

FINAL

AIR SAMPLING WORK PLAN FOR VAPOR INTRUSION TIER RESPONSE EVALUATION

Former Naval Air Station Moffett Field, Moffett Field, California



**Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310
May 17, 2012**

Prepared under:

**Contract Number: N62473-10-D-0814
Task Order Number: 0010
DCN: AM8A-0814-0010-0007**

Prepared by:

Accord MACTEC 8A JV

**6050 Santo Road, Suite 175
San Diego, California 92124
(858) 771-3588**

FINAL

**AIR SAMPLING WORK PLAN FOR VAPOR INTRUSION
TIER RESPONSE EVALUATION
Former Naval Air Station Moffett Field
Moffett Field, California**

May 17, 2012

Contract Number N62473-10-D-0814
Task Order Number 0010

Prepared for:
U.S. DEPARTMENT OF THE NAVY

REVIEW AND APPROVAL



Steve Hall
Project Manager
Accord MACTEC 8A JV

5/17/12
Date

This page left intentionally blank.

TABLE OF CONTENTS

Review and Approval	i
Acronyms and Abbreviations	vi
Section 1 Introduction	1-1
1.1 Purpose	1-1
1.2 General Scope of Work	1-2
Section 2 Site Description	2-1
2.1 Site History and Background	2-1
2.2 Hydrogeology	2-2
2.3 Vapor Intrusion ROD Amendment.....	2-2
2.4 Previous Vapor Intrusion Sampling	2-2
Section 3 Building Survey Results	3-1
3.1 Pre-survey Activities	3-1
3.2 Potential Sources and Pathways of Vapor Intrusive Volatile Organic Compounds	3-1
3.3 On-Site Building Survey	3-2
3.4 Building Survey Evaluation.....	3-3
Section 4 Indoor Air Sampling Plan	4-1
4.1 Basis of the Sampling Program	4-1
4.2 Data Quality Objectives	4-1
4.2.1 State the Problem	4-1
4.2.2 Identify the Goals of the Study	4-2
4.2.3 Identify the Information Inputs.....	4-2
4.2.4 Define the Boundaries of the Study	4-2
4.2.5 Develop the Analytical Approach.....	4-3
4.2.6 Specify Performance or Acceptance Criteria	4-3
4.2.7 Develop the Plan for Obtaining Data	4-3
4.3 Sampling Protocols.....	4-4
4.3.1 Indoor Air Sampling	4-4
4.3.2 Outdoor Air Sampling	4-5
4.3.3 Soil Gas and Sub-Slab Soil Vapor Sampling	4-6
4.4 Analytical Method and Data Review	4-6
4.4.1 Sample Quality Control Tasks	4-6
4.4.2 Data Review and Management.....	4-7

TABLE OF CONTENTS (CONTINUED)

4.4.3 Third-Party Data Validation..... 4-7

4.4.4 Documentation and Records 4-7

4.5 Sampling Activities 4-7

Section 5 Response Action Tiering System..... 5-1

Section 6 Reporting and Schedule 6-1

Section 7 References 7-1

TABLE OF CONTENTS (CONTINUED)

FIGURES

Figure 1. Moffett Field Location Map

Figure 2. Extent of TCE in Groundwater in the Upper Aquifer A/A1 Zone, MEW Superfund Study Area

Figure 3. Vapor Intrusion Areas of Responsibility, Moffett Field Area

TABLES

Table 1. Building List for the Navy Area of the Vapor Intrusion Study

Table 2. Hydrostratigraphy of MEW and Moffett Field Area, Mountain View and Moffett Field, California

Table 3. Indoor Air Cleanup Levels for Chemicals of Concern for the Vapor Intrusion Study Area, Moffett Field, California

Table 4. Number of Samples for Individual Buildings, Moffett Field, California

Table 5. Indoor Air Sampling Program, Moffett Field, California

Table 6. Summary of Tiering Descriptions and Response Actions for Existing Commercial Buildings in the Vapor Intrusion Study Area

APPENDICES

Appendix A Agreement Letter between the Navy, EPA, and the San Francisco Bay Regional Water Quality Control Board

Appendix B Historic Indoor Air Sampling Results

Appendix C Building Survey Forms and Summary Table

Appendix D Sampling and Analysis Plan/Quality Assurance Project Plan

Appendix E Sample Location Maps

Appendix F Project Schedule

ACRONYMS AND ABBREVIATIONS

$\mu\text{g}/\text{m}^3$	microgram per cubic meter
AM8AJV	Accord MACTEC 8A Joint Venture
Ames	Ames Research Center
BRAC	Base Realignment and Closure
COC	chemicals of concern
DCA	dichloroethane
DCE	dichloroethylene
DQOs	data quality objectives
DCN	document control number
ELAP	Environmental Laboratory Accreditation Program
EMD	Environmental Management Division
EPA	United States Environmental Protection Agency
HVAC	heating, ventilation, and air conditioning
ICs	Institutional Controls
MEW	Middlefield-Ellis-Whisman
MEW Site	MEW Superfund Study Area
NAS	Naval Air Station
NASA	National Aeronautics and Space Administration
Navy	U.S. Department of the Navy
NEDD	NIRIS Electronic Data Deliverables
NIRIS	Naval Installation Restoration Information Solution
PCE	perchloroethylene
PMO	Program Management Office
ppbv	parts per billion by volume
QA	quality assurance
QC	quality control
ROD	Record of Decision
ROICC	Resident Officer in Charge of Construction

ACRONYMS AND ABBREVIATIONS (CONTINUED)

SAP	Sampling and Analysis Plan
SES-TECH	Sealaska Environmental Services, Inc. and Tetra Tech EC, Inc.
SIM	Selected Ion Monitoring
TCE	trichloroethene
VOC	volatile organic compound
Water Board	San Francisco Bay Regional Water Quality Control Board
WATS	West-Side Aquifer Treatment System
Work Plan	<i>Air Sampling Work Plan for Vapor Intrusion Tier Response Evaluation, Former Naval Air Station Moffett Field, AM8AJV</i>

This page left intentionally blank.

Section 1 Introduction

The U.S. Department of the Navy (Navy) Base Realignment and Closure (BRAC) Program Management Office (PMO) West has prepared this Air Sampling Work Plan for Vapor Intrusion Tier Response Evaluation (Work Plan) for the Navy's Vapor Intrusion Area of Responsibility at the former Naval Air Station (NAS) Moffett Field. Moffett Field is located at the northern end of the Santa Clara Valley Basin, approximately 1 mile south of San Francisco Bay (Figure 1). Groundwater at the Middlefield-Ellis-Whisman (MEW) Superfund Study Area (MEW Site) has been contaminated with volatile organic compounds (VOCs), primarily the solvent trichloroethene (TCE) (Figure 2). Portions of the former NAS Moffett Field are owned and operated by the National Aeronautics and Space Administration (NASA) Ames Research Center (Ames). The Navy is responsible for implementing a CERCLA mandated vapor intrusion remedy within the area of the MEW Site on Moffett Field that is impacted by Navy sources (Navy Area). The Navy Area is shown in Figure 3.

In June 1989, the United States Environmental Protection Agency (EPA), Region 9, issued a Record of Decision (ROD) selecting the soil and groundwater cleanup remedy for the MEW Site. The groundwater cleanup remedy includes extraction and treatment systems and slurry walls to contain and to clean up groundwater contamination. The San Francisco Bay Regional Water Quality Control Board (Water Board) provides oversight of Navy activities for the state of California at former NAS Moffett Field.

In August 2010, EPA amended the 1989 ROD to select a remedy for the vapor intrusion pathway to prevent subsurface contaminants from migrating into indoor air or accumulating in enclosed building spaces at levels exceeding EPA's indoor air cleanup criteria for long-term exposure (EPA 2010). As specified in the 2010 ROD Amendment, the Vapor Intrusion Study Area is defined as the area where TCE concentrations in shallow groundwater are greater than 5 micrograms per liter. The Navy is responsible for implementing the 2010 ROD Amendment within the Navy Area.

This Work Plan was prepared pursuant to an agreement between the Navy, EPA, and the Water Board for the Navy to implement the vapor intrusion remedy in the Navy Area (Appendix A). This Work Plan was prepared by Accord MACTEC 8A Joint Venture (AM8AJV) on behalf of Navy BRAC PMO West.

1.1 Purpose

As presented in the 2010 ROD Amendment, the appropriate response action for existing buildings in the Navy Area will be determined by evaluation of indoor-air sampling results and other lines of evidence for each building. Some of the existing buildings in the Navy Area have not been characterized sufficiently to apply the ROD Amendment Response Action Tiering System to determine the appropriate response actions. As a result, EPA requested that the buildings be sampled in order to collect sufficient information for evaluation of the buildings using the tiering system.

The purpose for this Work Plan is to collect indoor air samples for comparison to outdoor air quality and indoor air cleanup levels (as provided in Table 3 of the 2010 ROD Amendment) for use in placing the buildings in response action tiers as provided in the ROD Amendment. The

Tier ranking determines the response action required for each building, using Tables 6A and 6B in the ROD Amendment.

The sample locations have been selected based on building construction and use, previous indoor air sample results, previous mitigation actions, and additional information about the buildings, including the design and operation of building ventilation systems, potential operational and maintenance sources for VOCs, and identified potential vapor intrusion pathways.

The Navy's sampling program is not designed to determine if an existing building qualifies for Tier 4 (no action required) in Table 6B. Addendums to this Work Plan will be prepared as needed for collection of additional data to provide multiple lines of evidence, to provide mitigation and remediation design parameters, and to establish monitoring programs.

1.2 General Scope of Work

All buildings with a vapor intrusion pathway within the Navy Area that are in use or may be occupied in the future have been included in the indoor air sampling program. Abandoned buildings that are scheduled for demolition are excluded. A list of the buildings to be sampled is provided in Table 1 and the building locations are shown in Figure 3.

The scope of work consists of the following components:

- Continue to work with NASA Ames to collect the basic heating, ventilation, and air conditioning (HVAC) system information for all buildings to be sampled, including Buildings 239A, 243 and 243A. Information provided by NASA on the HVAC systems of the buildings in the Navy Area is summarized in Table C-1 of Appendix C.
- Approximately 1-2 months before the indoor air sampling event, schedule access and conduct a resurvey of the buildings that have had HVAC system modifications since the original building surveys during the week of November 14, 2011.
- Logistics and schedules will be coordinated with Columbia Analytical Services' Simi Valley, California certified laboratory to ensure timely delivery of the sampling equipment at Moffett Field and for receipt and processing of the samples at the laboratory.
- Approximately 1 month before the sample events, finalize plans and request access to the buildings and the site area at NASA Ames for collection of the air samples. The request and notification will be made to the NASA Ames Environmental Management Division (EMD). Formal notification of the upcoming sampling event will also be submitted to EPA and the Navy Resident Officer in Charge of Construction (ROICC).
- The storage boxes, sample canisters and other equipment and supplies will be mobilized to the Moffett Field field office, the week prior to the initial sampling event.

- Buildings without an HVAC system will be sampled for 8, 10 or 24 hours, depending on use and occupancy. Buildings with an HVAC system that supplies outdoor air to a portion or all of a building will be sampled twice: once during work hours with the HVAC system operating and once after the building ventilation system has been shut down (or converted to internal air circulation) for 36 to 48 hours. The sampling duration will be 8 or 10 hours for buildings that only operate between roughly 7 a.m. to 6 p.m. The sampling duration will be 24 hours for buildings that are unoccupied or may be occupied 24 hours/day.
- Building 210 has a vapor collection system in operation beneath a raised floor in Room 145. A 8-hour sample will be collected from within the crawl space beneath the raised floor after the vapor collection system has been shut down for at least 48 hours.
- Selected ambient 24-hour outdoor air samples will be collected during each indoor air sampling date.
- The air samples will be analyzed by Method TO-15 SIM (Selected Ion Monitoring) for the chemicals of concern (COC) that are listed in Table 3 of the ROD Amendment. These COCs are TCE, perchloroethene (PCE), cis- and trans-1,2-dichloroethylene (DCE), vinyl chloride, 1,1-dichloroethane (DCA) and 1,1-DCE.
- A validation quality assurance review will be conducted of the laboratory analytical results.
- The analytical results will be compared to the indoor air cleanup levels that are presented in Table 3 of the ROD Amendment and to ambient outdoor air concentrations.
- The indoor air data will be evaluated using the Response Action Tiering System criteria as presented in Table 6A and 6B of the ROD Amendment. Detailed operation and performance information will be requested from NASA for the HVAC systems for buildings which had results that exceeded the indoor air cleanup levels.
- Buildings will be identified that may require collection of additional information for vapor intrusion assessment such as collection of subslab soil vapor samples, either as a result of not being able to collect indoor air samples without the HVAC system operating or in internal air circulation mode; or where buildings are classified as Tier 1 and NASA will not consider modification of the HVAC system to control vapor intrusion. A report will be prepared that documents sampling activities, provides the sample results and laboratory reports, presents the tiering system evaluation and results, provides recommendations based on the results of the tiering system evaluation, and provides the available information on the HVAC systems for the Tier 1 buildings. The report will include the following additional information (EPA 2011).
 - Building conditions, occupancy and use conditions, summary of building/property-specific data, including identification of potential pathways for subsurface vapor intrusion;
 - Evaluation of current indoor air ventilation system (e.g., HVAC) operations, building and property surveys as provided by NASA;

- Description of any interim vapor intrusion mitigation measures taken at the building to date, and a description of the tasks being performed to monitor the ongoing effectiveness of the measures;
 - Description and summary of all lines of evidence and specific data collected to determine response action tier;
 - Map of building/property layout and actual sampling locations;
 - Sampling and data collection results and summary of data;
 - Laboratory analytical data;
 - Proposed response action tier designation and, where necessary, indicate what additional information is needed to determine response action tier;
 - Quality Assurance/Quality Control data and activities;
 - Description of access requirements for the work to be performed, existing access conditions, and expected additional tasks necessary and scheduled to obtain access;
 - Description and schedule if an existing engineered vapor intrusion control system will be utilized that may not require a Building/Property-Specific Remedial Design;
 - Recommendations, and proposed follow-up actions; and
 - Schedule.
- If sampling shows the need for additional characterization, then a separate work plan/SAP addendum will be developed to provide the additional sampling.

Section 2 Site Description

The Navy Area is within the Vapor Intrusion Study Area on Moffett Field (Figure 3). NAS Moffett Field is a National Priorities List site (EPA ID: CA2170090078). The EPA is the lead regulatory agency responsible for directing the cleanup process under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and per a Federal Facility Agreement. The San Francisco Regional Water Quality Control Board is the state lead agency.

2.1 Site History and Background

The former NAS Moffett Field site was originally commissioned as NAS Sunnyvale in 1933. In 1935, the facility was transferred to the U.S. Army Air Corps. In 1939, Ames Aeronautical Laboratory obtained a permit to use a portion of the property. NAS Sunnyvale was returned to the Navy in 1942 and was renamed NAS Moffett Field. In 1991, the BRAC Commission designated NAS Moffett Field for decommissioning and transfer to NASA. On July 1, 1994, NAS Moffett Field was transferred to NASA Ames with the exception of the military housing. The military housing was assigned first to the U.S. Air Force and then to the U.S. Army. Part of the former air station was designated for a NASA Research Park (SES-Tech 2010; Haley & Aldrich 2011).

The NASA area is comprised of 213 acres that are planned for redevelopment as a collaborative research and educational campus, with associated facilities. The buildings are located on the original NASA Ames Campus and the NASA Research Park. Several buildings on Moffett Field are unoccupied and designated to be demolished. The occupied buildings are used primarily as office, research, or maintenance space (Haley & Aldrich 2011).

The MEW Site was brought into the Superfund program due to soil and groundwater contaminated with chlorinated solvents (primarily TCE). The MEW Site extends from approximately 1 mile south of U.S. Highway 101 along East Middlefield Road to within approximately 0.7 miles of the north end of former NAS Moffett Field (Figure 2). Source areas for the solvents have been identified on several former industrial properties located south of Highway 101, and on former Navy and NASA areas of operation. The Navy is responsible for groundwater cleanup from its sources, and operates a groundwater cleanup facility west of Hangar 1 in the area of Installation Restoration Site 28, known as the West-Side Aquifer Treatment System (WATS) area. The groundwater contamination in the WATS Area is commingled with similar contaminants from the regional groundwater plume.

Vapors from the Site COCs are dissolved in groundwater and have been detected in buildings overlying the shallow groundwater. The 2010 ROD Amendment was issued to address vapor intrusion into buildings that overlie the contaminated shallow subsurface contamination. Within the Navy Area (Figure 3), the Navy has the responsibility for implementing the vapor intrusion remedy as described in the 2010 ROD Amendment.

Potential chlorinated solvent sources of groundwater contamination in the Navy area of responsibility included a former dry cleaning facility, and former manufacturing facilities south of Moffett Field. In 1994, the Navy removed the contaminant sources, tank, sumps, and impacted soil and then began groundwater extraction and treatment.

2.2 Hydrogeology

Groundwater aquifers beneath the Vapor Intrusion Study Area consist of shallow and deep aquifer systems, separated by a laterally extensive aquitard approximately 40 feet thick (Table 2). The shallow aquifer system is generally less than 160 feet below ground surface. Subdivisions within the shallow aquifer are designated as the upper A (also known as A), lower A (also known as B1), B2, and B3 aquifers. The regional aquitard is designated as the B/C aquitard. The zones below the B/C aquitard are termed the C aquifer and the Deep aquifers. Groundwater flow in the shallow aquifer zone is generally to the north, while flows in the C and Deep aquifers are generally to the northeast. The shallow and deep aquifer systems in the Moffett Field and MEW Areas are not used for drinking water (Haley & Aldrich 2011).

The depth to water in the shallow A aquifer, which is the relevant groundwater zone for the vapor intrusion pathway, varies from approximately 5 to 10 feet below ground surface in the Moffett Field Area (Haley & Aldrich 2011). In the Navy Area, the seasonal variations in water elevations may range from 0.5 to 4.4 feet but more typically range from 0.8 to 1.0 feet, with higher levels in the spring and lower levels in the autumn. The hydraulic gradient is 0.005 to 0.007 feet per foot to the north (ERS-JV and Brown and Caldwell 2011).

2.3 Vapor Intrusion ROD Amendment

In August 2010, EPA amended the MEW Site 1989 ROD to select a remedy for the vapor intrusion pathway to prevent subsurface volatile contaminants in groundwater from migrating into indoor air or accumulating in enclosed building spaces at levels exceeding EPA's indoor air cleanup criteria for long-term exposure for residential and commercial buildings. The ROD Amendment provides a tiering system to determine the appropriate response action for each building/property within the Vapor Intrusion Study Area. The tiering system for existing buildings is based on indoor air sampling with or without engineering controls in place and other lines of evidence. The corresponding response action may include both engineering and institutional controls (EPA 2010).

2.4 Previous Vapor Intrusion Sampling

Indoor air sampling has been conducted in buildings within the Vapor Intrusion Study Area since the mid- 1990s. The studies have varied from one-time sampling events to extensive multiple sampling events to determine variations in concentrations over time and under different site conditions. Some events evaluated multiple sampling methods and reproducibility of results. Sample durations have varied from grab samples to 7 days.. Buildings 16 and N210 have had interim mitigation measures implemented to address vapor intrusion and reduce indoor air concentrations of Site COCs to below the indoor air cleanup levels. Historic sampling reports are included in the references in Section 7.0. A summary of indoor air sample results by building as listed on NASA Ames website (<http://environment.arc.nasa.gov/reports/map.html>) is provided in Appendix B.

Section 3 Building Survey Results

Building survey activities were conducted at 22 buildings located within the Navy Area in accordance with the Draft Building Survey Plan for Vapor Intrusion Sampling (AM8AJV 2011). The buildings surveyed are listed in Appendix C, which also contains a figure showing the buildings, the completed survey forms along with a summary table of the survey results. The purpose of the building surveys was to evaluate the building use, conditions, and operations, and to gather data to select sampling locations for the Work Plan. Information collected during the building surveys include observations on building construction and integrity, mechanical systems and operations, tenant use and activities, and use and storage of chemicals. In addition, interviews were conducted to understand building hours of use/occupancy, tenant activities, system operations, and historic uses.

3.1 Pre-survey Activities

NASA supplied information to the Navy on underground utility lines, building ventilation including HVAC systems, and chemicals stored and used in buildings. This information was compiled and entered into the building-specific survey forms.

Historical indoor air monitoring data were collected from NASA and reviewed, along with 2009 and 2010 groundwater sampling and monitoring data, prior to conducting the surveys. Floor plans for all floors were attached to each building-specific survey form.

The locations of waste storage areas, fueling tanks, and potential VOC source areas were identified within the Navy Area during the building surveys.

3.2 Potential Sources and Pathways of Vapor Intrusive Volatile Organic Compounds

Potential sources of VOCs in indoor air and the potential pathways and receptors are provided below. The COCs for the vapor intrusion pathways, as specified in the 2010 ROD Amendment, are TCE, PCE, cis- and trans-1,2- DCE, vinyl chloride, 1,1-DCA and 1,1-DCE. Table 3 shows the cleanup levels for these constituents in indoor air.

Sources of VOCs. Potential indoor exposure to VOCs could result from one or a combination of the following sources.

- Volatilization of dissolved VOCs in groundwater or soil and soil gas and migration into a building structure.
- Occupational, household, or consumer product use inside or outside of the building/workplace.
- Contribution from outdoor air moving into a building through opened doors or windows or from outdoor air supply intakes of HVAC systems. This outdoor air can include contributions from off-site background concentrations, nearby industrial emissions, and volatilization from the subsurface to outdoor air near the building.

Pathways. Chemicals may volatilize from the groundwater and soil migrate upward and enter buildings through voids and cracks in the floors, dry conduits, or subsurface structures (e.g.,

basements and other subsurface structures), and then migrate upward through elevator shafts, stairwells and utility conduits. For buildings with basements, VOCs may volatilize from groundwater intrusion directly through the basement floor and walls; receptors inside the buildings could inhale these vapors. VOCs may volatilize from products used in the buildings and disperse into work areas.

Potential Receptors. Potential receptors are persons in existing and future buildings in the Vapor Intrusion Study Area. While there are no acute health concerns, the response action in the ROD Amendment is designed to protect building occupants from potential long-term inhalation exposure to COCs.

3.3 On-Site Building Survey

The building survey form served as the basis for building inspection and interviews with tenants/occupants. Information documented on the building survey form included chemical use and storage in the building as a preliminary evaluation of other occupational sources. During the inspections conducted during the week of November 14, 2011, the survey teams made observations of building construction and integrity, mechanical systems and operations, tenant use and activities, and use and storage of chemicals. In addition, they conducted interviews to understand hours of use/occupancy, tenant activities, system operations, and historic uses. The survey team conducted the following activities:

- Examined basements, rooms and floors to identify areas where COCs were used or are present.
- Located plumbing and piping systems, power conduits, communication conduits, elevator shafts, sumps, and floor drains that penetrated the base slab.
- Examined the structural condition of the building, including locating areas where the floor is cracked or seamed.
- Verified information on chemical use and storage in the building, and inquired about operational procedures in laboratory and maintenance areas.
- Made observations of the HVAC system layout and use by the building occupants, and requested additional information on HVAC system design and operation.
- Gathered information about building use schedules.
- Screened work areas and chemical use and storage areas for VOCs using a part per billion by volume (ppbv) level photoionization detector.
- Took photographs, where permissible, of the ventilation systems, floor and wall cracks, crawl spaces, storage areas, and potential VOC source, including laboratories.
- Observed potential sample locations inside and outside the buildings.
- Surveyed the building exterior for chemical and waste storage areas, loading docks, and ventilation system intake and exhaust areas; inquired about vents and exhaust systems on building roofs.

3.4 Building Survey Evaluation

The information from the building surveys has been compiled into a table that is provided in Appendix C. The table includes information on building work hours, number of floors and approximate area in square feet, vapor intrusion pathways (e.g., basements and crawl spaces, floor structural condition, vertical conduits and elevators), and HVAC systems.

This page intentionally left blank.

Section 4 Indoor Air Sampling Plan

Indoor air sampling will be conducted at all buildings within the Navy Area that are currently in use or will be used in the future. Buildings that are not in use and planned for demolition will not be sampled. The list of buildings to be sampled are listed in Table 1 and shown in Figure 3.

4.1 Basis of the Sampling Program

The results of the building surveys were used to develop the sampling program. There are three types of samples: work areas, potential pathways and background (ambient and ventilation intake). Samples will be collected in the breathing zone of work areas (offices areas, meeting rooms and high traffic areas – hallways), at vapor intrusion pathways (foundation cracks, expansion joints, crawlspaces, drains and pipe inlets), and of ambient outdoor air. Grab samples will be collected in elevator shafts (ventilation pathways between floors). In selecting sample locations, priority is given to basement and first floor work areas, followed by potential pathways, then second through fourth floor work areas.

In buildings with HVAC systems, indoor air samples will be collected during normal work hours with the HVAC system operating, and at the end of a 3-day holiday weekend after the HVAC system has been shut down for 36 to 48 hours. The sampling duration will be 8 or 10 hours for buildings that operate between roughly 7 a.m. to 6 p.m., depending on the length of a regular work day for the employees in the building. The sampling duration will be 24 hours for buildings that may be occupied irregularly 24 hours/day, 7 days/week, outside of daytime work hours. Buildings that have consecutive 8 hour shifts throughout the 24 hour day (such as Building 15 – Security) will be sampled using a 24-hour sample. The number of samples per building is provided in Table 4, and Table 5 lists each sample by name and provides the location, duration, type of sample, sampling rationale and the tentative date for collection of the samples.

Outdoor air samples will also be collected to establish background or ambient air concentrations at the time of sampling. The duration of the outdoor air samples will be 24 hours.

4.2 Data Quality Objectives

The data quality objectives (DQOs) are described in detail in Worksheet #11 of the Sampling and Analysis Plan (SAP) in Appendix D. A summary of the DQOs are provided below.

4.2.1 State the Problem

Releases of chlorinated solvents from onsite and offsite sources have impacted the shallow groundwater underneath the former NAS Moffett Field Area, primarily with TCE. Volatilization of VOC contamination in shallow groundwater or soils is the source of vapor intrusion into buildings at the MEW Site. The seven identified COCs are TCE, PCE, vinyl chloride, 1,1-DCE, 1,1-DCA, cis-1,2-DCE, and trans-1,2-DCE.

In 2010, the EPA amended the 1989 ROD for the MEW Site to select a remedy for the vapor intrusion pathway to prevent subsurface contaminants from migrating into indoor air and accumulating at levels exceeding the indoor air cleanup levels. The ROD Amendment provided a tiering system to determine the appropriate response action for each building/property within the Vapor Intrusion Study Area. Sampling activities were conducted by NASA and EPA in many

of the buildings within the Navy Area. Data evaluation revealed that data gaps exist due to unsampled buildings within the study area. Existing data are not sufficient to perform the ROD Amendment response action tiering.

4.2.2 Identify the Goals of the Study

The goal of the study is to support selecting the appropriate response action based on the tiering system in the 2010 ROD Amendment. This includes answering the following questions.

- Do the indoor air concentrations exceed the outdoor (background) air concentrations and indoor air cleanup level for any of the seven COCs?
- Are the indoor air concentrations greater than the background air concentrations but below indoor air cleanup levels for any of the seven COCs?
- Do the outdoor (background) air samples have detected levels of any of the seven COCs?
- Are there occupational or consumer product sources within the building that may contribute to detectable levels of the seven COCs in indoor air?

4.2.3 Identify the Information Inputs

Data needed for selecting sample locations and applying the Response Action Tiering System include the following items.

- 2011-2012 Building survey results
- 2011-2012 Validated indoor and outdoor air samples results
- 2003- 2011 Historical validated air sampling, groundwater monitoring results, and soil gas data from the Navy Area
- EPA cleanup levels for the seven COCs as established in 2010 ROD Amendment
- Laboratory analytical method with limits below the cleanup levels
- Outdoor air (background) concentrations for the seven COCs

4.2.4 Define the Boundaries of the Study

The boundaries of the Vapor Intrusion study are as listed below.

- The approximate lateral boundaries are the buildings within the Navy Area (see Figure 3).
- The approximate vertical boundaries for work area samples are limited to the breathing zone between 36 to 60 inches above the floor.
- Building occupancy temporal boundaries are 8 hour work shifts during 7 AM – 6 PM for most buildings, or 10 hour work shifts for the research park buildings. For laboratories, the temporal boundary is 24 hours/day and includes weekends; this assumes workers may come in at any time to attend to ongoing research.
- Buildings with no HVAC system will be sampled after 36 to 48 hours with the windows and doors closed to limit ventilation from outside air to the extent possible.

- Buildings with HVAC systems will be sampled with the HVAC system operating and with the HVAC system off.
- Building 210 has a vapor collection system in operation beneath a raised floor in Room 145. A sample will be collected from within the crawl space beneath the raised floor after the vapor collection system has been shut down for at least 48 hours.
- Sampling will be conducted over 2 to 3 weeks during late spring to early summer. Temperature boundaries are the daily temperature variations. This is a one-time sample event so the results will not reflect any seasonal variations. Addendums to this sampling plan will be prepared as needed for collection of additional samples.
- The approximate, planned temporal boundary for vapor intrusion sampling fieldwork will be after the final work plan and SAP are approved in spring 2012

4.2.5 Develop the Analytical Approach

Indoor air samples will be collected using individually clean-certified stainless steel sample canisters and analyzed for the seven COCs using EPA Method TO-15 SIM. Quality control (QC) samples will be collected in conformance with Worksheets #12, #20, and #28 in the SAP. QC samples will include field duplicates and laboratory method blanks.

4.2.6 Specify Performance or Acceptance Criteria

Ensuring data quality and reducing decision errors will rely on prudent analytical test selection, instrument calibration and performance, standard operations, and sample design. Limits on the decision errors will be minimized by performing data usability assessments using PARCCS criteria (precision, accuracy, representativeness, completeness, comparability, and sensitivity) and third-party data validation. Sampling error will be minimized by using the following resources and standard procedures:

- Appropriately trained and experienced personnel;
- Proper field notation and logbook procedures;
- Standard procedures for sample collection, handling, and analysis;
- Qualified off-site laboratory for sample analysis;
- Third-party data validator to confirm data;
- Ten percent of the data are subjected to a Level IV validation; the remaining 90% of the data will be validated per Level III procedures. and
- Additional runs of sampling to confirm the results if necessary.

4.2.7 Develop the Plan for Obtaining Data

To determine the appropriate tier and corresponding response action for the non-residential buildings within the Navy Area, a VI investigation will be conducted that will consist of indoor air sampling and background air sampling. Based on a review of current and future use of the buildings in the Navy Area, the historic indoor air sampling data and the results of the building surveys, 22 non-residential buildings (Figure 3) have been selected for vapor intrusion sampling.

A total of 221 indoor air samples will be collected from 131 locations within the 22 buildings. The number of sample locations per building varies from one in Building 76 to 48 in Building

239. The number of samples for each building is provided in Table 4. Table 5 lists each sample by name and provides the location, duration, type of sample, sampling rationale and the tentative date for collection of the samples.

A total of 29 outdoor air samples will also be collected to provide information on ambient background air and air concentrations near outdoor air ventilation system intakes. Sampling will be conducted over a 2 week period. Initially, samples will be collected from buildings without an engineering control, and from buildings with an engineering control (e.g., HVAC system) operating. Buildings with an engineering control (HVAC systems) also will be sampled at the end of the 3-day Memorial Day weekend after the engineering control (HVAC system) has been shut down for minimum of 36 to 48 hours. Building 210 has a vapor collection system in operation beneath a raised floor in Room 145. This system will also be shut down for at least 48 hours prior to collection of the HVAC shut down samples. Duplicate samples will be collected at a rate of 10 percent (total of 29 duplicates). This makes an estimated total of 279 samples. Details of the sampling plan are provided in Section 4.5.

If sampling shows the need for additional characterization, then a separate work plan/SAP addendum will be developed to provide the additional sampling.

4.3 Sampling Protocols

Indoor air samples will be collected using 6-liter canisters equipped with a fixed-rate flow controller and a particulate filter. Prior to use, the analytical laboratory will clean and individually certify the canisters and flow controllers to be used for indoor air analysis. For work area samples, the sample canister will be placed 36 to 60 inches above the floor. For vapor pathway samples, the canisters will be placed within crawl spaces, hoses will be used to sample within cracks and from the Building 10 tunnel, and grab samples will be collected from within elevator shafts.

After collection of the air samples, the sample canisters will be collected, packed, and labeled in the field and then submitted to the analytical laboratory under chain of custody in accordance with Worksheet #27 in the SAP. Ground transportation will be used for sample shipping to the laboratory.

Indoor and outdoor air samples will be analyzed by an Environmental Laboratory Accreditation Program (ELAP) certified analytical laboratory using EPA Method TO-15 SIM for the COCs and results will be reported in ppbv and micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). The samples will be analyzed with a standard turnaround time of 10 business days for the initial email report. The hard copy Level D report will be provided within 21 days of receipt of the samples. A quality assurance (QA)/quality control (QC) evaluation of the data will be performed upon receipt of the analytical results.

A detailed listing of sampling protocols is provided in SAP Worksheet #14 in Appendix D.

4.3.1 Indoor Air Sampling

Sample locations and number of samples to be collected for each building were selected using the results of the building surveys. Details on sample locations and numbers are provided in Section 4.5. Indoor air samples will focus on the basement and ground floor of the building, but will also include samples from upper floors in areas of vertical conduits and in areas of HVAC

distribution vents when the air intake is in the basement or first floor. The inlet of the indoor air sampling devices will be placed within the breathing zone. One field duplicate will be collected for every 10 samples.

Buildings sampled in the Vapor Intrusion Study Area can be tiered based on whether the building is sampled with or without an operating engineering control:

1. Buildings sampled with an operating engineering control (e.g., HVAC system); and
2. Buildings sampled without an operating engineering control or with the engineering control turned off.

Group 1 - Buildings sampled with Engineering Control Operating (HVAC system).

Buildings with an engineering control (e.g., HVAC system) will be sampled while the engineering control (HVAC system) is operating during normal working hours, and at the end of the weekend after the HVAC system has been shut down or switched to internal air circulation for 36 to 48 hours. If the engineering control system cannot be shut down nor the ventilation system converted to internal air recirculation, then the shutdown sample will not be collected. Building 210 has a vapor collection system in operation beneath a raised floor in Room 145. This system will also be shut down for at least 48 hours prior to collection of the HVAC shut down samples.

Time-integrated 8-hour, 10-hour or 24-hour air samples will be collected for the ventilation system operation samples to coincide with building-specific, normal workday occupancy. The sample period for the engineering control (HVAC) shutdown samples will match the duration of the engineering control (HVAC) operation samples.

Information regarding engineering control (HVAC) operations will be verified with NASA to provide a basis for proper shutdown and sample duration criteria. The available shutdown and sampling period will be limited to weekend hours. The engineering control (HVAC) shutdown air samples will be collected at the same locations as the engineering control (HVAC) operating samples. Air samples will be collected using 6-liter canisters to provide consistent data collection methods during both sample events. Pathway samples from the elevator shafts will be collected as grab samples.

Group 2 - Buildings sampled without Engineering Control Operating (e.g., HVAC system off). Air samples will be collected during normal occupancy hours using 6-liter canisters, with the building windows shut to the extent possible. These samples will be collected over 24 hours beginning on Monday after the building has been closed up, with the windows shut, for over 48 hours, when possible.

4.3.2 Outdoor Air Sampling

For each event of indoor air sample collection, 1 to 6 outdoor air samples will be collected. The samples will be collected at outdoor locations near the building(s) being sampled for indoor air and near HVAC system intakes. A map showing the ambient air sample locations is provided in Appendix E. The outdoor sample will be collected concurrently with the indoor air samples.

Outdoor air samples will be collected using the same sampling methodology used for the indoor air samples (e.g., 6-liter canister equipped with individually certified, fixed-rate flow controller and a particulate filter). The outdoor samples will be collected within the same time period as

when the indoor air samples are collected. Outdoor air samples will be analyzed and reported in ppbv and $\mu\text{g}/\text{m}^3$ by a NELAP-certified analytical laboratory using EPA Method TO-15 SIM (selected ion monitoring) for the chemicals of concern.

During field sampling, weather conditions will be recorded every few hours for weather station Moffett NAS – KNUQ from the internet site:

<http://www.wunderground.com/cgi-bin/findweather/hdfForecast?query=94035> ; or mobile web:

<http://m.wund.com/cgi-bin/findweather/getForecast?brand=mobile&query=Moffett+Field%2C+CA> .

4.3.3 Soil Gas and Sub-Slab Soil Vapor Sampling

Collection of soil gas samples from adjacent to the exterior of buildings and from directly beneath the foundation of buildings is not part of the existing work scope. Collection of such samples may be selected in the future to provide additional lines of evidence to evaluate whether concentrations detected in indoor air are the result of vapor intrusion from the subsurface or whether other sources of COCs are contributing to indoor air concentrations.

4.4 Analytical Method and Data Review

Indoor and outdoor air samples will be analyzed by a NELAP-certified analytical laboratory using EPA Method TO-15 SIM for the COCs and results will be reported in parts per billion by volume (ppbv) and $\mu\text{g}/\text{m}^3$. TO-15 SIM provides detection limits below the cleanup levels and background outdoor air (see Worksheet #15). The samples will be analyzed with a standard turnaround time of 10 business days for the initial email report. The hard copy Level D report will be provided within 21 days of receipt of the samples. A QA/QC evaluation of the data will be performed upon receipt of the analytical results.

The air samples will be analyzed for TCE, PCE, vinyl chloride, 1,1-DCE, 1,1-DCA, cis-1,2-DCE, and trans-1,2-DCE.

4.4.1 Sample Quality Control Tasks

QC samples will be collected at a frequency designated in Worksheets #12, #20, and #28. QC samples will include field duplicates on a basis of one for every 10 field samples (10%) and laboratory method blanks. Analytical methods will include performing initial calibrations, continuing calibration, tuning, reagent blanks, instrument blanks, surrogates, replicates, laboratory control spikes, and other applicable QC as defined by the EPA Method.

The air samples from indoor and outdoor locations will be collected through laboratory-supplied, 6-liter, individually certified, and evacuated canisters. Each canister is equipped with individually certified fixed-rate flow controller, an analog gauge, and a particulate filter provided by the laboratory.

Indoor and outdoor air samples will be collected, handled, and shipped to the selected laboratory in accordance with the guidelines presented in Worksheet #27, Sample Custody Requirements, and Worksheet #26, Sample Handling System. Field QC samples will be collected and analyzed as directed in Worksheets #12 and #20. Details of QC sample measurement and performance requirements are presented in Worksheet #28 of the SAP.

4.4.2 Data Review and Management

Data from this sampling effort will be generated from three primary pathways: field activities, laboratory analytical data, and validated data. Data generated during field activities will be recorded using a field logbook and field forms. The field team lead will review these forms for compliance with QC criteria established in this SAP for completeness and accuracy.

Upon sample arrival, the laboratory will verify each sample's physical condition and ensure that all pertinent documentation associated with each sample is complete. Data generated from the laboratory analysis will be recorded in hardcopy and in electronic data deliverables for submission to the Navy NEDD/NIRIS (NIRIS Electronic Data Deliverables/Naval Installation Restoration Information Solution) website. The laboratory QA director will review the data before it is submitted for third-party data validation.

Pertinent data (i.e., geological, spatial, and temporal descriptions) from the field records and third-party-validated, electronic data deliverables will be entered into the Navy's NEDD/NIRIS web-based database. Hard-copy field records will be stored in a secure project file.

4.4.3 Third-Party Data Validation

Data generated for this project will be reviewed and verified by the AM8AJV CQM and validated by Laboratory Data Consultants, Inc. (LDC), an independent, third-party, data validation laboratory located in Carlsbad, California. The data validation process and criteria are described in Worksheets #33–37.

All data will be independently validated using the DQOs established for the project. Ten percent of the data are subjected to a Level IV validation. The remaining 90% of the data will be validated per Level III procedures. The data validator will facilitate uploading the validated data into the Navy's NEDD/NIRIS database in accordance with Environmental Work Instruction (EWI) #6 (NAVFAC SW 2005).

4.4.4 Documentation and Records

In association with sample collection, field personnel will document all pertinent data, electronically and manually, including date, time, location (coordinates), field personnel, weather conditions, instrument identification, and any other factors that may affect data quality. COC procedures (Worksheet #27) will be followed for all sample handling, storage, and shipping. All hardcopy data (e.g., field logbooks, photos, hard copies of COC forms, and other items) will be housed at the AM8AJV office in San Diego, California and kept in the project files as described in Worksheet #29.

Laboratory data packages and reports will be archived at AM8AJV or Navy Administrative Records offices. Laboratories that generated the data will archive hard-copy data for a minimum of 10 years. Field data associated with sampling will be recorded manually in the project field book.

4.5 Sampling Activities

Approximately 2 months before the first indoor air sampling event, the Navy will request access from NASA to resurvey the buildings that have had HVAC system modifications since the

original survey during the week of November 14, 2011. The original survey sheets will be updated. After review of the recent HVAC modifications, the building survey summary sheet will be updated, and the revised information along with a tentative sampling schedule will be finalized and provided to NASA and EPA. The schedule will also be supplied to the Navy ROICC at Moffett Field, and Columbia Analytical Services laboratory.

After approval of the overall sampling schedule by EPA and NASA, the Navy will request access to the buildings and areas of NASA. This request will include maps showing specific sample locations and building specific schedules that the NASA EMD can provide to each building coordinator. Floor plans, maps, and photographs showing the proposed sample locations are provided in Attachment E of this work plan. A pre-sampling meeting will be scheduled with NASA and EPA to review the logistics and protocols for the sampling events, access requirements, sample setup and security, HVAC operation contacts and schedules, requirements for weekend and evening work, and NASA Ames safety/security requirements including 24-hour contacts information. If requested by NASA, pre-meetings can include individual meetings with specific building coordinators, Plant/Facility Engineering, and NASA security. A notice will be provided to the building coordinators to provide to site workers with information on the upcoming sample event and instructions to not tamper with the sample canisters and not use or apply compounds or liquids containing VOCs in the area of the canisters.

Buildings without engineering controls (HVAC systems) will be sampled during normal work hours, with the windows shut. These non-engineering control building samples will generally be collected on Monday after the building has been closed, with the windows shut, for over 48 hours.

Buildings with engineering controls (HVAC systems) will be sampled twice. Samples will be collected during a normal workday with the HVAC system operating. The second sample event will be collected after the engineering control (HVAC system) has been shut down, or converted to internal air circulation, for 36 to 48 hours.

To meet logistical requirements for sample collection, the buildings have been split into two sample groups - buildings without and without an engineering control (e.g., HVAC system). The buildings with engineering controls (HVAC systems) will be sampled with and without the engineering control operating. The engineering control (HVAC) shutdown samples will be collected at the end of a 3-day holiday weekend after the engineering control (HVAC system) has been shut down for a minimum of 36 to 48 hours. The tentative project sampling program is provided in Table 5. The program information includes the building and the room location of each sample, the proposed sample duration (8-hour, 10-hour or 24-hour), a list of ambient air and duplicate samples by sample date, the type of sample to be collected (work area or pathway), and the rationale for selection of the locations. Floor plans showing the sample locations are provided in Appendix E.

Logistical arrangements for shipping of sample canisters have been coordinated with the laboratory. The week prior to the initial sampling event, the storage boxes, canisters and other equipment and supplies will be mobilized to the Moffett Field field office.

NASA EMD and the building coordinators will be re-notified at least one week and again 48 hours prior to each sampling event. The field team will mobilize to the field office at least one day prior to the onset of sample collection to prepare and setup equipment. Sufficient sampling

personnel will be provided so that all the individual canisters for each building can be opened within 30 to 45 minutes. Building tenants will be informed to not apply or use chemicals, cleaners, cosmetics or fuels (VOC containing materials) in the area of the canisters 48 hours prior to and during the sample period. Notices will be posted with each canister informing people that the canisters should not be moved or tampered with, and a phone number will be provided to answer questions and address concerns. Canisters in public access areas will be secured with chains and a lock.

At completion of the sample period, the canisters will be sealed, retrieved, and returned to the field office. The sample canisters will be collected, packed, and labeled in the field office, and then shipped to the analytical laboratory under chain-of-custody in accordance with Worksheet #27 in the SAP.

This page intentionally left blank

Section 5 Response Action Tiering System

The Response Action Tiering System in the 2010 ROD Amendment classifies buildings by the need for response action according to the detected concentrations of Site COCs in indoor air as specified in Tables 6A and 6B of the ROD Amendment. Table 6A is for existing commercial and residential buildings with passive or active engineering controls in place. Table 6B is for existing commercial and residential buildings with no engineering control in place. Table 8 of the ROD Amendment provides EPA's selected vapor intrusion remedy for existing and future buildings in the Vapor Intrusion Study Area. The tiering descriptions, the response actions and the selected remedies provided in Tables 6A, 6B and 8 of the ROD Amendment are compiled and presented in Table 6.

Buildings are classified as Tier 1 if the indoor air concentrations for any of the seven COCs exceed the outdoor air concentrations and the indoor air cleanup levels. Tier 1 buildings need an appropriate engineering control implemented as a remedy to meet indoor air cleanup levels. Governmental, proprietary, and informational institutional controls (ICs) will be implemented as needed.

Buildings are classified as Tier 2 if indoor air concentrations are below cleanup levels, but the sampling was conducted while an engineering control was in place or in operation. For Tier 2, operation and maintenance of active ventilation systems will be maintained, or other selected engineered remedies will be implemented to meet remedial action objectives. Long-term monitoring and governmental, proprietary, and informational ICs will be implemented. If the remedy is achieved through operation of an active ventilation system, then agreement of the property owner must be contained in a recorded agreement.

For buildings without an effective engineering control in place or in operation, if the indoor air concentrations exceed the outdoor air concentrations but are below the indoor air cleanup level for any of the seven COCs, then the building is classified as Tier 3A. If the indoor air concentrations are at or within the outdoor air concentrations, then the building is Tier 3B. Tier 3A and 3B buildings do not need an engineered remedy. Long-term monitoring is required for Tier 3A, but not for Tier 3B. Governmental ICs will be implemented for both 3A and 3B.

Buildings are classified as Tier 4 when converging lines of evidence demonstrate there is no longer the potential for vapor intrusion to exceed the indoor air cleanup levels. For Tier 4 buildings, no action is required after EPA approves confirmation sampling results and documentation that no action is necessary. The sampling program is not designed to determine if a building qualifies for Tier 4. Addendums to this sampling plan will be prepared as needed for collection of additional samples to provide multiple lines of evidence, to provide mitigation and remediation design parameters, and to establish monitoring programs.

Using the indoor air sampling results and Tables 6A and 6B of the 2010 ROD Amendment, the buildings will be tiered in accordance with the Response Action Tiering System. Recommendations will be prepared based on Table 8 of the ROD Amendment. If the data are inconclusive, then additional lines of evidence will be considered and/or additional sampling efforts may be recommended.

Recommendations may include proposed collection of soil vapor samples from the perimeter of buildings or collection of subslab soil vapor samples to evaluate the need for, or provide design

criteria for, a subslab ventilation and monitoring system. Detailed information on the operation and performance of the HVAC systems for specific buildings may be requested from NASA to evaluate if optimization of HVAC system performance may provide interim mitigation for results that exceeded the indoor air cleanup levels. Interim mitigation measures may include sealing cracks, conduits, and/or elevator shafts that penetrate foundations and floors; refurbishing, retrofitting, and/or installing ventilation systems; and installing air purification systems.

Section 6 Reporting and Schedule

A report will be prepared after evaluating the sampling results to the Response Action Tiering System tables in the 2010 ROD Amendment. The report will document sampling activities, provide the sample results and laboratory reports, present the Tiering System evaluation and results, and provide recommendations based on the results of the Tiering System evaluation.

If sampling shows the need for additional characterization, then a separate work plan/SAP addendum will be developed to provide the additional sampling.

The proposed schedule for implementation of the work plan and reporting of the results and recommendations is provided in Appendix F. The indoor air sampling fieldwork is projected to occur in May and June 2012. The report is expected to be finalized in December 2012.

This page left intentionally blank.

Section 7 **References**

- Accord MACTEC 8A Joint Venture (AM8AJV). 2011. *Draft Building Survey Plan for Vapor Intrusion Sampling, Former Naval Air Station Moffett Field, California*. October 24.
- ERS Joint Venture (ERS-JV) and Brown and Caldwell. 2011. *2010 Annual Groundwater Report for Installation Restoration Sites 26 and 28, Former Naval Air Station Moffett Field, California*. June 2011.
- Haley & Aldrich, Inc. 2011. *Indoor Air Sampling and Analysis Work Plan for Existing, Unsampled Commercial Buildings, Middlefield-Ellis-Whisman (MEW) and Moffett Field Study Area, Mountain View, California*. June 7.
- Harding ESE, Inc. 2001. *Draft Indoor Air Quality Investigation, Buildings 2, 15, 555 and 583C, Moffett Federal Airfield*. September 5.
- Neptune and Company, Inc. 2005. *Final Report on Long-Term Indoor Air Quality Monitoring; Buildings 15, 16, 17, 20, N-210 and N-243, NASA Ames Research Center, Moffett, California*. July 19.
- Neptune and Company, Inc. 2006. *Final Interim Report on Phase 2 Follow-up Sampling and Analysis for Building N210 and Baseline Sampling for Buildings N211, N239A, and N259, NASA Ames Research Center, Moffett, California*. April 24.
- Neptune and Company, Inc. 2008. *Final Report for February 2008 Vapor Intrusion Sampling in Buildings B3, B12, B18, B76, B107, B126, B154, B510, B556, N210, and N237*. July 20.
- Neptune and Company, Inc. 2009. *Final Report for May 2008 Vapor Intrusion Sampling in Buildings 16, 20, 107, and 126 at the NASA Research Park (NRP)*. January 7.
- Science Application International Corporation. 2000. *Draft Indoor Air Testing Report for Hanger 1 and Buildings 6, 21, 22, 26, 111, 148, 156, and 269, NASA Ames Research Center*. January.
- Sealaska Environmental Services, Inc. and Tetra Tech EC Inc. (SES-Tech). 2010. *Final 2009 Annual Groundwater Report for West-Side Aquifer Treatment System (WATS) and East-Side Aquifer Treatment System (EATS)*. June.
- United States Environmental Protection Agency, Region 9 (EPA). 2011. *Statement of Work, Remedial Design and Remedial Action to Address the Vapor Intrusion Pathway, Middlefield-Ellis-Whisman (MEW) Superfund Study Area, Mountain View and Moffett Field, CA*. Attachment 4 to U.S. EPA Administrative Order Docket Number 91-4A (Amendment to Administrative Order Docket Number 91-4), Issued to the Order Respondents of the MEW Study Area. September 16.
- EPA. 2010. *Record of Decision Amendment of the Vapor Intrusion Pathway, Middlefield-Ellis-Whisman (MEW) Superfund Study Area, Mountain View and Moffett Field, California*. August 16.

This page left intentionally blank.

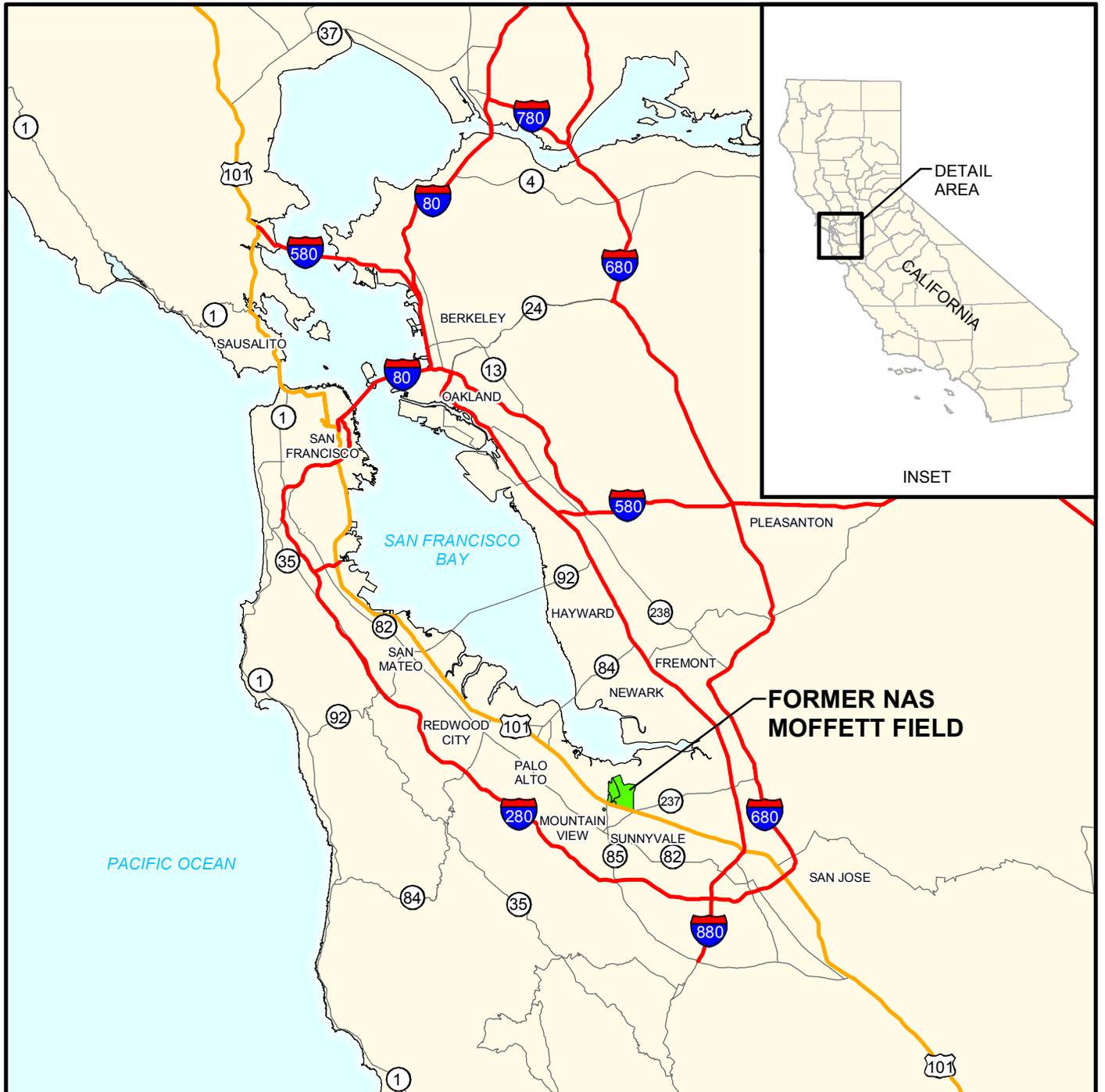
Figures

Figure 1. Moffett Field Location Map

**Figure 2. Extent of TCE in Groundwater in the Upper Aquifer A/A1 Zone,
MEW Superfund Study Area**

Figure 3. Vapor Intrusion Areas of Responsibility, Moffett Field Area

This page intentionally left blank.

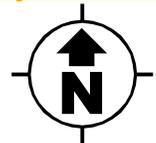
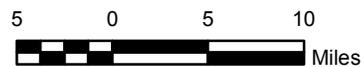


LEGEND

- STATE HIGHWAY
- U.S. HIGHWAY
- INTERSTATE HIGHWAY
- FORMER NAS MOFFETT FIELD
- WATER

NOTES:

EATS - EAST-SIDE AQUIFER TREATMENT SYSTEM
 NAS - NAVAL AIR STATION
 U.S. - UNITED STATES
 WATS - WEST-SIDE AQUIFERS TREATMENT SYSTEM



BASE REALIGNMENT AND CLOSURE
 PROGRAM MANAGEMENT OFFICE WEST
 SAN DIEGO, CALIFORNIA

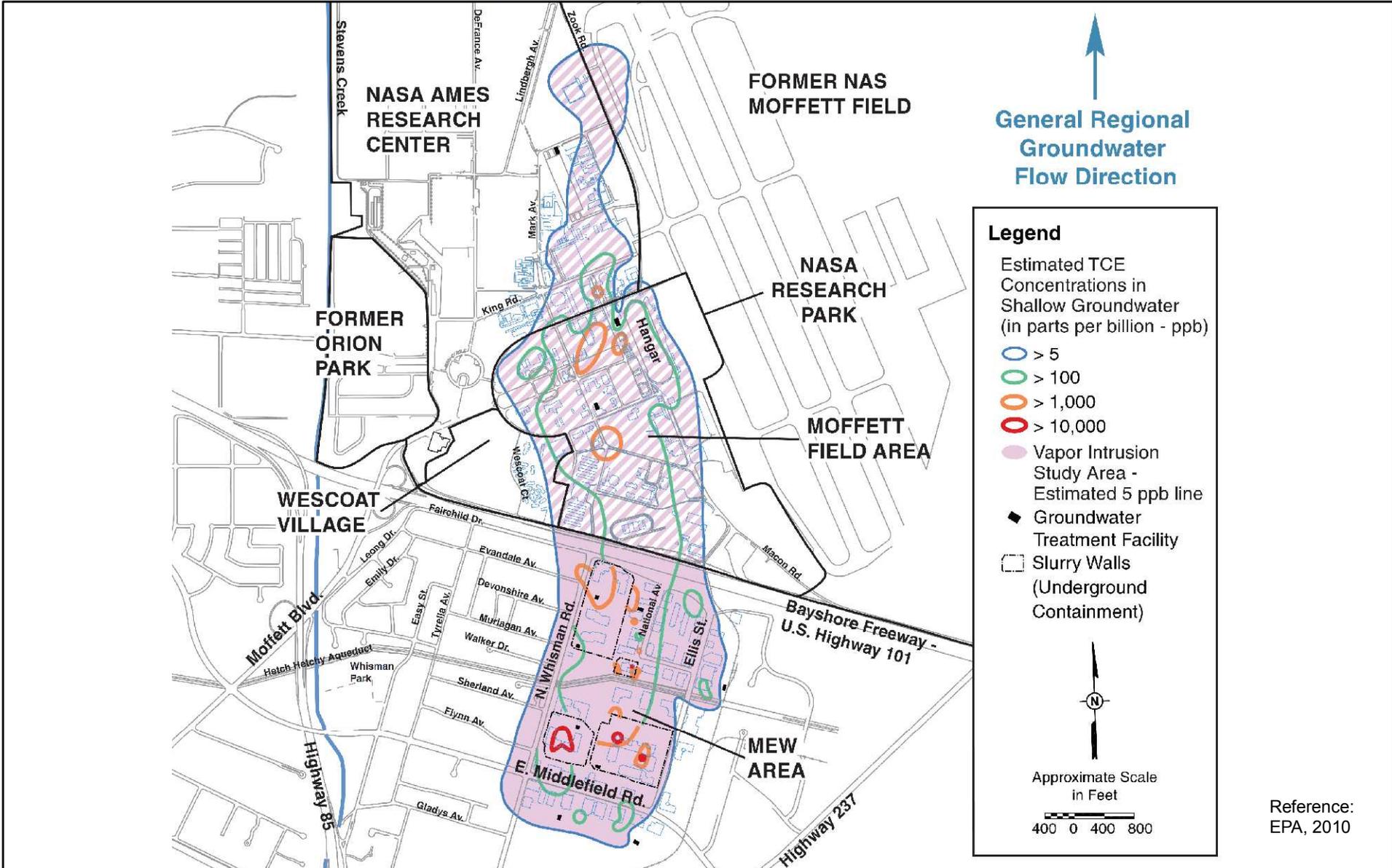
Indoor Air Sampling Work Plan for Vapor Intrusion

Figure 1

Moffett Field Location Map

Accord MACTEC 8A JV

This page intentionally left blank.



Extent of TCE Concentrations
 Aquifer A/A1 Zone
 Mew Superfund Study Area
 Moffett Field, California

Base Realignment and Closure
 Program Management Office West
 San Diego, California

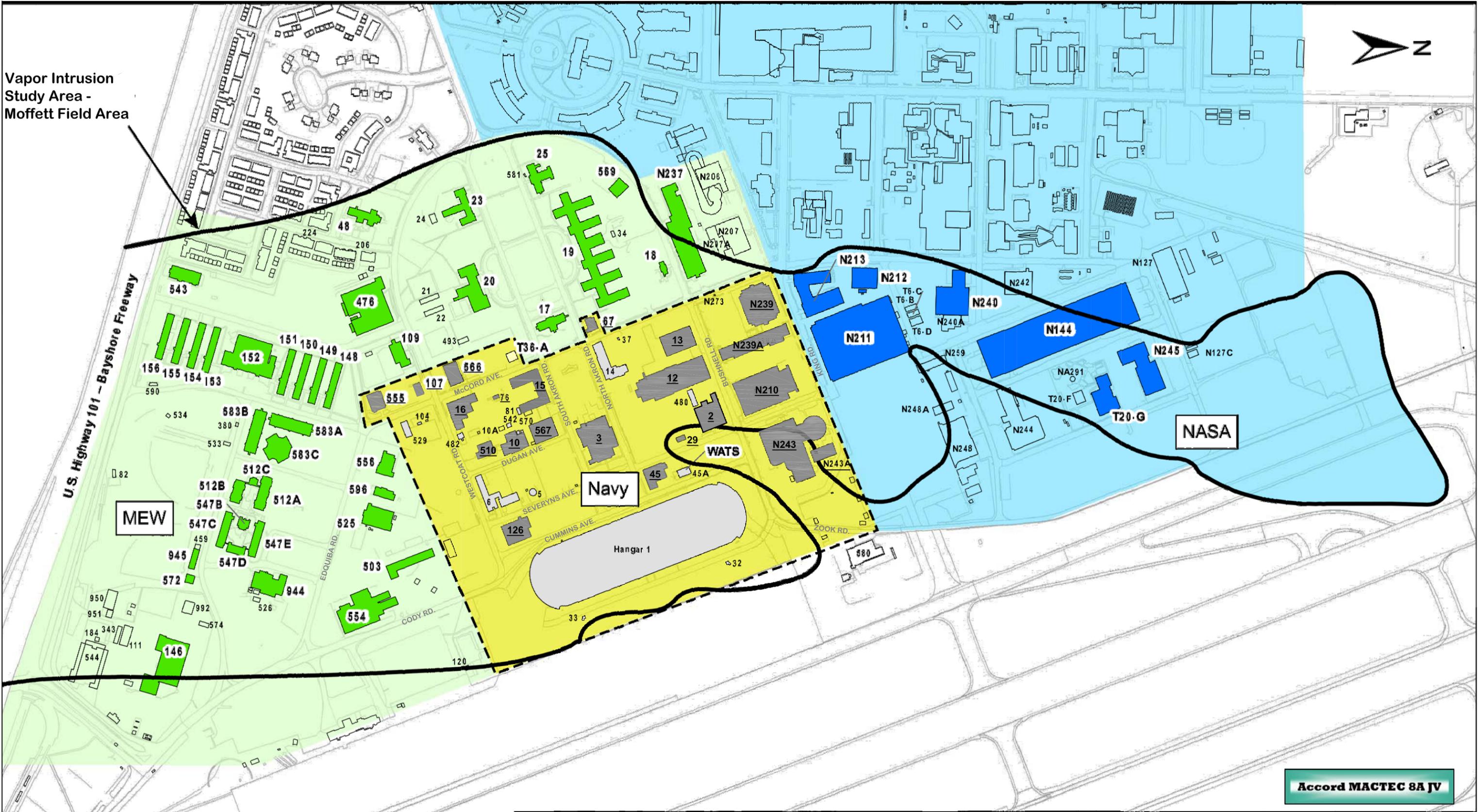
FIGURE
2

DRAWN TJH	JOB NUMBER 5012118006	CHECKED	CHECKED DATE 4/2012	APPROVED	APPROVED DATE
--------------	--------------------------	---------	------------------------	----------	---------------

This page intentionally left blank.



Vapor Intrusion Study Area - Moffett Field Area



Accord MACTEC 8A JV

- LEGEND**
-  Estimated TCE 5 parts per billion (ppb) plume boundary in shallow groundwater
 -  Building proposed to be surveyed

- Vapor Intrusion Areas of Responsibility**
-  NASA
 -  MEW
 -  Navy

NOTES:
 Base map prepared by EPA on August 23, 2011

NASA - National Aeronautics and Space Administration
 MEW - Middlefield-Ellis-Whisman
 WATS - West-Side Aquifers Treatment System

0 200 400 600 800 1000
 Feet

Figure 3
Vapor Intrusion Areas of Responsibility
Moffett Field Area

This page intentionally left blank.

Tables

This page intentionally left blank.

Table 1. Building List for the Navy Area of the Vapor Intrusion Study Area

Building Number	Building Use	Building Occupancy and Status	To Be Sampled
2	Gymnasium	intermittently occupied	Yes
3	Conference Center and Cafeteria	occupied; to be demolished	Yes
6	Warehouse	abandoned; to be demolished	No
10	Boiler Plant for NASA Research Park	occupied; to stay	Yes
12	Commissary	occupied; to be demolished	Yes
13	Commissary Warehouse	occupied; to be demolished	Yes
14	Offices & Storage	abandoned; to be demolished	No
15	NASA Security	occupied; to stay	Yes
16	Maintenance Contractor (IAP) Office & Shops	occupied; to stay	Yes
29	Bicycle Shop	occupied less than 8 hours/day	Yes
45	Storage Facility	Occasionally occupied; to be demolished	Yes
45A	WATS – open shelter	unoccupied; to stay	No
67	U.S. Post Office	occupied; to be demolished	Yes
76	Locksmith Shop	occupied less than 8 hours/day	Yes
107	ROICC Office	occupied; to be demolished	Yes
126	Moffett Historical Society Museum	occupied; to be demolished	Yes
480	Racquet Ball Court	Unoccupied; ventilated siding	No
510	Maintenance Offices	occupied; to be demolished	Yes
529	Offices & Storage	abandoned; to be demolished	No
555	Tenant Offices	occupied, to stay	Yes
566	Tenant Offices	occupied, to stay	Yes
567	Warehouse	occupied; to be demolished	Yes
N210	Offices & Storage (former hangar)	occupied; to stay	Yes
N239	Life Sciences Building (offices & laboratories)	occupied; to stay	Yes
N239A	Offices & Centrifuge	occupied; to stay	Yes
N243	Flight Guidance & Simulation Laboratory	occupied; to stay	Yes
N243A	Welding & Machine Shop	occupied; to stay	Yes
T36-A	Office Trailer	occupied; above ground on blocks	No

This page intentionally left blank.

**Table 2. Hydrostratigraphy of MEW and Moffett Field Areas,
Mountain View and Moffett Field, California**

Unit	Unit Subdivision	Range of Approximate Depths (feet below ground surface)	
		Top	Bottom
A	Upper portion of A (A) aquifer	0 to 13	15 to 35
	Lower portion of A (B1) aquifer	15 to 45	45 to 77
A/B	A/B (A/B2) aquitard	45 to 65	60 to 85
B	B2 (B2) aquifer zone	60 to 80	95 to 135
	(B2/B3) aquitard	95 to 105	99 to 111
	B3 (B3) aquifer zone	99 to 130	115 to 160
B/C	B/C (B3/C) aquitard	115 to 140	155 to 180
C	Unknown/undefined	155 to 160	250
Deep	Unknown/undefined	Generally deeper than 250	

Note: The equivalent aquifer/aquitard designations for the MEW study area are in parentheses.

This page intentionally left blank.

Table 3. Indoor Air Cleanup Levels for Chemicals of Concern for the Vapor Intrusion Study Area, Moffett Field, California

Chemical of Concern	Indoor Air Cleanup Level ($\mu\text{g}/\text{m}^3$) *	
	Residential	Commercial
Trichloroethene	1	5
Perchloroethylene	0.4	2
cis-1,2-Dichloroethene	60	210
trans-1,2-Dichloroethene	60	210
Vinyl Chloride	0.2	2
1,1-Dichloroethane	2	6
1,1-Dichloroethene	210	700

* Cleanup Levels as presented in the Record of Decision Amendment for the Vapor Intrusion Pathway (EPA, 2010)

This page intentionally left blank

Table 4. Number of Samples for Individual Buildings, Moffett Field, California

Building	Indoor Air Samples				Ambient/Outdoor Air Samples	Duplicate Samples	Total Number of Samples
	8-hour	10-hour	24-hour	Grab	24-hour		
2	4						4
3		18			2	2	22
10	6				1	1	8
12			12		1	1	14
13			2			1	3
15			12		2	2	16
16		10			2	2	14
29	2				1		3
45	2				1	1	4
67			2		1	1	4
76	2						2
107	4						4
126	10				6	1	17
210	13			1	1	3	18
239			38	4	2	4	48
239A			18	2		2	22
243			28	2	3	4	37
243A			8		2	2	12
510			6		2	2	10
555	6				2		8
566	6						6
567			3				3
Totals	55	28	129	9	29	29	279

This page intentionally left blank

Table 5. Indoor Air Sampling Program, Moffett Field, California

Sample Name	Sample Date	Sample Day	Location			HVAC (on or off)	Sample Duration				Sample Type	Building Information	Sampling Rationale
			Building	Floor	Room		8-hour	10-hour	24-hour	Grab			
Buildings with no HVAC System													
<i>Indoor Air Samples</i>													
M002-1-01	18-May	Friday	2	1	100	NA	x				Work Area	Gymnasium	Main gym floor
M002-1-02	18-May	Friday	2	1	107	NA	x				Work Area	Gymnasium	Potential future occupancy
M002-1-03	18-May	Friday	2	1	109	NA	x				Work Area	Gymnasium	Potential future occupancy
M002-1-04	18-May	Friday	2	1	104	NA	x				Pathway	Gymnasium	Boiler room, not occupied
M045-1-01	18-May	Friday	45	1	101	NA	x				Work Area	Former Paint Shop	Storage, unoccupied
M045-1-02	18-May	Friday	45	1	102	NA	x				Work Area	Former Paint Shop	Storage, unoccupied
M010-1-01	18-May	Friday	10	1	101	NA	x				Work Area	Boiler Plant	Main work area; east side of room
M010-1-02	18-May	Friday	10	1	101	NA	x				Work Area	Boiler Plant	Main work area; near cubes in SW corner
M010-1-03	18-May	Friday	10	1	101	NA	x				Work Area	Boiler Plant	Main work area; near tunnel & sump
M010-T-04	18-May	Friday	10	Tunnel	Tunnel	NA	x				Pathway	Boiler Plant Tunnel	In tunnel near Room 107
M010-1-05	18-May	Friday	10	1	102	NA	x				Work Area	Boiler Plant	Office
M010-1-06	18-May	Friday	10	1	N104	NA	x				Work Area	Boiler Plant	Boiler room, near water lines and sump
M029-B-01	21-May	Monday	29	Basement	Basement	NA	x				Pathway	Bicycle Shop	basement near drain and conduits
M029-1-01	21-May	Monday	29	1	106	NA	x				Work Area	Bicycle Shop	work area
M067-1-01	21-May	Monday	67	1	C101	NA			x		Work Area	U.S. Post Office	Near bathroom and slab break
M067-1-02	21-May	Monday	67	1	104	NA			x		Work Area	U.S. Post Office	Work area near AC unit
M076-1-01	21-May	Monday	76	1	101	NA	x				Work Area	Locksmith Shop	General work area, shut in with AC off
M567-1-01	21-May	Monday	567	1	107	NA			x		Work Area	Warehouse	Main work area, near former bollards
M567-1-02	21-May	Monday	567	1	102	NA			x		Work Area	Warehouse	Main work area, near electrical conduits
M567-1-03	21-May	Monday	567	1	104	NA			x		Work Area	Warehouse	Work area, near bathroom
M013-1-01	27-May	Sunday	13	1	103	NA			x		Work Area	Commissary Warehouse	Food storage, near cracks or seam
M013-1-02	27-May	Sunday	13	1	102	NA			x		Work Area	Commissary Warehouse	Merchandising storage, near crack or seam
<i>Ambient Air Samples</i>													
M045-A-01	18-May	Friday	45	Ambient Air	NA	NA			x		Background		
M010-A-01	18-May	Friday	10	Ambient Air	NA	NA			x		Background		
M029-A-01	21-May	Monday	29	Ambient Air	NA	NA			x		Background		
M067-A-01	21-May	Monday	67	Ambient Air	NA	NA			x		Background		
<i>Duplicate Air Samples</i>													
M045-1-01	18-May	Friday	45	1	101	NA	x				Duplicate	Former Paint Shop	
M310-1-01	18-May	Friday	10	Tunnel	Tunnel	NA	x				Duplicate	Boiler Plant Tunnel	
M367-1-01	21-May	Monday	67	Ambient Air	NA	NA			x		Duplicate	U.S. Post Office	
M313-1-01	27-May	Sunday	13	1	103	NA			x		Duplicate	Commissary Warehouse	
			Number of Indoor Air Samples = 22			Ambient Air Samples = 4			Duplicate Samples = 4				

Table 5. Indoor Air Sampling Program, Moffett Field, California

Sample Name	Sample Date	Sample Day	Location			HVAC (on or off)	Sample Duration				Sample Type	Building Information	Sampling Rationale
			Building	Floor	Room		8-hour	10-hour	24-hour	Grab			
Buildings with HVAC Systems - HVAC in Operation													
<i>Indoor Air Samples</i>													
M126-1-01-N	18-May	Friday	126	1	103	on	x				Work Area	Museum	Main room in northern corner, near closet opening
M126-1-02-N	18-May	Friday	126	1	103	on	x				Work Area	Museum	Main room, south area
M126-1-03-N	18-May	Friday	126	1	102	on	x				Work Area	Museum	Previous sample location
M126-1-04-N	18-May	Friday	126	1	106	on	x				Work Area	Museum	Access area for bathrooms
M126-1-05-N	18-May	Friday	126	1	101	on	x				Work Area	Museum	Previous sample location
M003-1-01-N	18-May	Friday	3	1	105	on		x			Work Area	Conference Center/Cafeteria	Hallway, outside of kitchen
M003-1-02-N	18-May	Friday	3	1	C104	on		x			Work Area	Conference Center/Cafeteria	Kitchen; near floor drains
M003-1-03-N	18-May	Friday	3	1	104A	on		x			Work Area	Conference Center/Cafeteria	Office
M003-1-04-N	18-May	Friday	3	1	122	on		x			Work Area	Conference Center/Cafeteria	Banquet Room
M003-C-05-N	18-May	Friday	3	1	Crawl Space	on		x			Pathway	Conference Center/Cafeteria	Beneath Room 105
M003-1-06-N	18-May	Friday	3	1	105A	on		x			Pathway	Conference Center/Cafeteria	Near conduit; phone lines penetrate floor
M003-1-07-N	18-May	Friday	3	1	108	on		x			Work Area	Conference Center/Cafeteria	Dining Room
M003-1-08-N	18-May	Friday	3	1	111	on		x			Work Area	Conference Center/Cafeteria	Office; near kitchen
M003-1-09-N	18-May	Friday	3	1	128	on		x			Work Area	Conference Center/Cafeteria	Work area with fire place
M012-1-01-N	21-May	Monday	12	1	109D	on			x		Work Area	Commissary Warehouse	Cashier office
M012-1-02-N	21-May	Monday	12	1	109	on			x		Work Area	Commissary Warehouse	By Cashier
M012-1-03-N	21-May	Monday	12	1	119	on			x		Work Area	Commissary Warehouse	Warehouse; near cracks or seams
M012-C-04-N	21-May	Monday	12	1	Crawl Space	on			x		Pathway	Commissary Warehouse	Under Room 119, warehouse area
M012-C-05-N	21-May	Monday	12	1	Crawl Space	on			x		Pathway	Commissary Warehouse	Under Room 110
M012-2-01-N	21-May	Monday	12	2	214	on			x		Work Area	Commissary Warehouse	Office, near stairwell
M015-1-01-N	22-May	Tuesday	15	1	135D	on			x		Work Area	NASA Security	Office; staffed 24/7/365
M015-1-02-N	22-May	Tuesday	15	1	118	on			x		Work Area	NASA Security	Office, near electrical conduits
M015-1-03-N	22-May	Tuesday	15	1	C107	on			x		Work Area	NASA Security	Hallway, near Room 163 (HVAC) and Room 166 (office), near cubes
M015-1-04-N	22-May	Tuesday	15	1	C107	on			x		Work Area	NASA Security	Hallway, near Room 163 (HVAC) and Room 166 (office), near cubes
M015-1-05-N	22-May	Tuesday	15	1	128	on			x		Work Area	NASA Security	Office

Table 5. Indoor Air Sampling Program, Moffett Field, California

Sample Name	Sample Date	Sample Day	Location			HVAC (on or off)	Sample Duration				Sample Type	Building Information	Sampling Rationale
			Building	Floor	Room		8-hour	10-hour	24-hour	Grab			
M015-1-06-N	22-May	Tuesday	15	1	C104	on			x		Work Area	NASA Security	Hallway, near Room 101 (drain), R102W and R104M (bathrooms) and N108 (HVAC)
N239A-B-01-N	22-May	Tuesday	239A	Basement	Basement	on			x		Work Area	Centrifuge and Offices	On bio-dome scaffolding
N239A-1-08-N	22-May	Tuesday	239A	1	125	on			x		Work Area	Centrifuge and Offices	Opposite flammable cabinet in highbay floor area
N239A-1-09-N	22-May	Tuesday	239A	1	144	on			x		Work Area	Centrifuge and Offices	Near sump with PID detections
N239A-1-02-N	22-May	Tuesday	239A	1	145	on			x		Work Area	Centrifuge and Offices	Lab with no chemicals
N239A-1-03-N	22-May	Tuesday	239A	1	120	on			x		Work Area	Centrifuge and Offices	Near bio-dome equipment
N239A-1-04-N	22-May	Tuesday	239A	1	120	on			x		Work Area	Centrifuge and Offices	Near storage basement & conduits penetrating floor
N239A-1-05-N	22-May	Tuesday	239A	1	102	on			x		Work Area	Centrifuge and Offices	Office
N239A-1-06-N	22-May	Tuesday	239A	1	C102	on			x		Work Area	Centrifuge and Offices	Hallway near utility rooms U101 and U102
N239A-G-07-N	22-May	Tuesday	239A	1	142	on				x	Pathway	Centrifuge and Offices	Elevator Grab
N239A-2-01-N	22-May	Tuesday	239A	2	227	on			x		Work Area	Centrifuge and Offices	Office
N243A-B-01-N	22-May	Tuesday	243A	Basement	1	on			x		Pathway	Welding and Machine Shop	Within Tunnel
N243A-1-01-N	22-May	Tuesday	243A	1	104	on			x		Work Area	Welding and Machine Shop	Main work area; near 10-inch vent conduit
N243A-1-02-N	22-May	Tuesday	243A	1	101	on			x		Work Area	Welding and Machine Shop	Main work area; near electrical conduits
N243A-2-01-N	22-May	Tuesday	243A	2	201	on			x		Work Area	Welding and Machine Shop	Office
M107-1-01-N	23-May	Wednesday	107	1	106	on	x				Work Area	ROICC Office	Conference room near comm. conduits
M107-1-02-N	23-May	Wednesday	107	1	C101	on	x				Work Area	ROICC Office	Near Room 102
M510-1-01-N	23-May	Wednesday	510	1	108A	on			x		Work Area	Maintenance Contractor Admin Offices	Communication Room, occupied 24/7/365
M510-1-02-N	23-May	Wednesday	510	1	110	on			x		Work Area	Maintenance Contractor Admin Offices	Cubical Area
M510-1-03-N	23-May	Wednesday	510	1	C101	on			x		Work Area	Maintenance Contractor Admin Offices	Near R101 and 103 (bathrooms)
N555-1-01-N	23-May	Wednesday	555	1	112	on	x				Work Area	Former hangar, now offices	Office, near Room 112B (drain)
N555-1-02-N	23-May	Wednesday	555	1	C101	on	x				Work Area	Former hangar, now offices	Near office 100A, 101
N555-1-03-N	23-May	Wednesday	555	1	107A	on	x				Work Area	Former hangar, now offices	Near Room 107B (communications)
M566-1-01-N	23-May	Wednesday	566	1	111	on	x				Work Area	Tenant Offices	Offices near 112 and 113
M566-1-02-N	23-May	Wednesday	566	1	C103	on	x				Work Area	Tenant Offices	Hallway, near electrical outlets in the floor
M566-1-03-N	23-May	Wednesday	566	1	C104	on	x				Work Area	Tenant Offices	Near offices 100, 101, 102
M016-1-01-N	24-May	Thursday	16	1	106	on		x			Work Area	Maintenance Contractor	Office
M016-1-02-N	24-May	Thursday	16	1	110	on		x			Work Area	Maintenance Contractor (IAP) Offices	Wood shop near cracks and seams

Table 5. Indoor Air Sampling Program, Moffett Field, California

Sample Name	Sample Date	Sample Day	Location			HVAC (on or off)	Sample Duration				Sample Type	Building Information	Sampling Rationale			
			Building	Floor	Room		8-hour	10-hour	24-hour	Grab						
M016-1-03-N	24-May	Thursday	16	1	111	on		x			Work Area	Maintenance Contractor (IAP) Offices	HVAC area, near cracks or seams			
M016-1-04-N	24-May	Thursday	16	1	113	on		x			Work Area	Maintenance Contractor (IAP) Offices	Office area; shallow groundwater			
M016-1-05-N	24-May	Thursday	16	1	103	on		x			Work Area	Maintenance Contractor	Office			
N239-B-01-N	24-May	Thursday	239	Basement	53A	on				x	Work Area	Life Sciences Building	Library; SW area, stagnant air			
N239-B-02-N	24-May	Thursday	239	Basement	053	on				x	Work Area	Life Sciences Building	Break area for library staff			
N239-B-03-N	24-May	Thursday	239	Basement	C001	on				x	Work Area	Life Sciences Building	Hallway near Rooms R001 and R002 (bathrooms)			
N239-G-04-N	24-May	Thursday	239	Basement	C001	on					x	Pathway	Elevator Grab			
N239-B-05-N	24-May	Thursday	239	Basement	C001	on					x	Work Area	Hallway near N089 (or B11); near sump			
N239-B-06-N	24-May	Thursday	239	Basement	C002	on					x	Work Area	Hallway near Room 030			
N239-G-07-N	24-May	Thursday	239	Basement	C004	on						x	Pathway	Elevator Grab		
N239-1-01-N	24-May	Thursday	239	1	C103	on						x	Work Area	Hallway near stairwell and elevator		
N239-1-02-N	24-May	Thursday	239	1	C104	on						x	Work Area	Hallway near Room 178		
N239-1-03-N	24-May	Thursday	239	1	191	on						x	Work Area	Office near chem lab		
N239-1-05-N	24-May	Thursday	239	1	138S	on						x	Work Area	Chem area near Room R103 (bathroom)		
N239-1-07-N	24-May	Thursday	239	1	102	on						x	Work Area	Cubicals; away from labs		
N239-1-08-N	24-May	Thursday	239	1	C101	on						x	Work Area	Hallway near stairwell and elevator		
N239-2-01-N	24-May	Thursday	239	2	211	on						x	Work Area	Office near chem labs		
N239-2-03-N	24-May	Thursday	239	2	275	on						x	Work Area	Office near chem labs		
N239-3-01-N	24-May	Thursday	239	3	355	on						x	Work Area	Conference room		
N239-3-02-N	24-May	Thursday	239	3	C303	on						x	Work Area	Hallway near Room 383 (autoclave), chem area		
N239-4-01-N	24-May	Thursday	239	4	C401	on						x	Work Area	Hallway, near stairwell and elevator		
N243-B-01-N	24-May	Thursday	243	Basement	063	on						x	Work Area	Flight Guidance/Simulation Lab	Highbay area; near cracks	
N243-B-02-N	24-May	Thursday	243	Basement	C002	on						x	Work Area	Flight Guidance/Simulation Lab	Main corridor for offices	
N243-B-03-N	24-May	Thursday	243	Basement	N032	on						x	Pathway	Flight Guidance/Simulation Lab	Utility room	
N243-B-04-N	24-May	Thursday	243	Basement	C008	on						x	Work Area	Flight Guidance/Simulation Lab	Hallway near Office 083	
N243-G-05-N	24-May	Thursday	243	Basement	C001	on							x	Pathway	Flight Guidance/Simulation Lab	Elevator Grab

May 2012

Table 5. Indoor Air Sampling Program, Moffett Field, California

Sample Name	Sample Date	Sample Day	Location			HVAC (on or off)	Sample Duration				Sample Type	Building Information	Sampling Rationale
			Building	Floor	Room		8-hour	10-hour	24-hour	Grab			
N243-B-06-N	24-May	Thursday	243	Basement	050	on			x		Work Area	Flight Guidance/Simulation Lab	Machine shop near sump
N243-B-07-N	24-May	Thursday	243	Basement	054	on			x		Work Area	Flight Guidance/Simulation Lab	Near below grade hydraulic equipment
N243-B-08-N	24-May	Thursday	243	Basement	C010	on			x		Pathway	Flight Guidance/Simulation Lab	Within Tunnel
N243-1-01-N	24-May	Thursday	243	1	136	on			x		Work Area	Flight Guidance/Simulation Lab	Office, near R102 and R103 (bathrooms)
N243-1-02-N	24-May	Thursday	243	1	C104	on			x		Work Area	Flight Guidance/Simulation Lab	Rotunda hallway, previous sample location
N243-1-03-N	24-May	Thursday	243	1	C103	on			x		Work Area	Flight Guidance/Simulation Lab	Hallway near stairwell
N243-2-01-N	24-May	Thursday	243	2	C202	on			x		Work Area	Flight Guidance/Simulation Lab	Hallway near stairwell
N243-2-02-N	24-May	Thursday	243	2	248	on			x		Work Area	Flight Guidance/Simulation Lab	Office
N243-2-03-N	24-May	Thursday	243	2	C207	on			x		Work Area	Flight Guidance/Simulation Lab	Hallway near Room 208 and 209S
N243-3-01-N	24-May	Thursday	243	3	N310	on			x		Pathway	Flight Guidance/Simulation Lab	HVAC Room
Ambient Air Samples													
M126-A-01-N	15-May	Monday	126	Ambient Air	NA	NA			x		Background		
M003-A-01-N	18-May	Friday	3	Ambient Air	NA	NA			x		Background		
M012-A-01-N	21-May	Monday	12	Ambient Air	NA	NA			x		Background		
M015-A-01-N	22-May	Tuesday	15	Ambient Air	NA	NA			x		Background		
M243A-A-01-N	22-May	Tuesday	243A	Ambient Air	NA	NA			x		Background		
M510-A-01-N	23-May	Wednesday	510	Ambient Air	NA	NA			x		Background		
M555-A-01-N	23-May	Wednesday	555	Ambient Air	NA	NA			x		Background		
M126-A-03-N	23-May	Wednesday	126	Ambient Air	NA	NA			x		Background		
M016-A-01-N	24-May	Thursday	16	Ambient Air	NA	NA			x		Background		
M239-A-01-N	24-May	Thursday	239	Ambient Air	NA	NA			x		Background		
M126-A-04-N	24-May	Thursday	126	Ambient Air	NA	NA			x		Background		
M243-A-01-N	24-May	Thursday	243	Ambient Air	NA	NA			x		Intake		
M243-A-02-N	24-May	Thursday	243	Ambient Air	NA	NA			x		Background		
Duplicate Samples													
M326-1-01-N	15-May	Monday	126	1	102	NA	x				Duplicate	Museum Conference Center/Cafeteria	
M403-1-01-N	18-May	Tuesday	3	1	105A	on		x			Duplicate		
M412-1-01-N	21-May	Monday	12	1	119	on			x		Duplicate	Commissary Warehouse	
M415-1-01-N	22-May	Tuesday	15	1	118	on			x		Duplicate	NASA Security	
M439-1-01-N	22-May	Tuesday	239A	2	144	on			x		Duplicate	Centrifuge and Offices	
M343A-B-01-N	22-May	Tuesday	243A	Basement	1	on			x		Duplicate	Welding and Machine Shop	
M410-1-01-N	23-May	Wednesday	510	1	108A	on			x		Duplicate	Maintenance Contractor Admin Offices	
M416-1-01-N	24-May	Thursday	16	1	111	on		x			Duplicate	Maintenance Contractor (IAP) Offices	
M339-B-01-N	24-May	Thursday	239	Basement	053	on			x		Duplicate	Life Sciences Building	
M339-1-01-N	24-May	Thursday	239	1	102	on			x		Duplicate	Life Sciences Building	

Table 5. Indoor Air Sampling Program, Moffett Field, California

Sample Name	Sample Date	Sample Day	Location			HVAC (on or off)	Sample Duration				Sample Type	Building Information	Sampling Rationale
			Building	Floor	Room		8-hour	10-hour	24-hour	Grab			
M343-B-01-N	24-May	Thursday	243	Basement	N032	on				x	Duplicate	Flight Guidance/Simulation Lab	
M343-1-01-N	24-May	Thursday	243	1	C103	on				x	Duplicate	Flight Guidance/Simulation Lab	
Number of Indoor Air Samples = 89			Ambient Air Samples = 13			Duplicate Samples = 12							

Table 5. Indoor Air Sampling Program, Moffett Field, California

Sample Name	Sample Date	Sample Day	Location			HVAC (on or off)	Sample Duration				Sample Type	Building Information	Sampling Rationale	
			Building	Floor	Room		8-hour	10-hour	24-hour	Grab				
Buildings with HVAC Systems - HVAC system shut down														
<i>Indoor Air Samples</i>														
M126-1-01-F	15-May	Monday	126	1	103	NA	x				Work Area	Museum	Main room in northern corner, near closet opening	
M126-1-02-F	15-May	Monday	126	1	103	NA	x				Work Area	Museum	Main room, south area	
M126-1-03-F	15-May	Monday	126	1	102	NA	x				Work Area	Museum	Previous sample location	
M126-1-04-F	15-May	Monday	126	1	106	NA	x				Work Area	Museum	Access area for bathrooms	
M126-1-05-F	15-May	Monday	126	1	101	NA	x				Work Area	Museum	Previous sample location	
M012-1-01-F	27-May	Sunday	12	1	109D	off			x		Work Area	Commissary Warehouse	Cashier office	
M012-1-02-F	27-May	Sunday	12	1	109	off			x		Work Area	Commissary Warehouse	By Cashier	
M012-1-03-F	27-May	Sunday	12	1	119	off			x		Work Area	Commissary Warehouse	Warehouse; near cracks or seams	
M012-C-04-F	27-May	Sunday	12	1	Crawl Space	off				x	Pathway	Commissary Warehouse	Under Room 119, warehouse area	
M012-C-05-F	27-May	Sunday	12	1	Crawl Space	off				x	Pathway	Commissary Warehouse	Under Room 110	
M012-2-01-F	27-May	Sunday	12	2	214	off			x		Work Area	Commissary Warehouse	Office, near stairwell	
M015-1-01-F	27-May	Sunday	15	1	135D	off			x		Work Area	NASA Security	Office; staffed 24/7/365	
M015-1-02-F	27-May	Sunday	15	1	118	off			x		Work Area	NASA Security	Office, near electrical	
M015-1-03-F	27-May	Sunday	15	1	C107	off				x	Work Area	NASA Security	Hallway, near Room 163 (HVAC) and Room 166 (office), near cubes	
M015-1-04-F	27-May	Sunday	15	1	C107	off				x	Work Area	NASA Security	Hallway, near Room 163 (HVAC) and Room 166 (office), near cubes	
M015-1-05-F	27-May	Sunday	15	1	128	off				x	Work Area	NASA Security	Office	
M015-1-06-F	27-May	Sunday	15	1	C104	off				x	Work Area	NASA Security	Hallway, near Room 101 (drain), R102W and R104M (bathrooms) and N108 (HVAC)	
M076-1-02	28-May	Monday	76	1	101	NA	x				Work Area	Locksmith Shop	General work area with AC unit on	
N239-B-01-F	27-May	Sunday	239	Basement	053	off				x	Work Area	Life Sciences Building	Library; SW area, stagnant air	
N239-B-02-F	27-May	Sunday	239	Basement	071	off				x	Work Area	Life Sciences Building	Break area for library staff	
N239-B-03-F	27-May	Sunday	239	Basement	C001	off				x	Work Area	Life Sciences Building	Hallway near Rooms R001 and R002 (bathrooms)	
N239-G-04-F	27-May	Sunday	239	Basement	C001	off					x	Pathway	Life Sciences Building	Elevator Grab Sample
N239-B-05-F	27-May	Sunday	239	Basement	C001	off				x	Work Area	Life Sciences Building	Hallway near N089 (or B11); near sump	
N239-B-06-F	27-May	Sunday	239	Basement	C002	off				x	Work Area	Life Sciences Building	Hallway near Room 030	
N239-G-07-F	27-May	Sunday	239	Basement	C004	off					x	Pathway	Life Sciences Building	Elevator Grab Sample

Table 5. Indoor Air Sampling Program, Moffett Field, California

Sample Name	Sample Date	Sample Day	Location			HVAC (on or off)	Sample Duration				Sample Type	Building Information	Sampling Rationale
			Building	Floor	Room		8-hour	10-hour	24-hour	Grab			
N239-1-01-F	27-May	Sunday	239	1	C103	off			x		Work Area	Life Sciences Building	Hallway near stairwell and elevator
N239-1-02-F	27-May	Sunday	239	1	C104	off			x		Work Area	Life Sciences Building	Hallway near Room 178
N239-1-03-F	27-May	Sunday	239	1	191	off			x		Work Area	Life Sciences Building	Office near chem lab
N239-1-04-F	27-May	Sunday	239	1	U102	off			x		Pathway	Life Sciences Building	Central utility corridor, slight negative pressure
N239-1-05-F	27-May	Sunday	239	1	138S	off			x		Work Area	Life Sciences Building	Chem area near Room R103 (bathroom)
N239-1-06-F	27-May	Sunday	239	1	U101	off			x		Pathway	Life Sciences Building	Central utility corridor
N239-1-07-F	27-May	Sunday	239	1	102	off			x		Work Area	Life Sciences Building	Cubicals; away from labs
N239-1-08-F	27-May	Sunday	239	1	C101	off			x		Work Area	Life Sciences Building	Hallway near stairwell and elevator
N239-2-01-F	27-May	Sunday	239	2	211	off			x		Work Area	Life Sciences Building	Office near chem labs
N239-2-02-F	27-May	Sunday	239	2	U202	off			x		Pathway	Life Sciences Building	South utility corridor
N239-2-03-F	27-May	Sunday	239	2	275	off			x		Work Area	Life Sciences Building	Office near chem labs
N239-2-04-F	27-May	Sunday	239	2	U201	off			x		Pathway	Life Sciences Building	North utility corridor
N239-3-01-F	27-May	Sunday	239	3	355	off			x		Work Area	Life Sciences Building	Conference room
N239-3-02-F	27-May	Sunday	239	3	C303	off			x		Work Area	Life Sciences Building	Hallway near Room 383 (autoclave), chem area
N239-3-03-F	27-May	Sunday	239	3	U302	off			x		Work Area	Life Sciences Building	South utility corridor
N239-4-01-F	27-May	Sunday	239	4	C401	off			x		Work Area	Life Sciences Building	Hallway, near stairwell and elevator
N239-4-02-F	27-May	Sunday	239	4	U401	off			x		Pathway	Life Sciences Building	North utility corridor
N239A-B-01-F	27-May	Sunday	239A	Basement	Basement	off			x		Pathway	Centrifuge and Offices	On bio-dome scaffolding
N239A-1-09-F	27-May	Sunday	239A	1	144	off			x		Pathway	Centrifuge and Offices	Near sump with PID detections
N239A-1-02-F	27-May	Sunday	239A	1	145	off			x		Work Area	Centrifuge and Offices	Lab with no chemicals
N239A-1-03-F	27-May	Sunday	239A	1	120	off			x		Work Area	Centrifuge and Offices	Near bio-dome
N239A-1-04-F	27-May	Sunday	239A	1	120	off			x		Work Area	Centrifuge and Offices	Near storage basement & conduits penetrating floor
N239A-1-05-F	27-May	Sunday	239A	1	C102	off			x		Work Area	Centrifuge and Offices	Office
N239A-1-06-F	27-May	Sunday	239A	1	C102	off			x		Work Area	Centrifuge and Offices	Hallway near utility rooms U101 and U102
N239A-G-07-F	27-May	Sunday	239A	1	C101	off				x	Pathway	Centrifuge and Offices	Elevator Grab
N239A-1-08-F	27-May	Sunday	239A	1	125	off			x		Work Area	Centrifuge and Offices	Opposite flammable cabinet in highbay floor area
N239A-2-01-F	27-May	Sunday	239A	2	227	off			x		Work Area	Centrifuge and Offices	Office
N243-B-01-F	27-May	Sunday	243	Basement	063	on		x			Work Area	Flight Guidance/Simulation Lab	Highbay area; near cracks

Table 5. Indoor Air Sampling Program, Moffett Field, California

Sample Name	Sample Date	Sample Day	Location			HVAC (on or off)	Sample Duration				Sample Type	Building Information	Sampling Rationale
			Building	Floor	Room		8-hour	10-hour	24-hour	Grab			
N243-B-02-F	27-May	Sunday	243	Basement	C002	off			x		Work Area	Flight Guidance/Simulation Lab	Main corridor for offices
N243-B-03-F	27-May	Sunday	243	Basement	N032	off			x		Pathway	Flight Guidance/Simulation Lab	Utility room
N243-B-04-F	27-May	Sunday	243	Basement	C008	off			x		Work Area	Flight Guidance/Simulation Lab	Hallway near Office 083
N243-G-05-F	27-May	Sunday	243	Basement	C001	off				x	Pathway	Flight Guidance/Simulation Lab	Near stair wall and V001 (elevator)
N243-B-06-F	27-May	Sunday	243	Basement	050	off			x		Work Area	Flight Guidance/Simulation Lab	Machine shop near sump
N243-B-07-F	27-May	Sunday	243	Basement	054	on		x			Work Area	Flight Guidance/Simulation Lab	Near below grade hydraulic equipment
N243-B-08-F	27-May	Sunday	243	Basement	C010	off			x		Pathway	Flight Guidance/Simulation Lab	Within Tunnel
N243-1-01-F	27-May	Sunday	243	1	136	off			x		Work Area	Flight Guidance/Simulation Lab	Office, near R102 and R103 (bathrooms)
N243-1-02-F	27-May	Sunday	243	1	C104	off			x		Work Area	Flight Guidance/Simulation Lab	Rotunda hallway, previous sample location
N243-1-03-F	27-May	Sunday	243	1	C103	off			x		Work Area	Flight Guidance/Simulation Lab	Hallway near stairwell
N243-2-01-F	27-May	Sunday	243	2	C202	off			x		Work Area	Flight Guidance/Simulation Lab	Hallway near stairwell
N243-2-02-F	27-May	Sunday	243	2	248	off			x		Work Area	Flight Guidance/Simulation Lab	Office
N243-2-03-F	27-May	Sunday	243	2	C207	off			x		Work Area	Flight Guidance/Simulation Lab	Hallway near Room 208 and 209S
N243-3-01-F	27-May	Sunday	243	3	N310	off			x		Pathway	Flight Guidance/Simulation Lab	HVAC Room
N243A-B-01-F	27-May	Sunday	243A	Basement	1	off			x		Work Area	Welding and Machine Shop	Within Tunnel
N243A-1-01-F	27-May	Sunday	243A	1	104	off			x		Work Area	Welding and Machine Shop	Main work area; near 10-inch vent conduit
N243A-1-02-F	27-May	Sunday	243A	1	101	off			x		Work Area	Welding and Machine Shop	Main work area; near electrical conduits
N243A-2-01-F	27-May	Sunday	243A	2	201	off			x		Work Area	Welding and Machine Shop	Office
M510-1-01-F	27-May	Sunday	510	1	108A	off			x		Work Area	Maintenance Contractor Admin Offices	Communication Room, occupied 24/7/365
M510-1-02-F	27-May	Sunday	510	1	110	off			x		Work Area	Maintenance Contractor Admin Offices	Cubical Area

Table 5. Indoor Air Sampling Program, Moffett Field, California

Sample Name	Sample Date	Sample Day	Location			HVAC (on or off)	Sample Duration				Sample Type	Building Information	Sampling Rationale
			Building	Floor	Room		8-hour	10-hour	24-hour	Grab			
M510-1-03-F	27-May	Sunday	510	1	C101	off			x		Work Area	Maintenance Contractor Admin Offices	Near R101 and 103 (bathrooms)
M003-1-01-F	28-May	Monday	3	1	105	off		x			Work Area	Conference Center/Cafeteria	Office; above crawl space sample
M003-1-02-F	28-May	Monday	3	1	C101	off		x			Work Area	Conference Center/Cafeteria	Hallway outside of kitchen
M003-1-03-F	28-May	Monday	3	1	104A	off		x			Work Area	Conference Center/Cafeteria	Office
M003-1-04-F	28-May	Monday	3	1	122	off		x			Work Area	Conference Center/Cafeteria	Banquet Room
M003-C-05-F	28-May	Monday	3	1	Crawl Space	off		x			Pathway	Conference Center/Cafeteria	Beneath Room 105
M003-1-06-F	28-May	Monday	3	1	105A	off		x			Pathway	Conference Center/Cafeteria	Near conduit; phone lines penetrate floor
M003-1-07-F	28-May	Monday	3	1	108	off		x			Work Area	Conference Center/Cafeteria	Dining Room
M003-1-08-F	28-May	Monday	3	1	111	off		x			Work Area	Conference Center/Cafeteria	Office; near kitchen
M003-1-09-F	28-May	Monday	3	1	128	off		x			Work Area	Conference Center/Cafeteria	Work area with fire place
M016-1-01-F	28-May	Monday	16	1	106	off		x			Work Area	Maintenance Contractor (IAP) Offices	Office
M016-1-02-F	28-May	Monday	16	1	110	off		x			Work Area	Maintenance Contractor (IAP) Offices	Wood shop near cracks and seams
M016-1-03-F	28-May	Monday	16	1	111	off		x			Work Area	Maintenance Contractor (IAP) Offices	HVAC area, near cracks or seams
M016-1-04-F	28-May	Monday	16	1	113	off		x			Work Area	Maintenance Contractor (IAP) Offices	Office area; shallow groundwater
M016-1-05-F	28-May	Monday	16	1	103	off		x			Work Area	Maintenance Contractor (IAP) Offices	Office
M107-1-01-F	28-May	Monday	107	1	106	off	x				Work Area	ROICC Office	Conference room near comm. conduits
M107-1-02-F	28-May	Monday	107	1	C101	off	x				Work Area	ROICC Office	Near Room 102
N210-1-01-F	28-May	Monday	210	1	143	off	x				Work Area	Former hangar, now offices	Near communications & offices
N210-1-02-F	28-May	Monday	210	1	C117A	off	x				Work Area	Former hangar, now offices	Hallway near cubicals
N210-G-03-F	28-May	Monday	210	1	near V101	off			x		Pathway	Former hangar, now offices	Elevator Grab Sample
N210-1-04-F	28-May	Monday	210	1	138E	off	x				Work Area	Former hangar, now offices	Office
N210-1-05-F	28-May	Monday	210	1	146	off	x				Work Area	Former hangar, now offices	Display in stairwell; previous sample location
N210-1-06-F	28-May	Monday	210	1	Q134	off	x				Pathway	Former hangar, now offices	AC Room
N210-1-07-F	28-May	Monday	210	1	100A	off	x				Work Area	Former hangar, now offices	Access room
N210-1-08-F	28-May	Monday	210	1	C10	off	x				Work Area	Former hangar, now offices	Near 010
N210-1-09-F	28-May	Monday	210	1	148	off	x				Work Area	Former hangar, now offices	Near wall of hanger pit
N210-1-10-F	28-May	Monday	210	1	near 033 & 036	off	x				Work Area	Former hangar, now offices	Cubicals
N210-1-11-F	28-May	Monday	210	1	145	off	x				Pathway	Crawl Space where vapor extraction system is located	Crawl Space beneath raised floor

Table 5. Indoor Air Sampling Program, Moffett Field, California

Sample Name	Sample Date	Sample Day	Location			HVAC (on or off)	Sample Duration				Sample Type	Building Information	Sampling Rationale	
			Building	Floor	Room		8-hour	10-hour	24-hour	Grab				
N210-2-01-F	28-May	Monday	210	2	L244	off	x				Work Area	Former hangar, now offices	Former Sample Location	
N210-2-02-F	28-May	Monday	210	2	C248	off	x				Work Area	Former hangar, now offices	Hallway near V201 (elevator)	
N210-2-03-F	28-May	Monday	210	2	255A	off	x				Work Area	Former hangar, now offices	Near wall opening to void	
N555-1-01-F	28-May	Monday	555	1	112	off	x				Work Area	Former hangar, now offices	Office, near Room 112B (drain)	
N555-1-02-F	28-May	Monday	555	1	C101	off	x				Work Area	Former hangar, now offices	Near office 100A, 101 Near Room 107B	
N555-1-03-F	28-May	Monday	555	1	107A	off	x				Work Area	Former hangar, now offices	(communications) Offices near 112 and 113	
M566-1-01-F	28-May	Monday	566	1	111	off	x				Work Area	Tenant Offices		
M566-1-02-F	28-May	Monday	566	1	C103	off	x				Work Area	Tenant Offices	Hallway, near electrical outlets in the floor	
M566-1-03-F	28-May	Monday	566	1	C104	off	x				Work Area	Tenant Offices	Near offices 100, 101,	
Ambient Air Samples														
M126-A-02-N	22-May	Tuesday	126		Ambient Air	NA							x	Background
M015-A-01-F	27-May	Sunday	15		Ambient Air	NA							x	Background
M239-A-01-F	27-May	Sunday	239		Ambient Air	NA							x	Background
M126-A-05-F	27-May	Sunday	126		Ambient Air	NA							x	Background
M243-A-01-F	27-May	Sunday	243		Intake	NA							x	Background
M243A-A-01-F	27-May	Sunday	243A		Ambient Air	NA							x	Background
M510-A-01-F	27-May	Sunday	510		Ambient Air	NA							x	Background
M003-A-01-F	28-May	Monday	3		Ambient Air	NA							x	Background
M016-A-01-F	28-May	Monday	16		Ambient Air	NA							x	Background
M210-A-01-F	28-May	Monday	210		Ambient Air	NA							x	Background
M555-A-01-F	28-May	Monday	555		Ambient Air	NA							x	Background
M126-A-06-F	28-May	Monday	126		Ambient Air	NA							x	Background
Duplicate Air Samples														
M310-G-03-F	28-May	Monday	210	1	near V101	off							x	Duplicate
M315-1-01-F	27-May	Sunday	15		Ambient Air	NA							x	Duplicate
M339-B-01-F	27-May	Sunday	239		Basement	053	off						x	Duplicate
M339-1-01-F	27-May	Sunday	239	1	102	off							x	Duplicate
M439-1-01-F	27-May	Sunday	239A	2	144	off							x	Duplicate
M343-B-01-F	27-May	Sunday	243		Basement	032	off						x	Duplicate
M343-1-01-F	27-May	Sunday	243	1	C103	off							x	Duplicate
M343A-B-01-F	27-May	Sunday	243A		Basement	1	off						x	Duplicate
M403-1-01-F	28-May	Monday	3	1	105A	off							x	Duplicate
M416-1-01-F	28-May	Monday	16	1	111	off							x	Duplicate
M310-1-02-F	28-May	Monday	210	1	148	off	x							Duplicate
M310-1-01-F	28-May	Monday	210	1	100	off	x							Duplicate
M410-1-01-F	27-May	Sunday	510		Ambient Air	NA							x	Duplicate
			Number of Indoor Air Samples = 110			Ambient Air Samples = 12			Duplicate Samples = 13					
			Total Indoor Air Samples = 221			Total Ambient Air Samples = 29			Total Duplicate Samples = 29					

This page intentionally left blank.

Table 6. Summary of Tiering Descriptions and Response Actions for Existing Commercial Buildings in the Vapor Intrusion Study Area

Tier	Description	Response Action	Selected Remedy
1	Building with indoor air concentrations greater than outdoor (background) air concentrations and indoor air cleanup levels.	Implement selected remedy (appropriate engineering control) to meet indoor air cleanup levels. Once indoor air cleanup level is achieved and confirmed, building is recategorized as Tier 2. Implement governmental, proprietary and information ICs.	Active sub-slab/sub-membrane ventilation, monitoring and ICs (including conduit sealing). ¹ ICs consist of : <ul style="list-style-type: none"> • Permitting and building requirements to install appropriate engineering controls in future construction. • Recorded agreements to ensure installation and operation of engineering controls; require information to be provided to future owners; require information of building changes be provided to EPA and MEW responsible parties. Tracking service to provide information to EPA and MEW responsible parties of occupancy and building changes.
2	Building with indoor air concentrations below the indoor air cleanup levels, while an engineering control is in place or in operation. Also, former Tier 1 buildings with confirmed indoor air concentrations that are below the indoor air cleanup levels.	Ensure continued operation and maintenance of active ventilation system or other selected engineered remedy to meet RAOs. Develop and implement long-term monitoring and ICs implementation plan. Implement governmental, proprietary and informational ICs. Where remedy is achieved through operation of an active ventilation system, agreement of property owner must be contained in a recorded agreement.	
3A	Building sampled without engineering control in place or operating with indoor air concentrations below indoor air cleanup levels, but greater than outdoor (background) concentrations.	No engineered remedy required. Develop and implement long-term monitoring plan. Implement governmental ICs.	No engineering control. ICs only. ICs consist of: <ul style="list-style-type: none"> • Permitting and building requirements to install appropriate engineering controls in future construction.
3B	Building sampled without engineering control in place or operating with indoor air concentrations at or within outdoor air (background) concentrations	No engineered remedy nor long-term monitoring required. Implement governmental ICs.	
4	Buildings where converging lines of evidence demonstrate that there is no longer the potential for vapor intrusion into the building exceeding indoor air cleanup levels.	No action required after performance of all necessary confirmation sampling and documentation approved by EPA that no action is necessary.	No remedy required.

1. Alternatively, active indoor air ventilation system, monitoring and ICs (including conduit sealing) may be selected as the vapor intrusion remedy for Tier 1 and 2 existing commercial building if the property/building owner agrees to use, operate and monitoring the indoor air ventilation system (e.g. HVAC) in a manner consistent with the operations, maintenance and monitoring plan developed for that building in a signed recorded agreement.

This page intentionally left blank.