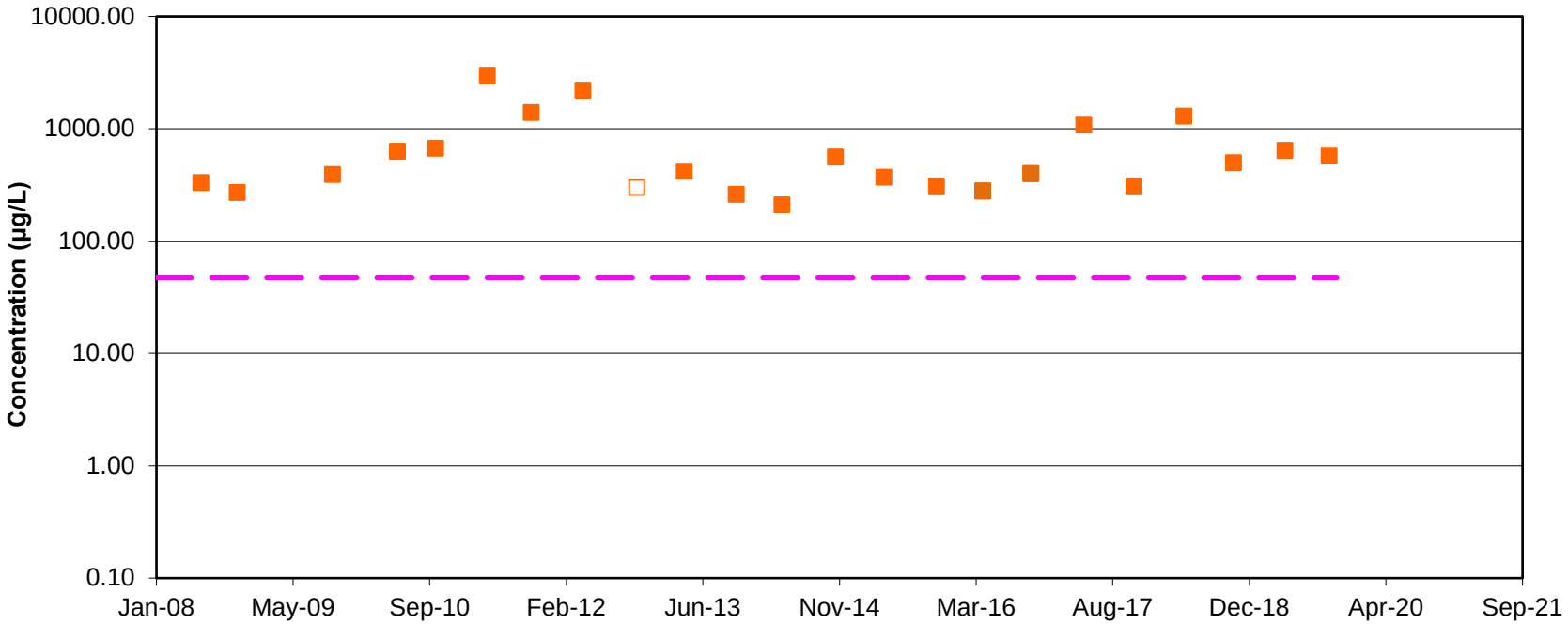


Notes:

1. Non-detect results are not plotted.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = revised calculated concentration limit.

Figure D-18

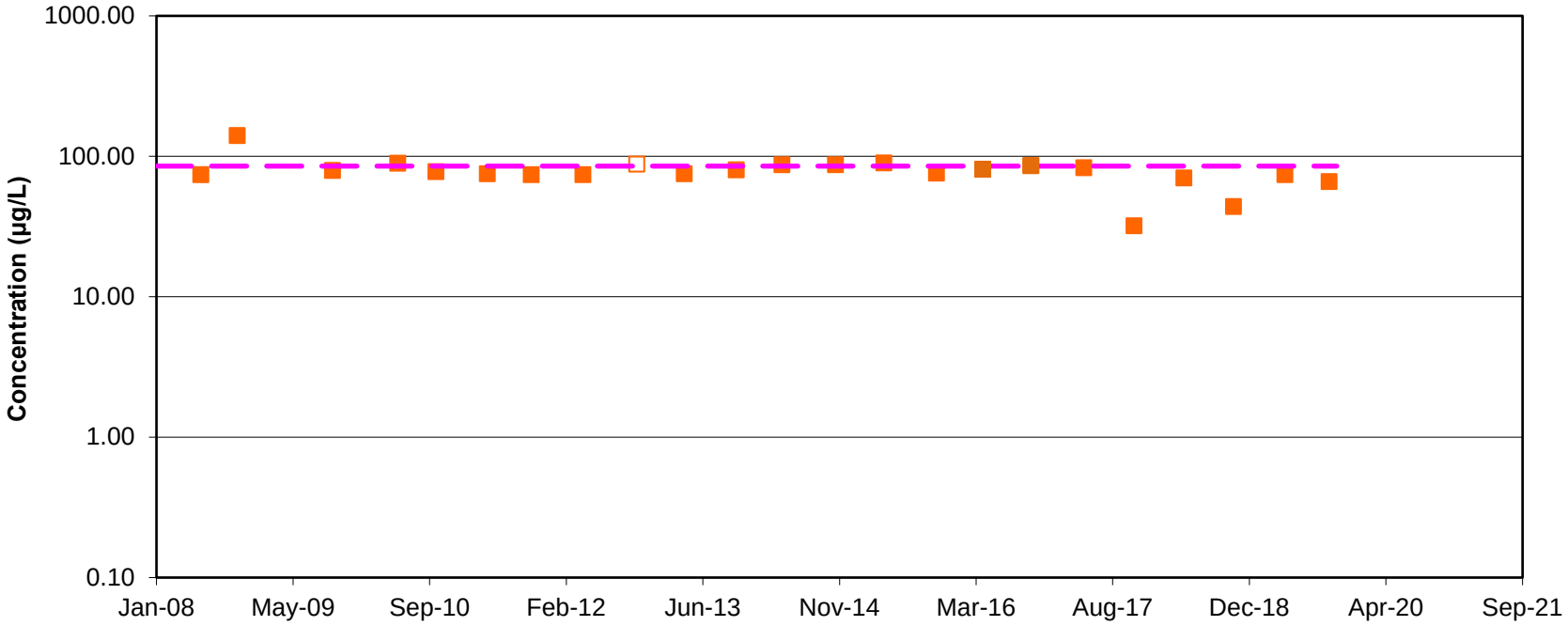
Site 1 Dissolved Barium Concentrations
Cross-gradient Monitoring Well W1-16



Notes:
1. Non-detect results are not plotted.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-19

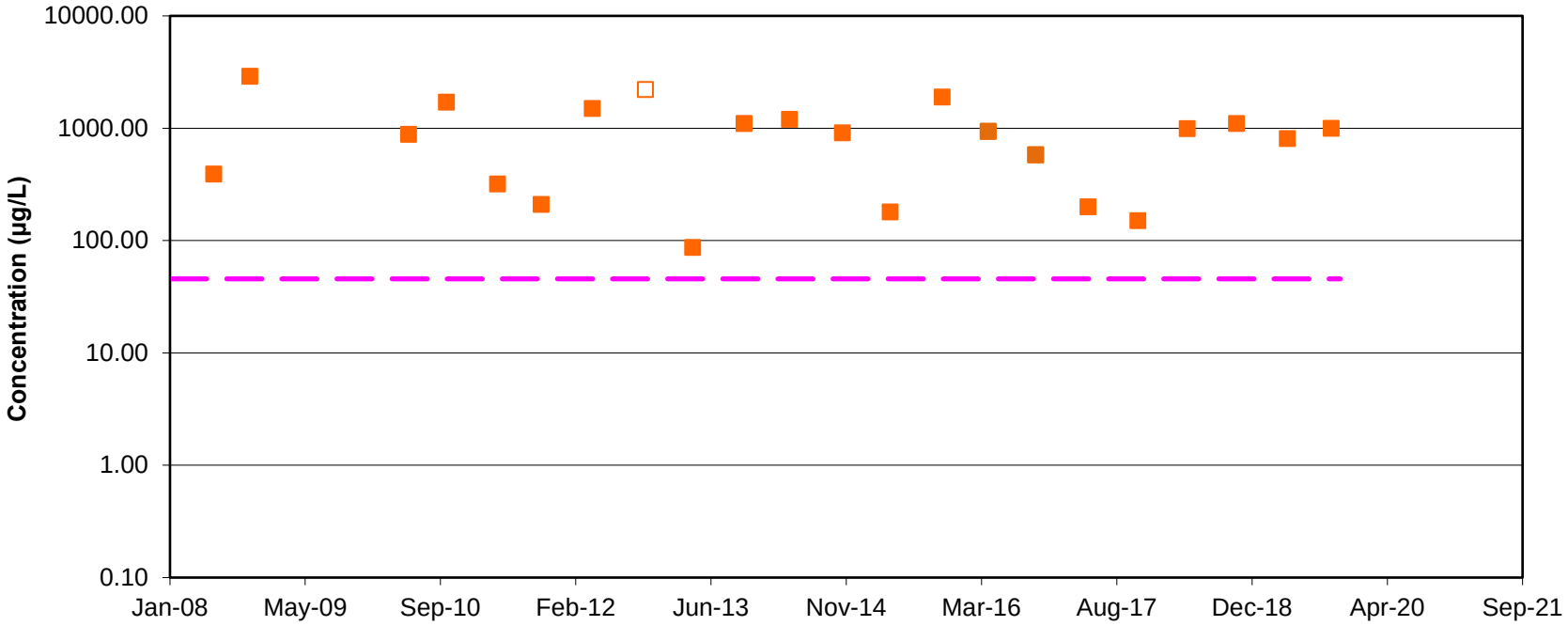
Site 1 Dissolved Barium Concentrations
Downgradient Monitoring Well W1-19



Notes:
1. Non-detect results are not plotted.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = revised calculated concentration limit.

Figure D-20

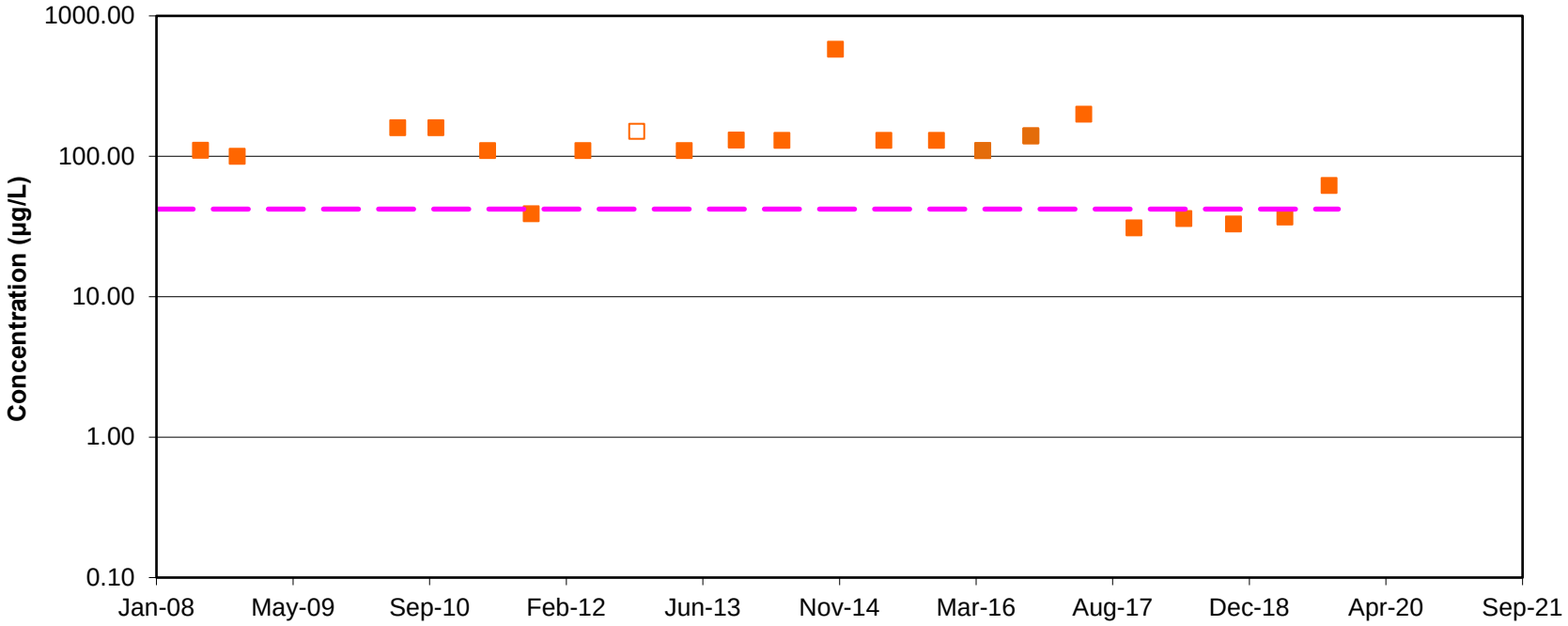
Site 1 Dissolved Barium Concentrations
Collection Trench Well W1-22



Notes:
1. Non-detect results are not plotted.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-21

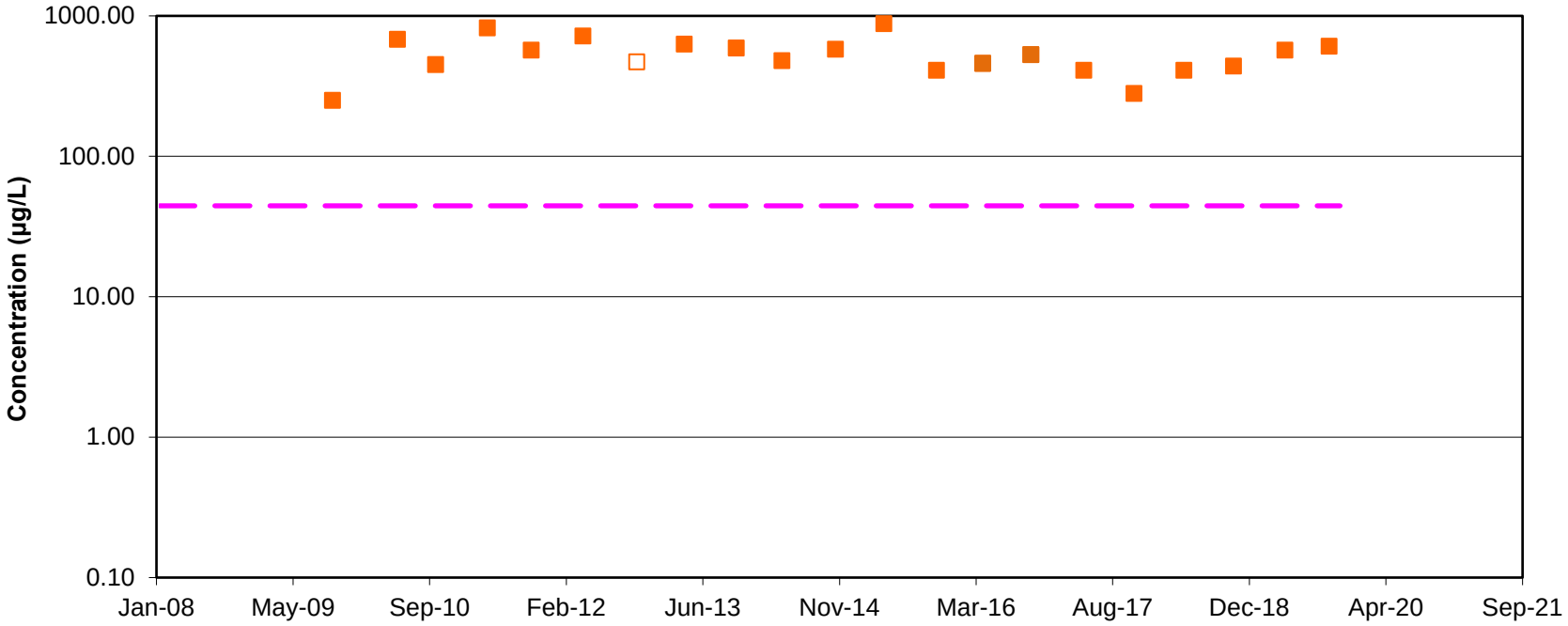
Site 1 Dissolved Barium Concentrations
Collection Trench Well W1-23



Notes:
1. Non-detect results are not plotted.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-22

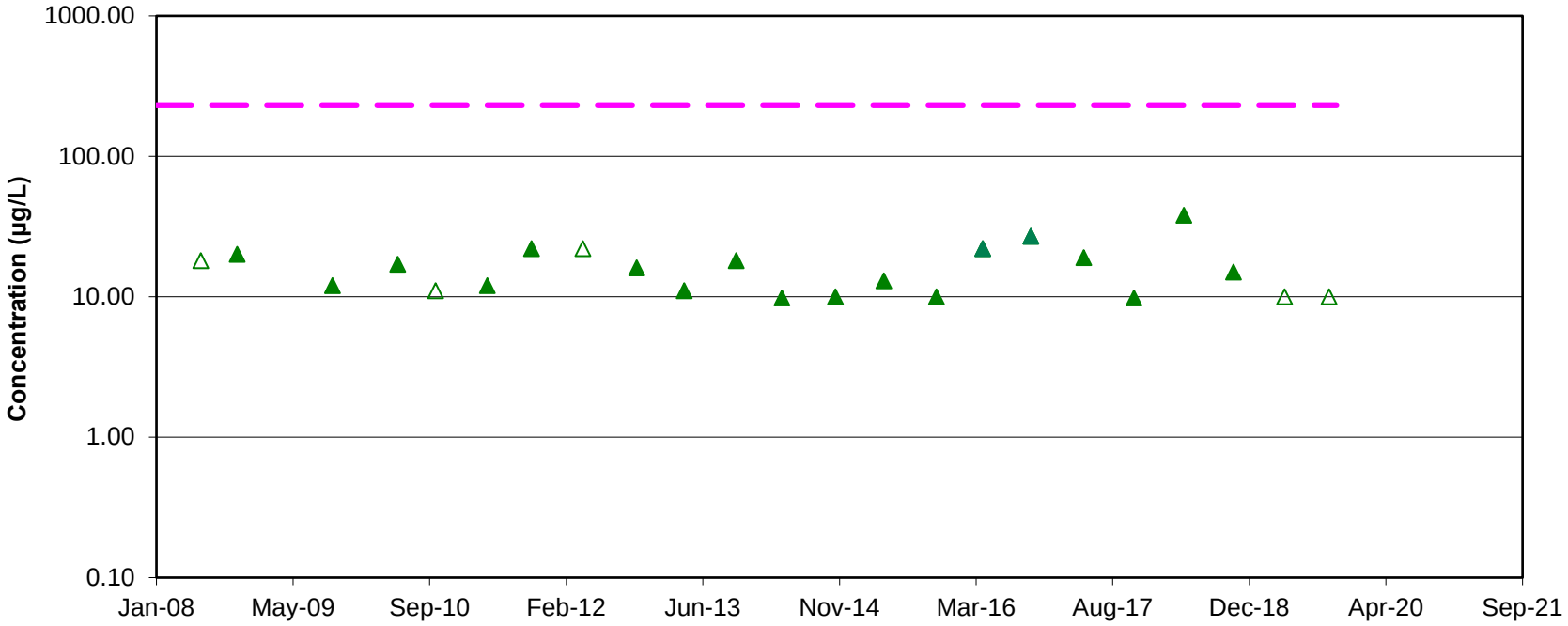
Site 1 Dissolved Barium Concentrations
Cross-gradient Monitoring Well W1-24



Notes:
1. Non-detect results are not plotted.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-23

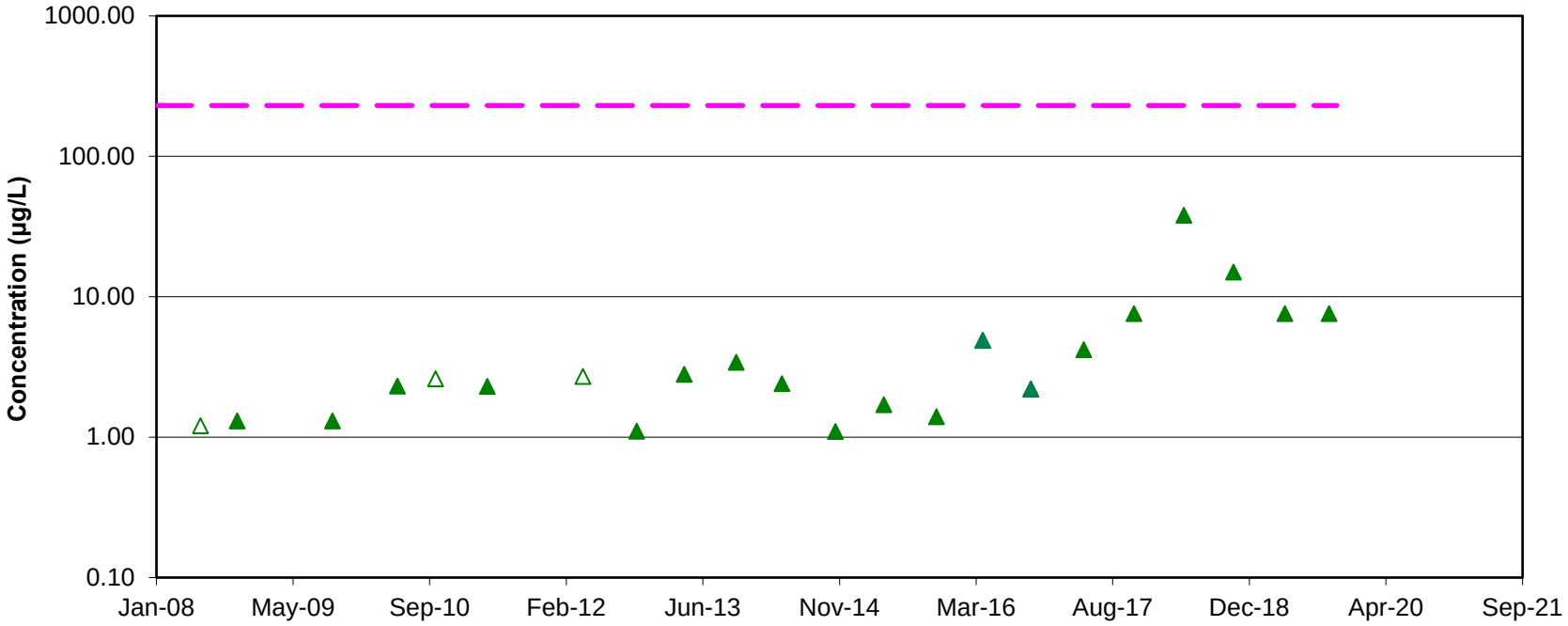
Site 1 Dissolved Cobalt Concentrations
Downgradient Monitoring Well W1-1R



Notes:
1. Non-detect results are plotted with the method detection limit.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-24

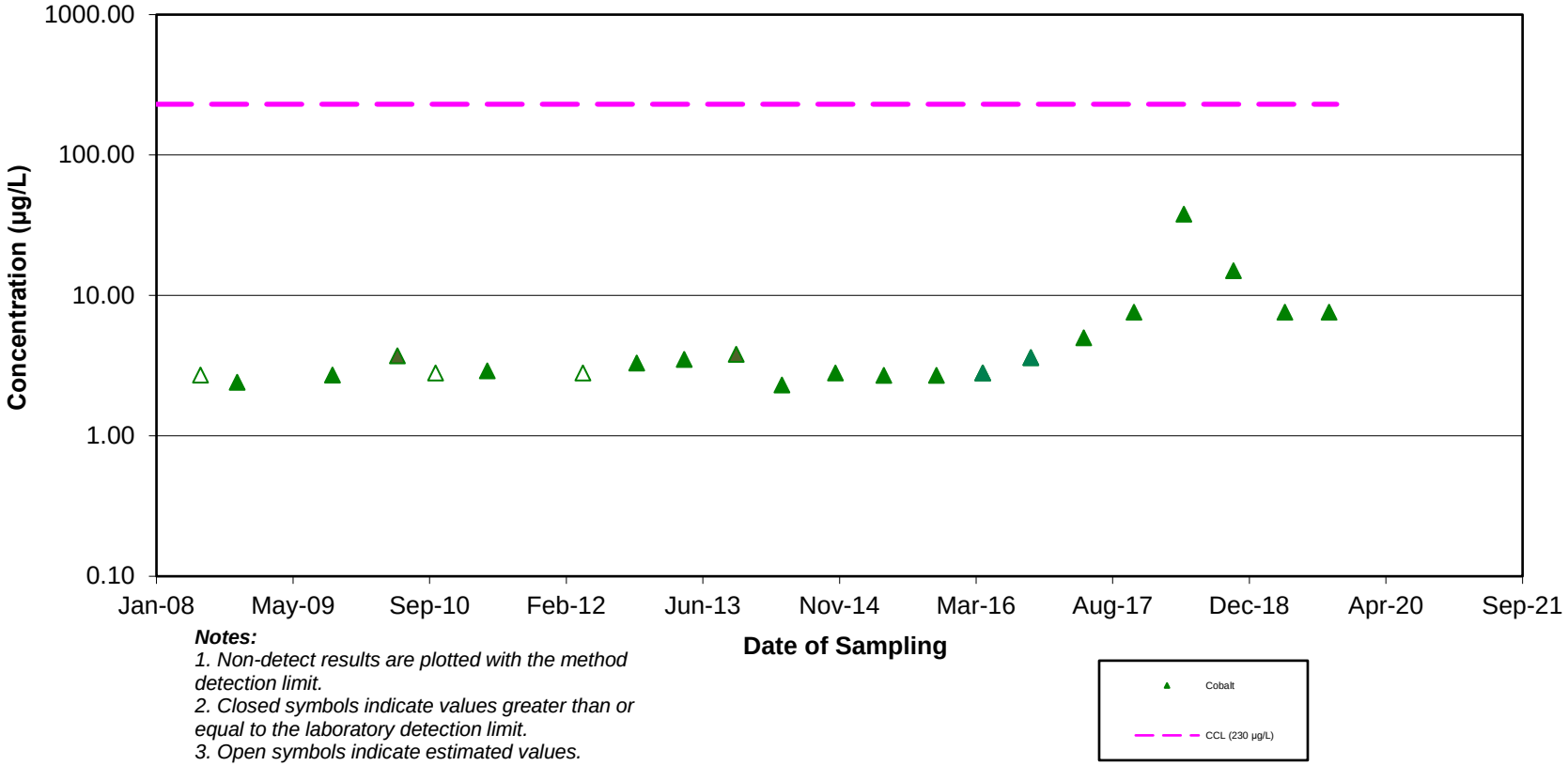
Site 1 Dissolved Cobalt Concentrations
Upgradient Monitoring Well W1-5



Notes:
1. Non-detect results are plotted with the method detection limit.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-25

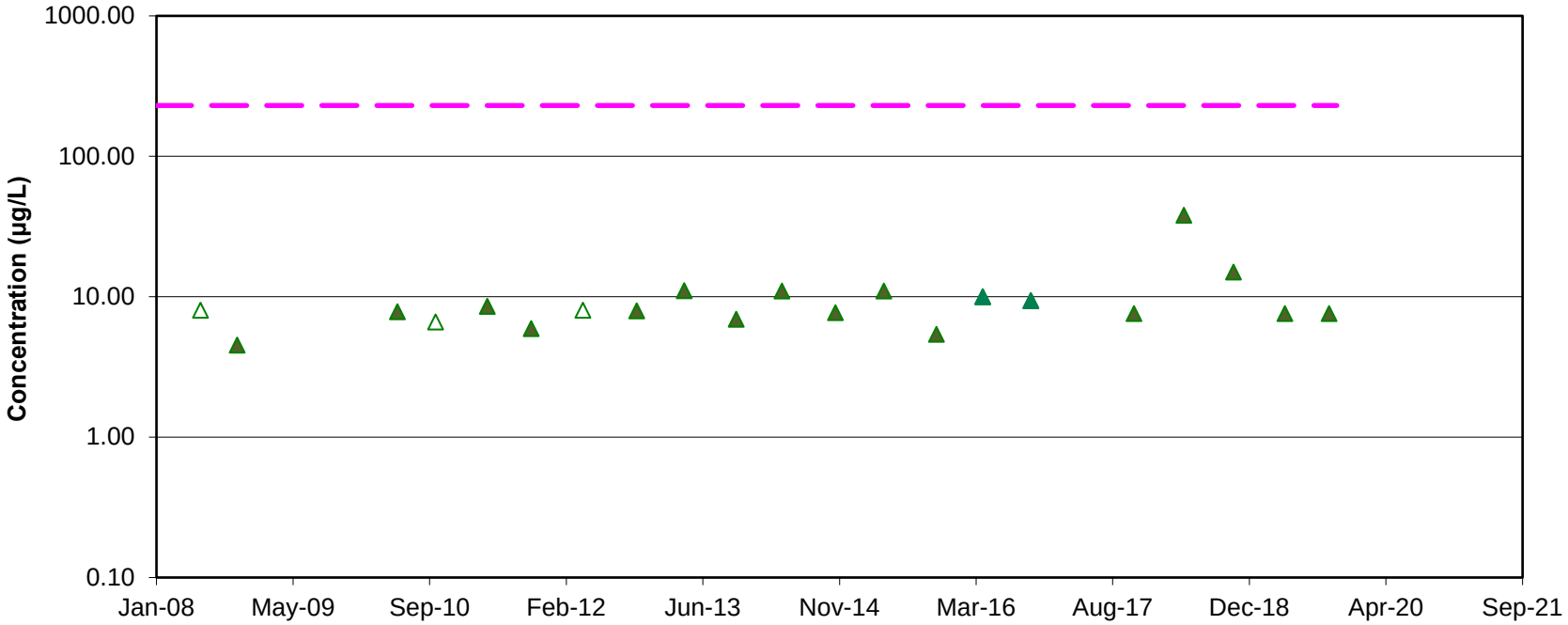
Site 1 Dissolved Cobalt Concentrations
Upgradient Monitoring Well W1-8



Notes:
1. Non-detect results are plotted with the method detection limit.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-26

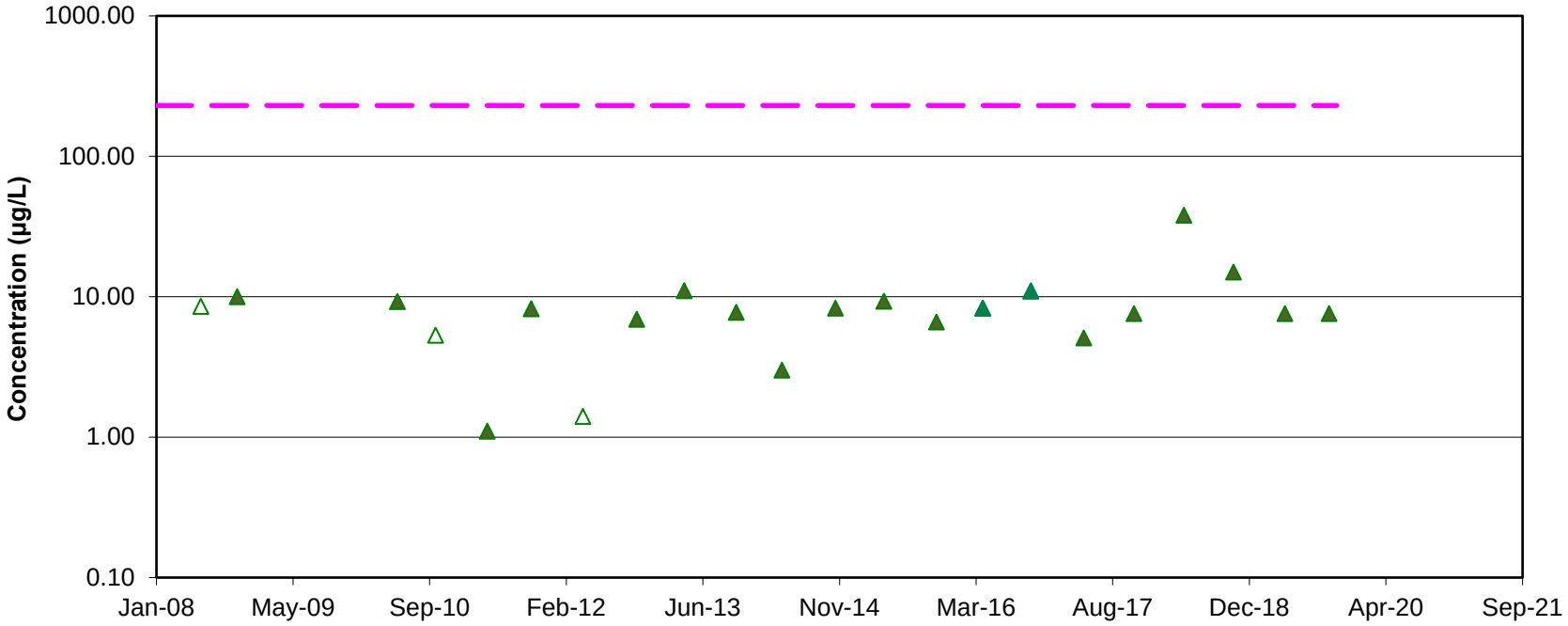
Site 1 Dissolved Cobalt Concentrations
Upgradient Monitoring Well W1-12R



Notes:
1. Non-detect results are plotted with the method detection limit.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-27

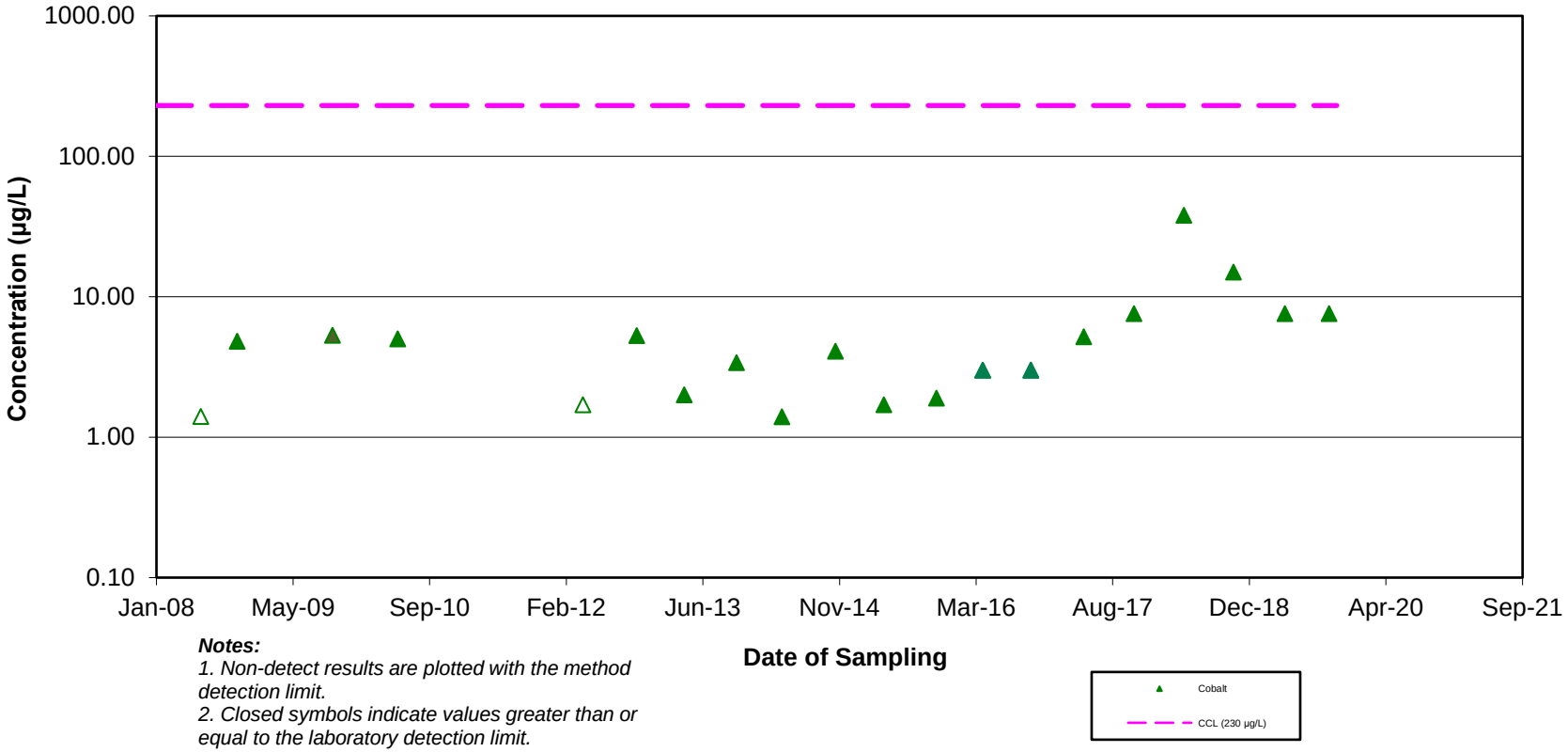
Site 1 Dissolved Cobalt Concentrations
Cross-gradient Monitoring Well W1-14



Notes:
1. Non-detect results are plotted with the method detection limit.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-28

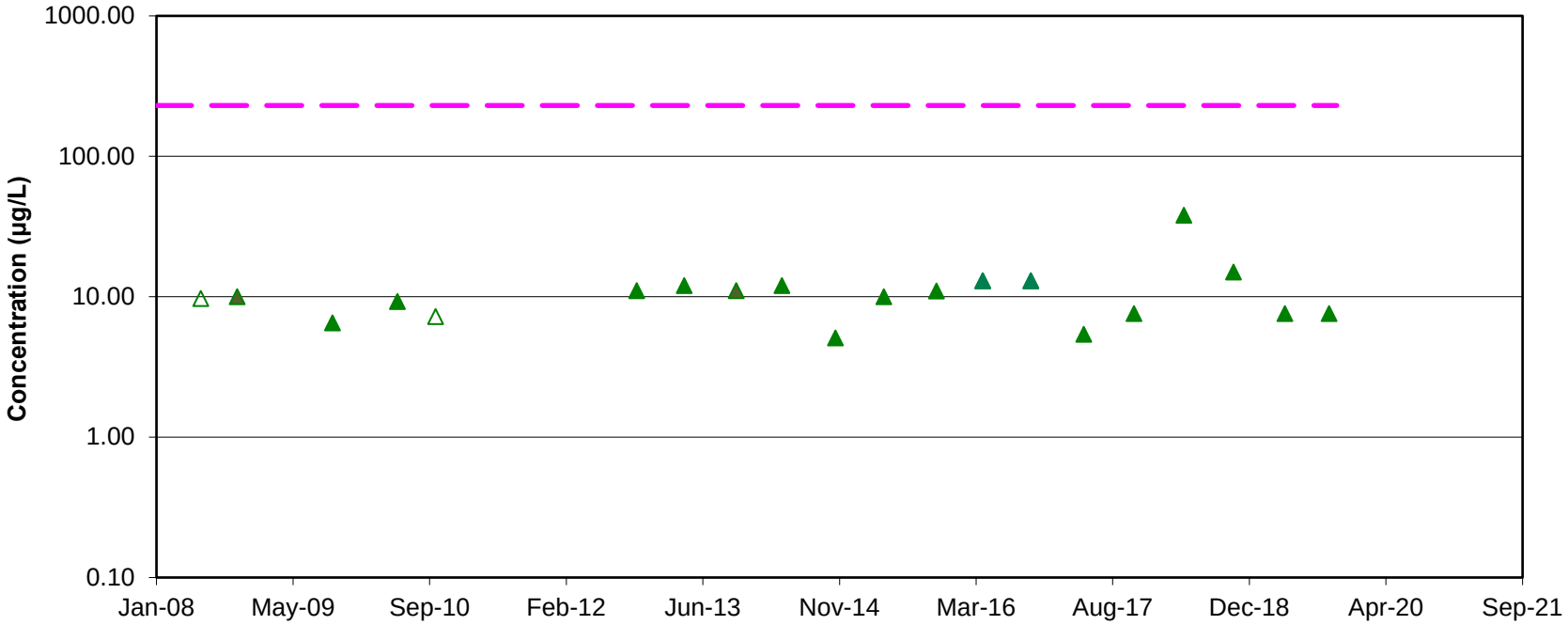
Site 1 Dissolved Cobalt Concentrations
Downgradient Monitoring Well W1-15



Notes:
1. Non-detect results are plotted with the method detection limit.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-29

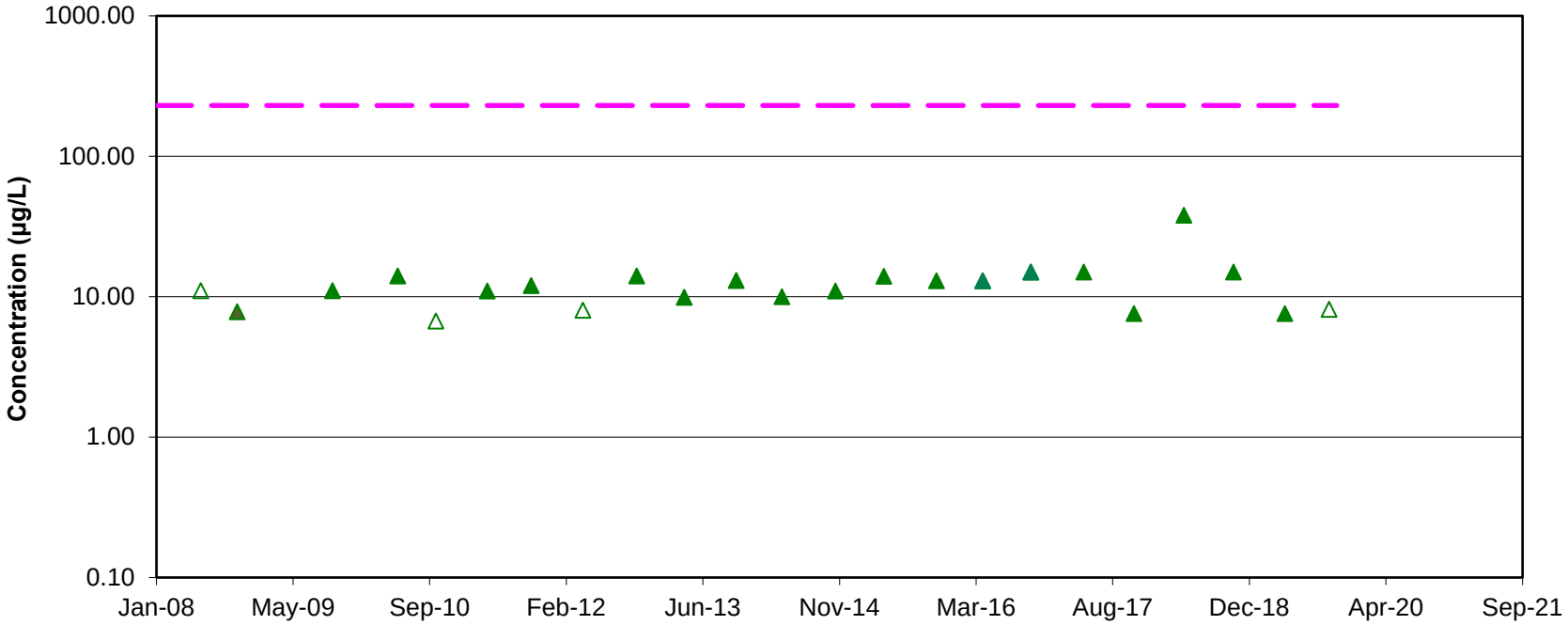
Site 1 Dissolved Cobalt Concentrations
Cross-gradient Monitoring Well W1-16



Notes:
1. Non-detect results are plotted with the method detection limit.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-30

Site 1 Dissolved Cobalt Concentrations
Downgradient Monitoring Well W1-19

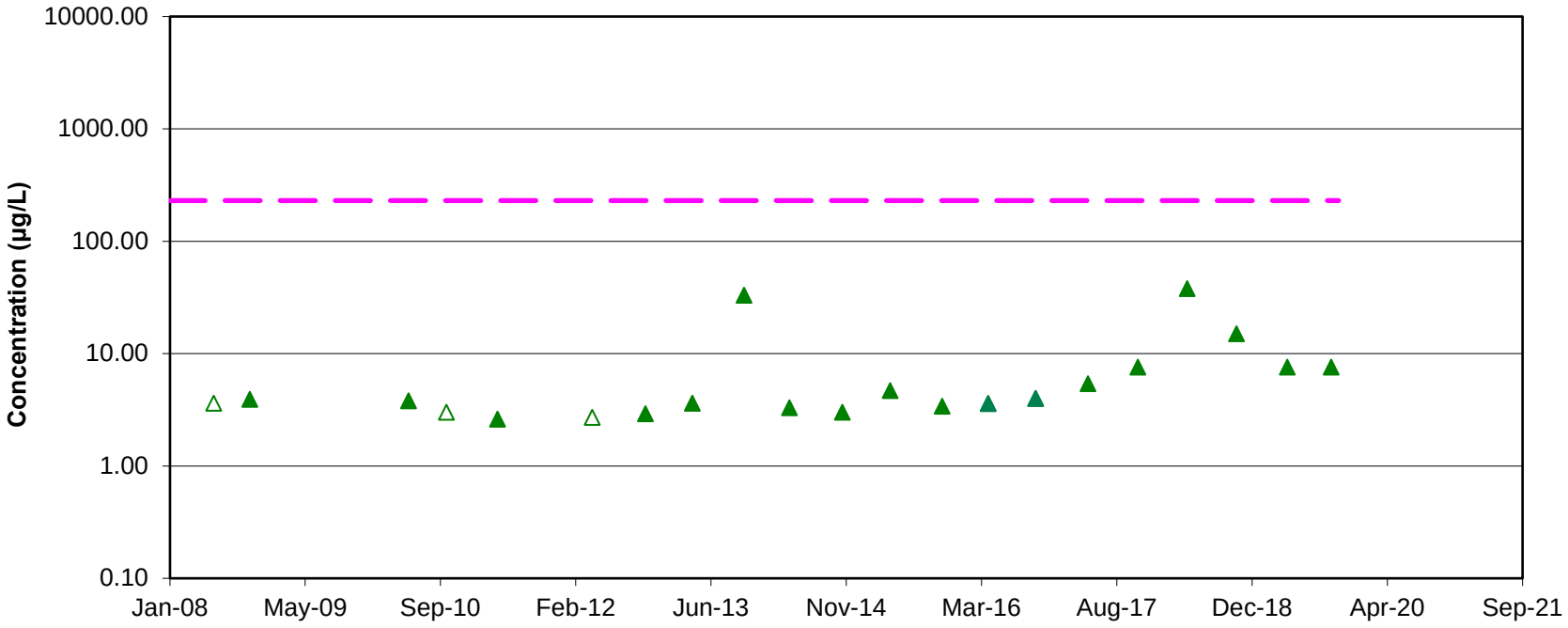


Notes:

1. Non-detect results are plotted with the method detection limit.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-31

Site 1 Dissolved Cobalt Concentrations
Collection Trench Well W1-22

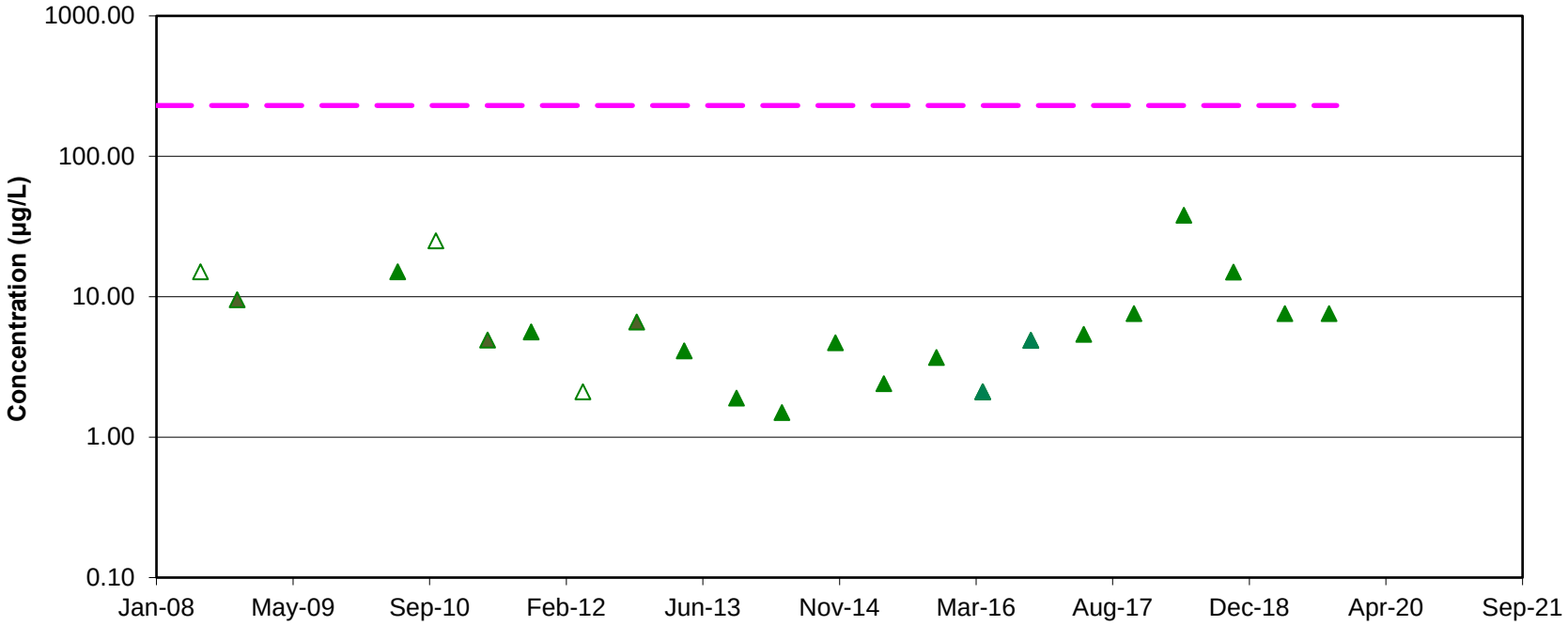


Notes:

1. Non-detect results are plotted with the method detection limit.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-32

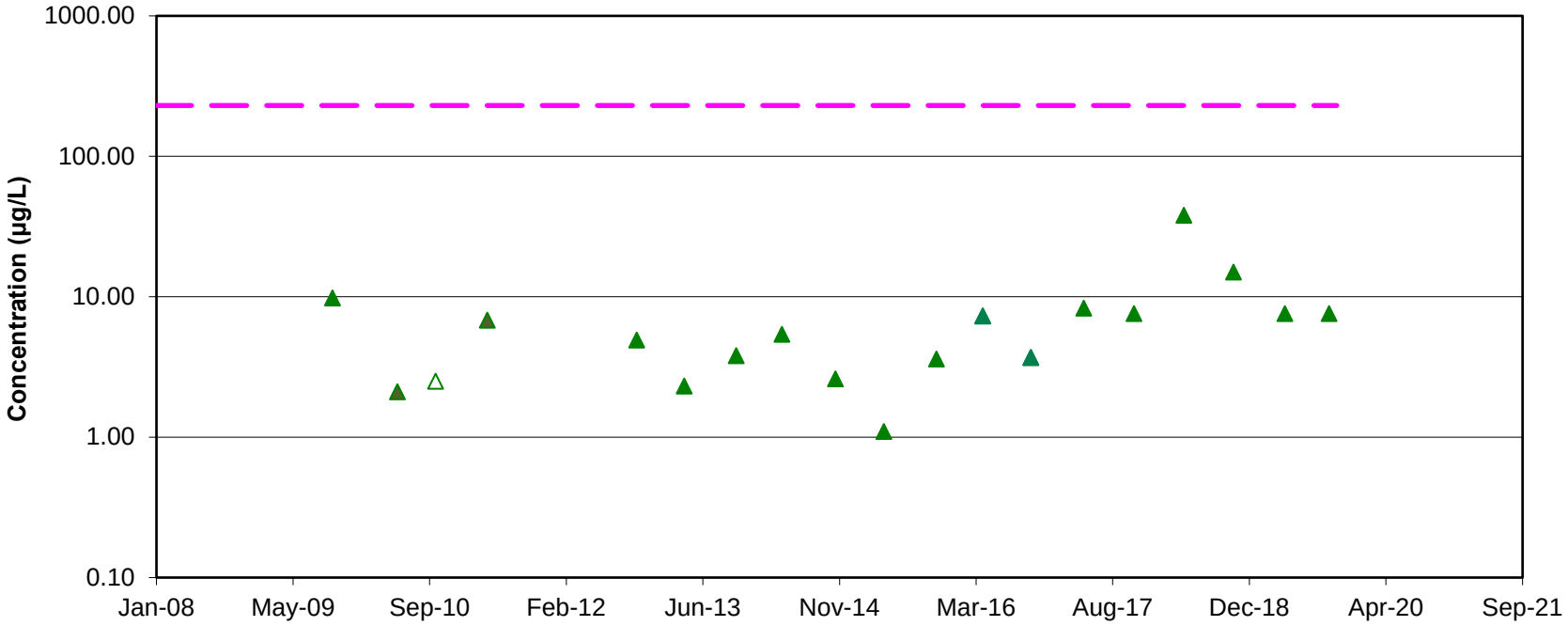
Site 1 Dissolved Cobalt Concentrations
Collection Trench Well W1-23



Notes:
1. Non-detect results are plotted with the method detection limit.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-33

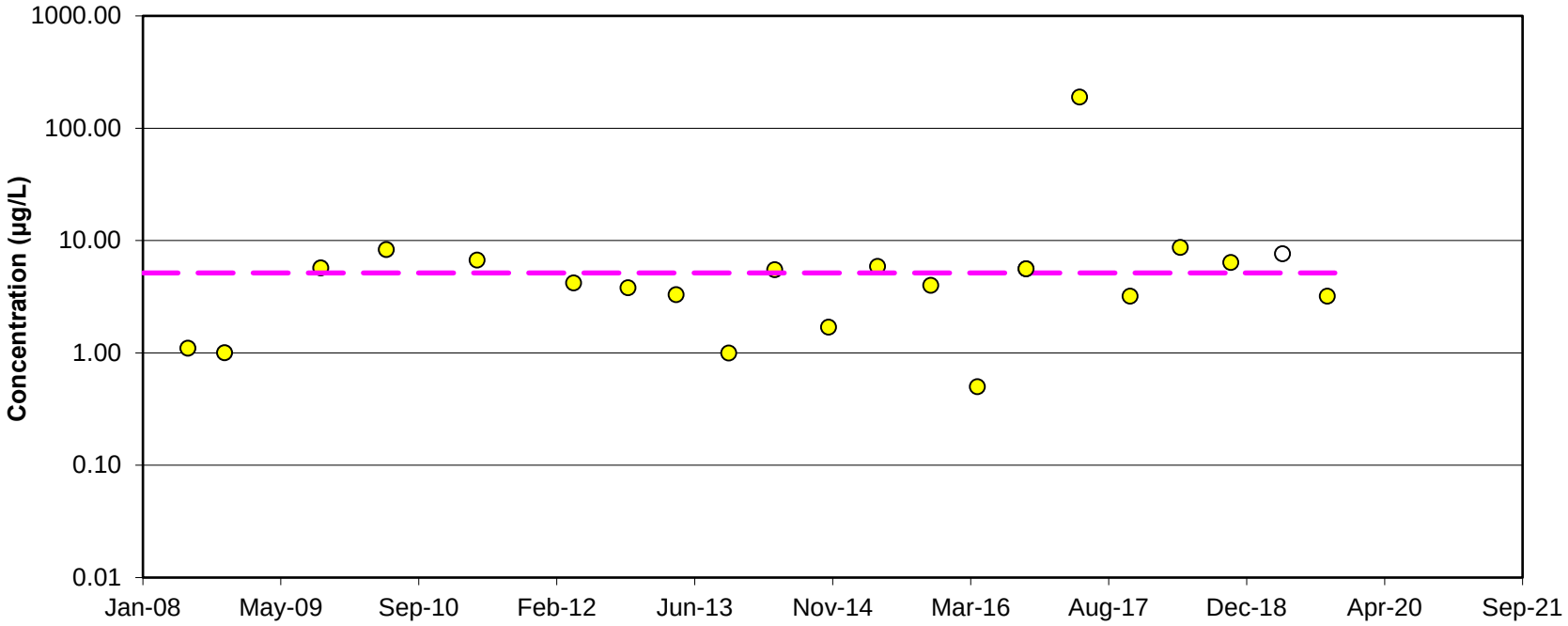
Site 1 Dissolved Cobalt Concentrations
Cross-gradient Monitoring Well W1-24



Notes:
1. Non-detect results are plotted with the method detection limit.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-34

Site 1 Dissolved Copper Concentrations
Downgradient Monitoring Well W1-1R

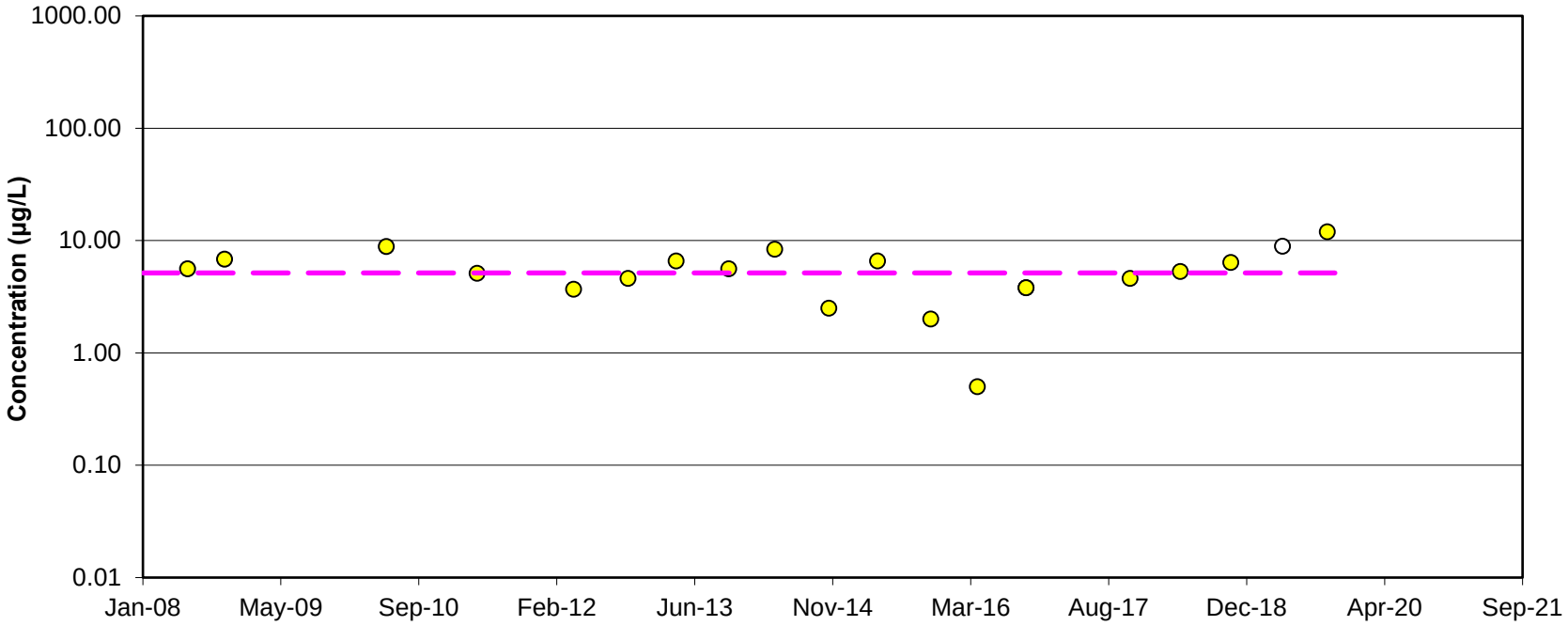


Notes:

1. Non-detect results are plotted with the method detection limit.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-35

Site 1 Dissolved Copper Concentrations
Upgradient Monitoring Well W1-12R

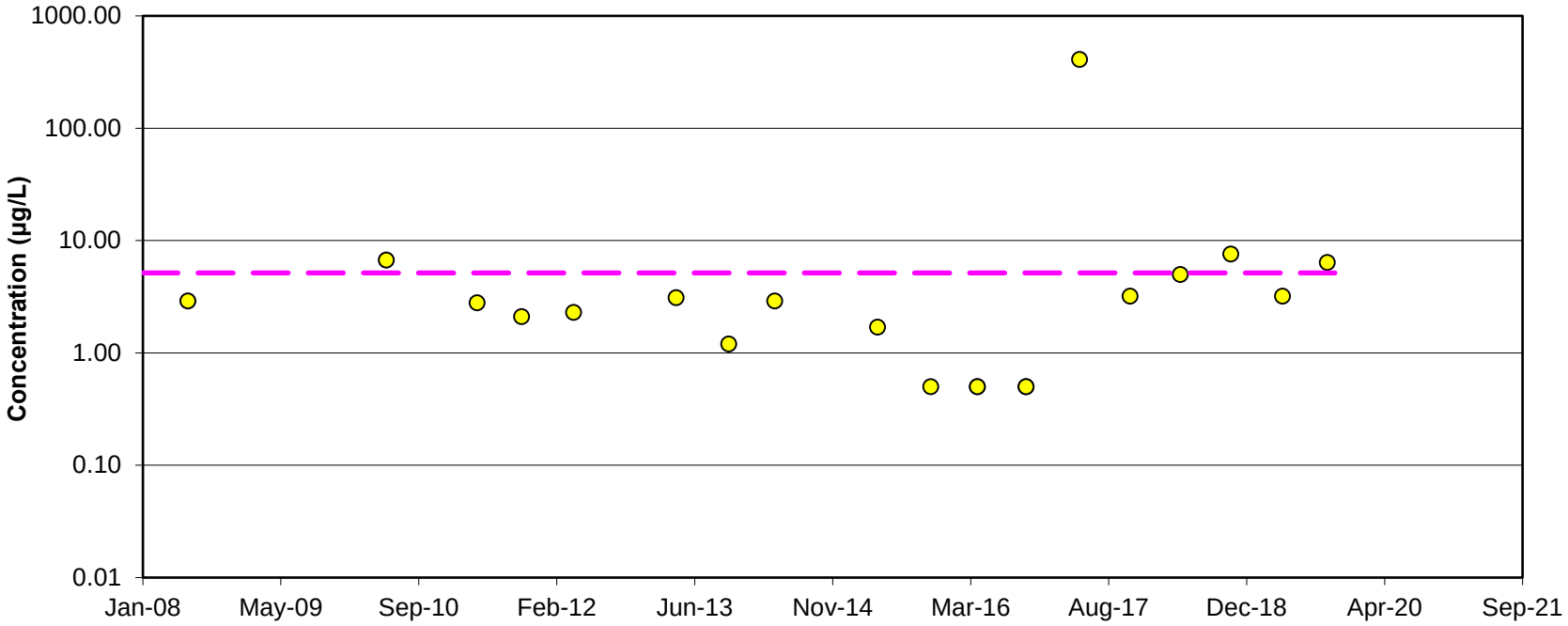


Notes:

1. Non-detect results are plotted with the method detection limit.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-36

Site 1 Dissolved Copper Concentrations
Downgradient Monitoring Well W1-19

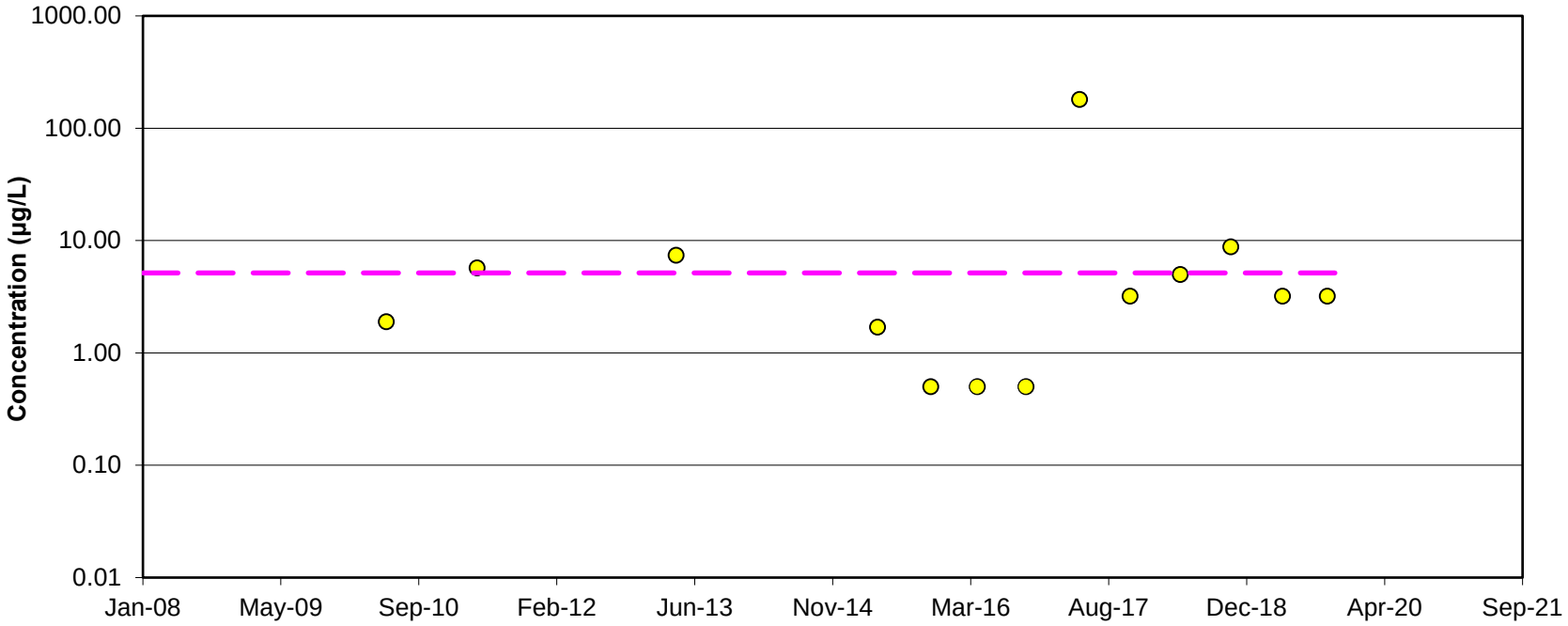


Notes:

1. Non-detect results are plotted with the method detection limit.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-37

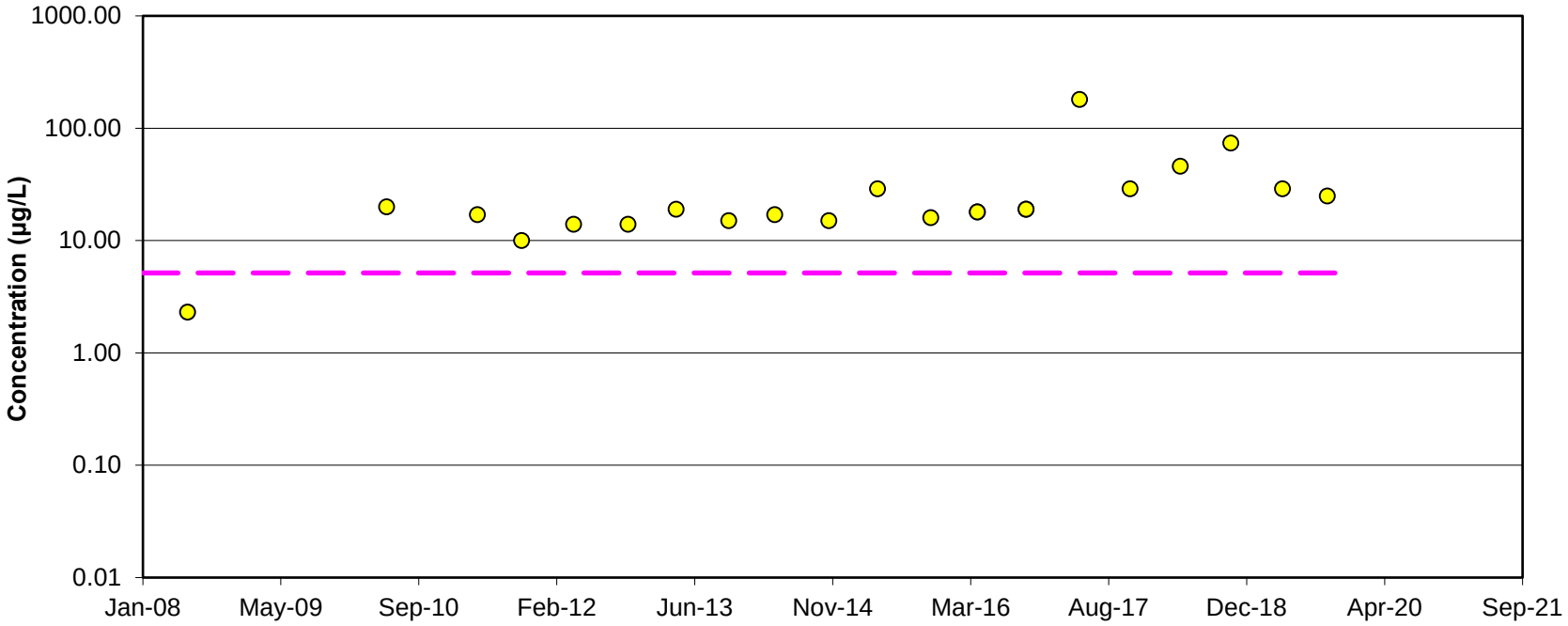
Site 1 Dissolved Copper Concentrations
Collection Trench Well W1-22



Notes:
1. Non-detect results are plotted with the method detection limit.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-38

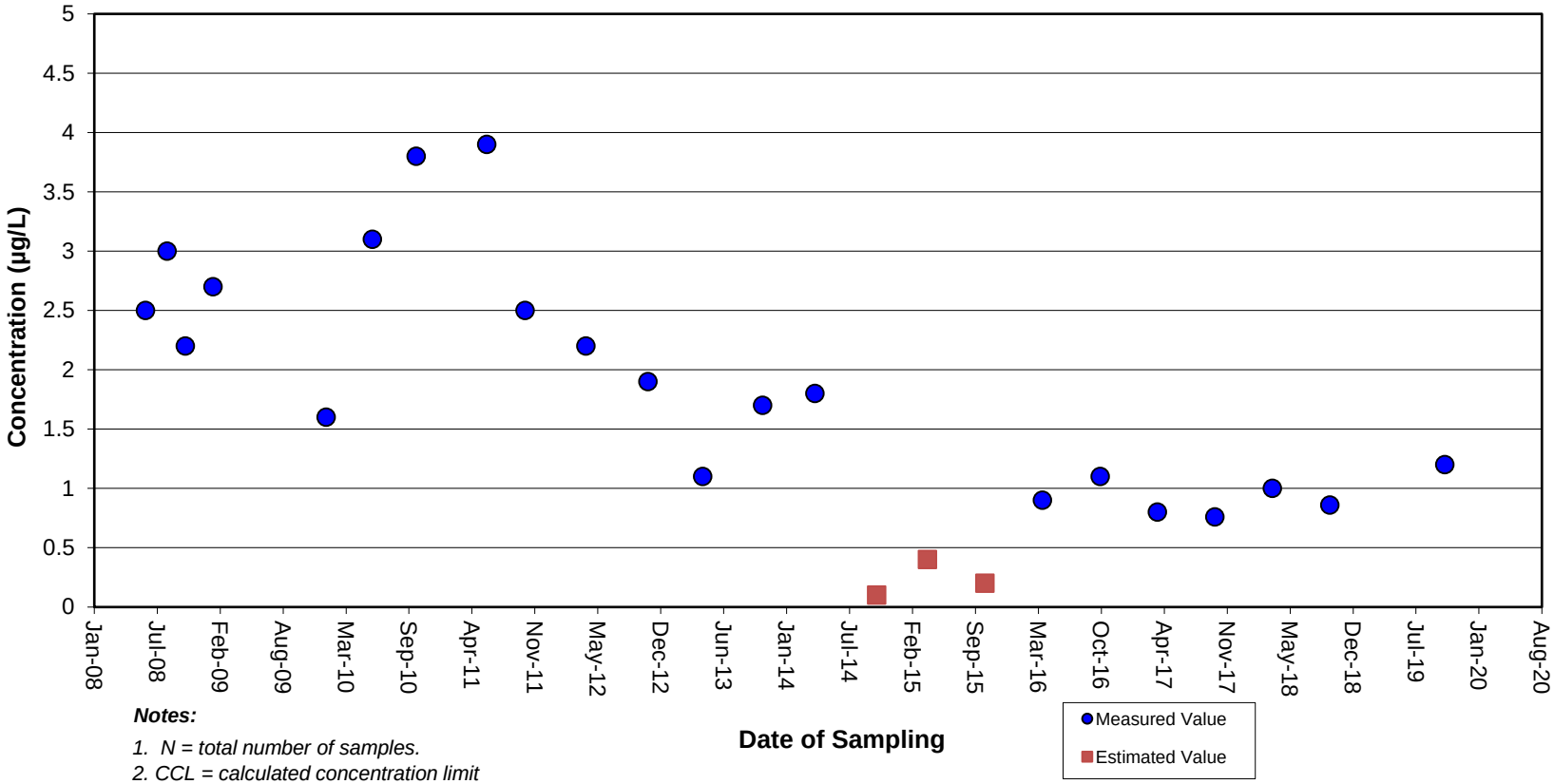
Site 1 Dissolved Copper Concentrations
Collection Trench Well W1-23



Notes:
1. Non-detect results are plotted with the method detection limit.
2. Closed symbols indicate values greater than or equal to the laboratory detection limit.
3. Open symbols indicate estimated values.
4. N = total number of samples.
5. CCL = calculated concentration limit.

Figure D-39

Site 22 Trichloroethene Concentrations
Monitoring Well WGC2-8

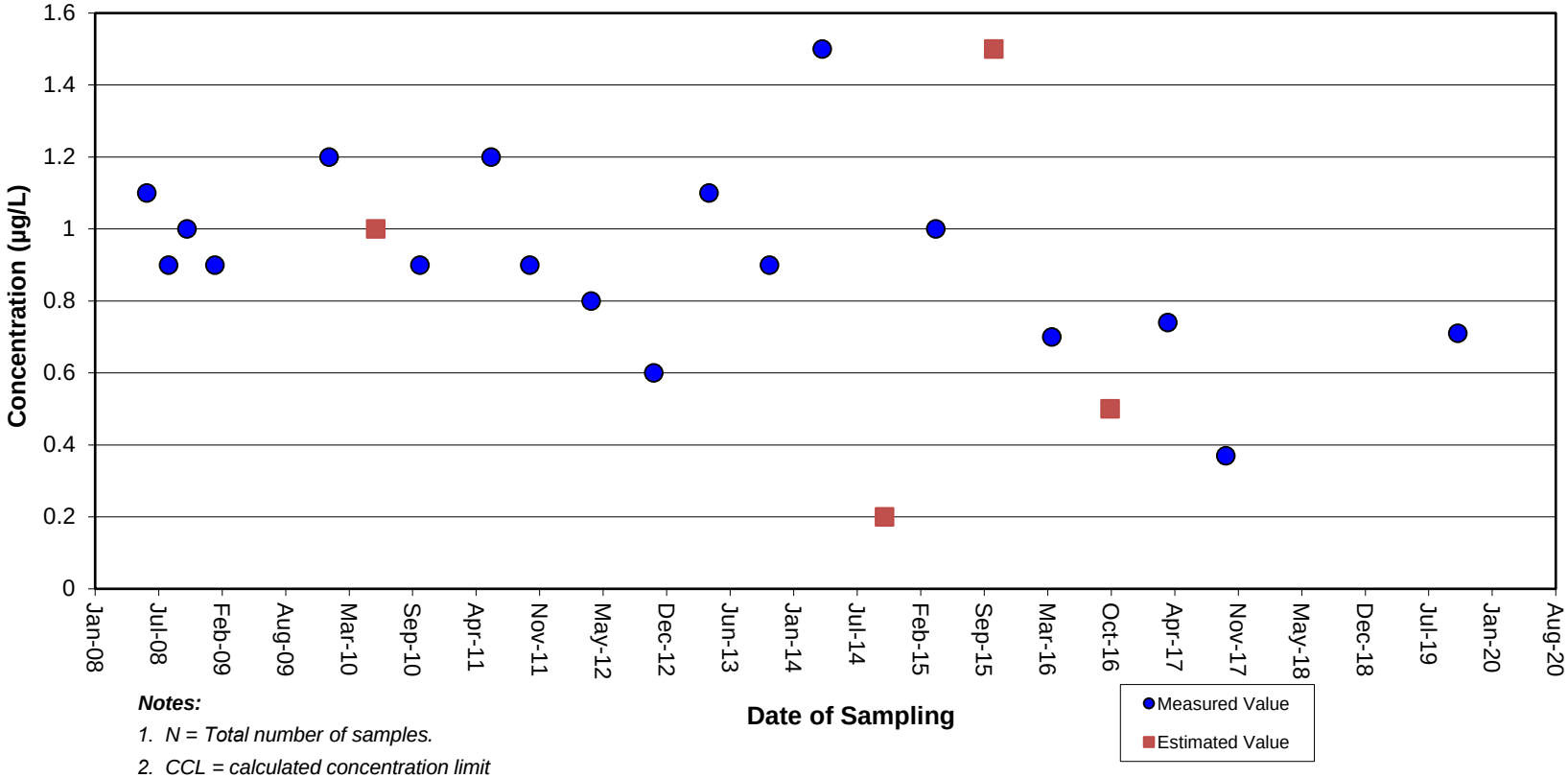


Notes:

1. N = total number of samples.
2. CCL = calculated concentration limit
CCL is 8.8 µg/L

Figure D-40

Site 22 Trichloroethene Concentrations
Monitoring Well WGC2-9



Notes:

1. N = Total number of samples.

2. CCL = calculated concentration limit

CCL is 8.8 µg/L

Appendix E

Site Photographs

Photo 1
Site 1 South of Entrance Road- Q1 - Looking Southwest toward W1-15 and airfield

Photo 2
Site 1 East Slope – Q1 - Looking Southeast from top of cap

Photo 3
Site 22 Northwest corner of cap – Q1 – Looking Southeast

Photo 4
Site 22 Northern Drainage Channel – Q1 – Looking West

Photo 5
Site 22 Southeast End – Q2 – Depressions in golf-cart path

Photo 6
Site 1 South of Entrance Road- Q2 - Looking Southwest toward W1-15 and airfield

Photo 7
Site 22– 2nd Qtr – View of Northwest corner (ponding area) facing west

Photo 8
Site 22 Eastern Footprint– 2rd Qtr – Cart path condition facing south

Photo 9

Site 1 South Slope – 3rd Qtr – Looking East toward pickle-weed and perimeter road

Photo 10
Site 1 South Slope – Q3 2018 – Fiber Optic Probe and Gopher Burrow

Photo 11
Site 1 – Example of One Way Door

Photo 12
Site 22 Cart Path – 3rd Qtr – Cart path in good condition

Photo 13

Site 1 East Slope – Q3 – Vegetation recently mowed and drainage channel weeded

Photo 14
Site 1 South Slope – Q4 – Flags marking burrow locations

Photo 15
Site 22 Northwest End – Q4 – Drainage Swale Low spot ponding during heavy rain storm

Appendix F

Five-Year Review Interview Records

INTERVIEW RECORD

Site Name: Former Naval Air Station (NAS) Moffett Field, California	**EPA ID No.:** CA2-1-70090078	
Subject: Five-Year Review of IR Sites 1 & 22	**Date:** **3/26/2020**	**Time:**
Type: Telephone Visit **Email**	**Interview Location:**	

Interview Record Submitted By:

Name: Garrett Turner	**Title:** Restoration Program Manager	**Organization:** NASA Ames Research Center

Individual Contacted

Name: Sally Lee	**Title:** Senior Environmental Health Specialist	**Organization:** County of Santa Clara Department of Environmental Health

Telephone: 408-918-2925 **Fax No.:** 408-280-6479 **E-Mail Address:** sally.lee@cep.sccgov.org	**Mailing Address:** The County of Santa Clara Department of Environmental Health Solid/Medical Waste Programs 1555 Berger Drive, Suite 300, San Jose, CA 95112-2716

Interview Summary for IR Sites 1 and 22 Landfills

1. *What is your affiliation with Former NAS Moffett Field and what is your role in regard to oversight of IR Sites 1 & 22?*

   I work for Santa Clara County Department of Environmental Health as a Senior Environmental Health Specialist. As the designated Local Enforcement Agency (LEA) for the California's Department of Resources Recycling and Recovery (CalRecycle) , we inspect and permit all active and closed solid waste facilities to ensure compliance with the California Code of Regulations (CCR) Title 27.

2. *Over the past five years, has Santa Clara County (SCC) been involved in on-going communication with the NASA in regard to environmental activities and progress at IR Sites 1 & 22?*

   Yes, over the past five years, Santa Clara County LEA has been involved in on-going communication with the NASA in regard to environmental activities and progress at IR Sites 1 & 22 through quarterly inspections.

3. *Have you or any of your SCC colleagues conducted any site visits and/or inspections at IR Sites 1 & 22?*

   Yes, my colleagues and I have conducted site visits and inspections on a quarterly basis at IR Sites 1 & 22.

4. *Please describe what efforts SCC is currently taking to regulate management of Moffett Fields closed landfills (Sites 1 & 22).*

   Santa Clara County LEA conducts quarterly on-site inspections at Moffett Fields closed landfills (Sites 1 & 22). LEA submits inspection reports to CalRecycle, and provides reports to site operators, California Dept of Fish and Wildlife, Regional Water Quality Control Board, and EPA. LEA will follow up with the operator on any noted violations and/or areas of concern to ensure compliance.

5. *In the last 5 years has SCC found any violations or areas of concern at IR Sites 1 & 22? If so, how is NASA notified and was NASA responsive to the issue?*

   In the last 5 years, the LEA found one area of concern at IR Sites 1 & 22 due to excessive open burrows from burrowing animal activities. NASA was notified during the joint inspection and with the written inspection report. NASA was very responsive to the issue and immediately resolved the area of concern and provided documentation to the LEA to confirm compliance.

6. *Describe the effectiveness of drainage within IR Sites 1 and 22. In the past five years has the landscape and topography been able to effectively regulate excessive storm surges? Has extensive flooding occurred over the past five years such that the sites drainage has proven inadequate? To what extent can the drainage capacity be increased to offset rising sea level in the event of an extreme storm?*

   Overall, the landscape and topography appeared to be able to effectively regulate excessive storm surges in the past five years. Vegetation in the channel along the perimeter fencing next to the east slope at Site 1 was cleared out to maintain proper drainage. Proactive measures need to continue on areas known to pond and make the necessary repairs to promote proper drainage away from the former disposal sites.

INTERVIEW RECORD

Site Name: Former Naval Air Station (NAS) Moffett Field, California	**EPA ID No.:** CA2-1-70090078	
Subject: Five-Year Review of IR Sites 1 & 22	**Date:** **4/3/2020**	**Time:**
Type: Telephone Visit **Email**	**Interview Location:**	

Interview Record Submitted By:

Name: Garrett Turner	**Title:** Restoration Program Manager	**Organization:** NASA Ames Research Center

Individual Contacted

Name: Dennis Tuhn	**Title:** Golf Course Manager	**Organization:** OB Sports

Telephone: 650-386-0721	**Mailing Address:** The Golf Club at Moffett Field 934 Macon Rd. Mountain View, CA 94043
Fax No.: None on Record	
E-Mail Address: dtuhn@obsports.com	

Interview Summary for IR Sites 1 and 22 Landfills

1. What is your affiliation with Former NAS Moffett Field and what is your role in regard to oversight of IR Site 22?

   I am the General Manager of the Golf Course and ensure that our maintenance department maintains the area to include making sure rodents do not overtake the site and there is no standing water on the site.

2. Over the past five years, has OB Sports been involved in on-going communication with the NASA in regard to environmental activities and progress at IR Site 22? *YES*

3. Have you or any of your OB Sports colleagues conducted any site visits and/or inspections at IR Site 22? *YES*

4. Please describe what efforts OB Sports is currently taking to implement wildlife management and drainage control in accordance with the MOA (Memorandum of Agreement) for Site 22, signed in 2008.

   With cooperation of the onsite biologist we identify that squirrel holes are not hosting burrowing owls and then will gas and fill the holes to prevent squirrels from returning.

5. In the last 5 years has OB Sports made any changes to the landscape, turf, trees or drainage channels within the IR Site 22 footprint and was NASA personnel notified to confirm that the activities are authorized under the MOA?

   There have been no changes made to my knowledge in the past 5 years.

6. Describe the effectiveness of drainage within the IR Site 22 footprint. In the past five years has the landscape and topography been able to effectively regulate excessive storm surges? Has extensive flooding occurred over the past five years such that the sites drainage has proven inadequate? To what extent can the drainage capacity be increased to offset rising sea level in the event of an extreme storm?

   All drainage is sufficient at this time for moderate storms on the site. The drainage canal that runs down the 3rd fairway collects water but does not sufficiently drain to the culvert adjacent Marriage Road. The rains of January and February flooded fairways #2 & #8 because of the lack of flow of this canal. Drainage would be much improved if this drainage canal was properly graded to allow the flow of water away from the site.