CLEAN
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Contract Task Order 0236

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NAVAL AIR STATION MOFFETT FIELD
CALIFORNIA

REVISED FINAL INSTALLATION RESTORATION PROGRAM
PETROLEUM SITES
(AND WASTEWATER TANKS AND SUMPS)
CHARACTERIZATION REPORT

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January 28, 1994

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Mr. Stephen Chao/Ms. Camille Garibaldi
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Western Division
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Subject: **Revised Final Installation Restoration Program Petroleum Sites (and Wastewater Tanks and Sumps) Characterization Report and Response to Agency Comments, Naval Air Station Moffett Field, CLEAN Contract Number N62474-88-D5086, Contract Task Order 0236**

Dear Stephen and Camille:

Enclosed please find two copies of the above referenced report prepared by PRC Environmental Management, Inc. Comments on the final characterization report were received from the San Francisco Bay Regional Water Quality Control Board and the U.S. Environmental Protection Agency and have been addressed in the revised final report. By cover of this letter, copies of the revised final characterization report and written responses have been sent to the appropriate project personnel and regulatory agencies.

If you have any questions or comments, please call us at (303) 295-1101.

Sincerely,

Brian Werle
Project Engineer

for Joshua D. Marvil
Project Manager

Enclosure

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Revised Final IRP Petroleum Sites (and Wastewater Tanks and Sumps) Characterization Report

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NAVAL AIR STATION MOFFETT FIELD
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REVISED FINAL INSTALLATION RESTORATION PROGRAM
PETROLEUM SITES (AND WASTEWATER TANKS AND SUMPS)
CHARACTERIZATION REPORT

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ACRONYMS

AIMD	Aircraft intermediate maintenance department
ARAR	Applicable or relevant and appropriate requirements
BLS	Below land surface
BRAC	Base Realignment and Closure program
BTEX	Benzene, toluene, ethylbenzene, and xylene
CAP	Corrective action plan
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-term Environmental Action Navy
DOD	Department of Defense
DTSC	California EPA Department of Toxic Substances Control
EPA	U.S. Environmental Protection Agency
FFA	Federal Facilities Agreement
IAS	Initial assessment study
IRP	Installation Restoration Program
IT	International Technology Corporation
JP5	Jet fuel
MCL	Maximum contaminant level
µg/kg	Micrograms per kilogram
µg/L	Micrograms per liter
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
mm	Millimeter
MEK	Methyl ethyl ketone
MEW	Middlefield-Ellis-Whisman
NAS	Naval Air Station
NASA	National Aeronautics and Space Administration
NEESA	Naval Energy and Environmental Support Activity
NEX	Naval Exchange
NPL	National Priorities List
OU	Operable unit
PCE	Tetrachloroethene
PRC	PRC Environmental Management, Inc.

ACRONYMS (Continued)

RCRA	Resource Conservation and Recovery Act
RD/RA	Remedial design and remedial action
RI/FS	Remedial investigation and feasibility study
ROD	Record of decision
RWQCB	California Regional Water Quality Control Board, San Francisco Bay Region
SVOC	Semivolatile organic compound
SWRCB	State of California Water Resources Control Board
TCE	Trichloroethene
TPH	Total petroleum hydrocarbons
USC	United States Code
UST	Underground storage tank
VOC	Volatile organic compound

EXECUTIVE SUMMARY

This characterization report summarizes existing data and presents recommendations for Naval Air Station (NAS) Moffett Field Installation Restoration Program (IRP) sites containing petroleum and wastewater underground storage tanks (USTs) and sumps. Originally, this report was intended to address only petroleum contamination, since petroleum and petroleum-related constituents are excluded from the actions currently being implemented at NAS Moffett Field under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (Section 101, Part 14 of 42 United States Code 9601). However, data revealed that some USTs and sumps originally thought to contain only petroleum products actually contained other substances (such as wastewater) in addition to petroleum products. Rather than delete these USTs and sumps from this report, the Navy recommends that these sites remain in this report and be distinguished from the petroleum sites. The rationale for this recommendation is that wastewater tanks and sumps should undergo an investigation and closure process similar to petroleum product tanks. Rather than creating a separate process to address IRP wastewater tanks and sumps, they will remain in this and subsequent reports (such as the corrective action plan) to expedite closure.

Regulatory requirements for petroleum and wastewater USTs and sumps will be evaluated on a site-specific basis. For example, although excluded from CERCLA, investigation and closure of petroleum tanks is governed by state and federal regulations (such as Title 23 California Code of Regulations Chapter 16 and Title 40 Code of Federal Regulations Part 280) and guidance (RWQCB 1990; SWRCB 1989 and 1993) and should be consistent with the Federal Facilities Agreement for NAS Moffett Field. Investigation and closure of wastewater tanks and sumps are not excluded from CERCLA and should be addressed under the provisions of CERCLA (which include using the above state and federal regulations and guidance as applicable or relevant and appropriate requirements).

This report addresses petroleum and wastewater tanks and sumps at IRP Sites 5, 9, 12, 15, and 19. Site 5 is an active fuel farm consisting of 11 active fuel tanks, four inactive fuel tanks, and three removed tanks. Soils around some of the active fuel tanks are contaminated with total petroleum hydrocarbon (TPH) constituents. Corrective action is recommended for these soils. Since the active fuel tanks are a suspected source of soil contamination, leak testing the active tanks is also recommended. The inactive tanks are recommended for removal and closure. Of the three former tank excavations, one is recommended for further investigation; no further action is recommended for the remaining two.

Site 9 is located on the western side of NAS Moffett Field, where several petroleum storage areas were located. These areas can be separated into the Building 29 area, the Building 31 area, the Building 15 area, and the Building 10 area. All 14 USTs have been removed from the Building 29 area. Four fuel storage USTs were removed near the Building 31 area. Fuel was also stored in two USTs near Building 10. One UST has been removed and the other is to be removed in the fall of 1993. One UST is located near Building 15 and removal is in progress. Soils surrounding the UST locations at Buildings 29 and 31 are recommended for corrective action. In addition, the former tank location near Building 10 is recommended for corrective action.

A corrective action for soil contamination has been recently completed at Site 12. However, recently available results indicate that petroleum-contaminated soils still exist. A technical memorandum summarizing the results of the corrective action is being prepared. This document will summarize the data collected and present recommendations for additional activities. A schedule will be proposed if additional investigation is warrented. Site 12 will be included in future petroleum sites documents after completion of the technical memorandum.

Site 15 consists of one tank and eight sumps and oil/water separators distributed throughout NAS Moffett Field. The tank has been removed; two of the eight sumps are active, one has been removed and requires no further action, and the remaining five are scheduled for removal and closure. The sumps have been inspected visually and soil sampling is recommended at the active sumps. Soil samples will be collected from all sumps scheduled for removal and closure at the time of the sump removal. Groundwater impacts will be evaluated at sump sites where soil contamination is identified.

Site 19 includes four tanks that have been removed. One former tank location is recommended for no further action. The remaining three former tank locations are recommended for corrective action based on excavation soil sample results.

1.0 INTRODUCTION

The U.S. Department of the Navy, as part of the Installation Restoration Program (IRP), has been identifying and evaluating past hazardous waste sites at Naval Air Station (NAS) Moffett Field and controlling the spread of contaminants from these sites. Environmental restoration activities are conducted under the Comprehensive Long-term Environmental Action Navy (CLEAN) contract. These activities are coordinated through a Federal Facilities Agreement (FFA) involving the Navy, the U.S. Environmental Protection Agency (EPA), the California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB), and the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC).

This characterization report summarizes existing data and presents recommendations for NAS Moffett Field IRP sites containing petroleum and wastewater underground storage tanks (UST) and sumps. Originally, this report was intended to address only petroleum contamination, since petroleum and petroleum-related constituents are excluded from the actions currently being implemented at NAS Moffett Field under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (Section 101, Part 14 of 42 United States Code [USC] 9601). However, data revealed that some USTs and sumps originally thought to contain only petroleum products actually contained other substances (such as wastewater), in addition to petroleum products. Rather than delete these USTs and sumps from this report, the Navy recommends that these sites remain in this report and be distinguished from the petroleum sites. The rationale for this recommendation is that wastewater tanks and sumps should undergo an investigation and closure process similar to petroleum product tanks. Rather than creating a separate process to address IRP wastewater tanks and sumps, they will remain in this and subsequent reports (such as the corrective action plan [CAP]) to expedite closure.

Regulatory requirements for petroleum sites and wastewater tanks and sumps will be evaluated on a site-specific basis. For example, although excluded from CERCLA, investigation and closure of petroleum tanks should be consistent with the state and federal regulations cited in the FFA: Sections 6001, 7003, and 9007 of the Resource Conservation and Recovery Act (RCRA); Title 40 Code of Federal Regulations (CFR) Part 280; California Health and Safety Code Division 20, Chapters 6.5, 6.7, 6.75 and 6.8; California Water Code Division 7; Title 23 California Code of Regulations Division 3, Chapter 16; and water quality control plans, as applicable. Additionally, the state has prepared general guidance (RWQCB 1990; SWRCB 1989 and 1993) for petroleum and UST investigations and closures. Investigation and closure of wastewater tanks and sumps are not excluded

from CERCLA and should be addressed under the provisions of CERCLA (which include using the above state and federal regulations and guidance as applicable or relevant and appropriate requirements [ARAR]).

This characterization report is divided into four sections. In addition to this introduction, Section 1.0 also describes the purpose and scope of this report and the site background. Section 2.0 presents a summary of existing data for the tank and sump locations at each site. Section 3.0 presents conclusions and recommendations, and references are provided in Section 4.0.

1.1 PURPOSE AND SCOPE

This characterization report presents existing data on petroleum product and wastewater USTs and sumps at IRP Sites 5, 9, 12, 15, and 19. These data are used to identify (1) sites that have not been sufficiently characterized and require additional investigation, and (2) sites that are adequately characterized and can be either included in a corrective action plan for cleanup and closure or recommended for no further action and closure approval (if warranted).

As noted above, this report was originally intended to address petroleum contamination only since petroleum is excluded from CERCLA response actions (42 USC 9601 Section 101 Part 14). However, data collected for this report revealed that several tanks and sumps handled other substances (such as wastewater). The CERCLA petroleum exclusion applies only to petroleum and petroleum-related constituents that are separate and distinguishable from any other hazardous wastes. The petroleum exclusion is not applicable to tanks and sumps that handled other substances (such as wastewater) in addition to petroleum products. Tanks and sumps not excluded from CERCLA will continue to be evaluated under the CERCLA process. Since, however, state UST closure requirements are similar regardless of tank or sump content (only sample analyses vary with content), both petroleum and nonpetroleum tanks and sumps will be addressed in this report. To address CERCLA requirements for the nonpetroleum tanks and sumps, data from these sites will be included in the NAS Moffett Field site-wide risk assessment. Therefore, tank and sump sites scheduled for closure will follow the appropriate regulations, either under CERCLA or other state and federal regulations and guidance, depending on the compounds present. CERCLA tank and sump sites will use state and federal regulations and guidance as ARARs for consistency in closures.

Commingling of petroleum products with other substances is of particular concern as it relates to groundwater under the western side of NAS Moffett Field. Groundwater under the western portion, with the exception of Site 12, is contaminated by a regional volatile organic compound (VOC) plume originating at the three upgradient Middlefield-Ellis-Whisman (MEW) Superfund sites. In some areas, such as Site 9, petroleum is commingled with the regional VOC plume. Furthermore, the groundwater in this area is being addressed on a regional basis through a CERCLA response action by the companies involved with the MEW sites, as well as by expanded source controls being implemented by the Navy (PRC 1992c and 1993g). This area is not excluded from the CERCLA response action and activities should continue as currently scheduled. Furthermore, evaluations presented in this report address possible sources of soil contamination from the tanks and sumps. Since these potential sources are being addressed, future impacts to groundwater will be minimized. Therefore, groundwater contaminated by tanks and sumps (whether petroleum or wastewater) in the western portion of NAS Moffett Field, with the exception of Site 12, will not be addressed by this report, but will continue to be addressed by the CERCLA response action. Groundwater under Site 12 will be addressed through this and future petroleum sites documents.

Groundwater under the eastern portion of NAS Moffett Field is not part of the regional VOC plume and is being addressed through the operable unit (OU) 5 remedial investigation and feasibility study (RI/FS). The OU5 RI/FS evaluates the nature and extent of groundwater contamination (including petroleum and other substances) and the risks of exposure to the contaminants. However, since petroleum is excluded from the RI/FS process, petroleum in groundwater under the eastern portion of NAS Moffett Field will also be addressed in this report.

Therefore, the overall scope of this report includes addressing (1) soil contamination from petroleum and wastewater tanks and sumps located at Sites 5, 9, 12, 15, and 19 and, (2) if warranted, all noncommingled groundwater petroleum contamination at NAS Moffett Field including groundwater under the western portion of NAS Moffett Field (Site 12 and the western portions of Site 15 not affected by the regional plume) and under the eastern portion (Site 5 and the eastern portions of Sites 15 and 19). Commingled groundwater contamination from petroleum and wastewater tanks and sumps on the western side of NAS Moffett Field will be addressed by the regional remediation program and the Navy source control activities. Groundwater contamination from wastewater tanks and sumps on the eastern side of NAS Moffett Field will be addressed through the OU5 RI/FS (IT 1993a).

Other tanks and sumps not identified by the IRP (primarily inactive tanks and sumps) are undergoing closure at NAS Moffett Field. These additional tank and sump sites are not included in this report, but will be addressed by future reports similar to this report.

1.2 SITE BACKGROUND

NAS Moffett Field is located about 1 mile from the southern end of San Francisco Bay, adjacent to the cities of Mountain View and Sunnyvale, California (Figure 1). The facility encompasses 2,200 acres in Santa Clara County. Since the 1950s, the primary mission of NAS Moffett Field has been to support antisubmarine warfare training and patrol squadrons. NAS Moffett Field is designated for closure as an active military base under the Department of Defense (DOD) Base Realignment and Closure (BRAC) program. The National Aeronautics and Space Administration (NASA), which operates the Ames Research Center on the northern side of NAS Moffett Field, is scheduled to assume control of the facility by October 1994. EPA proposed NAS Moffett Field as a National Priorities List (NPL) site in June 1986 and placed it on the NPL in July 1987. Placement on the NPL initiated the RI/FS process under CERCLA. Environmental investigation and restoration activities at NAS Moffett Field are coordinated under an FFA signed by the Navy, EPA, DTSC, and RWQCB.

The Navy, as part of the IRP, has been identifying and evaluating past hazardous waste sites and controlling the spread of contaminants from these sites. The Navy began its environmental investigation of NAS Moffett Field in 1984 with an initial assessment study (IAS) to gather data on the past use and disposal of hazardous materials (NEESA 1984). Nineteen sites have been identified as potential sources of waste, including nine sites identified in the IAS and 10 sites added during subsequent investigations (ERM 1986a, 1986b; ESA 1986; and ERM 1987). Data collected during these studies were used to plan the RI/FS for NAS Moffett Field. In December 1991, the Navy, EPA, DTSC, and RWQCB formally agreed to the division of NAS Moffett Field into six OUs and modified the FFA to incorporate them. The OUs, as originally identified, included:

OU1 - IRP Sites 1 and 2 soils
OU2 - IRP Sites 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 16, 17, 18, and 19 soils
OU3 - IRP Sites 12 and 15 soils
OU4 - Aquifers on the western side of the station
OU5 - Aquifers on the eastern side of the station
OU6 - Wetland areas

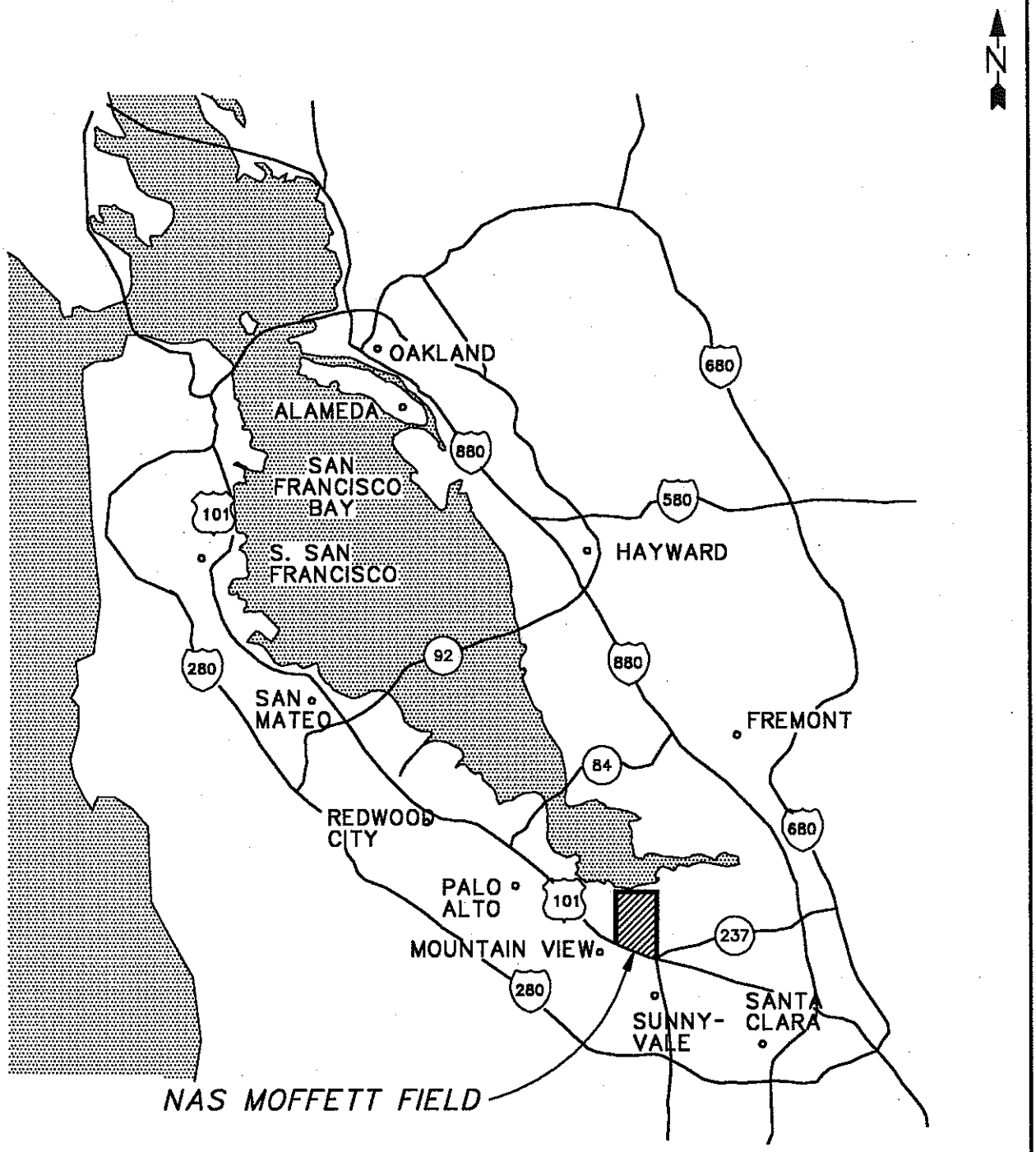

FIGURE 1
NAS MOFFETT FIELD
REGIONAL LOCATION MAP

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In October 1992, EPA determined that the aquifers on the western side of NAS Moffett Field were affected by the regional VOC plume emanating from the MEW Superfund sites and that these aquifers were subject to the 1989 record of decision (ROD) already written for the MEW sites to direct the remediation of these aquifers. Consequently, OU4 was deleted and OU5 was modified to include all aquifers not part of the regional VOC plume. Similarly, EPA considered the IRP soil sites overlying the regional VOC plume to also be subject to the MEW ROD. Therefore, OU2 was separated into OU2-West (Sites 8, 9, 10, 14, 16, 17, 18, and 19, which overlie the regional VOC plume) and OU2-East (Sites 3, 4, 6, 7, 10, 11, 13, and 19, which do not overlie the regional VOC plume). Because some of the IRP sites are large or composed of multiple subsites, some are included in both divisions of OU2.

Concurrent with the RI/FS, removal actions and additional investigations have been implemented for many tanks and sumps at NAS Moffett Field. The primary objectives of the tank and sump removals were to remove potential contaminant sources and to evaluate the impact of the tanks and sumps on the surrounding soil and the uppermost aquifer. The removal actions occurred at six of the 19 IRP sites. Removal actions are interim activities within the RI/FS at NAS Moffett Field. The initial removal actions occurred in two phases in 1990 and involved 10 tanks and three sumps suspected as sources of contamination. Field activities included tank and sump removal, sampling of excavated soil and groundwater, and monitoring well installation and sampling. Field operations included activities at Site 9 (Tanks 56A, 56B, 56C, and 56D), Site 14 (Tanks 67 and 68), Site 16 (Sump 60), Site 17 (Sump 61), Site 18 (Sump 66), and Site 19 (Tanks 2, 14, 43, and 53). All tanks and sumps were removed with the exception of Tank 68, which had been closed in place before the tank and sump activities began.

In April 1992, additional field work was conducted to investigate the extent of contamination remaining after the removal of Tanks 14 and 53. Further discussion of Tanks 14 and 53 is provided in Sections 2.5 and 3.5.

2.0 SUMMARY OF EXISTING DATA

All available data have been summarized from other reports or provided if not included elsewhere. The appropriate references have been cited, such as OU2 RI report (IT 1993b) and the tank and sump removal summary report (PRC 1991b), that contain specific data, such as evaluation of regional and local geology, field boring logs, well completion records, and laboratory analytical data. These

references should be consulted for these data. For sites not included in previous reports, available data have been provided. As new data become available or are collected, ongoing status reports will be provided.

Some of the tank and sump sites described in this report are still active, some have been removed, some are inactive and awaiting closure, and some are temporarily inactive. For tanks and sumps previously removed, groundwater samples have been collected when groundwater was observed in the excavation, and sidewall soil samples were collected at the soil/groundwater interface. If groundwater was not present, soil samples have been collected from the bottom of each excavation. Tank and soil conditions have also been described in previous reports, in addition to being described in the official notices of inspection prepared by Santa Clara County during oversight of removal activities. Copies of available notices of inspection can be provided on an individual basis.

The tables presented in the following sections summarize the analytical results from sample locations where TPH (both purgeable and extractable) and benzene, toluene, ethylbenzene, and xylene (BTEX) constituents were detected. The summary tables are intended to summarize or present all available TPH and BTEX data for each site. Sample locations shown in the figures but not discussed in the text indicate samples in which TPH and BTEX constituents were not detected. Samples that did not contain detectable levels of TPH or BTEX are not reported in these summary tables. In addition, soil samples taken prior to tank excavations or within an initial excavation that was later enlarged are not reported. These data do not represent current site conditions since the soils were excavated during tank removal activities.

Available soil and groundwater data are summarized below and in corresponding tables and figures for each site. Available groundwater data for the tank and sump sites on the eastern portion of NAS Moffett Field including distances to nearest downgradient wells, groundwater elevations, well screen intervals, sampling dates, and analytical results have been provided in the text and tables. Hydrographs depicting groundwater elevations for relevant wells have been provided in Appendix A.

Laboratory data sheets for previous analyses discussed in this report have not been provided. Most analytical data have been discussed in previous reports, or previously submitted on an individual basis, or are not available. If required, additional copies of specific laboratory data sheets can be provided on an individual basis, if available.

2.1 SITE 5

Site 5, known as the active fuel farm, is still operating as the main fuel facility for NAS Moffett Field. The fuel facilities are located on the eastern edge of NAS Moffett Field, east of Hangars 2 and 3. The site is separated into a northern and a southern section. The northern area is located in the triangular area bordered by Macon Road, Patrol Road, and the golf course. The southern area is bounded by an unnamed road on the east, aircraft aprons to the south and west, and Hangar 3 to the north (Plate 1).

The Site 5 fuel farm area includes 18 tanks, which are summarized in Table 1. Tanks described as receiving tanks are connected to a pipeline and receive petroleum products from a barge; working tanks dispense petroleum products for base activities. Tanks 4, 6, 7, 10, 11, 12, 13, 72, 73, 74, and 75 are active (Tanks 72, 73, 74, and 75 are above ground), Tanks 26, 30, and 31 have been removed (PRC 1992d), and Tanks 5, 8, 9, and 18 are inactive (Tank 18 is scheduled for removal in fall 1993). Available records indicate that a previously reported tank (Tank 27) never existed (PRC 1993f; Navy 1993b) and is therefore not included. The majority of tanks manage JP5; however, Tanks 4, 5, and 18 manage or previously managed diesel, Tank 7 manages unleaded gasoline, Tank 26 managed waste oil, and Tanks 30 and 31 were never used.

Many of the tanks have a sump and a discharge pipe associated with them. The discharge pipes are located next to tanks and are used to remove waste products such as sediments, water, and some petroleum products from the bottoms of the tanks. Previous operating practices at Site 5 included discharging these waste products from the sumps on to the ground next to the tanks or into dry wells located in the vicinity of Site 5. The standard operation was to pump the tank bottom to draw off water and sediments from the fuel. About 500 to 600 gallons of water were drawn off at a time (NEESA 1984). Thus, varying quantities of fuel may have been included in the discharged water, although the total quantity of fuel discharged to the ground is unknown. The locations of the dry wells are uncertain.

The sump discharge pipes and dry wells have previously been thought to be part of a french drain system. However, no evidence of this system has been found (Navy 1993d). The original design drawings for the fuel facilities do not show a french drain system (NEESA 1984). Regardless of the existence of this system, investigations are intended to evaluate all potential contamination at Site 5.

TABLE 1

NAS MOFFETT FIELD PETROLEUM SITES
SITE 5
TANK SUMMARY

Tank	Capacity (Gallons)	Contents	Use	Status	Target Removal
4	50,000	JP5/Diesel	Receiving Tank	Active	NA
5	50,000	JP5/Diesel	Working Tank	Inactive	TBD
6	25,000	JP5	Receiving Tank	Active	NA
7	25,000	Unleaded Gasoline	Bulk Storage	Active	NA
8	150,000	JP5	Working Tank	Inactive	TBD
9	150,000	JP5	Working Tank	Inactive	TBD
10	567,000	JP5	Bulk Storage	Active	NA
11	567,000	JP5	Bulk Storage	Active	NA
12	567,000	JP5	Bulk Storage	Active	NA
13	567,000	JP5	Bulk Storage	Active	NA
18	935	Diesel	Emergency Generator	Inactive	Fall 1993
26	10,000	Waste Oil	Storage	Removed	6/1/91
30	4,000	Never Used	Never Used	Removed	1/4/93
31	4,000	Never Used	Never Used	Removed	1/4/93
72[2]	25,000	JP5	Settling Tank	Active	NA
73[2]	20,000	Contaminated JP5	Settling Tank	Active	NA
74[2]	15,000	Contaminated JP5	Settling Tank	Active	NA
75[2]	5,800	Contaminated JP5	Temporary Storage	Active	NA

Source: PRC 1992d
Note: Tanks are underground tanks unless otherwise noted
[1] Tanks 30 and 31 were never used
[2] Aboveground tanks
NA Not applicable, active tank
TBD To be determined

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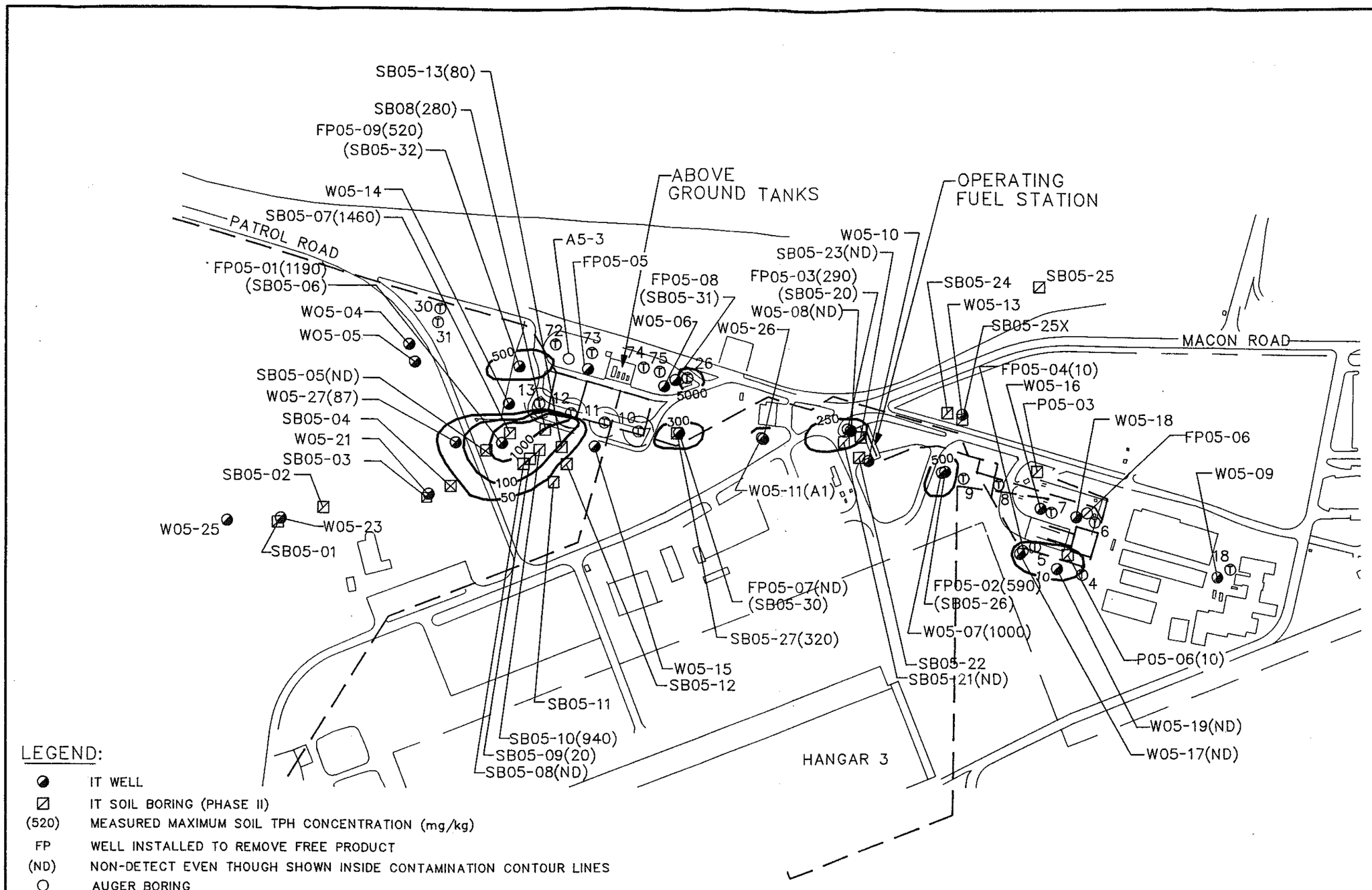
Current operating practices at NAS Moffett Field include containing all waste products discharged from the tank sumps and minimizing spills. Additionally, leak testing is being conducted to identify possible additional sources and to meet current UST operation requirements. Therefore, active sources at Site 5 have been eliminated or are being investigated and any contamination identified has most likely resulted from previous activities.

2.1.1 Soil Analytical Results

All soil data for Site 5 were collected during both Phase I and II RI activities (IT 1993b) and the removal of Tank 26 (Quorum 1991). Analytical data from the removal of Tanks 30 and 31 are not available because sampling was not required when these two tanks were excavated. These tanks originally were installed to hold cleaning solvent, but were never put into operation (Navy 1993c). The data collected during the RI include sample analysis for petroleum products (TPH as JP5 and BTEX), VOCs, semivolatile organic compounds (SVOCs), and metals. Data collected from the Tank 26 removal also include petroleum products, VOCs, SVOCs, and metals (Quorum 1991).

Boring and sample locations are shown in Figure 2. Table 2 summarizes available petroleum-related soil data. Data regarding other constituents are discussed below (for Tank 26). These data indicate that petroleum-related soil contamination exists at Site 5. The majority of petroleum detections are quantified as JP5 from samples collected near active storage Tanks 10, 11, 12, and 13. Other areas with samples containing TPH as JP5 detections are located near the fuel station and Tanks 4, 5, and 8. However, detections from samples collected near Tanks 4 and 5 are not significant. Table 2 shows maximum concentrations of TPH as JP5 at 1,460 milligrams per kilogram (mg/kg) in a sample from boring SB05-07 near Tanks 12 and 13, 1,190 mg/kg in a sample from boring SB05-06 also near Tanks 12 and 13, 1,000 mg/kg from a soil sample from well W05-07 near Tanks 8 and 9; and 940 mg/kg in a sample from boring SB05-10, also near Tanks 12 and 13. Contours of TPH detections are provided in Figure 2.

Minor detections of BTEX constituents were also observed at Site 5. Benzene was detected in two samples from boring A5-3 at a maximum concentration of 0.950 mg/kg. This sample was taken in 1984 during the IAS (NEESA 1984). The maximum detected value of toluene was 0.009 mg/kg in a soil sample from boring SB05-02. Ethylbenzene was detected in only one sample (from boring P05-06) near Tank 4 at a concentration of 2.70 mg/kg. Xylene was detected in two soil samples; the maximum concentration was 2.91 mg/kg from boring A5-3, near Tank 12. These data indicate BTEX detections range from 0.001 to 0.95 mg/kg and indicate no consistent contamination pattern.



LEGEND:

- IT WELL
- IT SOIL BORING (PHASE II)
- (520) MEASURED MAXIMUM SOIL TPH CONCENTRATION (mg/kg)
- FP WELL INSTALLED TO REMOVE FREE PRODUCT
- (ND) NON-DETECT EVEN THOUGH SHOWN INSIDE CONTAMINATION CONTOUR LINES
- AUGER BORING
- TANK (TANKS 26, 30, AND 31 HAVE BEEN REMOVED)
- FUEL LINE
- —10— ESTIMATED SOIL TPH CONCENTRATION (mg/kg). CONTOUR GENERATED FROM EACH BORING WITHOUT CONSIDERATION OF DEPTH.

SOURCES: IT 1992b
NEESA 1984

300' 0 300'

SCALE: 1"=300'

FIGURE 2
NAS MOFFETT FIELD
SITE 5
SOIL TPH CONCENTRATION MAP

DATE: 10/01/93 BCM DN FILE NAME: 044\0238\RP\SRP\FIG2-TPHL.DWG

TABLE 2

NAS MOFFETT FIELD PETROLEUM SITES
SITE 5
PETROLEUM HYDROCARBONS SOIL SAMPLE SUMMARY
(concentrations in mg/kg)

Sample Location	Associated Tank(s)	Sample Depth (Feet BLS)	TPH Extractable as JP5	Benzene	Toluene	Ethylbenzene	Xylene
A5-3[1]	72 and 73	3-4.5 6-7.5	--- ---	0.95 0.054	--- ---	--- ---	2.91 ---
FP05-04	5	8-9.5	10 J	---	---	---	---
FP05-06	6	8-10	---	---	---	---	0.850
P05-06	4	4-5.5 8-9.5	--- 10	--- ---	0.004 J ---	--- 2.7	--- ---
SB08	12 and 13	2-3.5 4-5.5	70 280	--- ---	--- ---	--- ---	--- ---
SB05-01	None	1-3	10 J	---	---	---	---
SB05-02	None	1-3	---	---	0.009	---	---
SB05-06	12 and 13	3-4.5 5-6.5	1,190 590	--- ---	--- ---	--- ---	--- ---
SB05-07	12 and 13	4-5.5 6-7.5	630 1,460	--- ---	--- ---	--- ---	--- ---
SB05-09	12 and 13	6-7.5	20	---	0.002 J	---	---
SB05-10	12 and 13	4-5.5 6-7.5	940 270	--- ---	--- ---	--- ---	--- ---

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TABLE 2 (Continued)

NAS MOFFETT FIELD PETROLEUM SITES
SITE 5
PETROLEUM HYDROCARBONS SOIL SAMPLE SUMMARY
(concentrations in mg/kg)

Sample Location	Associated Tank(s)	Sample Depth (Feet BLS)	TPH Extractable as JP5	Benzene	Toluene	Ethylbenzene	Xylene
SB05-13	11 and 12	6-7.5	80	---	---	---	---
SB05-20	Fuel Station	8-9.5 8-9.5[2]	130 290	--- ---	--- ---	--- ---	--- ---
SB05-22	Fuel Station	1-3 3-5	--- ---	--- ---	0.003 0.003	--- ---	--- ---
SB05-23	Fuel Station	12-14	---	---	0.002	---	---
SB05-26	8 and 9	1-3 4-5.5	--- 590 J	--- ---	0.003 J 0.004 J	--- ---	--- ---
SB05-27	10	3-5 6-7.5	--- 320	--- ---	0.002 J ---	--- ---	--- ---
SB05-32	13	3-4.5 3-4.5[2]	240 520	--- ---	--- ---	--- ---	--- ---
Tank 26 (West Sidewall)	26	10	5200[3], 1700[4]	---	---	---	---
W05-05	None	3-5	---	---	0.001 J	---	---
W05-07	8 and 9	5-6.5	1,000	---	---	---	---
W05-09	18	1-3	---	---	0.002 J	---	---
W05-10	Fuel Station	1-3	---	---	0.003 J	---	---
W05-11	None	1-3 3-5 5-10	--- --- ---	--- --- ---	0.008 J 0.004 J 0.003 J	--- --- ---	--- --- ---

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TABLE 2 (Continued)

NAS MOFFETT FIELD PETROLEUM SITES
SITE 5
PETROLEUM HYDROCARBONS SOIL SAMPLE SUMMARY
(concentrations in mg/kg)

Sample Location	Associated Tank(s)	Sample Depth (Feet BLS)	TPH Extractable as JP5	Benzene	Toluene	Ethylbenzene	Xylene
W05-15	11	3-5	---	---	0.001 J	---	---
W05-23	None	3-5	---	---	0.002 J	---	---
W05-27	12 and 13	6-7.5	87	---	---	---	---

Source: IT 1992b

[1] NEESA 1984
[2] Duplicate sample
[3] Total petroleum hydrocarbons as motor oil
[4] Total petroleum hydrocarbons as diesel
--- Not detected
BLS Below land surface
TPH Total petroleum hydrocarbons
mg/kg milligrams per kilogram
J Estimated value

Tanks

Soil samples were collected from the soil boring used for well W05-09, approximately 48 feet downgradient from Tank 18, which is inactive. The only petroleum-related compound detected was toluene at a concentration of 0.002 mg/kg. Tank 18 is scheduled for removal in 1994, and will undergo sampling and closure following state and federal regulations and guidance.

Tank 26 was removed in 1991. Analytical results from samples taken during the removal of Tank 26 indicate detections of TPH as diesel and motor oil. Free phase fuel was also observed in the excavation. Analytical results from sidewall samples indicate maximum concentrations of 1,700 mg/kg of TPH as diesel and 5,200 mg/kg of TPH as motor oil were detected in the west excavation sidewall sample. However, analytical results from a soil sample from boring SB05-31 collected directly downgradient of Tank 26 did not indicate any TPH detections (IT 1993b). BTEX constituents were not detected in excavation samples (Quorum 1991). Analytical results from sidewall sample S-10-T26W indicate detections of chromium (83 mg/kg), lead (44 mg/kg), zinc (78 mg/kg), and tetrachloroethene (PCE) (0.0094 mg/kg) (Quorum 1991). These data indicate that TPH as diesel and motor oil are present in the immediate vicinity of the former tank location; however, the extent of contamination is not significant. However, soil analytical data indicate the need for further investigation to evaluate the extent of contamination.

Tanks 30 and 31 have been closed by removal. No sampling was required during these removal activities because these tanks were never used.

Tanks 72, 73, 74, and 75 are active aboveground JP5 settling tanks located near the fuel storage tanks in the northern fuel farm area. Three soil borings (FP05-5, SB05-31, and W05-6) were drilled near these tanks. TPH as JP5 and BTEX constituents were not detected in any samples from these borings (IT 1993b).

A limited field investigation at the northern fuel farm area in May 1991 (IT 1992a) indicated JP5 soil concentrations similar to those represented in Figure 2. Possible sources of contamination include the reported spill of 5,000 gallons of JP5, leaks or spills from Tank 26, now removed, or potentially leaking tanks at the northern fuel farm (such as Tanks 10, 11, 12, or 13). However, analysis of groundwater samples collected in November 1992 (discussed below in Section 2.1.2) indicate only low levels of TPH and BTEX constituents are present in the groundwater at Site 5.

These soil data indicate that five areas of TPH contamination exist at Site 5: (1) the area north of Tank 13, northwest of Tanks 11, 12, and 13, and south of Tank 10, (2) the area surrounding the former Tank 26 excavation, (3) the area around the fuel station, (4) the area north of Tank 8, and (5) the area near Tanks 4 and 5 (see Figure 2). For consistency with state guidance, therefore, groundwater data downgradient of these five areas have been included in Section 2.1.2.

The soil data also indicate that some data gaps exist at each of the areas above. For example, few data have been collected west of the detections near Tanks 4 and 5, northwest of the fuel station, and southwest of Tank 10. An additional investigation will be conducted to fill data gaps before considering these areas at Site 5 for corrective action. A field work plan was prepared for agency review describing additional activities.

2.1.2 Groundwater Analytical Results

Based on the above observations of soil contamination, groundwater data have been evaluated for wells downgradient of the five areas described above. Twenty wells are located downgradient of the five areas and include:

Tanks 10, 11, 12 and 13:	Wells FP05-01, FP05-05, FP05-07, FP05-09, W05-04, W05-05, W05-10, W05-14, W05-15, W05-21, and W05-27
Tank 26:	Wells FP05-08 and W05-06
Fuel Station:	Wells FP05-03, W05-08, and W05-10
North of Tank 9:	Wells FP05-02 and W05-07
Tanks 4 and 5:	Wells FP05-04, W05-17, and W05-19

Data, if available, for these wells include distances to the nearest downgradient wells, well screen intervals, seasonally high water elevations, sampling dates, and analytical results. Sample locations are shown in Figure 3. Table 3 presents downgradient well data; Table 4 presents sampling dates and notes detections; and Table 5 presents analytical results for the detections. As discussed below, the free product wells (designated as FP-series wells) have not been sampled since installation; therefore, data are unavailable. However, these wells are scheduled to be sampled during fall 1993. Analytical results and well screen information for the FP wells will be provided in the fall 1993 quarterly sampling report or in routine status reports.

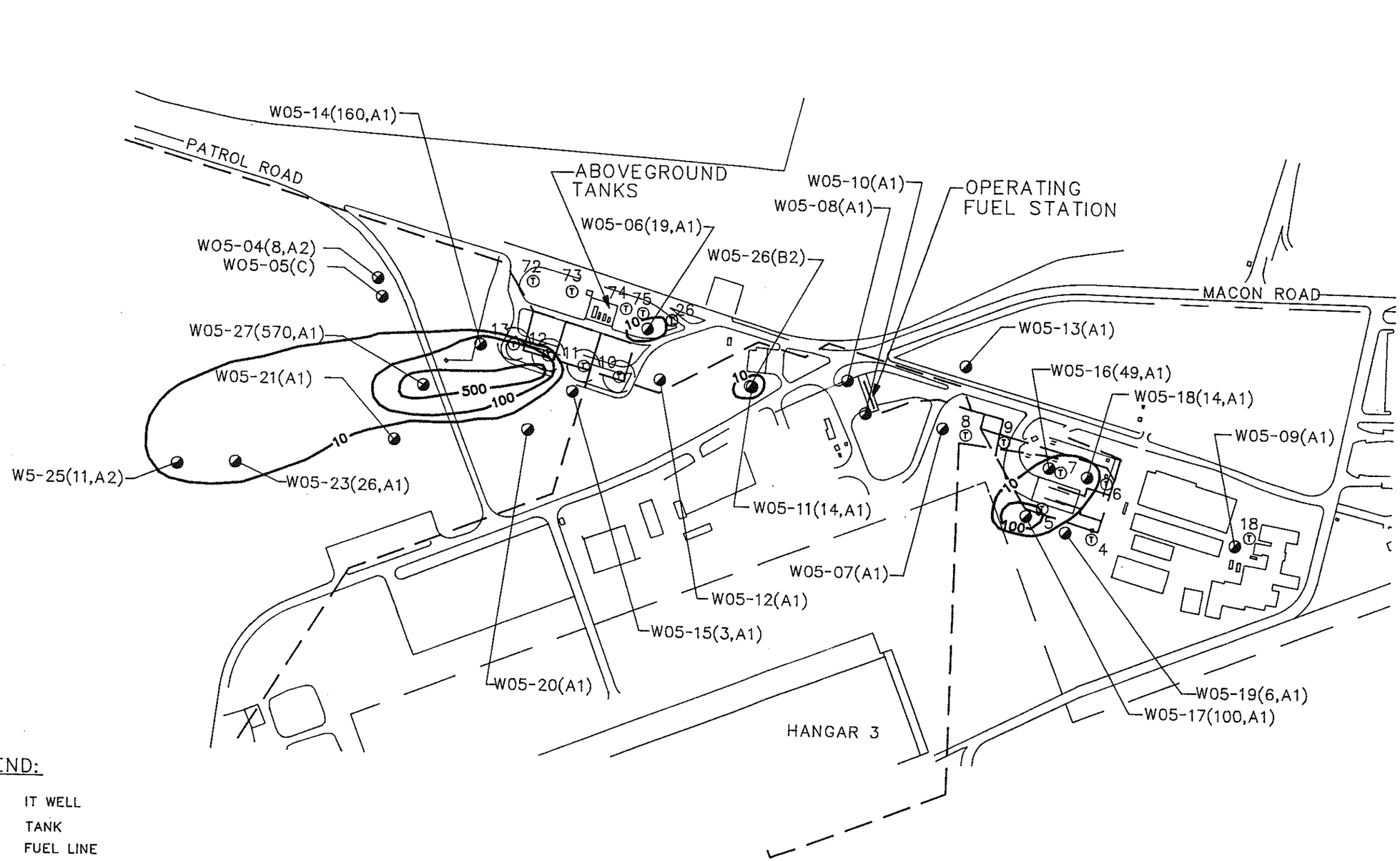

FIGURE 3
NAS MOFFETT FIELD
SITE 5
GROUNDWATER TPH CONCENTRATION MAP

DATE: 10/01/93 BCM DN FILE NAME: 044\0238\VRP\SRP\FIG3-TPH.DWG

TABLE 3
NAS MOFFETT FIELD PETROLEUM SITES
SITE 5
GROUNDWATER WELL SUMMARY

Well	Possible Source	Aproximate Downgradient Distance (±10 ft.)	Screened Interval (feet BLS)	Seasonal High Water Table Level* (Date Measurement)
Groundwater Wells with TPH, BTEX Contamination				
W05-06	Tank 26	74	10-15	(3/19/92) 5.58
W05-08	Fueling Station	30	38.1-43.1	(2/25/93) 7.69
W05-11	Fueling Station	297	17-27	(2/25/93) 7.32
W05-23	Tank 12 Tank 13	930 840	4.5-14.5	(2/25/92) 4.69
W05-27	Tank 10 Tank 11 Tank 12 Tank 13	456 449 356 276	4.6-14.6	(2/25/93) 4.49
Groundwater Wells without TPH, BTEX Contamination				
W05-7	Tank 8 Tank 9	137 68	31-41	(2/25/93) 7.76
W05-9	Tank 18	48	11.9-16.9	(2/25/93) 5.05
W05-14	Tank 10 Tank 11 Tank 12 Tank 13	396 290 189 90	12-17	(3/1/91) 5.43
W05-15	Tank 10 Tank 11	130 77	15-20	(5/24/90) 7.25
W05-16	Tank 6 Tank 7	165 24	8-13	(3/2/89) 5.92
W05-17	Tank 4 Tank 5	194 53	16-21	(2/25/93) 5.80
W05-18	Tank 6	60	11-16	(2/25/93) 4.38
W05-19	Tank 4	77	27-37	(2/25/93) 5.45
W05-21	Tank 12 Tank 13	480 420	5.3-15.3	(2/25/92) 4.96

* Feet BLS

TABLE 4
NAS MOFFETT FIELD PETROLEUM SITES
SITE 5
DOWNGRADIENT WELLS AND SAMPLING DATES

Well	Sample Date	TPH Detected[1]	BTEX Detected
FP05-01[2]	NS	NS	NS
FP05-02[2]	NS	NS	NS
FP05-03[2]	NS	NS	NS
FP05-05[2]	NS	NS	NS
FP05-07[2]	NS	NS	NS
FP05-08[2]	NS	NS	NS
FP05-09[2]	NS	NS	NS
W05-04	05/01/91	---	---
	10/21/91	---	---
	01/15/92	---	---
	04/13/92	---	---
	12/10/92	X	X
W05-05	05/07/91	---	---
	10/22/91	---	---
	01/15/92	---	---
	04/14/92	---	---
	12/08/92	---	---
W05-06	04/25/91	X	---
	10/18/91	---	---
	01/16/92	---	---
	04/13/92	---	---
	12/09/92	X	X
W05-07	04/25/91	---	---
	10/17/91	---	---
	01/09/91	---	---
	04/13/92	---	---
	12/10/92	---	---

TABLE 4 (Continued)
NAS MOFFETT FIELD PETROLEUM SITES
SITE 5
DOWNGRADIENT WELLS AND SAMPLING DATES

Well	Sample Date	TPH Detected[1]	BTEX Detected
W05-08	05/16/91	---	---
	01/17/91	---	---
	01/14/92	---	---
	04/14/92	---	---
	12/10/92	---	X
W05-09	04/24/91	---	---
	10/21/91	---	---
	01/15/92	---	---
	04/13/92	---	---
	12/10/92	---	---
W05-10	04/24/91	---	---
	10/16/91	---	---
	01/08/92	---	---
	04/14/92	---	---
	12/10/92	---	---
W05-11	05/20/91	---	---
	06/17/91	---	---
	07/24/91	---	---
	09/24/91	---	---
	01/03/92	---	---
	04/08/92	---	---
	12/10/92	X	X
W05-12	05/20/91	---	---
	06/18/91	---	---
	07/24/91	---	---
	09/24/91	---	---
	01/03/92	---	---
	04/01/92	---	---
	12/09/92	---	---

TABLE 4 (Continued)
NAS MOFFETT FIELD PETROLEUM SITES
SITE 5
DOWNGRADIENT WELLS AND SAMPLING DATES

Well	Sample Date	TPH Detected[1]	BTEX Detected
W05-13	05/20/91	---	---
	06/18/91	---	---
	07/26/91	---	---
	09/26/91	---	---
	01/08/92	---	---
	04/08/92	---	---
	12/09/92	---	---
W05-14	04/26/91	X	---
	10/21/91	---	---
	01/09/92	---	---
	04/14/92	---	---
	12/11/92	X	X
W05-15	04/26/91	---	---
	10/18/91	---	---
	01/09/92	---	---
	04/14/92	---	---
	12/09/92	X	---
W05-16	04/25/91	---	---
	10/18/91	---	---
	01/16/92	---	---
	04/15/92	---	---
	12/15/92	X	---
W05-17	04/25/91	---	---
	10/17/91	---	---
	01/09/92	---	---
	04/15/92	---	---
	12/11/92	X	---

TABLE 4 (Continued)
NAS MOFFETT FIELD PETROLEUM SITES
SITE 5
DOWNGRADIENT WELLS AND SAMPLING DATES

Well	Sample Date	TPH Detected[1]	BTEX Detected
W05-18	04/25/91	---	---
	10/18/91	---	---
	01/16/92	---	-
	04/15/92	---	---
	12/14/92	X	---
W05-19	04/25/91	---	---
	10/17/91	---	---
	01/09/92	---	---
	04/15/92	---	---
	12/14/92	X	---
W05-20	05/21/91	---	---
	06/18/91	---	---
	07/25/91	---	---
	09/25/91	---	---
	01/07/92	---	---
	04/08/92	---	---
	12/09/92	---	---
W05-21	05/21/91	---	---
	06/18/91	---	---
	07/25/91	---	---
	09/25/91	---	---
	01/07/92	---	---
	04/08/92	---	---
	12/09/92	---	---
W05-23	05/21/91	---	X
	06/20/91	---	---
	07/26/91	---	---
	09/26/91	---	---
	01/06/92	---	---
	04/02/92	---	---

TABLE 4 (Continued)
NAS MOFFETT FIELD PETROLEUM SITES
SITE 5
DOWNGRADIENT WELLS AND SAMPLING DATES

Well	Sample Date	TPH Detected[1]	BTEX Detected
	12/08/92	X	---
W05-25	05/21/91	---	---
	06/19/91	---	---
	07/25/91	---	---
	09/25/91	---	---
	01/06/92	---	---
	04/02/92	---	---
	12/08/92	X	---
W05-26	05/20/91	---	---
	06/17/91	---	---
	07/24/91	---	---
	09/25/91	---	---
	01/08/92	---	---
	04/08/92	---	---
	12/10/92	---	---
W05-27	05/21/91	X	---
	06/19/91	---	---
	07/25/91	---	---
	09/26/91	---	---
	01/07/92	X	---
	04/09/92	X	---
	12/08/92	X	---

Sources: IT 1993b, PRC 1993e

Notes:

[1] Prior to December 1992, TPH was analyzed for JP5 only
[2] FP-series wells to be sampled Fall 1993
--- Not detected
X TPH detected
NS Not sampled

TABLE 5
NAS MOFFETT FIELD PETROLEUM SITES
SITE 5
PETROLEUM HYDROCARBONS GROUNDWATER SAMPLE DETECTIONS SUMMARY
(Concentrations in μg/L)

Well	Sample Date	TPH as JP 5	Other TPH	Benzene	Toluene	Ethylbenzene	Xylene
W05-04	12/10/92	---	8(L), 0.9J(H)	---	0.3J	0.2J	0.8
W05-06	04/25/91 12/09/92	90 ---	NA 19(L)	--- ---	--- 0.1BJ	--- ---	--- ---
W05-08	12/10/92	---	---	---	---	---	0.5
W05-11	12/10/92	---	14(L), 1J(H)	---	1	---	2
W05-14	04/26/91 12/11/92	90J ---	NA 160(L)	--- ---	--- ---	--- ---	--- 0.2J
W05-15	12/09/92	---	3J(H)	---	---	---	---
W05-16	12/15/92	---	49(L), 4BJ(H)	---	---	---	---
W05-17	12/11/92	---	100(L)	---	---	---	---
W05-18	12/14/92	---	14BJ(H)	---	---	---	---
W05-19	12/14/92	---	6(L), 6BJ(H)	---	---	---	---
W05-23	05/21/91 12/08/92	--- ---	NA 26(L)	--- ---	2J ---	--- ---	--- ---
W05-25	12/08/92	---	11J(H)	---	---	---	---
W05-27	05/21/91 01/07/92 04/09/92 12/08/92	570ZJ 1040J 900J ---	NA NA NA 570(D), 340(H), 220(L)	--- --- --- ---	--- --- --- ---	--- --- --- ---	--- --- --- ---

Sources: IT 1993b, PRC 1993e

L TPH other light components
H TPH other heavy components
D TPH diesel
J Estimated value
B Found in blank
NA Not analyzed
--- Not detected
μg/L Micrograms per liter
ZJ Identity and quantity are estimated

Analytical results presented in Table 5 show the maximum TPH detection at near Tanks 10, 11, 12, and 13 (1,040 micrograms per liter [μg/L] TPH as JP5 from well W05-27), near former Tank 26 (90 μg/L TPH as JP5 from well W05-06), near the fuel station (0.5 μg/L xylene from well W05-08), near Tank 9 (no detections), and near Tanks 4 and 5 (100 μg/L TPH as other light fractions from well W05-17). TPH as gasoline and benzene were not detected in any groundwater samples. Toluene was detected in samples from only two wells (W05-04 and W05-06) at a maximum concentration of 0.3 μg/L. Ethylbenzene was detected only once (0.2 μg/L in a sample from well W05-04) and xylene was detected in three wells at a maximum concentration of 0.8 μg/L. There were no VOC detections from samples collected from well W05-06, located downgradient of Tank 26 (PRC 1993d).

As mentioned in Section 2.1.1, free phase fuel was detected in some soil borings near the fuel station and near Tanks 11, 12, and 13 during the OU2 RI (IT 1993b). Free product thicknesses were measured in borings SB05-30 (3 millimeters [mm]), SB05-31 (2 mm), SB05-32 (1 mm), and well W05-27 (4 mm) (IT 1992a). Most of the soil borings where free product was detected were completed as free product wells. Subsequent sampling of well W05-27 has not indicated the presence of free product (the free product wells, however, have not been sampled since installation, as discussed above). During well development and purging, an unrecorded quantity of free phase fuel was recovered. Apparently all free phase fuel present at the time was removed from the wells because the fuel did not re-enter any of the free product wells (IT 1993b).

These groundwater data indicate that groundwater at three areas has been affected by petroleum releases (Figure 3). These areas include the areas northwest of Tanks 12 and 13, near Tank 26, and near Tanks 4 and 5. Groundwater near the fuel station and north of Tank 9 does not appear significantly affected. However, these conclusions will be revised accordingly after results are available from groundwater samples are collected from the free product wells. Additionally, data gaps exist at some of the areas depicted in Figure 3. For example, the area west of Tank 5 and the area west and northwest of Tanks 12 and 13 need additional wells to locate contaminated groundwater. Additional investigations will be conducted to fill these data gaps.

2.2 SITE 9

Site 9 is located on the western side of NAS Moffett Field. Site 9 includes the old fuel farm, (Building 29 area) and the old naval exchange (NEX) (Building 31 area). However, this report considers all tanks located in the area bounded by McCord Avenue on the west, Hangar 1 on the east,

Bushnell Road on the north, and Wescoat Road on the south as part of Site 9 (Plates 1 and 2). Several areas of petroleum storage have previously been located within Site 9. The following paragraphs briefly describe these fuel storage areas.

Building 29 and the surrounding area was the site of the old fuel farm. Aviation gasoline and jet fuels were stored in 13 USTs and one aboveground tank at the old fuel farm between the 1940s and 1964. Table 6 summarizes the contents and sizes of these tanks. Plate 2 shows the previous locations of these tanks. The tanks were abandoned in 1964 and filled with water. All 13 USTs were removed during July 1993, however, removal data are not currently available. These data will be provided when available. Additionally, aboveground Tank 52 was removed (PRC 1992d). The Building 29 area has been previously described (PRC 1991c).

Building 31 was the site of the old NEX gas station and four USTs. Fuel was stored in three of the tanks and waste oil was stored in the fourth; all were removed in October 1990. The contents and size of these tanks are summarized in Table 6. Fuel was also stored in two tanks (Tanks 1 and 32) in the vicinity of Building 10. These tanks stored auxiliary fuel for a boiler and generator. Of these two tanks, Tank 1 was removed in June 1991 (Quorum 1991) and Tank 32 is scheduled for removal during fall 1993. One fuel dispensing tank (Tank 87) was also located near Building 15. This tank dispensed fuel for vehicle maintenance operations at Building 15; removal is scheduled for fall 1993 (PRC 1992d). Table 6 summarizes the contents and sizes of the tanks associated with Buildings 10, 15, 29, and 31.

2.2.1 Soil Analytical Results

Available soil data from the Site 9 tank locations are summarized in Table 7 and sample locations are provided in Figures 4, 5, 6, and 7 and Plate 2. These data indicate two primary areas of TPH contamination: near the former tank locations at Buildings 29 and 31. Data collected from the tank removals near Building 31 (Tanks 56A, 56B, 56C, and 56D) have been fully described in a previous report (PRC 1991b). This reference should be consulted for detailed site descriptions and analytical results. The maximum concentration of TPH as JP5 (4,600 mg/kg) was observed in a sample from boring SB-65 near the former Building 29 tanks. In the Building 31 area, bottom and sidewall samples taken from the excavation during the removal of Tanks 56C and 56D yielded TPH concentrations as high as 4,570 mg/kg for TPH as gasoline. Tank 56A was the only tank to manage waste oil; analytical results for TPH constituents and VOCs revealed two detections of each toluene

TABLE 6

NAS MOFFETT FIELD PETROLEUM SITES
SITE 9
TANK SUMMARY

Location	Tank	Capacity (Gallons)	Contents	Use	Status	Target Removal
Building 29	47	25,000	AVGAS	Fuel Storage	Removed (7/93)	Removed
	48	25,000	AVGAS	Fuel Storage	Removed (7/93)	Removed
	49	25,000	AVGAS	Fuel Storage	Removed (7/93)	Removed
	50	25,000	AVGAS	Fuel Storage	Removed (7/93)	Removed
	52[1]	25,000	AVGAS	Fuel Storage	Removed (Date Unknown)	Removed
	79	10,000	AVGAS	Fuel Storage	Removed (7/93)	Removed
	80	10,000	AVGAS	Fuel Storage	Removed (7/93)	Removed
	81	10,000	AVGAS	Fuel Storage	Removed (7/93)	Removed
	82	10,000	AVGAS	Fuel Storage	Removed (7/93)	Removed
	83	10,000	AVGAS	Fuel Storage	Removed (7/93)	Removed
	84	10,000	AVGAS	Fuel Storage	Removed (7/93)	Removed
	97	6,000	AVGAS	Fuel Storage	Removed (7/93)	Removed
	98	430[2]	AVGAS	Fuel Storage	Removed (7/93)	Removed
	99	430[2]	AVGAS	Fuel Storage	Removed (7/93)	Removed

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TABLE 6 (Continued)

NAS MOFFETT FIELD PETROLEUM SITES
SITE 9
TANK SUMMARY

Location	Tank	Capacity (Gallons)	Contents	Use	Status	Target Removal
Building 31	56A	500	Waste Oil	Storage	Removed (10/90)	Removed
	56B	8,750	Gasoline	Vehicle Fuel Storage	Removed (10/90)	Removed
	56C	10,000	Gasoline	Vehicle Fuel Storage	Removed (10/90)	Removed
	56D	10,000	Gasoline	Vehicle Fuel Storage	Removed (10/90)	Removed
Building 10	1[3]	2,000	Diesel	Auxiliary Fuel Tank	Removed (6/91)	Removed
	32	5,000	Fuel Oil/Diesel	Auxiliary Boiler and Generator Fuel	Inactive	Fall 1993
Building 15	87	10,000	Diesel	Fuel Dispensing	Inactive	Fall 1993

Source: PRC 1992d

AVGAS Aviation gasoline
[1] Aboveground tank
[2] PRC 1993f
[3] Quorum 1991

RE:044-0236IRPSRP\moffett\petroste\table.5\9-30-93\jlk

TABLE 7

NAS MOFFETT FIELD PETROLEUM SITES
SITE 9
PETROLEUM HYDROCARBONS SOIL SAMPLE SUMMARY
(concentrations in mg/kg)

Sample Location	Sample Depth (Feet BLS)	TPH Purgeable as Gasoline	TPH Extractable as JP5	Benzene	Toluene	Ethylbenzene	Xylene
SB9-03[1]	1 - 2.5	NA	—	—	—	—	0.023
SB9-05[1]	1 - 2.5	NA	—	0.053	0.015 J	0.210	1.4
	3 - 4.5	NA	—	—	—	0.019 J	0.110
	5 - 6.5	NA	—	0.017	0.006 J	0.029	0.130
	10 - 11.5	NA	—	—	16	25	150
SB9-13[1]	3 - 4.5	NA	—	—	0.001 J	—	—
SB9-100[2]	5.0	—	—	0.001	0.006	0.001	0.005
	10.0	—	—	0.001	0.006	0.0009	0.005
	16.8	—	—	0.001	0.008	0.002	0.009
SB9-101[2]	5.5	—	—	0.001	0.005	0.0008	0.004
	10.0	—	—	0.001	0.003	0.0008	0.001
	15.0	—	—	0.008	0.004	0.0007	0.002
	23.5	—	—	0.0007	0.004	0.0008	0.004
SB9-102[2]	0.0	NA	—	NA	NA	NA	NA
	5.5	—	1.5 J	—	—	—	—
	12.5	—	4.2 J	—	—	—	—
	24.5	—	1.2 J	—	—	—	—
SB9-104[2]	7	1,300	—	0.53	—	—	—
	14.5	12	—	0.28	—	0.015	0.010
	19.0	660	—	—	—	2.1	0.880
	29.5	—	—	—	—	—	0.0016
SB9-105[2]	5	0.11	1.3	—	0.0017	—	0.0016
	9	28	22	—	—	0.033	0.037
	10	1,800	68	4.3	6.1	18	26
	22.5	—	2.2	—	—	0.0013	0.0017

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TABLE 7 (Continued)

NAS MOFFETT FIELD PETROLEUM SITES
SITE 9
PETROLEUM HYDROCARBONS SOIL SAMPLE SUMMARY
(concentrations in mg/kg)

Sample Location	Sample Depth (Feet BLS)	TPH Purgeable as Gasoline	TPH Extractable as JP5	Benzene	Toluene	Ethylbenzene	Xylene
SB9-106[2]	5 10 19 25	3.5 730 2,100 —	— — — —	0.012 1.1 — —	— 0.46 — —	— 0.54 10 —	— — 8.8 —
SB9-107[2]	19.5	7.4	—	—	—	—	14
SB-24[3]	5.0 10.0 12.0	12 13 57	12 200[7] 36[7]	— — —	0.021 — —	— — —	— — —
SB-31[3]	5.0 10.0	— 380	— 270[7]	— —	— —	— —	— —
SB-38[3]	5.0 10.0 12.0	12 43 70	— 100[7] 29[7]	— — —	0.036 — —	— — —	— — —
SB-42[3]	5.0 10.0 14.0	— 122 —	— 440[7] —	— — —	0.001 J — 0.025	— — —	— — —
SB-49[3]	5.0 10.0	— 71	— 230[7]	— —	0.019 0.036	— —	— —
SB-51[3]	5.0 10.0 18.5	— 185 —	— 16[7] —	— — —	0.037 J 0.032 J 0.057	— 1.1 DJ 0.16	— 1.5 DJ 0.048
SB-60[3]	5.0 10.0 12.0	— — —	— 20[7] —	— — —	0.006 J 0.019 0.003 J	— — —	— — —
SB-63[3]	5.0 10.0	— —	— 26[7]	— —	0.005 J —	— —	— —

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TABLE 7 (Continued)

NAS MOFFETT FIELD PETROLEUM SITES
SITE 9
PETROLEUM HYDROCARBONS SOIL SAMPLE SUMMARY
(concentrations in mg/kg)

Sample Location	Sample Depth (Feet BLS)	TPH Purgeable as Gasoline	TPH Extractable as JP5	Benzene	Toluene	Ethylbenzene	Xylene
SB-65[3]	6.0 13.0	— 103	19[7] 4,600[7]	— —	0.043 —	— —	— —
SB-73[3]	6.0 12.0	— —	— 25	— —	0.029 0.031	— —	— —
SBU4-14	11.0-13.0	9.0	16	—	—	—	—
SBU4-17[4]	9.0 11.0-14.0	70 20	50 13	0.130 0.044	— —	0.550 0.039	0.230 0.028
SBU4-20[4]	9.0	1,600	820	—	—	0.110	—
W9-4[1]	1 - 2.5	NA	—	—	—	—	0.005
W9-5[1]	1 - 2.5 3 - 4.5 5 - 8	NA NA NA	— — —	— — —	0.037 0.002 J 0.002 J	— — —	— — —
W9-6[1]	1 - 2.5	NA	—	—	0.002 J	—	—
W9-9[1]	1 - 2.5 3 - 4.5 5 - 6.5	NA NA NA	— — —	0.230 0.220 —	0.059 0.067 —	0.850 0.870 —	4.8 D 4.1 D 0.026 J
W9-12[1]	1 - 2.5	NA	—	—	0.001 J	—	—
W9-13[1]	3 - 4.5	NA	—	—	—	0.009	0.024
W9-14[1]	3 - 4.5 5 - 6.5	NA NA	— —	— —	0.002 J 0.002 J	— —	— —
W9-17[1]	1 - 2.5	NA	—	—	0.001 J	—	—
W9-27[1]	1 - 2.5 3 - 4.5	NA NA	— —	— —	0.002 J 0.002 J	— —	— —
W9-36[1]	1 - 2.5	NA	—	—	0.002 J	—	0.007 J

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TABLE 7 (Continued)

NAS MOFFETT FIELD PETROLEUM SITES
SITE 9
PETROLEUM HYDROCARBONS SOIL SAMPLE SUMMARY
(concentrations in mg/kg)

Sample Location	Sample Depth (Feet BLS)	TPH Purgeable as Gasoline	TPH Extractable as JP5	Benzene	Toluene	Ethylbenzene	Xylene
W9-39[1]	1-2.5	NA	—	—	—	—	—
	3-4.5	NA	—	—	—	—	—
	5-6.5	NA	—	—	—	—	—
W29-1[3]	5.0	—	—	—	0.34	0.003 J	—
	12.0	—	56	—	0.007	—	—
	16.0	—	—	—	0.036	—	—
W29-2[3]	6.0	—	—	—	0.008	—	—
	10.0	59	710	—	—	—	—
	15.0	—	20[7]	—	0.021	—	0.003 J
W29-3[3]	5.0	—	—	—	0.054	—	—
	12.0	—	—	—	0.085	—	—
	15.0	—	—	—	0.087	—	0.004 J
	21.0	—	—	—	0.051	—	—
W29-4[3]	5.0	—	—	—	0.019	—	—
	10.0	—	—	—	0.006	—	—
	13.0	—	—	—	0.091	—	—
W29-5[3]	5.0	—	—	—	0.028	—	—
	13.0	123	380	—	—	—	—
	24.0	—	—	—	—	—	—
W56-1[5]	5.5	3.8	—	0.005	0.046	0.019	0.057
	10.5	4,300 J	17[7], 740	0.24	16.0	30.0	100.0
	18.5	—		0.005	0.034	0.12	0.480
W56-2[5]	10	407	204[7]	—	0.50 J	4.4 J	4.4 J
	14	—	—	—	0.011	0.010	—
W61-1[3]	7.0	—	—	—	0.017	—	—
	10.0	—	—	—	0.035	—	—
	16.0	—	—	—	0.28	—	—

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TABLE 7 (Continued)

NAS MOFFETT FIELD PETROLEUM SITES
SITE 9
PETROLEUM HYDROCARBONS SOIL SAMPLE SUMMARY
(concentrations in mg/kg)

Sample Location	Sample Depth (Feet BLS)	TPH Purgeable as Gasoline	TPH Extractable as JP5	Benzene	Toluene	Ethylbenzene	Xylene
FP9-2[1]	1 - 2.5 3 - 4.5 5 - 6.5	NA NA NA	— — — —	0.085 — —	0.027J — —	0.700 — 0.026 J	3.2 0.080 0.110
TN56A-NX[5]	North Wall Tank 56A	0.6	—	—	52	—	—
TN56A-EX[5]	East Wall Tank 56A	—	—	—	6 J	—	—
TN56A-WX[5]	West Wall Tank 56A	14	—	—	—	—	—
TN56B-EX[5]	East Wall Tank 56B	—	—	—	0.103	—	—
TN56B-WX[5]	West Wall Tank 56B	—	44.5[7]	—	—	—	—
TN56CD-NX[5]	North Wall Tanks 56C and 56D	12.1 J	—	0.028 J	0.039 J	0.273 J	0.986 J
TN56CD-SX[5]	South Wall Tanks 56C and 56D	210 J	—	0.749 J	1.780 J	6.170 J	38.700 J
TN56CD-EX[5]	East Wall Tanks 56 C and 56D	176 J	—	1.050 J	3.290 J	8.200 J	14.700 J
TN56CD-WX[5]	West Wall Tanks 56C and 56D	4,570 J	—	2.270 J	9.270 J	27.400 J	197.700 J

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TABLE 7 (Continued)

NAS MOFFETT FIELD PETROLEUM SITES
SITE 9
PETROLEUM HYDROCARBONS SOIL SAMPLE SUMMARY
(concentrations in mg/kg)

Sample Location	Sample Depth (Feet BLS)	TPH Purgeable as Gasoline	TPH Extractable as JP5	Benzene	Toluene	Ethylbenzene	Xylene
TN56CD-SFX[5]	Below Tanks 56C and 56D	1,350 J	—	4.450 J	10.100 J	12.200 J	85.700 J
S09-T1S[6]	9	NA	4,200	—	—	—	—
S09-T1N[6]	9	NA	1,100	—	—	—	0.094
S09-T1W[6]	5	NA	—	—	—	—	—

1 IT 1992b
2 PRC 1992a
3 PRC 1991c
4 PRC 1993a
5 PRC 1991b
6 Tank 1, Quorum 1991
7 TPH as diesel
J Estimated Value
D Selected at secondary dilution factor
BLS Below land surface

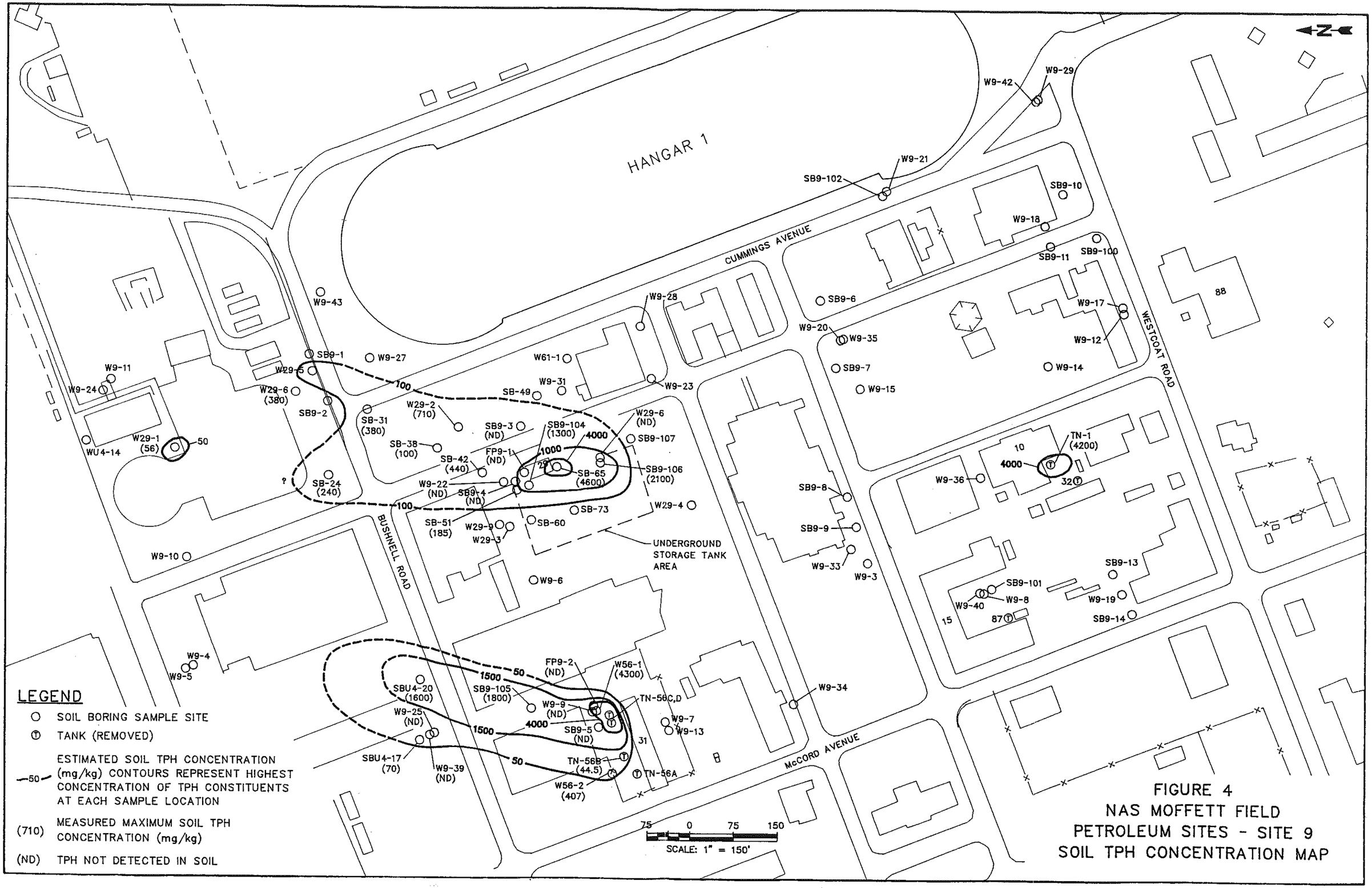


FIGURE 4
NAS MOFFETT FIELD
PETROLEUM SITES - SITE 9
SOIL TPH CONCENTRATION MAP

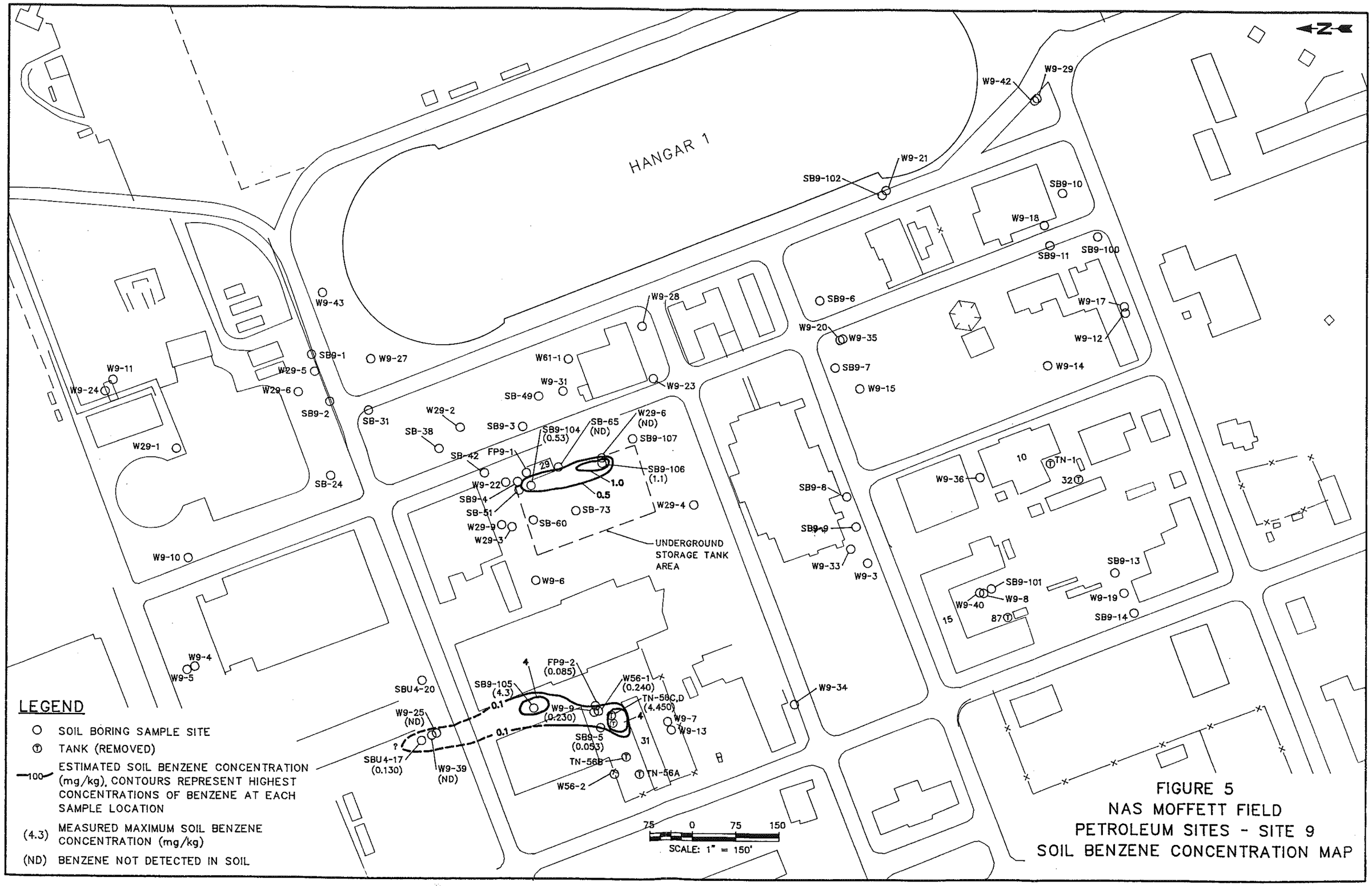
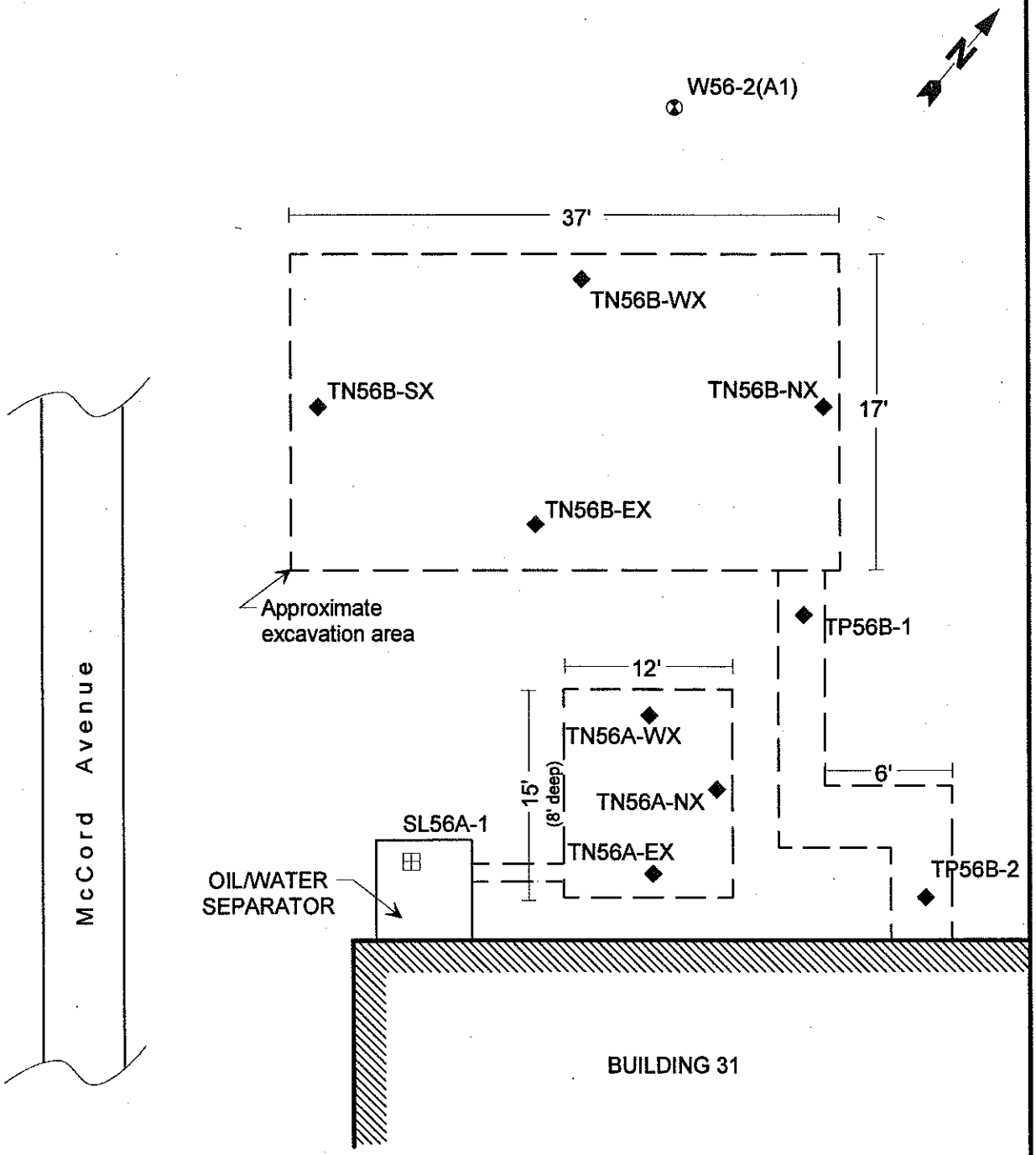


FIGURE 5
NAS MOFFETT FIELD
PETROLEUM SITES - SITE 9
SOIL BENZENE CONCENTRATION MAP



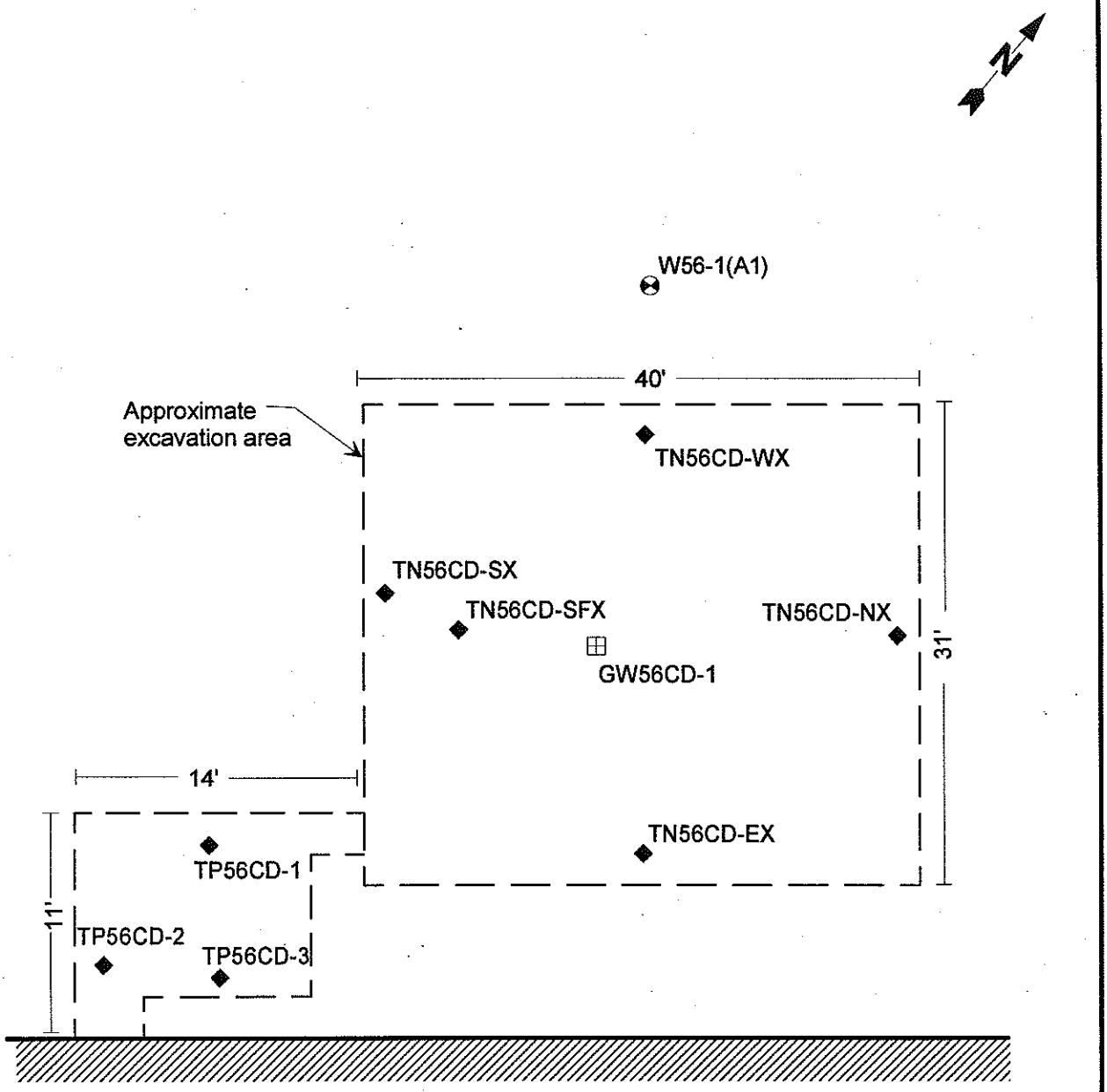
LEGEND

- SOIL SAMPLE, ORIGINAL EXCAVATION
- GROUND WATER SAMPLE
- GROUND WATER MONITORING WELL

NOT TO SCALE

DATE: 10/01/93 JLH DN FILE: 044\0236\IRS\RPMEX_SALL.DRW

FIGURE 6
NAS MOFFETT FIELD
TANKS 56A AND 56B
EXCAVATION AND SAMPLE LOCATIONS



LEGEND

- SOIL SAMPLE, ORIGINAL EXCAVATION
- GROUND WATER SAMPLE
- GROUND WATER MONITORING WELL

NOT TO SCALE

DATE: 09/28/93 JLH DN FILE: 044\0236\RPSRP\EX_SALL.DRW

FIGURE 7
NAS MOFFETT FIELD
TANKS 56C AND 56D
EXCAVATION AND SAMPLE LOCATIONS

and TPH as gasoline at maximum concentrations of 0.052 mg/kg (from sample TN56A-NX) and 14.0 mg/kg (from sample TN56A-WX) (PRC 1991b). Tank 56A was recommended for no further action.

Analytical results from the recent tank removals at Building 29 are currently not available; copies of the results will be provided on an individual basis when available. Samples from nearby downgradient boreholes, however, indicate TPH constituents in soil at levels greater than 100 mg/kg are detected as far as 450 feet downgradient of the USTs near Building 29 at well W29-5, and as far as 350 feet downgradient of the former USTs near Building 31 at boring SBU4-20. However, a large data gap exists between these sample locations and the former tank locations. Additional sampling, therefore, is recommended north of the Building 29 and 31 former tank sites to fill these gaps and confirm the extent of contamination.

TPH as diesel (4,200 and 1,100 mg/kg) was detected in soil samples (S09-T1S and S09-T1N) taken from sidewalls of the Tank 1 excavation (Table 7). Additional investigation is recommended to evaluate the extent of contamination from these sidewall samples. The only BTEX constituent detected was xylene at a concentration of 0.094 mg/kg. No soil sample data are available for the area near Tank 32. Samples will be collected when Tank 32 is removed. Samples will also be collected when Tank 87 is removed.

BTEX constituents were also detected at Site 9. Elevated concentrations of BTEX constituents were primarily detected near the former tanks at Buildings 29 and 31. The maximum concentration of benzene (4.450 mg/kg) was detected in a sample collected at the bottom of the Tank 56C and 56D excavation (TN56CD-SFX). Figure 5 depicts benzene concentration contours. These contours closely follow the TPH contours in Figure 4.

Soil data indicate that three areas of TPH contamination may exist at Site 9: (1) the area north of the former tanks at Building 29, (2) the area north of the former tanks at Building 31, and (3) the area around Tank 1 (Figure 4). The soil contamination could originate from previous operational practices (such as tank stripping or accidental overfilling), or some tanks may have leaked. All of the tanks in these areas have been removed, with the exception of Tanks 32 and 87, which are scheduled for removal; therefore, active sources at Site 9 have been eliminated or are being investigated and removed.

Soil data from Site 9 indicate that some data gaps exist at the areas above. For example, additional data are needed north of Building 29, north of Building 31, and north and south of Tank 1. Additional investigations will be conducted to fill these data gaps before considering these areas in Site 9 for corrective action. A field work plan was prepared for agency review describing additional activities.

2.2.2 Groundwater Analytical Results

Site 9 is located above the regional groundwater VOC plume and TPH constituents detected in groundwater at Site 9 are commingled with the regional VOC plume. As discussed in Section 1.1, groundwater in this area is being addressed through a regional CERCLA response action and through expanded Navy source control activities (also following CERCLA requirements). Furthermore, potential sources of contamination are being addressed. Since these potential sources are being addressed, future impacts to groundwater will be minimized. Therefore, groundwater at the Site 9 area is not evaluated in this report, but is addressed by the CERCLA response actions.

2.3 SITE 12

Site 12 was a fire fighting training area located on the western portion of NAS Moffett Field. The site consisted of an unlined 65-foot by 65-foot pit with a surrounding berm about 1 foot high. Within the pit was a mockup of a plane used as a target. The site also contained a 5,000-gallon aboveground fuel tank located 90 feet north of the pit, which stored waste fuels used in the training exercises.

Data collected thus far at Site 12 are documented in the Site 12 fire fighting training area action memorandum (PRC 1993c), which should be consulted for specific data and information. Petroleum-related compounds and SVOCs were detected in soil samples, and recommendations for remediation were made. Subsequently, remediation of Site 12 soils occurred during fall 1993. Remediation consisted of excavation and treatment by catalytic oxidation. This treatment technology used a continuous batch process with hydrogen peroxide and a catalyst to chemically oxidize petroleum constituents. The results of the Site 12 soil remediation, however, were not available for inclusion in this document. A technical memorandum documenting results and recommendations will be prepared as part of Site 12 activities and will be submitted during spring 1994. Once the technical memorandum has been completed, any additional investigations, evaluations, and remediations required at Site 12 will be included in future petroleum sites documents.

Only minor levels of TPH constituents were detected in groundwater samples collected in August 1992 from the six groundwater monitoring wells at Site 12 (PRC 1993d). Toluene and ethylbenzene (less than or equal to 0.5 μg/L) were recorded in a sample from well W12-4. However, additional collection and evaluation of Site 12 groundwater data is required after remediation is complete. Therefore, data from Site 12 will be addressed when the Site 12 technical memorandum is complete and will be included in future petroleum sites documents.

2.4 SITE 15

Site 15 consists of eight sumps and oil/water separators and one UST, described in Table 8 and shown in Figure 8 and Plate 1. The tank and sumps were used or are in use to collect liquid wastes accumulated in containment areas from various operational activities. The Site 15 tank and sumps are distributed throughout NAS Moffett Field. Tank 54 and Sumps 59, 63, and 65 are located in the eastern portion of the facility. Sumps 25, 42, 58, 62, and 64 are located in the western portion.

Of the one tank and eight sumps at Site 15, only two are active (Sumps 59 and 63). Sump 42 was removed in October 1990, Tank 54 was removed in June 1993, and Sump 65 is assumed to have been removed since it can't be located. Sumps 25, 58, and 62 are inactive and scheduled for removal in fall 1993. Sump 64, a stormwater diversion box, is inactive and will either be used in the future or closed. Below is a summary of the Site 15 tank and sumps:

Sump 25 is inactive; it previously collected wastewater generated by aircraft washing activities south of Hangar 1 (ERM 1986b). Sump 25 is scheduled for removal in fall 1993.

Sump 42 previously collected condensed gasoline vapor and was located at the new NEX service station. In October 1990, Sump 42 and four nearby USTs were removed.

Tank 54 was a wastewater tank located near Hangar 3 that was used by the aircraft intermediate maintenance department (AIMD) paint shop. Tank 54 was removed in June 1993.

Sump 58 is an oil/water separator that received drainage from the work areas and washwater from the wash rack at the auto hobby shop (Building 544). The wastewater discharged from Sump 58 to the sanitary sewer (ERM 1986b).

Sump 59 is an oil/water separator that receives washwater from the California Air National Guard ground support equipment activity cleaning area. The sump effluent at Building 684 discharges to the sanitary sewer (ERM 1986b).

TABLE 8

NAS MOFFETT FIELD PETROLEUM SITES
SITE 15
SUMP SUMMARY

Sump	Capacity (Gallons)	Contents	Use	Status	Target Removal
25	2,000	Aircraft Wash Wastewater	Oil/water Separator	Inactive	Fall 1993
42	100	Condensed Gasoline Vapor	Condensed Vapor Sump	Removed (10/90)	Removed
54[1]	1,500	Wastewater	Storage	Removed (6/93)	Removed
58	300	Oily Wastewater	Oil/water Separator	Inactive	Fall 1993
59	1,400	Machine Surface Oily Wastewater	Separator and Sump	Active	Not scheduled
62	13,000	Paint Wastewater	Paint Mist Recirculator	Inactive	TBD
63	200	Stripping Wastewater	Separator and Sump	Active	Not scheduled
64	628	Storm Water	Stormwater Diversion Box	Inactive	TBD
65	Unknown	Battery Locker Wastewater	Wastewater Sump	Unknown (Assumed Removed)	Unknown

Source: PRC 1992d

[1] Underground storage tank

TBD To be determined

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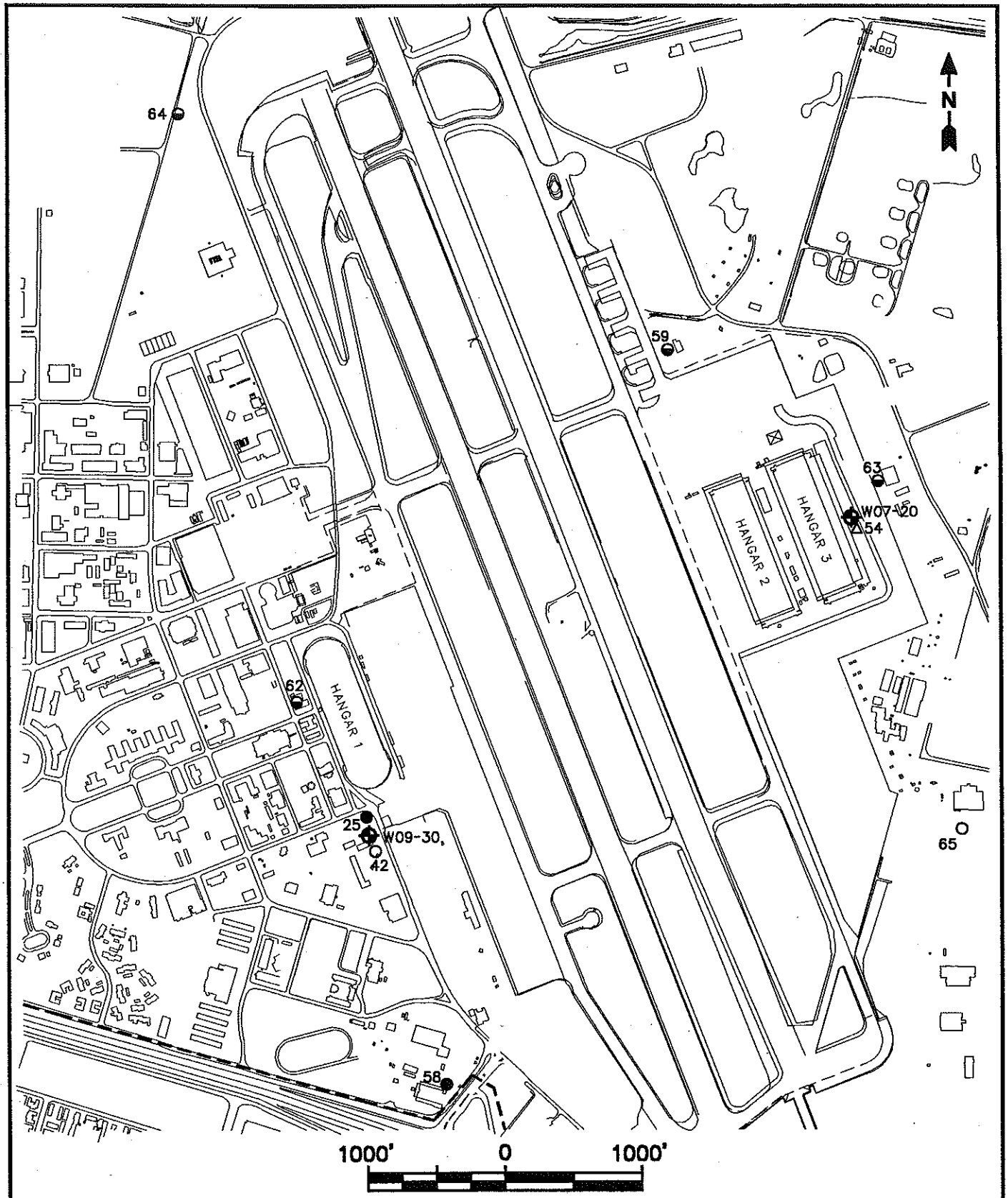

SCALE: 1"=1000'

LEGEND

- OIL/WATER SEPARATOR
- SEPARATOR & SUMP
- SUMP
- GROUNDWATER MONITORING WELL
- TANK

FIGURE 8
NAS MOFFETT FIELD
SITE 15 - TANK AND SUMPS

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Sump 62 consisted of two separate pits and was used as an oil/water separator that previously received excess oil- and latex-based paints and wastewater from painting operations in the paint shop spray booth. The sump also collected paint overspray from the paint spray booth through a floor drain. Sump 62 is located at the northwestern corner inside Building 45. During painting operations, excess oil- and latex-based paints drained through two open grates into a concrete sump (Sump 62) located directly below the painting area. The spray booth contained a water impingement fume scrubber that operated on recirculated water. Sump pumps were located at opposite ends of each pit and recirculated the water through the system. The wastewater in Sump 62 was replaced every 3 to 4 months with fresh water after the system was emptied to the storm sewer through a settlement sump (Sump 61) located north of Building 45. Sump 61 (Site 17) was removed in October 1990. The paint shop activities ceased in October 1992 (Navy 1993a). Sump 62 was drained, cleaned, and is inactive.

Sump 63 is active. It consists of a drain and sump located west of Building 142 that collects surface water runoff from the sandblasting and cleaning area west of Building 142. Operations in this area support the AIMD ground support equipment activity (ERM 1986b).

Sump 64 is an inactive stormwater diversion box. This sump previously collected runoff water through the west side storm sewer system and either directed the water north to the stormwater retention basins or diverted the flows east to the Building 191 lift station, depending on flow volumes. The storm sewer system is now rerouted to NASA's retention pond. Sump 64 has been visually inspected and was recommended for removal by RWQCB staff. NASA has agreed to remove the sump as part of its remedial activities.

Sump 65 received neutralized electrolyte from processing lead-acid and nickel-cadmium batteries. NAS Moffett Field no longer neutralizes electrolytes at the battery locker, where Sump 65 is located (ERM 1986b). During a recent site visit, Sump 65 could not be located. It is assumed that the sump has been removed. No data are available regarding any potential removal or sampling activities. Inspections and sampling are recommended.

2.4.1 Soil Analytical Results

Analytical data for soils surrounding Sumps 25, 58, 59, 62, 63, 64, and 65 are not available; data are available, however, for Sump 42 and 54 and are discussed below. Data are not available because releases from these sumps have not been identified and soil samples have not been collected. Therefore, consistent with state guidance, inspections have been conducted to assess whether releases have occurred. Based on the inspections, collection of soil samples has been recommended for all sumps not scheduled for removal to evaluate whether a release has occurred. All sumps scheduled for removal will be sampled according to state guidance and evaluated for closure. State guidance includes the appropriate soil sampling, sampling groundwater if present in the excavation, and installing downgradient wells if soil or groundwater contamination is identified.

Sampling results from removal of Sump 42 at the new NEX service station are provided in Table 9 and sample locations in Figure 9. During removal, floating product was noted on the groundwater that seeped into the UST excavation, and approximately 1 foot of free product was measured in a groundwater monitoring well north of the tank excavation before the well was pumped dry. All free floating product and groundwater from the excavation were removed during tank removal activities. Soil and groundwater samples were taken from the tank excavation (Figure 3) and the excavation was backfilled with the removed soil and backfill materials as an interim measure, as agreed by the Navy and regulatory agencies (PRC 1990a). In addition, the vapor condensation sump (Sump 42) and all piping associated with the tanks were removed following the tank removals. Approximately 6 inches of product were in the bottom of the sump at the time of its removal. No visible soil staining or detectable odors were noted within the piping trenches. Data indicate that only low concentrations of TPH and BTEX constituents were measured in samples from the soils remaining in the piping trenches and below the vapor condensation sump (Table 9). Analytical results of samples from the spoils piles have been provided since these soils were used for backfill. Concentrations of up to 1,200 mg/kg TPH as gasoline were detected in samples collected from the tank excavation spoils piles (Table 9). Concentrations of BTEX compounds were also observed. These data indicate that only minor concentrations of TPH and BTEX constituents exist in the unexcavated soils around Sump 42. However, the soils used as backfill may contain elevated levels of TPH and BTEX constituents, although during the period between the sample collection and placement back into the Sump 42 excavation, aeration and volatilization may have reduced the concentrations previously measured. Therefore, additional investigation of Sump 42 is recommended and has been included with the additional investigation scheduled to begin at the NEX service station during spring 1994. Currently, soil borings and monitoring wells are proposed for the vicinity of Sump 42, which are documented in the addendum to the NEX service station field work plan. Once the additional investigation has been completed and recommendations provided in a summary report, recommendations will be included in future petroleum sites documents.

Soil samples were collected from the Tank 54 excavation sidewalls in December 1992 and analyzed for TPH and VOCs. Sample locations are provided in Figure 10. Copies of analytical results for TPH, however, have not been located; although personnel familiar with the tank removal indicated there were no detections. VOC analysis of these samples revealed detections of methylene chloride (maximum of 0.280 mg/kg) in two sidewall samples (samples 54S and 54N) and trichloroethene (TCE) (0.024 mg/kg) in one sidewall sample (sample 54S). Copies of the laboratory analytical VOC data sheets have been provided in Appendix B since they have not been previously submitted. A

TABLE 9

NAS MOFFETT FIELD PETROLEUM SITES
SITE 15
PETROLEUM HYDROCARBONS SOIL SAMPLE SUMMARY, SUMP 42
(concentrations in mg/kg)

Sample Location	Sample Depth (Feet BLS)	TPH as Gasoline	Benzene	Toluene	Ethylbenzene	Xylene
4 (piping)	3.3	2.3	0.095	0.016	0.030	0.11
10 (beneath sump)	8.5	32	0.2	0.86	0.53	2.4
20 (spoils pile)	NA	980	0.81	14	17	170
21 (spoils pile)	NA	1,200	0.81	23	27	210
22 (spoils pile)	NA	97	0.16	1.9	1.1	5.6
23 (spoils pile)	NA	1,000	1.8	20	12	81
24 (spoils pile)	NA	560	2.7	16	8.5	47

Source: PRC 1990a
--- Not detected
NA Not applicable
TPH Total petroleum hydrocarbons
BLS Below land surface
mg/kg Milligrams per kilogram

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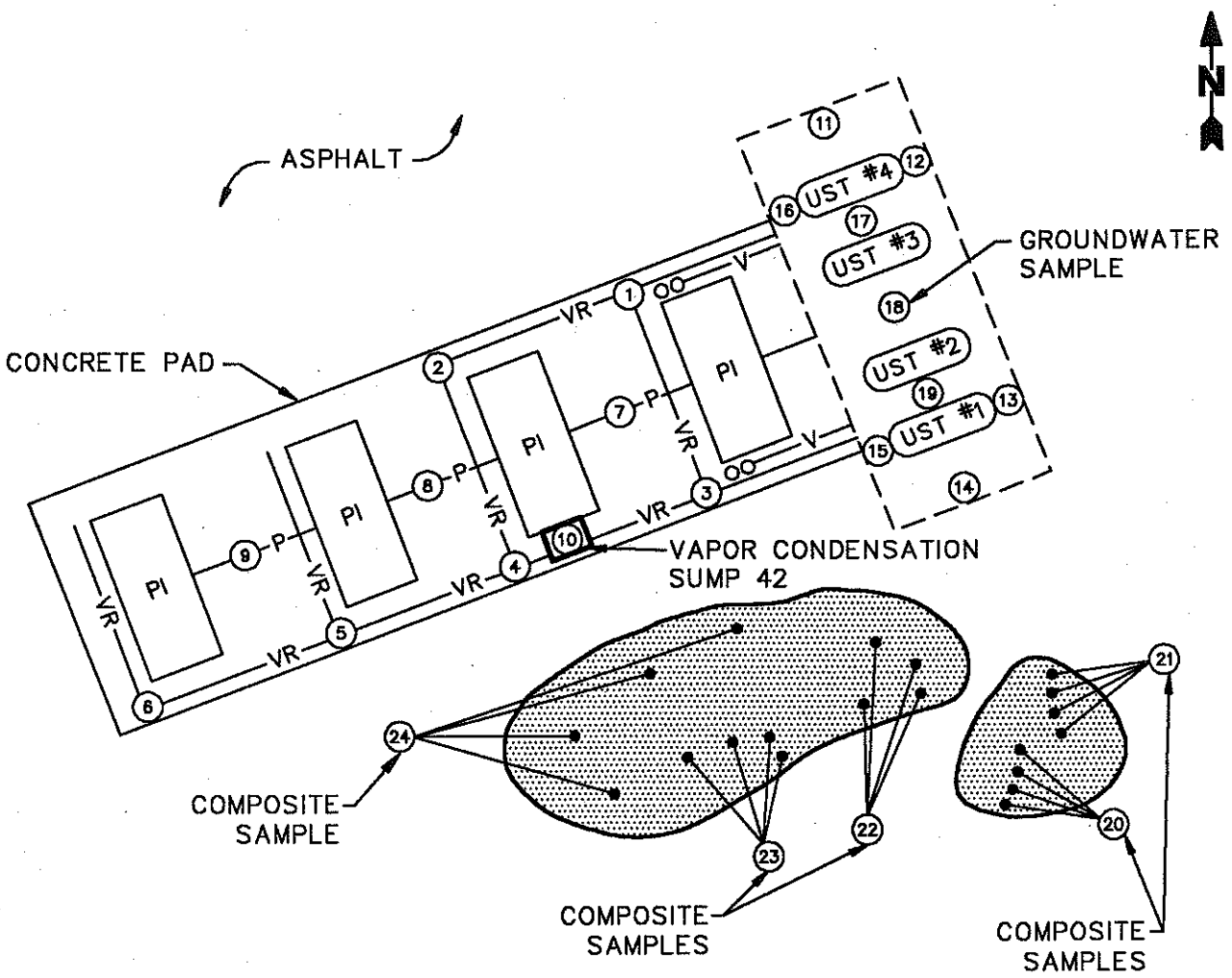


LEGEND

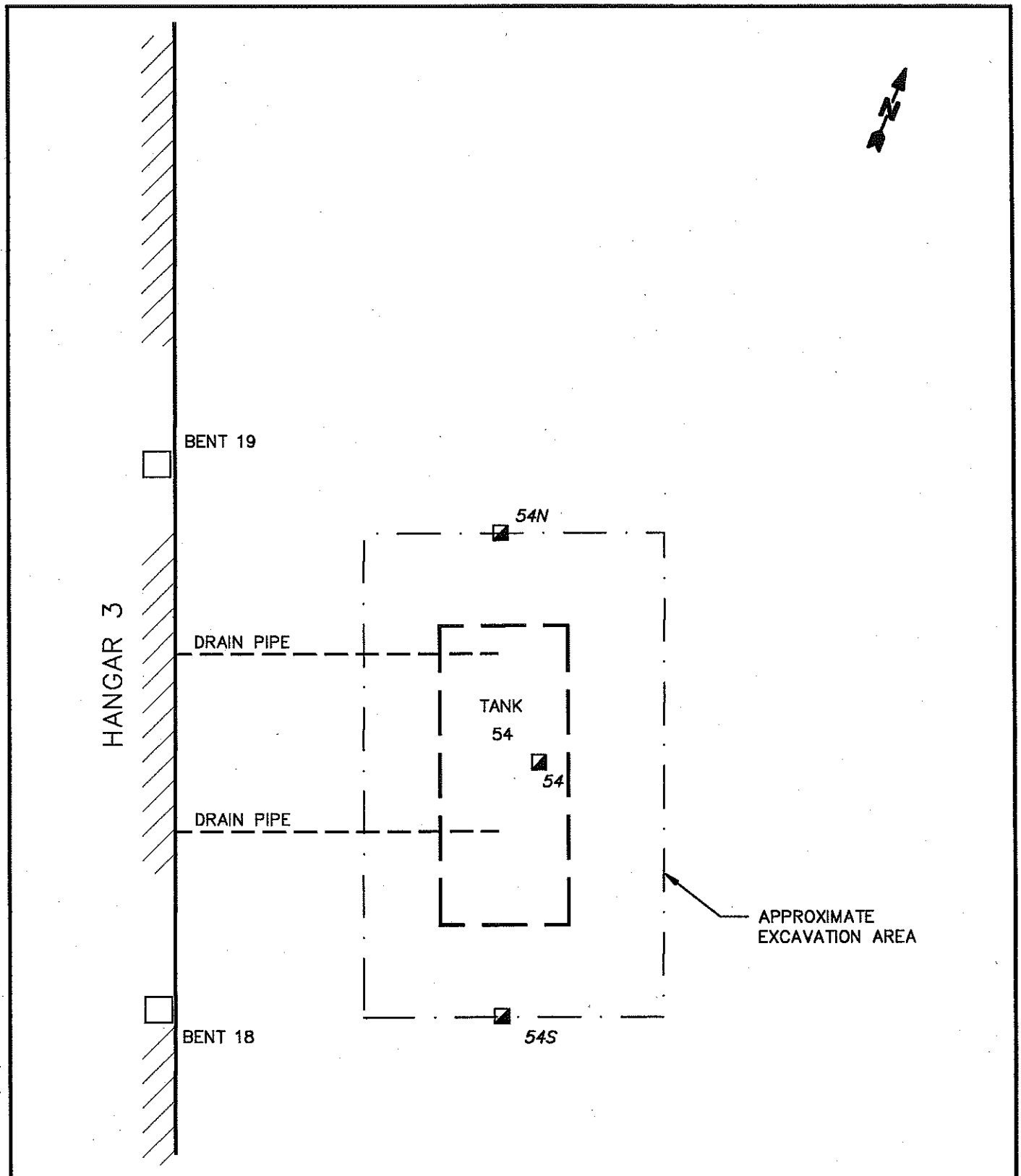
- UNDERGROUND STORAGE TANK LOCATIONS
- LOCATION OF EXCAVATED SOIL PILE (FROM TANK REMOVALS)
- PI — PUMP ISLAND
- (1) — SAMPLE LOCATION NUMBER
- (UST #3) — UNDERGROUND TANK
- —VR— VAPOR RECOVERY LINE
- —V— VENT LINE
- —P— PRODUCT LINE

SOURCE: PRC 1990a

NOT TO SCALE

FIGURE 9
NAS MOFFETT FIELD
SITE 15
NEW NEX SERVICE STATION
SUMP 42 SAMPLING LOCATIONS

DATE: 09/28/93 JLH DN FILE NAME: \044\0236\IRP\SRP\F108.DWG



LEGEND

SOIL SAMPLE, ENLARGED EXCAVATION

2.5 0 2.5 5

SCALE IN FEET

FIGURE 10
NAS MOFFETT FIELD
SITE 15 - TANK 54
EXCAVATION AND
SAMPLE LOCATIONS

DATE: 09/29/93 JLH DN FILE NAME: \044\0236\RP\SRP\TNK15-54.DWG

followup bottom sample (sample hole 54) was collected in July 1993 and no VOCs were detected. These data indicate that minor concentrations of methylene chloride and TCE may exist, but are probably limited to the immediate vicinity of the excavation walls. Since only minor concentrations were in the sidewall samples and none were detected in samples from beneath Tank 54, no further action is recommended.

2.4.2 Groundwater Analytical Results

As discussed above, evidence of releases from Sumps 25, 58, 59, 62, 63, 64, and 65 has not been obtained. Consistent with state guidance, groundwater evaluations are not required unless evidence of soil contamination is identified. Therefore, groundwater near these sumps should be evaluated only if soil contamination is identified. Tank 54 and Sumps 59, 63, and 65 are located in the eastern portion of the facility and Sumps 25, 42, 58, 62, and 64 are located in the western portion. As discussed in Section 1.1, groundwater contamination under the western portion will be addressed as part a CERCLA response action for a regional VOC plume and expanded Navy source control activities. Groundwater under the eastern portion is also being addressed on a regional basis as part of a CERCLA response action for NAS Moffett Field (with the exception of groundwater contaminated by only petroleum products since petroleum-contaminated groundwater is excluded from CERCLA).

Regardless of which program is addressing groundwater near the Site 15 tank and sumps, groundwater data concerning petroleum products and other constituents, similar to soil data, are generally not available. Groundwater data are not available because evidence of releases to soils has not been identified and groundwater monitoring wells have not been installed near the tank or sumps. There are, however, wells downgradient of the tank and sumps, although the distance between them is greater than recommended by state guidance (within 10 feet). If soil contamination is identified and groundwater evaluations required, the Navy will use these existing well locations, to the extent possible, to maximize the use of existing data.

Since minor soil contamination was identified at Tank 54 and Sump 42, analytical results from groundwater samples collected from the closest downgradient monitoring wells were reviewed, consistent with state guidance. Quarterly sampling results for samples from well W9-30 (near former

Sump 42) and well W6-10 (near former Tank 54) are included in Table 10. Well W9-30 was evaluated for petroleum constituents only since Sump 42 managed only petroleum products and no

TABLE 10

NAS MOFFETT FIELD PETROLEUM SITES
SITE 15
PETROLEUM HYDROCARBON GROUNDWATER AND WASTEWATER SAMPLE SUMMARY
(concentrations in μg/L)

Source	Date	Sample Location	Approximate Down Gradient Distance (feet)	Screened Interval (feet BLS)	Seasonal High Water Level* (Date Measurement)	TPH Purgeables as Gasoline	TPH Extractables as Diesel	Benzene	Toluene	Ethlbenzene	Xylene
Sump 42	09/09/92	W09-30[1] Sump[3]	80 0.0	7.5-17.5 NA	5.91 (11/19/92)	--- free phase	— NA	— NA	— NA	— NA	— NA
Tank 54	08/07/92	W07-20[4] Tank[3]	15 0.0	28-33 NA	(5/20/93) 5.72 NA	NA NA	NA NA	— —	— —	— —	— —
Sump 58	11/07/85	Tank[3]	0.0	NA	NA	NA	NA	—	—	—	36
Sump 59	11/07/85	Sump[3]	0.0	NA	NA	NA	NA	—	—	—	—

Source: PRC 1993d
PRC 1993e
IT 1992c

— Not Detected
NA Not Applicable or Not Analyzed
* Feet BLS

detections were observed (PRC 1993e). Well W6-10 was evaluated for VOCs and petroleum constituents since Tank 54 managed wastewater and the only detection was acetone at a concentration of 8 μg/L (PRC 1993d). Well W9-30 is screened at 7.5 to 17.5 feet BLS and well W6-10 is screened at 9.5 to 19.5 feet BLS.

Additionally, wastewater samples were taken from all sumps except Sump 58 (Table 10). A wastewater sample was collected, however, from the first sanitary sewer manhole downstream from Sump 58. The wastewater results indicate that BTEX was either not detected or was detected at insignificant levels.

2.5 SITE 19

Site 19 includes Tanks 2, 14, 43, and 53, which are located throughout NAS Moffett Field (Plate 1). Table 11 summarizes the capacity, contents, use, and status for each tank. Tanks 2 and 43 previously contained waste products and Tanks 14 and 53 contained petroleum products. These tanks have been removed and all removal and sampling activities have been fully described in previous reports (PRC 1991b and 1993b). Below is a summary from the previous reports.

Tank 2 was a 2,000-gallon tank that was used to store waste products from the power plant shop in Hangar 3. Waste products included oils, hydraulic fluids, methyl ethyl ketone (MEK), JP fuels, cleaners, PD-680 solvent, toluene, and stoddard solvent. The tank was removed in May 1990 (PRC 1991b).

Tank 14 was a 1,100-gallon tank that was used as a standby diesel fuel storage tank for the backup generator in Building 158, the Operations Building. The tank was removed May 1990 (PRC 1991b). The tank was in good condition when it was removed and showed no indication of having leaked. However, soil staining was observed in the initial excavation, which may have been caused by operating practices such as accidental overfilling. Additional soil was excavated and further investigations indicated only very minor levels of contaminants remain in the former Tank 14 area (discussed below).

Tank 43 was a 2,000-gallon tank that was used to collect rinse water from an engine cleaning rack, drains, and sinks in Hangar 3. The tank was removed in May 1990 (PRC 1991b). The tank stored waste oils, solvents, waste fuel, MEK, PD-680 solvent, paint waste, and battery acids.

TABLE 11

NAS MOFFETT FIELD PETROLEUM SITES
SITE 19
TANK SUMMARY

Tank	Capacity (Gallons)	Contents	Use	Status
2	2,000	Waste Products[1]	Waste and wastewater storage	Removed 5/90
14	1,100	Diesel	Fuel storage	Removed 5/90
43	2,000	Waste Products[2]	Waste and wastewater storage	Removed 5/90
53	500	Unleaded gasoline	Fuel storage	Removed 5/90

Source: PRC 1991b

[1] Oils, hydraulic fluids, methyl ethyl ketone, JP fuels, B&B cleaner, PD 680 solvent, toluene and Stoddard solvent.

[2] Waste oils, solvents, waste fuel, methyl ethyl ketone, PD-680 solvent, paint waste, and battery acids.

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Tank 53 was an unleaded gasoline tank that was used for fuel storage at the golf course maintenance area. The tank was removed in May 1990 (PRC 1991b). When the tank was removed, the soil covering the tank had a conspicuous gasoline odor. The soil surrounding the tank also appeared saturated with gasoline and had a strong gasoline odor.

2.5.1 Soil Analytical Results

As discussed above, analytical results for Tanks 2, 14, 43, and 53 have been fully described previously (PRC 1991b and 1993b) and should be consulted for specific data. However, a summary is provided below.

Soil samples were collected from the Tank 2 excavation and from monitoring well WT2-1 (PRC 1991b). Figure 11 depicts the sample locations and Table 12 presents the sample analytical results for Tank 2. The results indicated petroleum-related contamination in the walls of the excavation. One excavation wall sample, TN2-NY, contained 610 mg/kg TPH as gasoline and 1,700 mg/kg TPH as diesel, and sample, TN2-EY, contained 150 mg/kg TPH as gasoline and 59 mg/kg TPH as diesel. Additionally, TPH as JP5 was detected at 110 mg/kg in a soil sample from monitoring well W07-20. However, no TPH constituents were detected in soil samples from monitoring well WT2-1, located approximately 7 feet north of the excavation. Since Tank 2 managed waste products, analysis for VOCs and SVOCs were included. Analysis for VOCs revealed minor detections of toluene (maximum concentration of 0.086 mg/kg from a sample from well W2-2.5) and TCE (0.008 mg/kg from sample TP2-1) (PRC 1991b). SVOC analysis revealed five detections; the maximum was 4-methylphenol at a concentration of 1.420 mg/kg (PRC 1991b)

Tank 14 soil samples were collected from the east and west walls of the excavation during initial tank removal activities. Figure 12 depicts the sample locations and Table 13 presents analytical results. Because soil in the excavation was visibly stained, additional soils were excavated. Groundwater was encountered while enlarging the excavation; therefore, no sample was collected from the bottom of the excavation. A groundwater sample was collected and is discussed in Section 2.5.2. Additional soil samples were collected from the north, east, south, and west walls at the soil/groundwater interface after the excavation was enlarged (PRC 1991b). Only the sample collected from the north wall of the Tank 14 excavation indicated an elevated concentration of petroleum-related constituents. Sample TN14-NY contained 1,700 mg/kg TPH as diesel. Minor detections of TPH as motor oil were also observed ranging from 15 mg/kg (sample TN14-EY) to 48 mg/kg (sample TP14-1). An

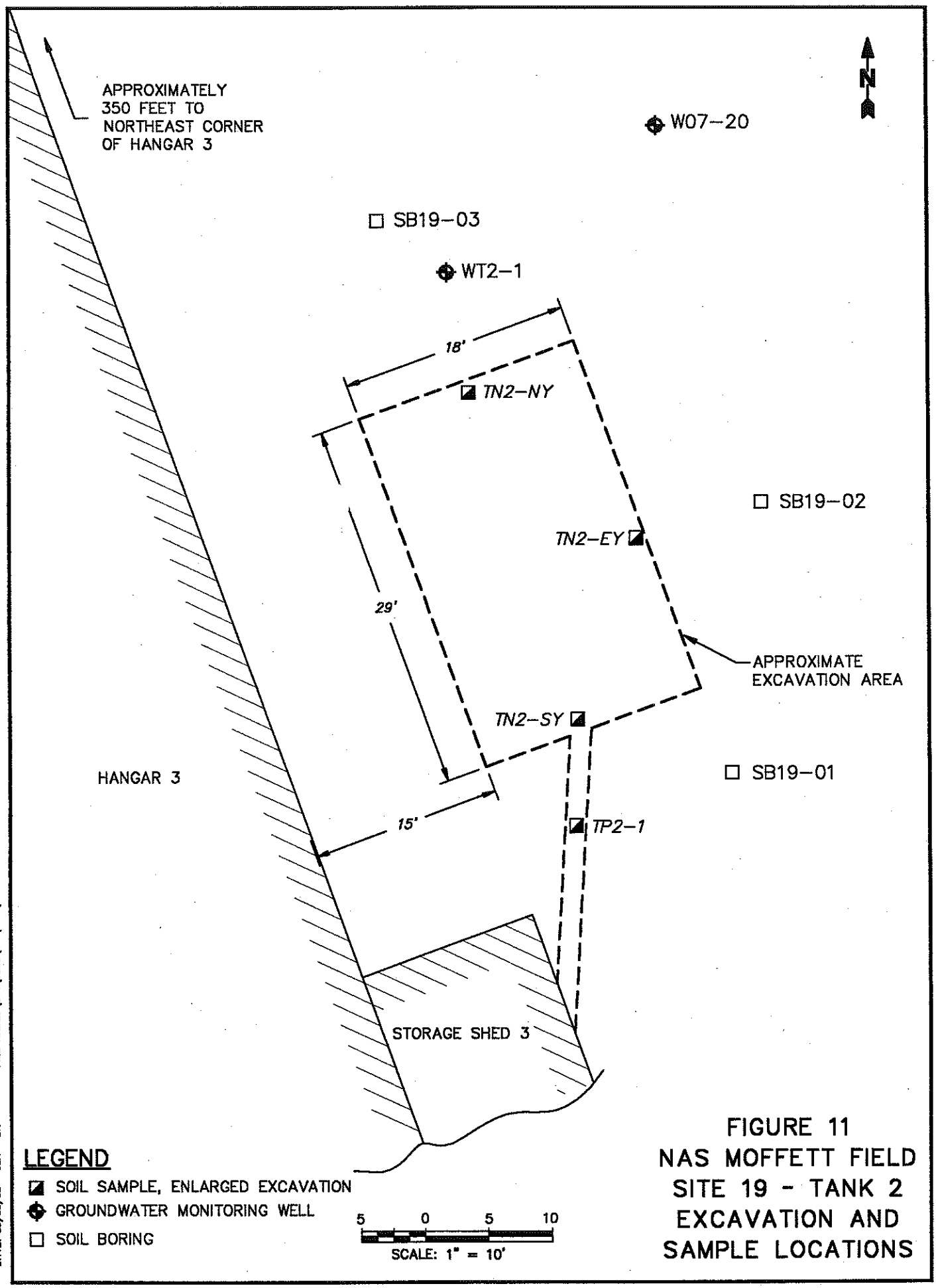

FIGURE 11
NAS MOFFETT FIELD
SITE 19 - TANK 2
EXCAVATION AND
SAMPLE LOCATIONS

TABLE 12

NAS MOFFETT FIELD PETROLEUM SITES
SITE 19
PETROLEUM HYDROCARBONS SOIL SAMPLE SUMMARY
TANK 2
(concentrations in mg/kg)

Sample Location	Sample Depth (Feet BLS)	TPH Purgeable as Gasoline	TPH Extractable as Diesel	TPH Extractable as JP5	TPH Extractable as Motor Oil	Benzene	Toluene	Ethylbenzene	Xylene
TN2-SY	8.0	—	—	—	—	—	—	—	—
TN2-NY	8.0	610	1,700	—	—	—	—	—	—
TN2-EY	8.0	150	59	—	—	—	—	—	—
TP2-1	2.0	43	72	—	120	—	0.068	—	
W07-20[1]	1-2.5	NA	NA	—	NA	—	0.002	—	—
	3-4.5	NA	NA	110	NA	—	0.004	—	—
	5-6.5	NA	NA	—	NA	—	0.002	—	—
WT2-1[1]	2.5	NA	NA	—	NA	—	0.086	—	—
	5	NA	NA	—	NA	—	0.010	—	—
SB19-01[1]	1-2.5	NA	NA	—	NA	—	0.004	—	—
SB19-02[1]	3-4.5	NA	NA	—	NA	—	0.002	—	—
	5-6.5	NA	NA	—	NA	—	0.002	—	—
SB19-03[1]	1-2.5	NA	NA	—	NA	—	0.002	—	—
	3-4.5	NA	NA	—	NA	—	0.002	—	—
	5-6.5	NA	NA	—	NA	—	0.002	—	—

Source: PRC 1991b unless otherwise noted.
[1] IT 1993b
— Not detected
TPH Total petroleum hydrocarbons
mg/kg Milligrams per kilogram
BLS Below land surface
NA Not analyzed
J Estimated value

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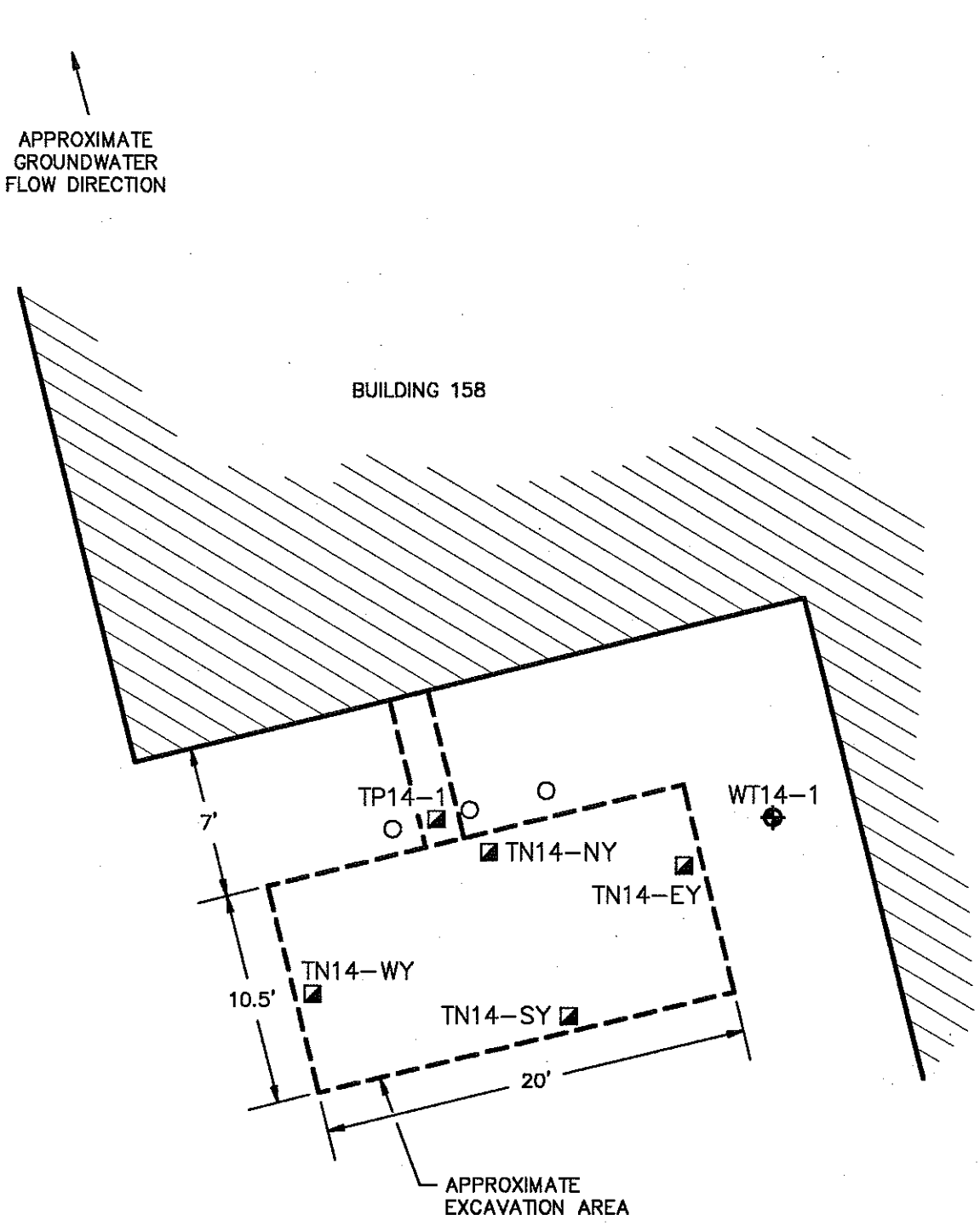

LEGEND

- SOIL SAMPLE, ENLARGED EXCAVATION (JUNE 1990)
- GEOPROBE® SUBSURFACE SOIL SAMPLE LOCATION (TWO DEPTHS; 8–9 FT AND 13–14 FT BLS)
- GROUNDWATER MONITORING WELL

SOURCE: ADDITIONAL TANK SUMP FIELD INVESTIGATION TECHNICAL MEMORANDUM (PRC 1993b)

NOT TO SCALE

FIGURE 12
NAS MOFFETT FIELD
SITE 19 - TANK 14
EXCAVATION AND SOIL
SAMPLE LOCATIONS

DATE: 09/29/93 JLH FILE: \044\0236\IRP\SRP\TNK-19-14.DWG

TABLE 13

NAS MOFFETT FIELD PETROLEUM SITES
SITE 19
PETROLEUM HYDROCARBONS SOIL SAMPLE SUMMARY
TANK 14
(concentrations in mg/kg)

Sample Location	Sample Depth (Feet BLS)	TPH as Gasoline	TPH as Diesel	TPH as Motor Oil
TN14-EY	8.0	NA	3.0	15
TN14-NY	8.0	NA	1,700	---
TN14-SY	8.0	NA	3.9	20
TN14-WY	8.0	NA	---	25
TP14-1	2.0	NA	7.9	48

Source: PRC 1991b

--- Not detected

Note: BTEX constituents were not analyzed

TPH Total petroleum hydrocarbons
BLS Below land surface
mg/kg Milligrams per kilogram
NA Not analyzed

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additional investigation was undertaken to further characterize the area of the north excavation wall. Six soil samples were collected from the vicinity of the north wall of the enlarged Tank 14 excavation during May 1992. Soil samples were collected at two depths from each of the three locations shown in Figure 10. The samples were analyzed for TPH as diesel. No TPH as diesel was detected in any of the samples. Therefore, the previous detection of 1,700 mg/kg was attributed to localized contamination with no significant extent.

At Tank 43, TPH as diesel was detected in soil samples at concentrations ranging from 1.7 to 2,000 mg/kg. Table 14 presents the analytical results and Figure 13 indicates the sample locations. TPH as motor oil was detected in only one soil sample, at 20 mg/kg. TPH as gasoline concentrations ranged from no detections to 350 mg/kg. Significant levels of TPH constituents were detected in soil samples from the enlarged excavation, especially in samples TN43-WY (1,400 mg/kg) and TN43-SY (2,000 mg/kg) from the western and southern excavation walls. Only minor concentrations (all less than 20 mg/kg and most less than 10 mg/kg) of TPH constituents were detected in the samples collected from the enlarged piping trenches. Since Tank 43 managed waste products, analysis for VOCs, SVOCs, and metals was included. In addition to the BTEX detections presented in Table 14, other VOC detections include: PCE (maximum concentration of 23 μg/kg from sample TN43-EY), styrene (maximum of 7 μg/kg from sample W43-1), and TCE (maximum of 21 μg/kg from sample TN43-EY) (PRC 1991b; pages 75 through 79). Metals values were within estimated ranges for NAS Moffett Field, with the exception of arsenic and calcium; only one soil boring had arsenic concentrations above the reported range, W43-2, with concentrations ranging from 11.8 to 23.5 mg/kg (PRC 1991b; pages 80 through 82). Because visual observations were made of contamination remaining in the Tank 43 excavation and TPH was confirmed in soil samples, additional investigation is recommended to determine the extent.

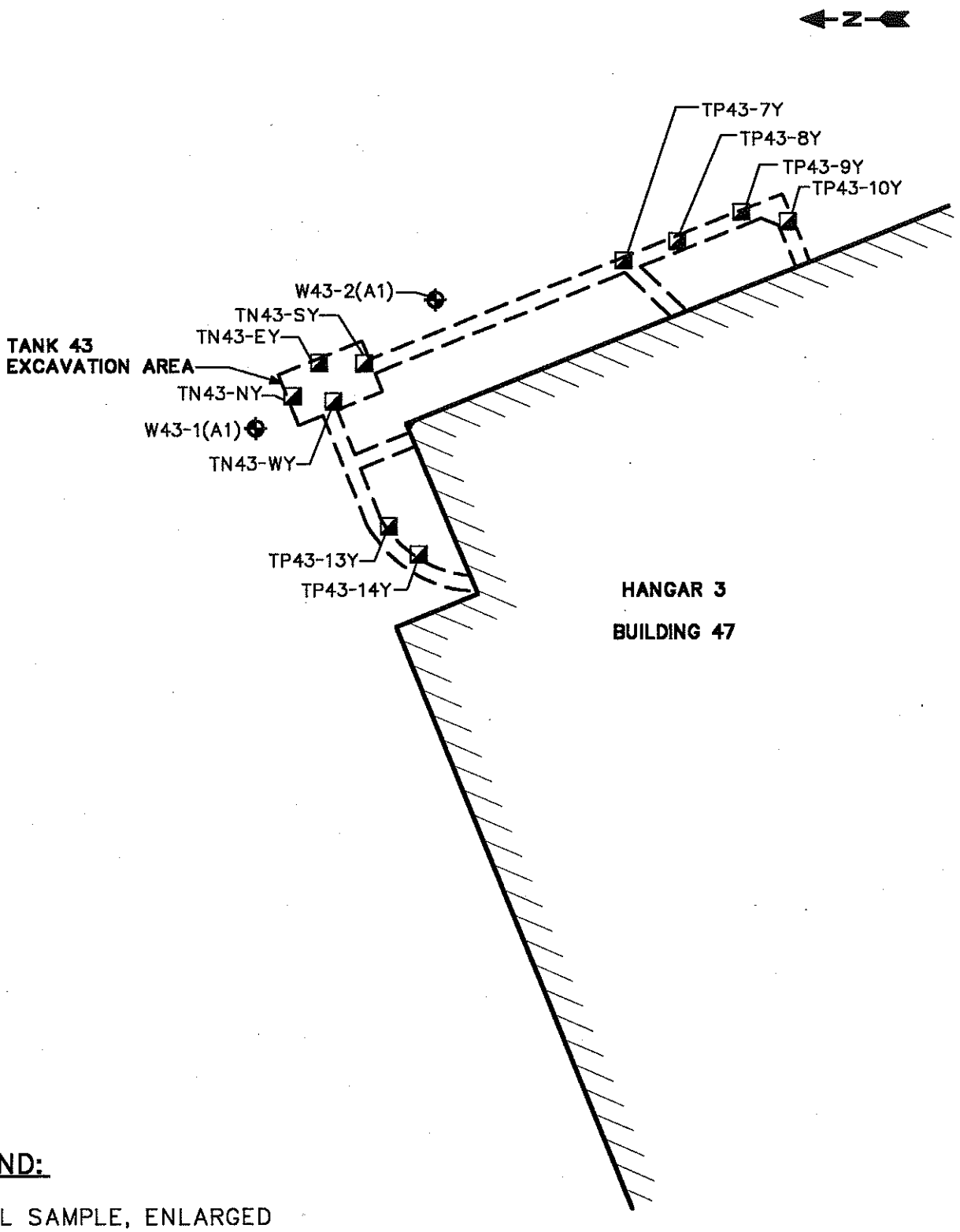
Similar to Tank 14, the Tank 53 area was also the subject of two investigations. Figure 14 indicates the location of the samples and Table 15 presents the analytical results. After a review of analytical results from a sidewall sample collected from the south wall of the initial Tank 53 excavation, the excavation was enlarged. Additional samples TN53-NY, TN53-SY, TN53-EY, and TN53-WY were collected from the walls of the enlarged excavation. These samples indicated that contamination remained in the excavation walls and, therefore, additional investigations in the Tank 53 area were conducted in 1992. Twenty-four soil samples were collected from the areas south, east, and west of the previous Tank 53 excavation and were analyzed for TPH as gasoline and BTEX compounds. Analytical results from samples collected during the additional investigation did not indicate any

TABLE 14

NAS MOFFETT FIELD PETROLEUM SITES
SITE 19
PETROLEUM HYDROCARBONS SOIL SAMPLE SUMMARY
TANK 43
(concentrations in mg/kg)

Sample Location	Sample Depth (feet BLS)	TPH Purgeable as Gasoline	TPH Extractable as Diesel	TPH as Motor Oil	Benzene	Toluene	Ethylbenzene	Xylene
TN43-EY	8.0	—	—	—	—	0.137	—	—
TN43-NY	8.0	6.2	1.7	—	—	—	—	—
TN43-SY	8.0	350	2,000	—	—	0.240	0.071	0.371
TN43-WY	8.0	250	1,400	—	—	0.072	—	0.027
W43-1	7.5	—	650	NA	—	1.180	0.150	0.420
W43-2	2.5	—	100	NA	—	—	—	—
W43-2	5.0	—	480	NA	—	—	—	—
W43-2	7.5	—	400	NA	—	—	—	—
TP43-7Y	2	—	5.8	NA	—	—	—	—
TP43-8Y	2	—	11	NA	—	—	—	—
TP43-9Y	2	—	5.5	NA	—	—	—	—
TP43-10Y	2	—	7.0	NA	—	—	—	—
TP43-13Y	2	14	13	20	—	—	—	—
TP43-14Y	2	—	2.6	—	—	0.058	—	0.007
TP43-16Y	2	1.0	73	NA	NA	NA	NA	NA

Sources: PRC 1991b
— Not detected
TPH Total petroleum hydrocarbons
mg/kg milligrams per kilogram
BLS Below land surface
NA Not analyzed



LEGEND:

- SOIL SAMPLE, ENLARGED EXCAVATION
- GROUNDWATER MONITORING WELL

50' 0 50'

SCALE: 1"=50'

SOURCE: PRC 1991b

FIGURE 13
NAS MOFFETT FIELD
SITE 19 - TANK 43
EXCAVATION AND
SAMPLE LOCATIONS

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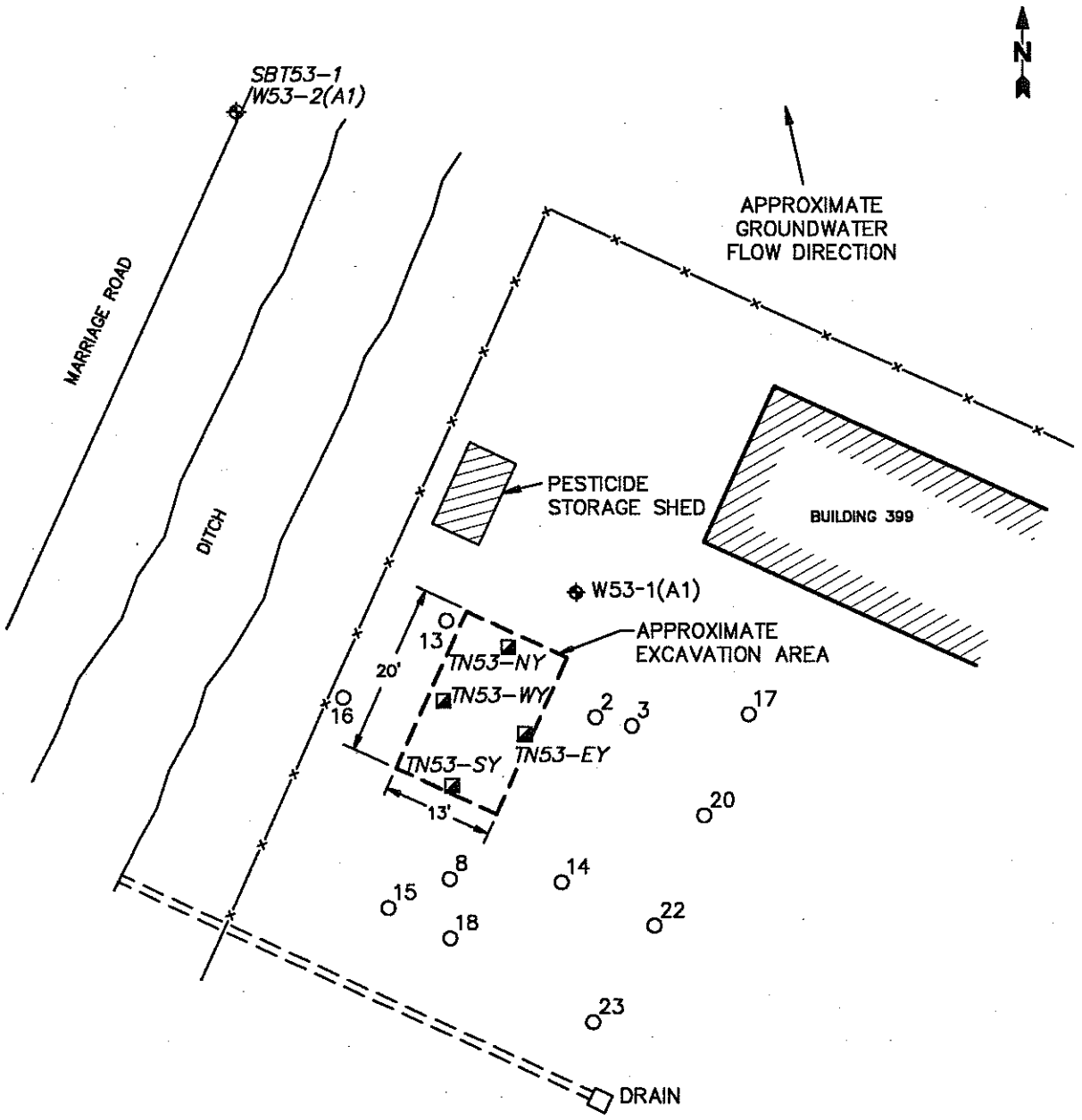

LEGEND

- SOIL SAMPLE, ENLARGED EXCAVATION (MAY 1990)
- SUBSURFACE SOIL SAMPLE LOCATION, COLLECTED AT 5.0–5.5 FEET
- GROUNDWATER MONITORING WELL

10 0 10 20

SCALE: 1" = 20'

FIGURE 14
NAS MOFFETT FIELD
SITE 19 - TANK 53
EXCAVATION AND SOIL
SAMPLE LOCATION

DATE: 09/29/93 JLH FILE:\044\0236\IRP\SRP\TNK19-53.DWG

TABLE 15

NAS MOFFETT FIELD PETROLEUM SITES
SITE 19
PETROLEUM HYDROCARBONS SOIL SAMPLE SUMMARY
TANK 53
(concentrations in mg/kg)

Sample Location	Sample Depth (Feet BLS)	TPH as Gasoline	Benzene	Toluene	Ethylbenzene	Xylene
TN53-NY[1]	8.0	8.7	0.064	0.032	0.077	—
TN53-WY[1]	8.0	15	0.576J	1.094J	2.320J	4.955J
TN53-EY[1]	8.0	12	0.203J	1.200J	1.430J	—
TN53-SY[1]	8.0	1,600	4.160J	6.810J	14.950J	77.710J
W53-1[1]	2.5	1.0J	0.038	0.050	0.0076	—
W53-1	5.0	2.7J	0.252	—	0.475	—
SBT 53-1	5.0	—	—	—	—	—
SBT 53-1	10.0	—	—	—	—	—
SBT 53-1	12.0	—	—	—	—	—
T53-2	5.5	203	—	—	1.1	1.91
T53-3	5.5	35	—	—	0.2	—
T53-8	5.0	67	—	—	0.1	0.9
T53-13	5.5	—	—	—	—	—
T53-14	5.0	203	—	0.2	1.4	6.7
T53-15	5.0	—	—	—	—	—
T53-16	5.5	—	—	—	—	—
T53-17	5.5	—	—	—	—	—
T53-18	5.0	392	—	0.5	5.6	12.8
T53-20	5.0	157	—	—	1.0	0.9
T53-22	5.0	94	—	—	1.6	0.8
T53-23	2.5	1,160	—	5.2	20	79
T53-23	4.0	568	—	2.9	11	38

Source: PRC 1993a
[1] PRC 1991b
NA Not analyzed
— Not detected
J Estimated value
BLS Below land surface
mg/kg Milligrams per kilogram
TPH Total petroleum hydrocarbons

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detections of petroleum-related compounds in the area west of the former Tank 53 excavation. However, gasoline-related constituents were detected in soil samples collected south and east of the former Tank 53 excavation.

The maximum concentration of TPH as gasoline (1,160 mg/kg) measured during the 1992 investigation was detected in a soil sample collected at 2.5 feet BLS at location T53-23, southeast of the previous Tank 53 excavation. The local ground surface in this area of the golf course maintenance yard (including the area around the Tank 53 excavation) slopes downward to the southeast toward a drain. A pipe from this drain transports surface water to the Marriage Road ditch immediately west of the maintenance yard area. Sample T53-23 was located between the drain and the Tank 53 excavation, about 10 feet northwest of the drain. The high concentrations of TPH as gasoline detected in samples collected at 2.5 and 4.0 feet BLS suggest that fuel leaking from Tank 53 or fuel spilled from the dispensing area above the tank may have followed the local topography and migrated toward the drain. In addition, decreasing TPH concentrations with increasing depth at location T53-23 (1,160 mg/kg at 2.5 feet BLS decreasing to 568 mg/kg at 4.0 feet BLS) suggest the vertical infiltration of gasoline.

Soil data indicate that three areas of petroleum-related contamination may exist at Site 19: (1) the area northeast of former Tank 2, (2) the area southwest of former Tank 43, and (3) the area south of former Tank 53. The soil contamination could originate from previous operational practices (such as tank stripping or accidental overfilling), or some tanks may have leaked. All of the tanks in these areas have been removed; therefore, active sources at Site 19 have been eliminated or are being investigated and any contamination identified has most likely resulted from previous activities.

Soil data from Site 19 indicate that some data gaps exist at each of the areas above. For example, data are needed northeast of Tank 2 and southwest of Tank 43. Additional investigations will be conducted to fill these data gaps before considering these areas in Site 19 for corrective action. A field work plan was prepared for agency review describing additional activities. Sufficient data are available on Tank 53 to include in the CAP without further soil investigation.

2.5.2 Groundwater Analytical Results

Several groundwater monitoring wells are located near the Site 19 tanks: wells WT2-1 and W07-20 are located near Tank 2, well WT14-1 is located near Tank 14, wells W43-1 and W43-2 are located

near Tank 43, and wells W53-1 and W53-2 are located near Tank 53 (Table 16). Analytical data for samples collected during August and November 1992 from these wells indicated that only samples from well W43-1 (near Tank 43) had elevated concentrations of petroleum-related constituents (Table 16). TPH as gasoline was measured in a sample from well W43-1 at 120 μg/L. No other petroleum-related constituents were detected at any of the other Site 19 tank sites. Since Tanks 2 and 43 contained wastewater, groundwater data were reviewed for VOCs. Analytical data from samples collected from well WT2-1 (near Tank 2) indicate detections of 1,2-dichloroethene (3 μg/L), chloroform (2 μg/L), TCE (10 μg/L) and PCE (5 μg/L) (PRC 1993e). Analytical results from samples collected from wells W43-1 and W43-2 (near Tank 43) indicate concentrations of TCE (maximum of 46 μg/L from well W43-2), PCE (maximum of 120 μg/L from well W43-2), and vinyl chloride (only one detection of 56 μg/L from well W43-1) (PRC 1993e).

Additionally, groundwater samples were collected from the tank excavations and analyzed for petroleum constituents and VOCs (PRC 1991b). Sample GW2-1 taken from the Tank 2 excavation revealed detections of toluene (110 μg/L), TPH as diesel (610 mg/L), and TPH as gasoline (68 mg/L). Sample GW14-1 collected from the Tank 14 excavation indicated only one detection, 5.6 mg/L of TPH as diesel. Sample GW43-1 taken from the Tank 43 excavation revealed a maximum VOC detection of 68 μg/L (total xylene). Sample GW53-1 taken from the Tank 53 excavation indicated VOC detections of total xylene (1,800 μg/L) and benzene (240 μg/L), and a maximum BTEX concentration of 404 μg/L (total xylene).

3.0 CONCLUSIONS AND RECOMMENDATIONS

This section summarizes conclusions and presents recommendations for tanks and sumps located at IRP Sites 5, 9, 12, 15, and 19. These tanks and sumps are either active, temporarily inactive, inactive, or previously removed. Recommendations are based on data and conclusions presented in this report. Recommendations include (1) inspections and soil sampling near tanks and sumps that are active or temporarily inactive to evaluate if a release has occurred, (2) removal of and sampling beneath tanks and sumps that are inactive, (3) additional investigations at sites that require additional data, and (4) no further action. Table 17 presents a summary of recommendations. Recommendations for inspections of active tanks and sumps include visual and other techniques (such as leak testing) to evaluate whether a release has occurred. Soil sampling is also recommended to evaluate whether a release has occurred. The results of the inspections and sampling will determine the need for further action (such as evaluating groundwater effects). Recommendations for removal

TABLE 16
NAS MOFFETT FIELD PETROLEUM SITES
SITE 19
PETROLEUM HYDROCARBON GROUNDWATER SAMPLE SUMMARY
(Concentrations in μg/L)

Associated Tank	Sample Location (Approximate distance downgradient, feet)	Sample Date	TPH as Gasoline	TPH as Diesel and others	Benzene	Toluene	Ethylbenzene	Xylenes	Highest Recorded Water Level* (Date Measurement)	Screened Interval (Feet BLS)
2	WT2-1 (10)	09/11/90	---	---	NA	---	NA	NA	5.30 (3/19/92)	8 to 18
		09/17/92	---	---	---	1J	---	---		
		12/10/92	14(L)	---	---	---	---	---		
	W07-20[1] (15)	05/03/91	NA	---	---	---	---	---	5.72 (5/20/93)	28 to 33
		10/22/91	NA	---	---	---	---	---		
		01/20/92	NA	---	---	---	---	---		
		04/17/92	NA	---	---	---	---	---		
14	WT14-1 (8)[2]	09/11/90	---	---	---	---	---	---	4.85 (2/25/93)	7.8 to 17.8
		07/30/91	---	---	---	---	---	---		
		11/11/91	---	---	---	---	---	---		
		02/12/92	---	---	---	---	---	---		
		05/26/92	---	---	---	---	---	---		
		08/25/92	---	6J(H)	---	1J	---	---		
43	W43-1 (15)	09/11/90	---	1,000	1J	4J	36	---	8.64 (3/19/92)	8 to 18
		07/30/91	120J	750	---	---	11	---		
		11/14/91	390J	920J	0.77	0.71	14	1.1		
		02/13/92	---	---	---	---	6.3	---		
		06/01/92	---	---	---	1J	8	---		
		12/15/92	120	11BJ	---	0.8J	4J	0.7J		
	W43-2 (30)[3]	09/11/90	---	---	---	---	---	---	8.93 (3/19/92)	8 to 18
		07/30/91	79	---	---	---	---	---		
		11/14/91	97J	---	---	---	---	---		
		02/13/92	---	---	---	---	---	---		
		06/02/92	---	---	---	---	---	---		
		12/16/92	68(L)	11BJ(H)	---	---		---		

TABLE 16 (Continued)
NAS MOFFETT FIELD PETROLEUM SITES
SITE 19
PETROLEUM HYDROCARBON GROUNDWATER SAMPLE SUMMARY
(Concentrations in µg/L)

Associated Tank	Sample Location (Approximate distance downgradient, feet)	Sample Date	TPH as Gasoline	TPH as Diesel and others	Benzene	Toluene	Ethylbenzene	Xylenes	Highest Recorded Water Level* (Date Measurement)	Screened Interval (Feet BLS)
53	W53-1 (10)	09/11/90	---	NA	---	---	---	---	4.66 (2/25/93)	5.5 to 15.5
		07/31/91	---	---	0.36	---	---	---		
		11/14/91	40J	180J	0.66	---	---	---		
		02/12/92	---	---	---	---	---	---		
		05/26/92	---	---	---	---	---	---		
		09/16/92	19(L)	---	---	0.5J	---	---		
	W53-2 (65)	06/18/92	---	NA	---	---	---	---	3.39 (2/25/93)	5.5 to 15.5
		09/16/92	---	---	---	---	---	---		
		12/04/92	16(L)	6J(H)	---	---	---	---		

Sources: IT 1992c, IT 1993b, PRC 1991b, PRC 1993b, PRC 1993d, PRC 1993e

Notes:

TPH	Total petroleum hydrocarbons	NA	Not analyzed	1	Analyzed for TPH as JP5 and BTEX only
---	Not detected	J	Estimated value	2	Well is east of tank excavation
µg/L	Micrograms per liter	L	TPH other light components	3	Upgradient of tank excavation
B	Found in blank	H	TPH other heavy components		
BLS	Below land surface	*	Feet BLS		

TABLE 17

NAS MOFFETT FIELD PETROLEUM SITES
SUMMARY OF RECOMMENDATIONS

Site	Tank or Sump	Status	Recommendations
5	4	Active	Leak test, investigate for soils and groundwater west, include in CAP
	5	Inactive	Leak test, investigate for soils and groundwater west, include in CAP
	6	Active	Leak test, no further action
	7	Active	Leak test, no further action
	8	Inactive	Leak test, no further action
	9	Inactive	Leak test, investigate soils northwest, include in CAP
	10	Active	Leak test, investigate soils south, include in CAP
	11	Active	Leak test, investigate soils west, include in CAP
	12	Active	Leak test, investigate soils and groundwater northwest, include in CAP
	13	Active	Leak test, investigate soils and groundwater northwest, include in CAP
	18	Inactive	Remove, excavation samples as required for closure
	26	Removed	Investigate soils east
	30	Never used Removed	No further action, closure approval
	31	Never used Removed	No further action, closure approval
	72	Active	Leak test, no further action
	73	Active	Leak test, no further action
	74	Active	Leak test, no further action
	75	Active	Leak test, no further action
	Fuel Station	Active	Investigate soils north and northwest, include in CAP
9 (Bldg. 29)	47	Removed	Investigate soils north, include in CAP
	48	Removed	Investigate soils north, include in CAP
	49	Removed	Investigate soils north, include in CAP
	50	Removed	Investigate soils north, include in CAP
	52	Removed	Investigate soils north, include in CAP

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TABLE 17 (Continued)

NAS MOFFETT FIELD PETROLEUM SITES
SUMMARY OF RECOMMENDATIONS

Site	Tank or Sump	Status	Recommendations
9 (Bldg. 29 continued)	79	Removed	Investigate soils north, include in CAP
	80	Removed	Investigate soils north, include in CAP
	81	Removed	Investigate soils north, include in CAP
	82	Removed	Investigate soils north, include in CAP
	83	Removed	Investigate soils north, include in CAP
	84	Removed	Investigate soils north, include in CAP
	97	Removed	Investigate soils north, include in CAP
	98	Removed	Investigate soils north, include in CAP
	99	Removed	Investigate soils north, include in CAP
9 (Bldg. 31)	56A	Removed	Investigate soils north, include in CAP
	56B	Removed	Investigate soils north, include in CAP
	56C	Removed	Investigate soils north, include in CAP
	56D	Removed	Investigate soils north, include in CAP
9 (Bldg. 10)	1	Removed	Investigate soils south and north, include in CAP
	32	Inactive	Remove, excavation samples as required for closure
9 (Bldg. 15)	87	Inactive	Remove, excavation samples as required for closure
12	None	Corrective action in progress for soils	No further action
15	25	Inactive	Remove, excavation samples as required for closure
	42	Removed	Investigate soils used for backfill, include in CAP or closure approval
	54	Removed	No further action, closure approval
	58	Inactive	Remove, excavation samples as required for closure
	59	Active	Inspection for release, soil sampling if warranted
	62	Inactive	Remove, excavation samples as required for closure
	63	Active	Inspection for release, soil sampling if warranted
	64	Inactive	Inspection for release, soil sampling if warranted

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TABLE 17 (Continued)

NAS MOFFETT FIELD PETROLEUM SITES
SUMMARY OF RECOMMENDATIONS

Site	Tank or Sump	Status	Recommendations
15 (Continued)	65	Unknown	Inspection to determine status, inspection for release; soil sampling if warranted
19	2	Removed	Investigate soils north and east, include in CAP
	14	Removed	No further action, closure approval
	43	Removed	Investigate soils south and west, include in CAP
	53	Removed	Include in CAP

of inactive tanks and sumps include removal and soil sampling as required by state guidance. Groundwater samples will be collected if groundwater is present in the excavations or soil contamination is identified. Data collected from additional investigations are required to proceed with recommendations for remediation or closure and will be consistent with state guidance (RWQCB 1990); a field work plan was submitted for regulatory review during late fall 1993.

Recommendations for remediation or closure of inactive tanks and sumps will be documented in the CAP, based on the results of the above recommendations. Tank and sump closures will be consistent with the applicable state and federal regulations and guidance stated in the FFA. Closure is not applicable for active tanks and sumps; the results of the above recommendations will determine the need for further action.

3.1 SITE 5

Below is a summary of conclusions and recommendations for Site 5. Table 17 provides a summary of recommendations for specific tanks.

Soil

Soil data indicate that five areas of TPH as JP5 contamination exist at Site 5: (1) the area north, west, and south of Tanks 10, 11, 12 and 13, (2) the area surrounding the former Tank 26 excavation, (3) the area around the fuel station, (4) the area north of Tank 9, and (5) the area near Tanks 4 and 5 (Figure 2). The soil contamination could originate from previous operational practices (such as tank stripping or accidental overfilling and spilling) or some tanks may have leaked. Current operating practices at NAS Moffett Field include containing all waste products discharged from the tanks and minimizing overfilling and spills. Additionally, leak testing is being performed to identify possible additional sources and to meet current UST operation requirements. Therefore, active sources at Site 5 have been eliminated or are being investigated.

Soil data from Site 5 indicate that some data gaps exist at each of the areas above. For example, few data have been collected west of the detections near Tanks 4 and 5, northwest of the fuel station, and southwest of Tank 10. Additional investigations will be conducted to fill these data gaps before considering these areas in Site 5 for corrective action. A field work plan was prepared for agency review describing additional activities. After completing the additional investigations, TPH

concentrations observed in soils at the five areas should be considered in the CAP. Cleanup levels will be developed for Site 5 in the CAP and compared to concentrations observed at each of the five areas. Soil TPH concentrations above cleanup levels will be addressed through a corrective action.

Groundwater

Free product was recovered from wells near the northern Site 5 tanks during the OU2 RI; however, no subsequent sampling has been conducted at these wells. The origin of this contamination has not been confirmed, and could be either potentially leaking tanks or routine tank stripping activities in the past. The free phase fuel apparently was not characterized but, based on the JP5 fuel spill and the because most of the tanks in the northern fuel farm manage JP5, the free product was most likely JP5. JP5 is essentially insoluble in water, and apparently most of the JP5 was removed during development of the surrounding wells. One A1 aquifer zone well (W05-21) located downgradient from the tanks (Figure 2) was sampled in November 1992 (PRC 1993d) and no TPH constituents were detected. Two other A1 wells sampled during the same period, however, had detections of 26 μg/L of TPH as other light components (W05-23) and 11 μg/L of TPH as other heavy components (W05-25). TPH as diesel was also detected (0.57 mg/L) in a sample from well W05-27, which is also downgradient.

Groundwater data indicate that groundwater northwest of Tanks 12 and 13, near Tank 26, and near Tanks 4 and 5 has been affected by petroleum releases (Figure 3). Groundwater near the fuel station and north of Tank 9 does not appear to be affected. However, once results are available from samples collected from the free product wells, these conclusions will be revised accordingly. Additionally, data gaps exist and an additional investigation is recommended in conjunction with the soil investigation recommended above. A field work plan was prepared for agency review describing additional activities. Groundwater contaminant concentrations should be evaluated simultaneously with the evaluation of soil concentrations so potential remedies may complement each other. During the period that additional investigations are conducted, additional groundwater data will be collected from appropriate existing wells and included in the evaluation.

3.2 SITE 9

Below is a summary of conclusions and recommendations for Site 9. Table 17 provides a summary of recommendations for specific tanks. No conclusions or recommendations are presented for groundwater, since groundwater beneath Site 9 is being addressed on a regional basis by a CERCLA response action and Navy source control actions (see Sections 1.1 and 2.2.2).

Soil

Soil data indicate that three areas of TPH contamination may exist at Site 9: (1) the area north of the former tanks at Building 29, (2) the area north of the former tanks at Building 31, and (3) the area north and south of former Tank 1 (Figure 4). Soil contamination could originate from previous operational practices (such as tank stripping or accidental overfilling), or some tanks may have leaked. All of the tanks in these areas have been removed, with the exception of Tanks 32 and 87, which are scheduled for removal. Therefore, the only remaining potential source at Site 9 is the contaminated soils remaining in place and used as backfill.

Soil data from Site 9 indicate that some data gaps exist at each of the areas above. For example, additional data are needed north of the Building 29 area, north of the Building 31, and north and south of Tank 1. Additional investigations will be conducted to fill these data gaps before considering these areas in Site 9 for corrective action. A field work plan was prepared for agency review describing additional activities. After completing the additional investigation, TPH concentrations observed in soils at the three areas should be considered in a CAP. Cleanup levels will be developed for Site 9 in the CAP and compared to concentrations observed at each of the three areas. Soil TPH concentrations above cleanup levels will be addressed through a corrective action.

Tanks 32 and 87 are being closed by removal. Removal activities are in progress for Tank 87 and removal of Tank 32 is scheduled for fall 1993. Tank closures will follow state and federal regulations (23 CCR Chapter 16; 40 CFR Part 280) and guidance (RWQCB 1990; SWRCB 1989).

3.3 SITE 12

As discussed in Section 2.3, a corrective action for soils contamination is in progress at Site 12 (PRC 1993c). The results of the corrective action, however, were not available for inclusion in this document. A technical memorandum documenting results and recommendations will be prepared as part of the Site 12 activities and be submitted during spring 1994. Once the technical memorandum has been completed, any additional required investigations, evaluations, and remediations at Site 12 will be included in future petroleum sites documents.

Only minor TPH constituents were detected in groundwater samples collected in August 1992 from the six groundwater monitoring wells at Site 12 (PRC 1993d). Toluene and ethylbenzene (less than

or equal to 0.5 μg/L) were detected in a sample from well W12-4. However, additional groundwater data collection and evaluation is required after remediation is complete. Therefore, Site 12 groundwater will be addressed following the completion of the Site 12 technical memorandum and be included in future petroleum sites documents.

3.4 SITE 15

Below is a summary of conclusions and recommendations for Site 15. Table 17 provides a summary of recommendations for specific tanks and sumps. Conclusions and recommendations regarding groundwater will be prepared when soil sampling and sump removals have been completed. If soil sampling results indicate contamination, groundwater effects will be evaluated following state guidance and addressed in the petroleum sites documents.

Soil

Analytical data for soils surrounding Sumps 25, 58, 59, 62, 63, 64, and 65 do not exist. Analytical data for the above sumps do not exist because evidence of releases from these sumps has not been identified and soil samples have not been collected. Therefore, consistent with state guidance (RWQCB 1990), inspections and soil sampling will be conducted to assess whether releases have occurred. If analytical results from soil samples indicate soil contamination exists, groundwater will be evaluated as required. Excavation samples, as required for closure, will be collected from beneath the sumps as they are removed (Sumps 25, 58, and 62). Data are available, however, from the removals of Sump 42 and Tank 54.

Analytical results from samples collected from the contents of Sump 25 indicate only very low concentrations of BTEX and other solvent components. No data are available for the soils surrounding Sump 25. However, this sump is scheduled for removal in fall 1993, and soil samples will be collected at that time to meet closure requirements.

Sump 42 has been removed. Analytical results for soil samples collected below Sump 42 indicated low levels of TPH and BTEX constituents. No further action with regard to Sump 42 itself appears warranted. However, additional investigation is recommended for the soil used as backfill for the tank excavations near Sump 42. This area will be investigated with the rest of the new NEX service station or during the investigations recommended in this report.

Tank 54 has been removed. Analytical results from soil samples collected from the Tank 54 excavation indicated minor levels of VOCs. However, copies of analytical results for TPH have not been located, although personnel familiar with the removal reported no detections. Analytical results from a groundwater sample collected from a downgradient well indicated only one minor detection of acetone. Therefore, no further action is necessary for this tank and closure approval is requested.

Analytical results from samples collected from the contents of Sump 58 indicate insignificant concentrations of BTEX and other solvent components. No data are available for the soils surrounding Sump 58, although there is no evidence of a release. However, this sump is scheduled for removal in fall 1993, and soil samples will be collected at that time as part of closure activities.

Sump 59 is active. No data are available for the soils near this sump, although analysis of the contents of Sump 59 did not indicate the presence of BTEX compounds. Therefore, visual inspections and soil sampling are recommended to evaluate if a release has occurred. If a release is identified, groundwater sampling will be recommended. If a release is not identified, no further action is necessary and Sump 59 should be removed from further consideration. However, if this sump becomes inactive in the future, removal and sampling activities required for closure will be implemented.

Sump 62 is inactive and tentatively scheduled for closure. Soil samples will be collected as part of closure activities if Sump 62 is removed. However, NASA has indicated that Sump 62 may be reactivated for painting operations after the facility transfer in 1994. If Sump 62 is reactivated, inspections and soil sampling are recommended to evaluate whether a release has occurred. If no release is identified, no further action for Sump 62 is warranted and it should be removed from further consideration.

Sump 63 is active and Sump 64 is temporarily inactive. No analytical data are available for the soils surrounding these sumps. Therefore, visual inspections and soil sampling are recommended for both sumps to assess whether releases have occurred. The surrounding soil and all visible components should be inspected for cracks, leaks, or other evidence that a release has occurred. If evidence of a release is found, groundwater samples will be collected and evaluated for possible corrective action. Currently, NASA plans to maintain Sump 63 as an active sump and is responsible for re-routing the discharge to the sanitary sewer system. If future planning indicates that these sumps are no longer required, closures (removal and sampling) will be consistent with state regulations and guidance.

Sump 65 could not be located and is assumed to have been removed. An inspection is recommended to verify if the sump still exists. If the sump is still in place, removal and sampling are recommended to close the sump. If Sump 65 has been removed, soil sampling is recommended for closure (including metals analysis).

Groundwater

As discussed above, evidence of releases from Sumps 25, 58, 59, 62, 63, 64, and 65 has not been obtained. Consistent with state guidance, groundwater evaluations are not required unless evidence of soil contamination is identified. Sumps 25, 42, 58, 62, and 64 are located on the western portion of NAS Moffett Field, and the groundwater in the vicinity of these sumps is being addressed as part of the regional VOC plume under CERCLA. Since Sump 42 and Tank 54 were removed, groundwater data were reviewed. Analytical results for groundwater samples collected from wells downgradient of Sump 42 and Tank 54 showed no detections of petroleum constituents and only minor detections of VOCs downgradient of Tank 54. VOCs downgradient of Sump 42 were not evaluated since the sump managed petroleum products, and groundwater in this area is addressed through the CERCLA response action. However, Sump 42 is part of the NEX service station, which will undergo an additional investigation during spring 1994. The investigation will include using the Geoprobe® to collect soil samples for field screening. Soil borings and monitoring wells will be located from the results of the screening. Upon completion of the additional investigation, Sump 42 will be evaluated for remediation or closure. These recommendations and actions will be included in future petroleum sites documents.

3.5 SITE 19

Below is a summary of conclusions and recommendations for Site 19. Table 17 provides a summary of recommendations for specific tanks.

Soils

Soil data indicate that three areas of TPH contamination may exist at Site 19: (1) the area northeast of former Tank 2, (2) the area southwest of former Tank 43, and (3) the area south of former Tank 53. The soil contamination could originate from previous operational practices (such as tank stripping or accidental overfilling), or some tanks may have leaked. All of the tanks in these areas have been removed; therefore, active sources at Site 19 have been eliminated or are being investigated and removed.

Soil data from Site 19 indicate that some data gaps exist at each of the areas above. For example, data are needed for the areas northeast of Tank 2 and southwest of Tank 43. Additional investigations will be conducted to fill these data gaps before considering these areas in Site 19 for a corrective action. A field work plan was prepared for agency review describing additional activities. After completing the additional investigation, contaminant concentrations observed in soils at the three areas should be considered in a CAP. Cleanup levels will be developed for Site 19 in the CAP and compared to concentrations observed in samples from each of the three areas. Soil contaminant concentrations above cleanup levels will be addressed through a corrective action.

Analytical results from soil samples collected from the Tank 2 excavation indicate that elevated TPH concentrations exist between the former northern and eastern walls of the excavation and monitoring well W07-20. However, additional investigation is required for the area northeast of the former Tank 2 excavation.

Data collected regarding Tank 14 have been fully described in previous reports (PRC 1991b; 1993b). Tank 14 has been removed; these reports conclude that only a minor isolated area of TPH as diesel exists and that no further action is warranted for the nearby soils. Therefore, approval of the Tank 14 closure is requested.

Visual observations of contamination remaining in the Tank 43 excavation sidewalls were verified by analytical results from the soil samples. Analytical results indicated the presence of TPH as diesel at elevated levels in samples collected from the southern and western sidewalls. Analytical results from samples collected from the piping trenches associated with the Tank 43 excavation did not indicate significant levels of petroleum-related contamination. Additional investigation is warranted for the areas south and west of the former Tank 43 excavation.

Data collected during two investigations of the Tank 53 area indicate that significant levels of fuel-related contaminants exist in the soils south and east of the former Tank 53 excavation. Contamination may have been caused by fuel leaking from Tank 53 or fuel spilled from the dispensing area above Tank 53. The fuel may have followed the local topography and migrated toward the maintenance yard drain. No additional investigation is warranted and Tank 53 will be included in the CAP.

4.0 REFERENCES

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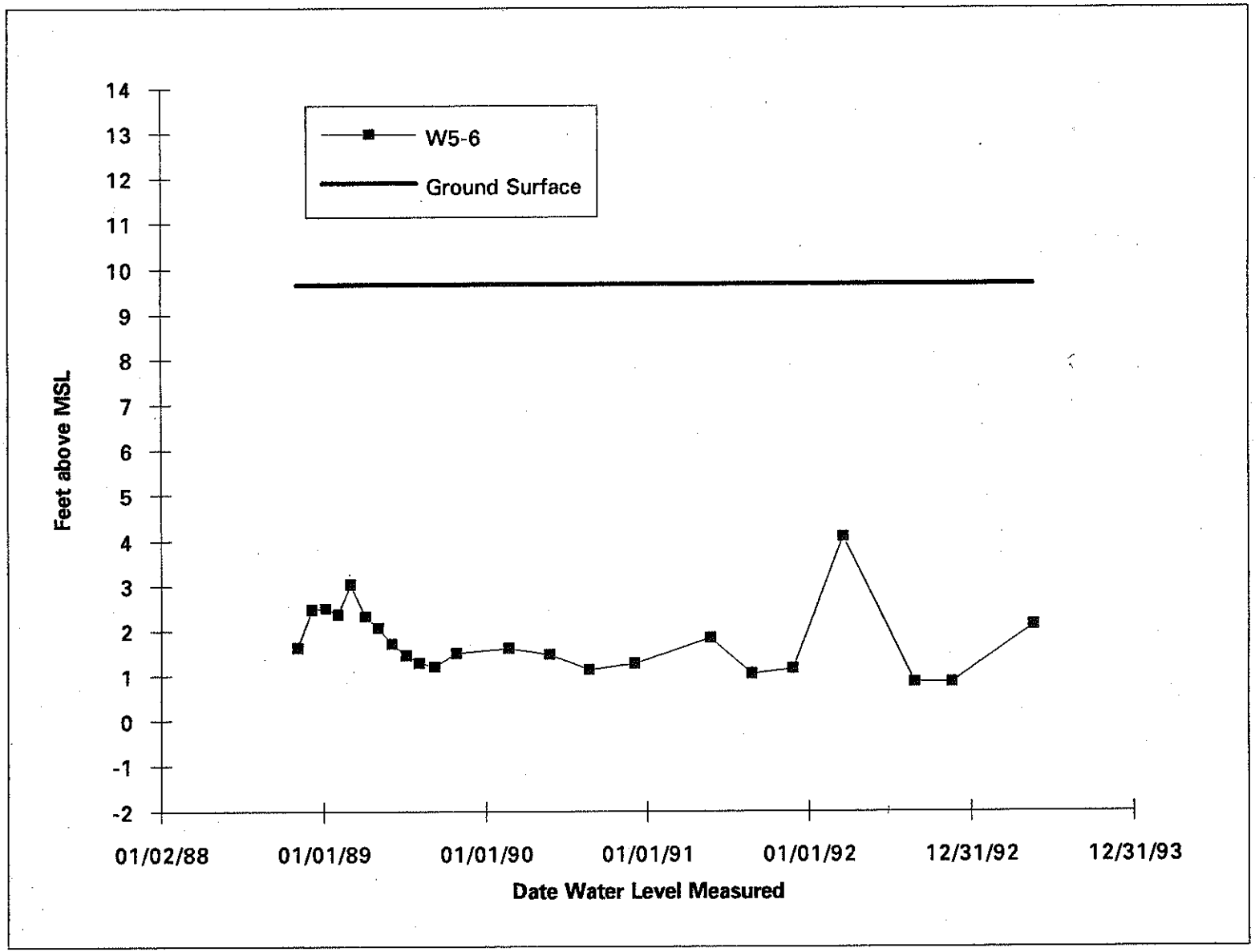
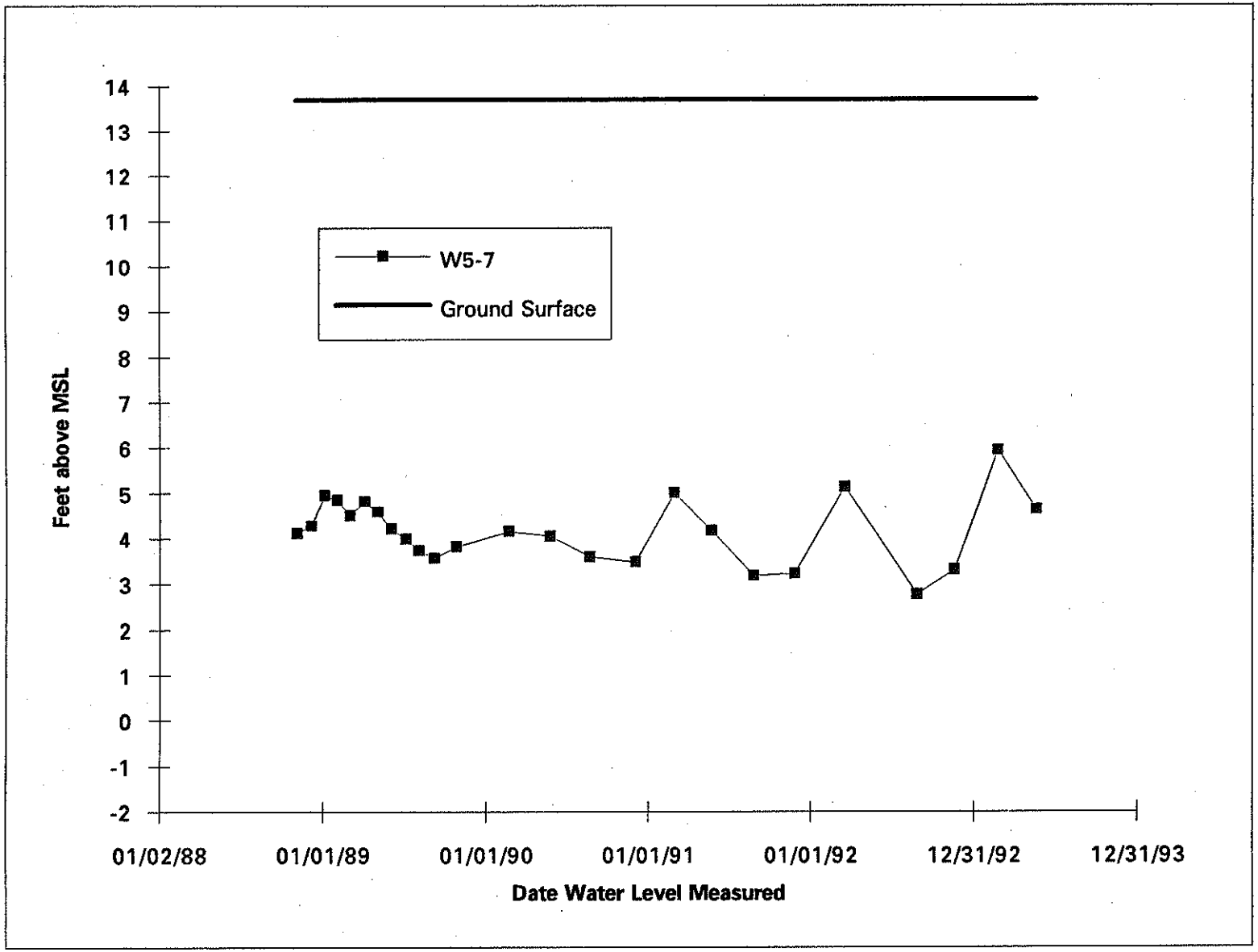
APPENDIX A

HYDROGRAPHS



NAS MOFFETT FIELD
SITE 5
A1 AQUIFER WATER LEVELS



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SITE 5
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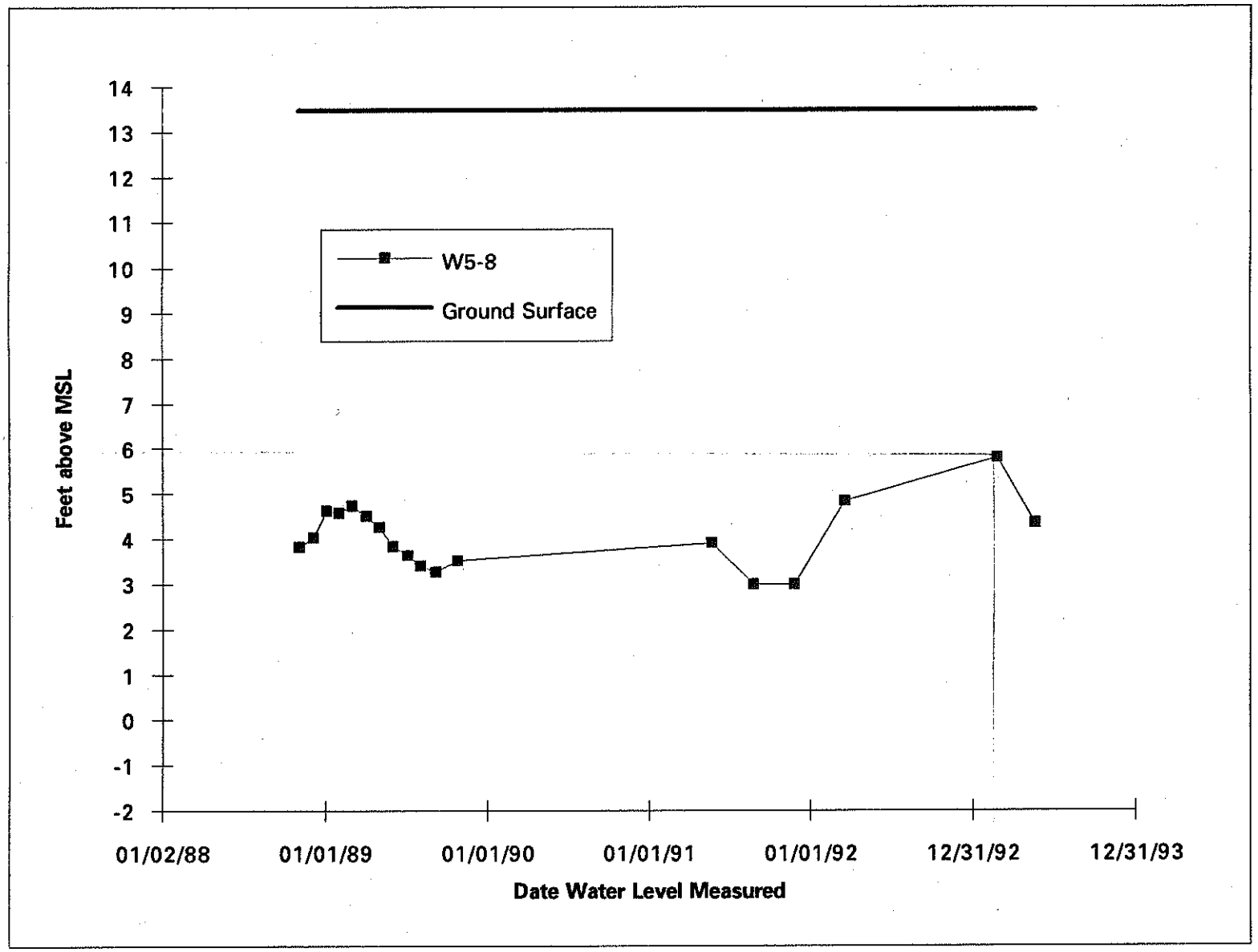
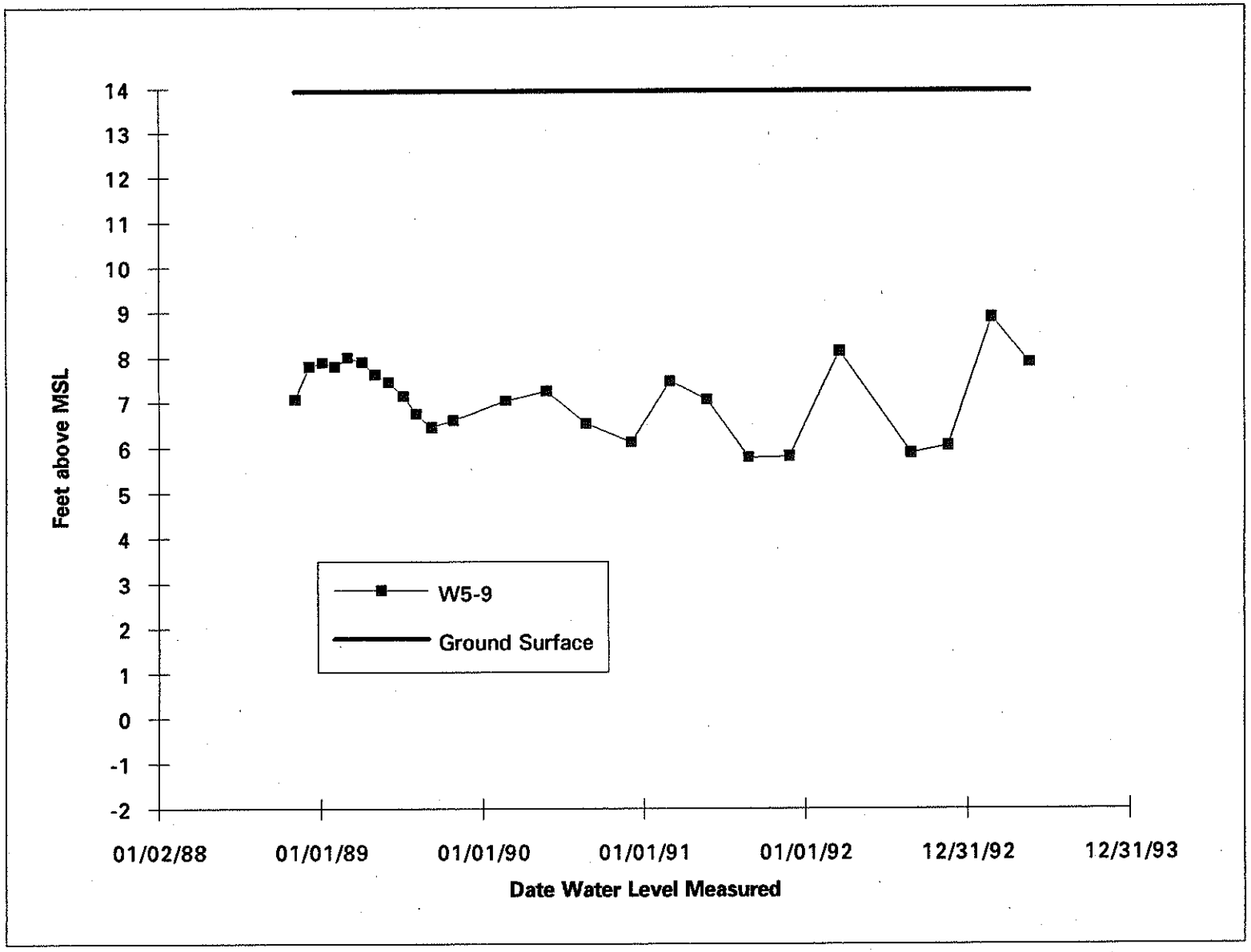
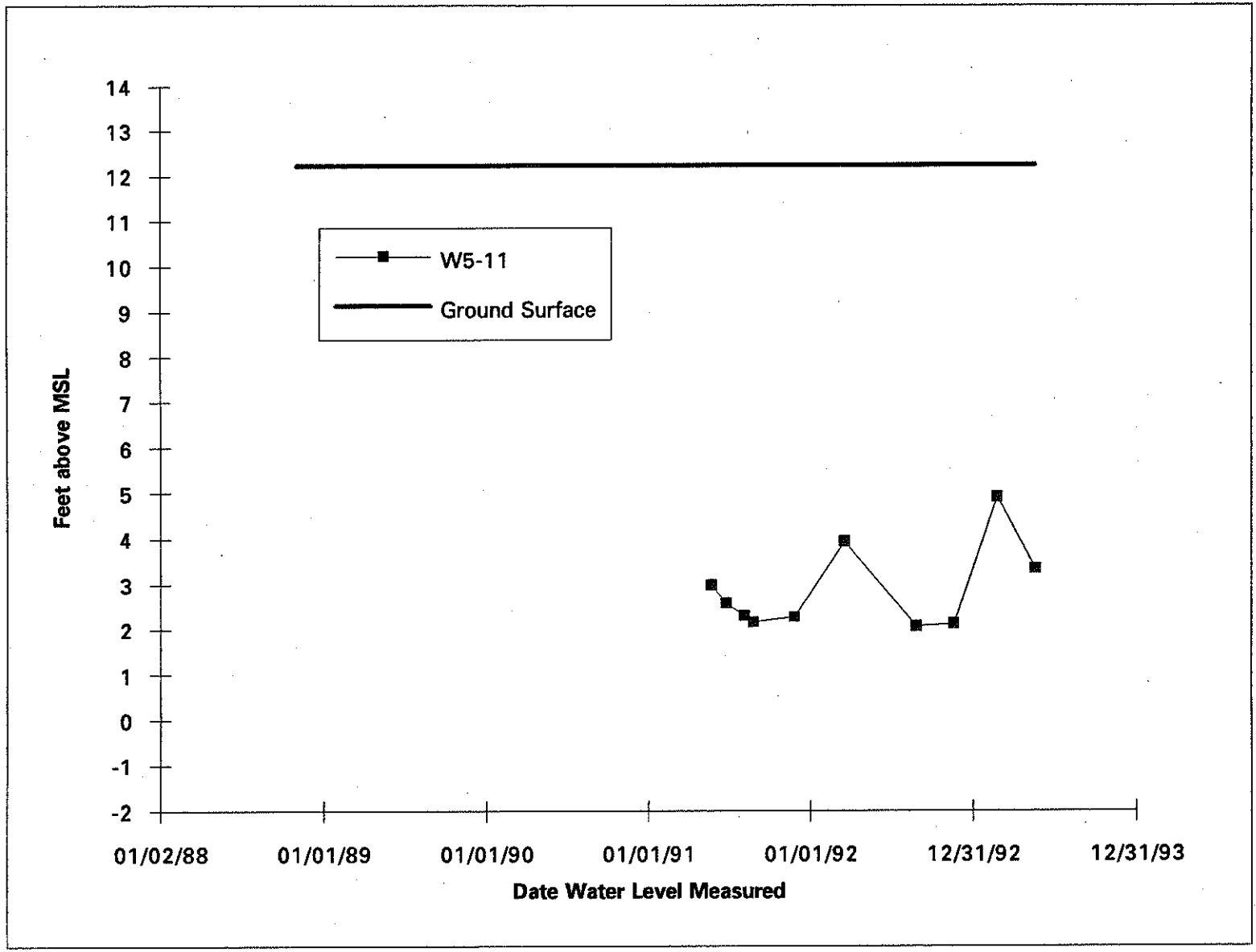


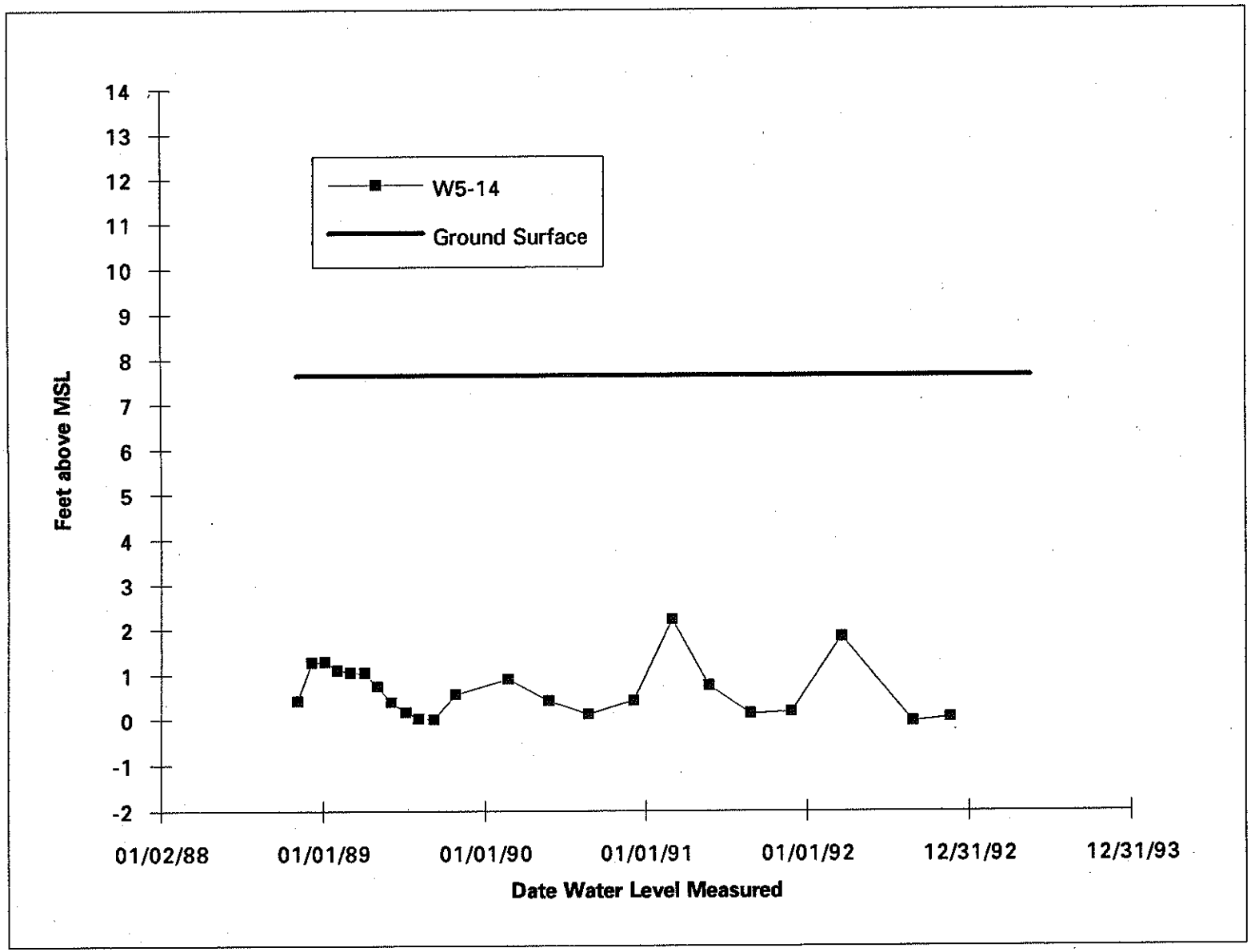
NAS MOFFETT FIELD
SITE 5
A1 AQUIFER WATER LEVELS



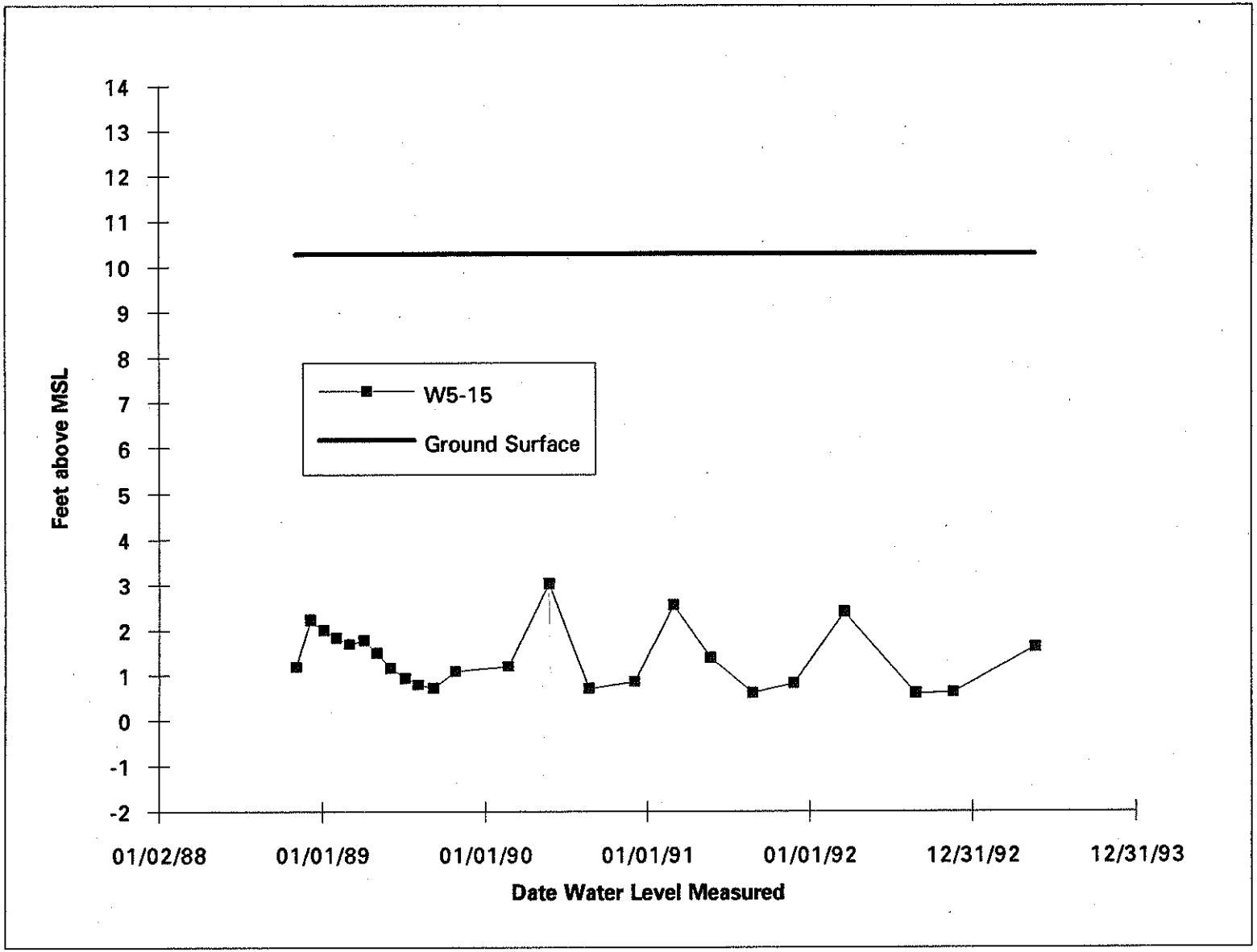
NAS MOFFETT FIELD
SITE 5
A1 AQUIFER WATER LEVELS



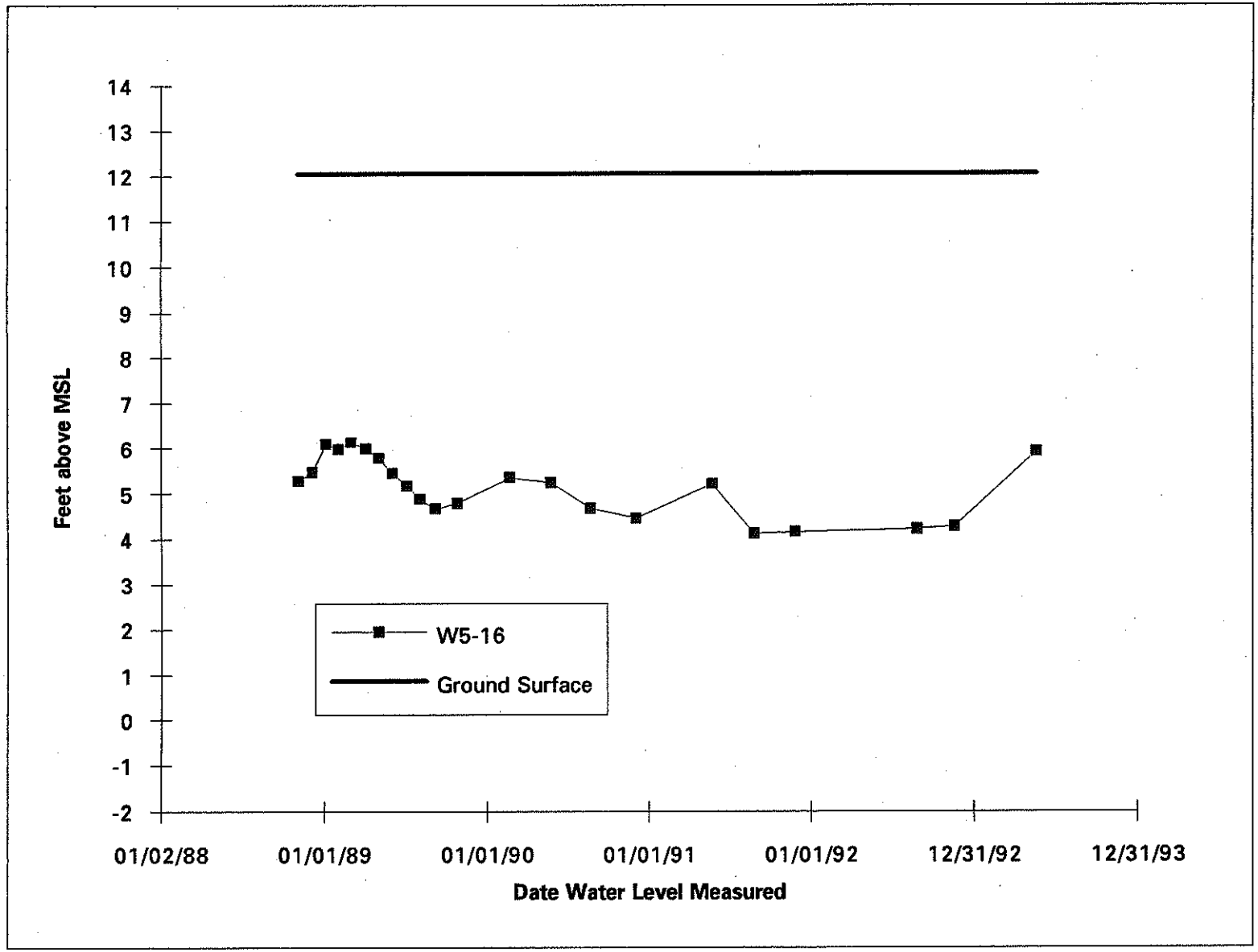
NAS MOFFETT FIELD
SITE 5
A1 AQUIFER WATER LEVELS



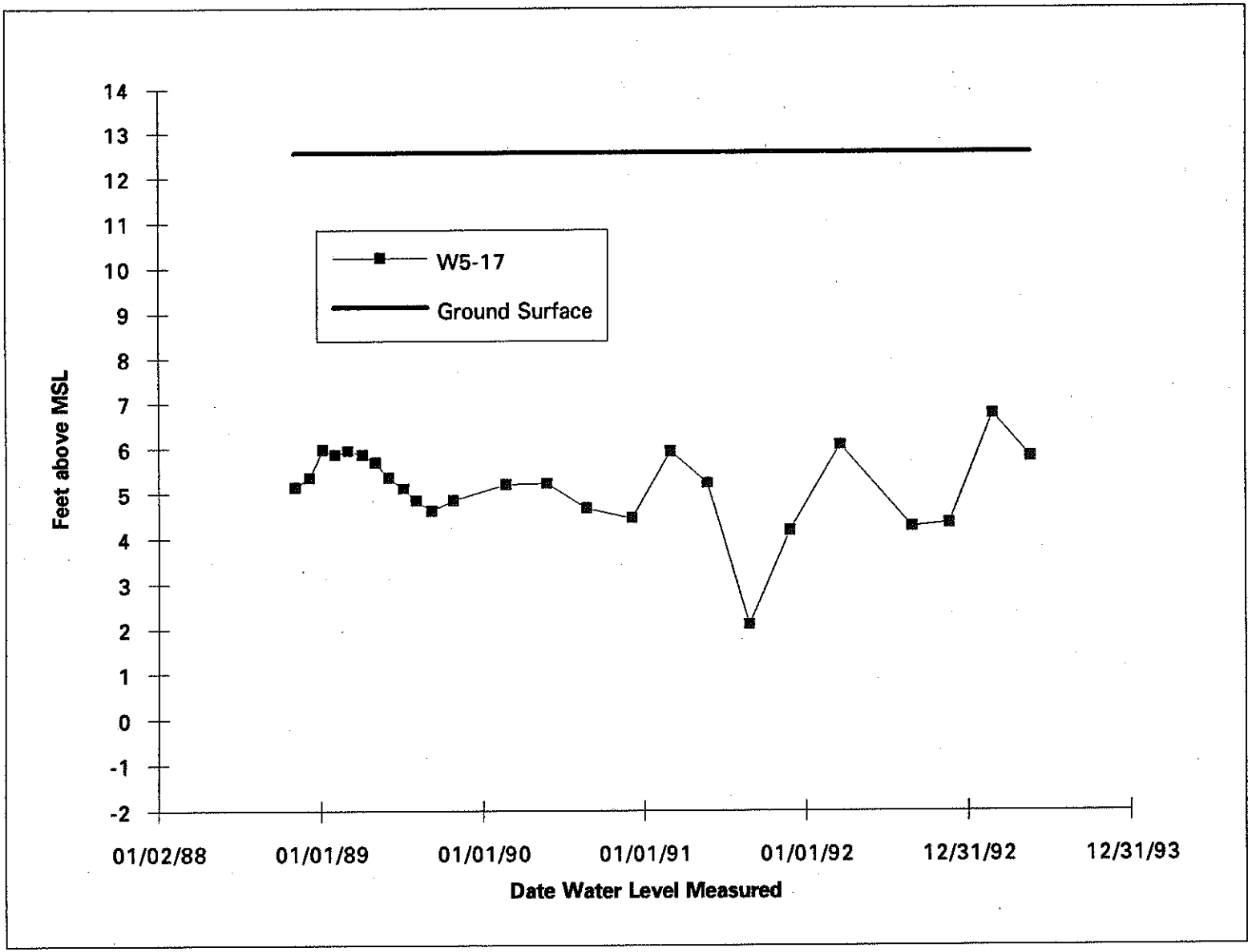
NAS MOFFETT FIELD
SITE 5
A1 AQUIFER WATER LEVELS



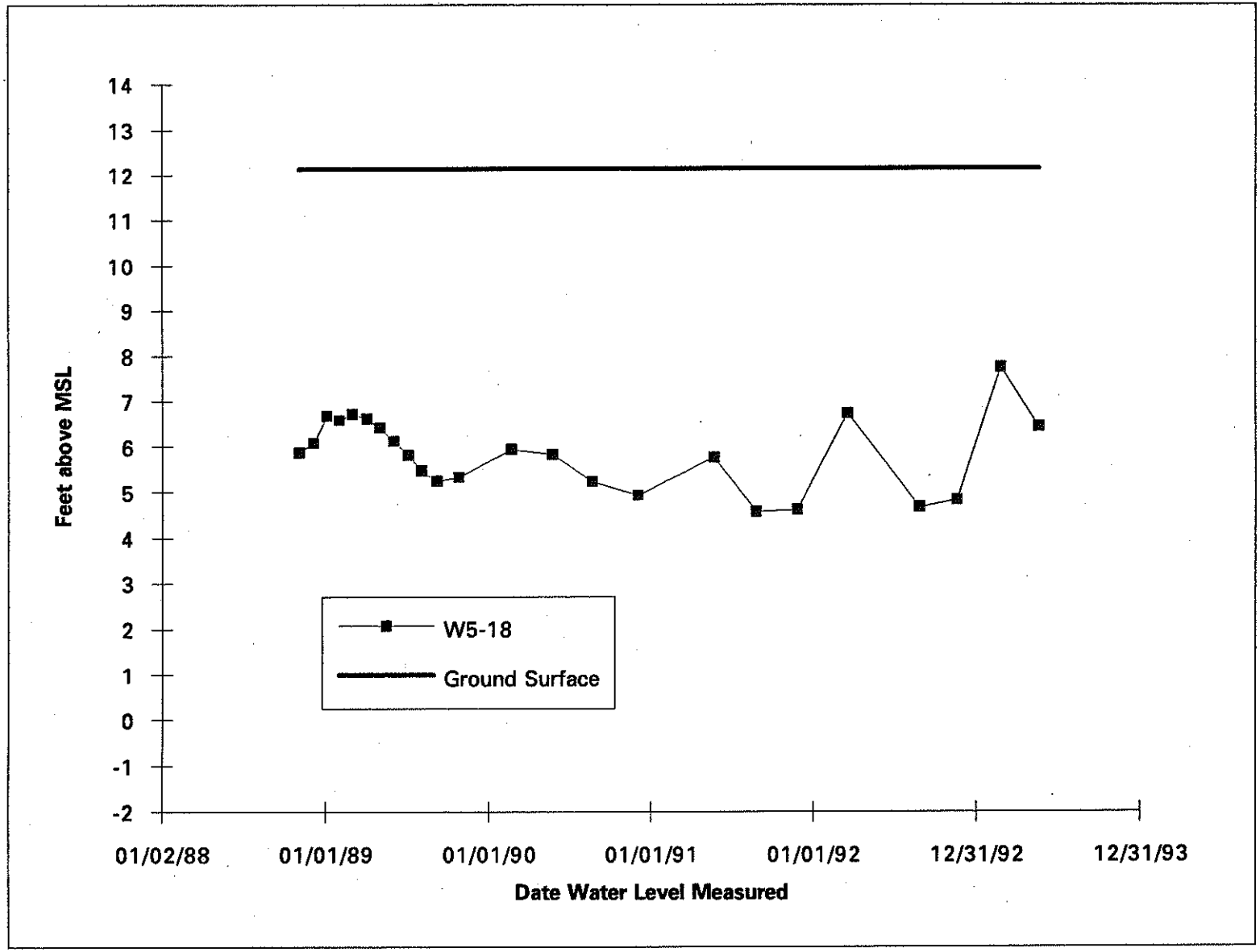
NAS MOFFETT FIELD
SITE 5
A1 AQUIFER WATER LEVELS



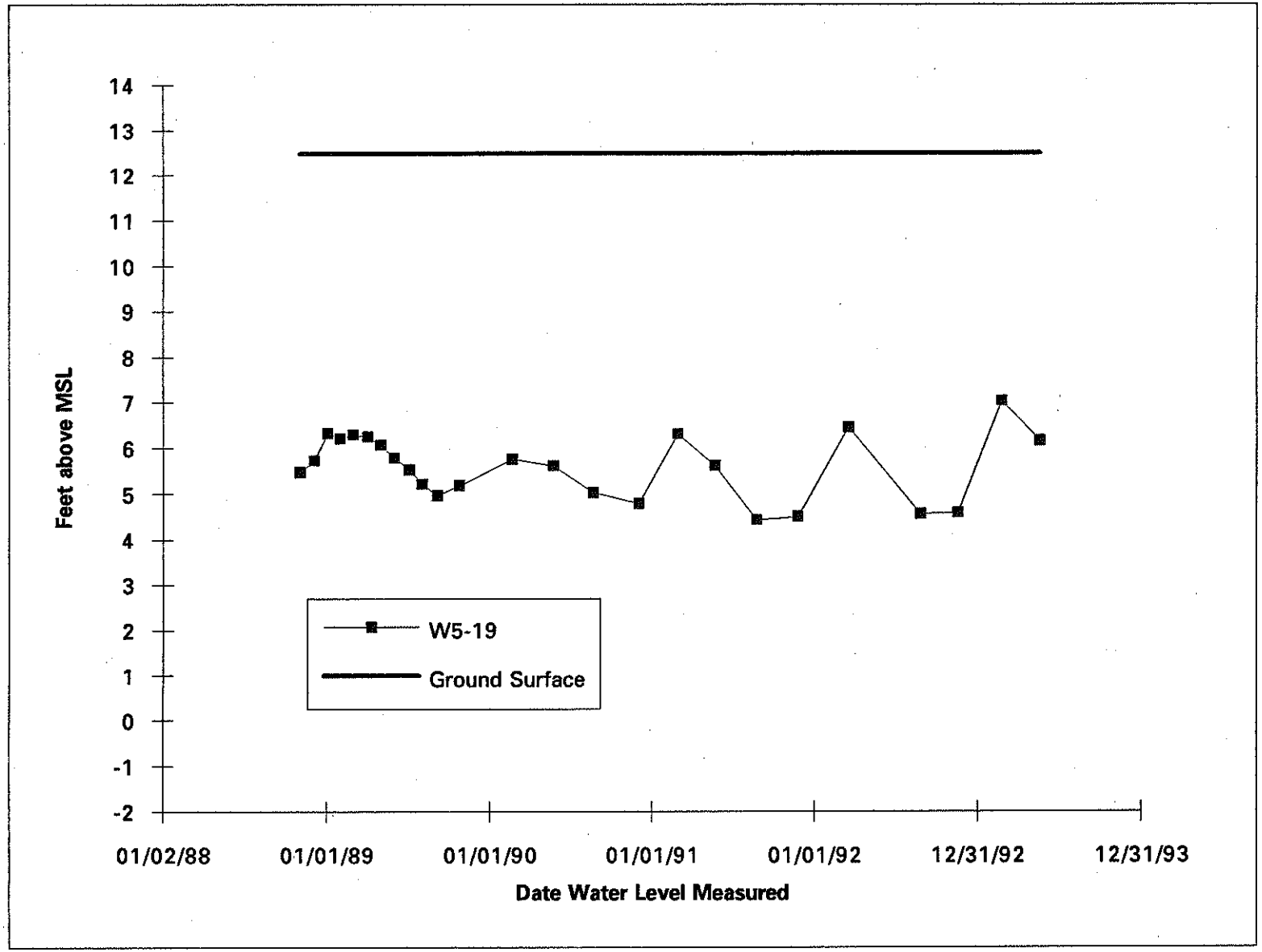
NAS MOFFETT FIELD
SITE 5
A1 AQUIFER WATER LEVELS



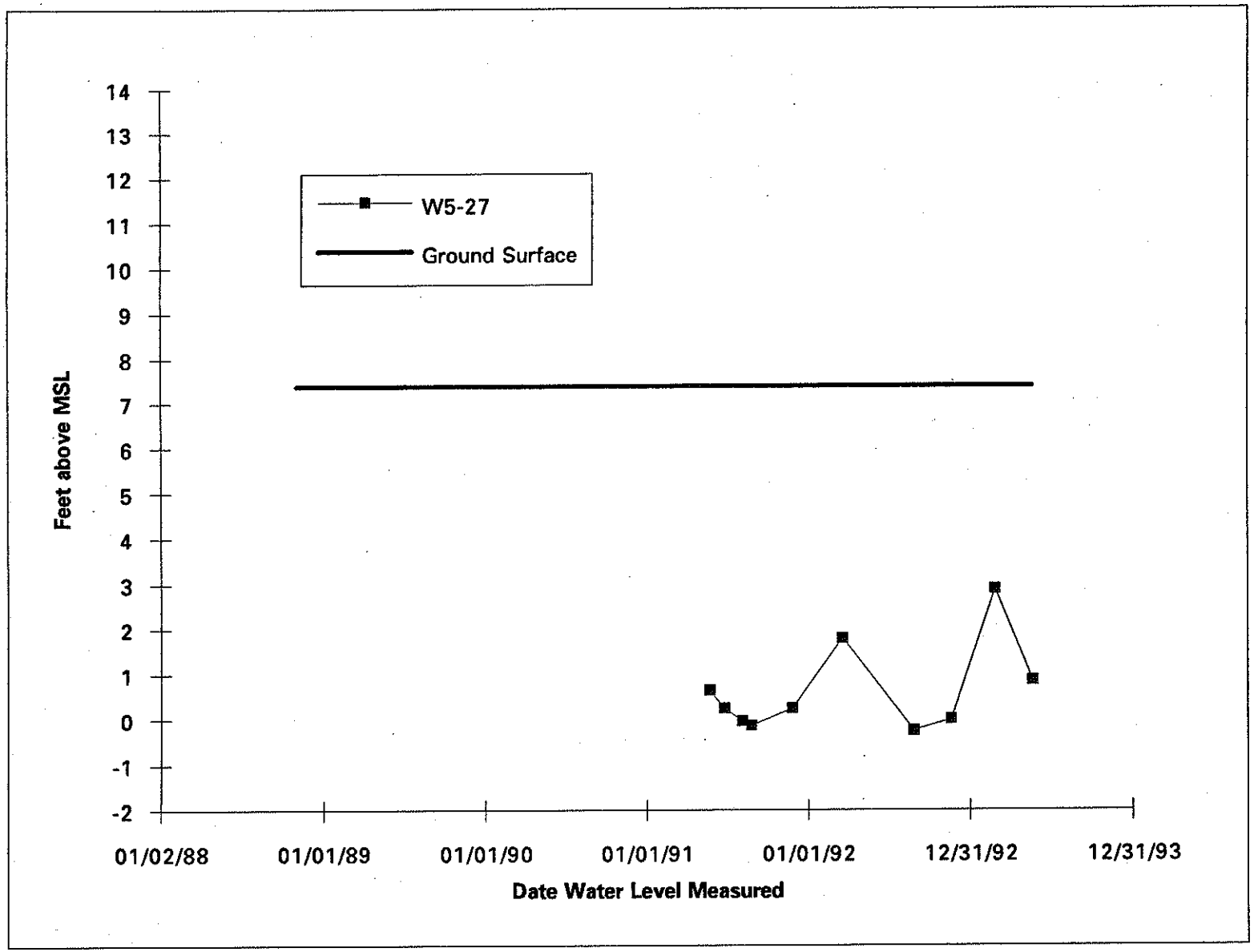
NAS MOFFETT FIELD
SITE 5
A1 AQUIFER WATER LEVELS



NAS MOFFETT FIELD
SITE 5
A1 AQUIFER WATER LEVELS



NAS MOFFETT FIELD
SITE 5
A1 AQUIFER WATER LEVELS



NAS MOFFETT FIELD
SITE 5
A1 AQUIFER WATER LEVELS

APPENDIX B

TANK 54 ANALYTICAL RESULTS

SEQUOIA ANALYTICAL
680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

O'Grady Construction	Client Project ID:	Moffett Field	Sampled:	Jul 2, 1993
2513 Wyandotte Street	Sample Descript:	Soil, Hole #54	Received:	Jul 2, 1993
Mountain View, CA 94043	Analysis Method:	EPA 5030/8010	Analyzed:	Jul 13, 1993
Attention: Tom O'Grady	Lab Number:	3G39901	Reported:	Jul 16, 1993

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
Bromodichloromethane	5.0	N.D.
Bromoform	5.0	N.D.
Bromomethane	10	N.D.
Carbon tetrachloride	5.0	N.D.
Chlorobenzene	5.0	N.D.
Chloroethane	10	N.D.
2-Chloroethylvinyl ether	10	N.D.
Chloroform	5.0	N.D.
Chloromethane	10	N.D.
Dibromochloromethane	5.0	N.D.
1,3-Dichlorobenzene	5.0	N.D.
1,4-Dichlorobenzene	5.0	N.D.
1,2-Dichlorobenzene	5.0	N.D.
1,1-Dichloroethane	5.0	N.D.
1,2-Dichloroethane	5.0	N.D.
1,1-Dichloroethene	5.0	N.D.
cis-1,2-Dichloroethene	5.0	N.D.
trans-1,2-Dichloroethene	5.0	N.D.
1,2-Dichloropropane	5.0	N.D.
cis-1,3-Dichloropropene	5.0	N.D.
trans-1,3-Dichloropropene	5.0	N.D.
Methylene chloride	50	N.D.
1,1,2,2-Tetrachloroethane	5.0	N.D.
Tetrachloroethene	5.0	N.D.
1,1,1-Trichloroethane	5.0	N.D.
1,1,2-Trichloroethane	5.0	N.D.
Trichloroethene	5.0	N.D.
Trichlorofluoromethane	5.0	N.D.
Vinyl chloride	10	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Marla Lee
Project Manager

Envirotox	Client Project ID:	Moffett Field Tank Pull	Sampled:	Dec 18, 1992
1336 Dixie Anne Ave.	Sample Descript:	Soil, Tank 54 South	Received:	Dec 21, 1992
Sacramento, CA 95815	Analysis Method:	EPA 5030/8010	Analyzed:	Dec 29, 1992
Attention: Norman Wheat	Lab Number:	212-0624	Reported:	Jan 7, 1993

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit ug/kg	Sample Results ug/kg
Bromodichloromethane	5.0	N.D.
Bromoform	5.0	N.D.
Bromomethane	10	N.D.
Carbon tetrachloride	5.0	N.D.
Chlorobenzene	5.0	N.D.
Chloroethane	10	N.D.
2-Chloroethylvinyl ether	10	N.D.
Chloroform	5.0	N.D.
Chloromethane	10	N.D.
Dibromochloromethane	5.0	N.D.
1,2-Dichlorobenzene	5.0	N.D.
1,3-Dichlorobenzene	5.0	N.D.
1,4-Dichlorobenzene	5.0	N.D.
1,1-Dichloroethane	5.0	N.D.
1,2-Dichloroethane	5.0	N.D.
1,1-Dichloroethene	5.0	N.D.
cis-1,2-Dichloroethene	5.0	N.D.
trans-1,2-Dichloroethene	5.0	N.D.
1,2-Dichloropropane	5.0	N.D.
cis-1,3-Dichloropropene	5.0	N.D.
trans-1,3-Dichloropropene	5.0	N.D.
Methylene chloride	50	280
1,1,2,2-Tetrachloroethane	5.0	N.D.
Tetrachloroethene	5.0	N.D.
1,1,1-Trichloroethane	5.0	N.D.
1,1,2-Trichloroethane	5.0	N.D.
Trichloroethene	5.0	24
Trichlorofluoromethane	5.0	N.D.
Vinyl chloride	10	N.D.

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Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Michael R. Giles
Laboratory Director

(916) 921-9600 • FAX (916) 921-0100

Envirotox	Client Project ID:	Moffett Field Tank Pull	Sampled:	Dec 18, 1992
1336 Dixie Anne Ave.	Sample Descript:	Soil, Tank 54 North	Received:	Dec 21, 1992
Sacramento, CA 95815	Analysis Method:	EPA 5030/8010	Analyzed:	Dec 29, 1992
Attention: Norman Wheat	Lab Number:	212-0625	Reported:	Jan 7, 1993

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit ug/kg	Sample Results ug/kg
Bromodichloromethane	5.0	N.D.
Bromoform	5.0	N.D.
Bromomethane	10	N.D.
Carbon tetrachloride	5.0	N.D.
Chlorobenzene	5.0	N.D.
Chloroethane	10	N.D.
2-Chloroethylvinyl ether	10	N.D.
Chloroform	5.0	N.D.
Chloromethane	10	N.D.
Dibromochloromethane	5.0	N.D.
1,2-Dichlorobenzene	5.0	N.D.
1,3-Dichlorobenzene	5.0	N.D.
1,4-Dichlorobenzene	5.0	N.D.
1,1-Dichloroethane	5.0	N.D.
1,2-Dichloroethane	5.0	N.D.
1,1-Dichloroethene	5.0	N.D.
cis-1,2-Dichloroethene	5.0	N.D.
trans-1,2-Dichloroethene	5.0	N.D.
1,2-Dichloropropane	5.0	N.D.
cis-1,3-Dichloropropene	5.0	N.D.
trans-1,3-Dichloropropene	5.0	N.D.
Methylene chloride	50	110
1,1,2,2-Tetrachloroethane	5.0	N.D.
Tetrachloroethene	5.0	N.D.
1,1,1-Trichloroethane	5.0	N.D.
1,1,2-Trichloroethane	5.0	N.D.
Trichloroethene	5.0	N.D.
Trichlorofluoromethane	5.0	N.D.
Vinyl chloride	10	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Michael R. Giles
Laboratory Director

2120618.EEE <7>

(916) 921-9600 • FAX (916) 921-0100

Envirotox	Client Project ID:	Moffett Field Tank Pull	Sampled:	Dec 18, 1992
1336 Dixie Anne Ave.	Sample Matrix:	Soil	Received:	Dec 21, 1992
Sacramento, CA 95815	Analysis Method:	EPA 3550/8015	Reported:	Jan 7, 1993
Attention: Norman Wheat	First Sample #:	212-0624		

FUEL FINGERPRINT

Analyte	Reporting Limit mg/kg	Sample I.D. 212-0624 Tank 54 South	Sample I.D. 212-0625 Tank 54 North	Sample I.D. 212-0626 Tank 88 West	Sample I.D. 212-0627 Tank 88 East
Extractable Hydrocarbons	1.0	N.D.	N.D.	N.D.	N.D.
Chromatogram Pattern:		--	--	--	--

93 JAN 13 PM 3:05

Quality Control Data

Report Limit Multiplication Factor:	10	1.0	1.0	1.0
Date Extracted:	12/28/92	12/28/92	12/28/92	12/28/92
Date Analyzed:	12/29/92	12/29/92	12/29/92	12/29/92
Instrument Identification:	HP-3 Inj B	HP-3 Inj B	HP-3 Inj B	HP-3 Inj B

Extractable Hydrocarbons are quantitated against a fresh diesel standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

SEQUOIA ANALYTICAL

Michael R. Giles
Laboratory Director

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