

Decision Document
for
Site 17, Hangar 7

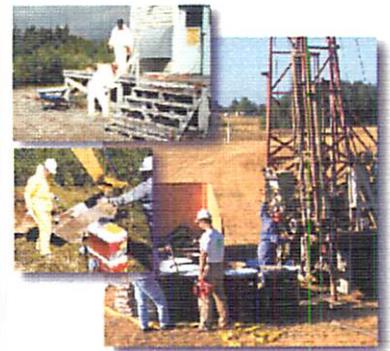
Naval Air Station Fallon
Fallon, Nevada

Delivery Order 0029

November 2003

ARCHITECT-ENGINEERING SERVICES
**ENVIRONMENTAL
RESTORATION PROJECTS**

ENGINEERING FIELD ACTIVITY
NORTHWEST, NAVAL FACILITIES
ENGINEERING COMMAND
CONTRACT NO: N44255-00-D-2476



THE URS TEAM

URS Group, Inc.

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DECLARATION OF THE DECISION

Page 1 of 2

SITE NAME AND LOCATION

Site 17, Hangar 7
Naval Air Station Fallon
Fallon, Nevada

CERCLIS Identification Number
NV9170022173

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedy for Site 17, Hangar 7, at Naval Air Station (NAS) Fallon, in Fallon, Nevada. This decision is based on information contained in the Administrative Record for the site and is in accordance with the general guidelines of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is also in accordance with Nevada Administrative Code (NAC) 445A.226 through 445A.22755.

The U.S. Navy (Navy) selected the remedy, and the State of Nevada concurs with the remedy selection.

DESCRIPTION OF THE SELECTED REMEDIES

Based on the following observations and data, No Further Action is required at Hangar 7 (Installation Restoration Site 17), NAS Fallon, Nevada. Data collected within, adjacent to, and downgradient of Site 17 indicate no significant contaminant migration from the site. Total petroleum hydrocarbons (TPH), volatile organic compounds, and semivolatile organic compounds were detected at concentrations above the state action or guidance levels in one groundwater sample (17002). These detections are related to impacted surface water runoff from adjacent Site 14. Soil contaminated with TPH—extractable above the state action level appears to be confined to near surface soil, and the soil near the water table appears to have been impacted with TPH—purgeable at concentrations exceeding the state guidance level at only one location (17005). This area is capped with asphalt. The concentrations of TPH in soil at Site 17 has not resulted in groundwater contamination.

STATUTORY DETERMINATIONS

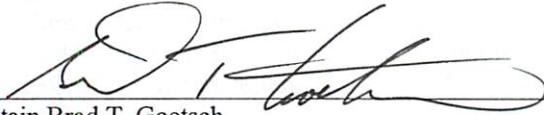
The selected remedy for Site 17 is protective of human health and the environment and in compliance with federal and state applicable or relevant and appropriate requirements (ARARs). Although soil contains concentrations of petroleum hydrocarbons above the state action levels, the area of contaminated soil is limited, and the soil has not affected groundwater beneath the site. TPH, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and naphthalene were detected in groundwater above the state action or guidance levels. TPH was detected in one of the four groundwater samples at a concentration 400 µg/L above the state guidance level. 1,2,4-trimethylbenzene was detected in one of four groundwater samples at a concentration 47 µg/L greater than the state action level. 1,3,5-trimethylbenzene was detected in one of four groundwater samples at a concentration 9 µg/L greater than the state action level. Naphthalene was detected in one of four groundwater samples at a concentration 26.8 µg/L above the state action level. Shallow groundwater at Site 17 (and NAS Fallon) is not used as a water supply and will not be used in the future. Therefore, there is no exposure pathway and these groundwater detections do not pose a threat to human health or the environment. The site may be reopened for further evaluation and, if necessary, cleanup, on the basis of newly discovered information that leads the Navy and the Nevada Division of Environmental Protection (NDEP) to determine that the remedy may not be protective of human health and the environment.

DECLARATION OF THE DECISION
Page 2 of 2

SITE NAME AND LOCATION

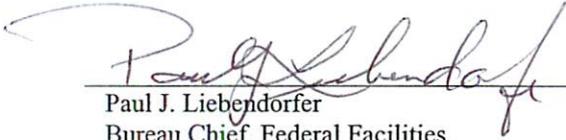
Site 17, Hangar 7
Naval Air Station Fallon
Fallon, Nevada

CERCLIS Identification Number
NV9170022173



Captain Brad T. Goetsch
Commanding Officer
Naval Air Station Fallon

20 Nov 03
Date



Paul J. Liebendorfer
Bureau Chief, Federal Facilities
Nevada Division of Environmental Protection

25 Nov 03
Date

CONTENTS

ABBREVIATIONS AND ACRONYMS	vii
1.0 INTRODUCTION	1-1
2.0 SITE NAME, LOCATION, DESCRIPTION, AND HISTORY	2-1
2.1 SITE DESCRIPTION	2-1
2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES.....	2-2
3.0 COMMUNITY PARTICIPATION	3-1
4.0 SCOPE AND ROLE OF SITE	4-1
5.0 SITE CHARACTERISTICS.....	5-1
5.1 PHYSICAL SETTING	5-1
5.1.1 Physical Setting of Facility	5-1
5.1.2 Site 17 Physical Setting	5-2
5.2 ECOLOGY	5-2
5.2.1 Vegetation	5-2
5.2.2 Endangered and Threatened Plant Species	5-3
5.2.3 Wildlife	5-3
5.2.4 Aquatic Life	5-3
5.2.5 Endangered Animal Species	5-3
5.3 GEOLOGY AND HYDROGEOLOGY	5-4
5.3.1 Regional and Facility Geology	5-4
5.3.2 Regional and Facility Hydrogeology	5-5
5.3.3 Site 17 Geology and Hydrogeology.....	5-6
5.4 NUMERICAL VALUES FOR COMPARISON TO CONTAMINANT CONCENTRATIONS	5-8
5.5 NATURE AND EXTENT OF CONTAMINATION.....	5-9
5.5.1 Qualitative Data From Groundwater Test Holes	5-10
5.5.2 Quantitative Soil Data.....	5-11
5.5.3 Groundwater Monitoring	5-13
5.6 FATE AND TRANSPORT.....	5-15
5.7 BASIS FOR DESIGN.....	5-16
6.0 CURRENT AND POTENTIAL SITE AND RESOURCE USES	6-1

FINAL DECISION DOCUMENT FOR SITE 17
Naval Air Station Fallon
U.S. Navy, Engineering Field Activity, Northwest
Contract No. N44255-00-D-2476
Delivery Order 0029

Contents
Revision No.: 0
Date: 11/13/03
Page iv

CONTENTS (Continued)

7.0 SUMMARY OF SITE RISKS 7-1
8.0 STATUTORY AUTHORITY FINDING 8-1
9.0 DOCUMENTATION OF SIGNIFICANT CHANGES 9-1
10.0 BIBLIOGRAPHY 10-1

APPENDIX

A Responsiveness Summary

CONTENTS (Continued)

FIGURES

2-1	Location Map, NAS Fallon.....	2-4
2-2	NAS Fallon Facility Map.....	2-5
2-3	Site 17, NAS Fallon.....	2-7
5-1	Generalized Stratigraphy of NAS Fallon.....	5-18
5-2	Sampling Locations at Site 17, Hangar 7.....	5-19
5-3	Generalized Fence Diagram, Site 17.....	5-21
5-4	Groundwater Surface Elevation Contours, November 2002, NAS Fallon.....	5-23
5-5	Estimated Area of Contamination at Site 17, Hangar 7.....	5-25

TABLES

4-1	Summary of Data From Sampling Locations Used as the Basis of Decision for Site 17, Hangar 7.....	4-3
4-2	Chronological Quantitative Sampling Summary.....	4-4
5-1	Summary of Detected Organic Compounds in Soil at Site 17, Hangar 7.....	5-27
5-2	Summary of Detected Total Metals in Soil at Site 17, Hangar 7.....	5-29
5-3	Summary of Detected Analytes in Groundwater Samples From Site 17, Hangar 7.....	5-31

ABBREVIATIONS AND ACRONYMS

ARAR	applicable or relevant and appropriate requirement
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and total xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
cm/sec	centimeter per second
CRP	community relations plan
DCE	dichloroethane
DRO	diesel-range organics
EPA	U.S. Environmental Protection Agency
FS	feasibility study
GRO	gasoline-range organics
HBP PHC	high-boiling-point petroleum hydrocarbons
IR	Installation Restoration
JP-5	jet petroleum No. 5
LBP PHC	low-boiling-point petroleum hydrocarbons
LD	lower diagonal
MCL	maximum contaminant level
µg/kg	microgram per kilogram
µg/L	microgram per liter
mg/kg	milligram per kilogram
mg/L	milligram per liter
NAC	Nevada Administrative Code
NAS	Naval Air Station
Navy	U.S. Navy
NDEP	Nevada Division of Environmental Protection
NPL	National Priorities List
PA	preliminary assessment
PID	photoionization detector
PRG	Preliminary Remediation Goal
PSCS	preliminary site characterization summary
RAB	Restoration Advisory Board
RI	remedial investigation
SI	site inspection

ABBREVIATIONS AND ACRONYMS (Continued)

TCLP	toxicity characteristics leaching procedure
SVOC	semivolatile organic compound
TCE	trichloroethene
TPH	total petroleum hydrocarbons
TPH-E	total petroleum hydrocarbons—extractable
TPH-P	total petroleum hydrocarbons—purgeable
TRC	Technical Review Committee
VOC	volatile organic compound

1.0 INTRODUCTION

This decision summary describes the site-specific factors and analyses that led to the selection of No Further Action as the remedy for Site 17, Hangar 7, at Naval Air Station (NAS) Fallon, in Fallon, Nevada.

This decision document supersedes and replaces the *Draft Final Decision Document, Site 17, Hangar 7*, dated August 27, 1999. Documents supporting the decision are included in the Administrative Record for the site. Key documents are identified in Section 10.

The format and organization of this decision document are based on U.S. Environmental Protection Agency's (EPA's) *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents*, dated July 1999. This decision document includes the pertinent elements of Nevada Division of Environmental Protection's (NDEP's) *Requirements for (IR) Program Decision Documents*, transmitted in a letter dated December 30, 1998. This decision document is organized as follows:

- **Declaration of the Decision.** Functions as the abstract and formal authorizing signature page for the decision document
- **Section 1—Introduction.** Summarizes the purpose and organization of the decision summary portion of the decision document, identifies the site to which the decision document pertains, and clarifies the relationship of this decision document to previous versions of the decision document
- **Section 2—Site Name, Location, Description, and History.** Identifies and describes the site, provides location and property ownership information, and summarizes the history of the site that led to conditions observed at the site, as well as previous investigation activities
- **Section 3—Community Participation.** Documents community participation activities throughout the decisionmaking process, references the “responsiveness summary” in Appendix A, and describes the location and availability of the Administrative Record
- **Section 4—Scope and Role of Site.** Discusses Site 17 in relation to other sites at NAS Fallon and identifies when and where monitoring or remedial activities at other sites influence, or are influenced by, monitoring or remedial activities at Site 17

- **Section 5—Site Characteristics.** Summarizes the regional, facility, and site-specific characteristics and conditions, including the concentrations and distribution of contaminants and their fate and transport
- **Section 6—Current and Potential Site and Resource Uses.** Discusses the current and potential future uses of the land
- **Section 7—Summary of Site Risks.** Discusses risks due to contamination present at the site
- **Section 8—Statutory Authority Finding.** States the conclusion that no further action is necessary at Site 17
- **Section 9—Documentation of Significant Changes.** Describes the changes made to this decision document on the basis of comments received during the public comment period
- **Section 10—Bibliography.** Lists the sources of information used in preparing this decision document
- **Appendix A — Responsiveness Summary.** Summarizes responses to public comments on the proposed plan

2.0 SITE NAME, LOCATION, DESCRIPTION, AND HISTORY

NAS Fallon is located in west-central Nevada, approximately 6 miles southeast of the city of Fallon and 70 miles east of the city of Reno (Figure 2-1). NAS Fallon was originally established as a military facility in 1942, when the Civil Aviation Administration and Army Air Corps constructed four airfields in Nevada as part of the Western Defense Program. In 1943, the Navy assumed control of the still-uncompleted facility, and on June 10, 1944, Naval Air Auxiliary Station (NAAS) Fallon was commissioned. The newly commissioned facility provided training, servicing, and support to air groups sent to the facility for combat training. From 1946 to 1951, NAAS Fallon experienced varying but reduced operational status and was eventually turned over to Churchill County and the Bureau of Indian Service.

In 1951, Fallon was used as an auxiliary landing field for NAS Alameda, California, and on October 1, 1953, NAAS Fallon was re-established. From 1945 to 1975, the Air Force also occupied part of the station as part of an early warning radar network. On January 1, 1972, NAAS Fallon was upgraded to its current status of NAS Fallon. NAS Fallon serves as the primary aircraft weapons delivery and tactical air combat training facility. With the construction of a new runway and additional aircraft maintenance facilities, NAS Fallon's training mission is expected to continue to expand. The U.S. Navy (Navy) is expected to maintain NAS Fallon in the future.

2.1 SITE DESCRIPTION

Site 17, Hangar 7, is located in the southern portion of NAS Fallon, west of Site 16 (Figure 2-2). The site's Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) Identification Number is listed as NV9170022173. The Navy is the lead agency for site activities, and the NDEP serves as the lead regulatory agency.

Site 17 was investigated as part of the Group IV sites, nine sites that were grouped together because of their proximity and the potential for commingled contaminated areas. Site 17 is located on the central portion of the northern boundary of the Group IV sites between Site 14 and 16. During the preliminary assessment/site inspection (PA/SI), Site 17 was known as Hangar 4. Site 17 was later renamed Hangar 5 and is currently named Hangar 7. The surface of Site 17 consists generally of buildings and paved areas. The area between the hangar and the road along the southern border of the site is unpaved. The area east of the hangar was unpaved until 1985, when all but the extreme southern portion was paved with asphalt. The Navy does not expect any change in land use at Site 17 or that of the surrounding sites.

Hangar 7 was used nearly continuously for aircraft maintenance and repair from 1941 to 1943 and from 1951 to the present. Waste was generated by the servicing and washing of aircraft. Fluid changing and minor engine maintenance were the primary servicing activities that occurred at the site. Spills of aircraft fluids during servicing may have also occurred. Information on waste generation was not recorded before 1970; therefore, pre-1970 information has been extrapolated from figures reported since 1970. As much as 4,500 total gallons of the following materials were estimated in the PA/SI to have been released to the environment at Site 17 from 1943 to 1946 and from 1951 to 1987: wash solvents (Turco), lube oil, hydraulic fluid, grease, aviation gasoline, jet petroleum No. 4 (JP-4), JP-5, methyl ethyl ketone, isopropyl alcohol, and PD-680.

There are two areas that received runoff from the servicing and washing of aircraft and from spills of aircraft fuels, oils, and solvents: the unpaved area directly south of Site 17 along the road, and the area east of the hangar, which was unpaved until 1985 (see Figure 2-3).

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The purpose of the Navy's Installation Restoration (IR) Program is to identify, assess, characterize, and clean up or control contamination from past hazardous material spills and waste disposal activities at Navy and Marine Corps facilities. As part of the IR Program, the Navy conducted the following investigations/assessment activities:

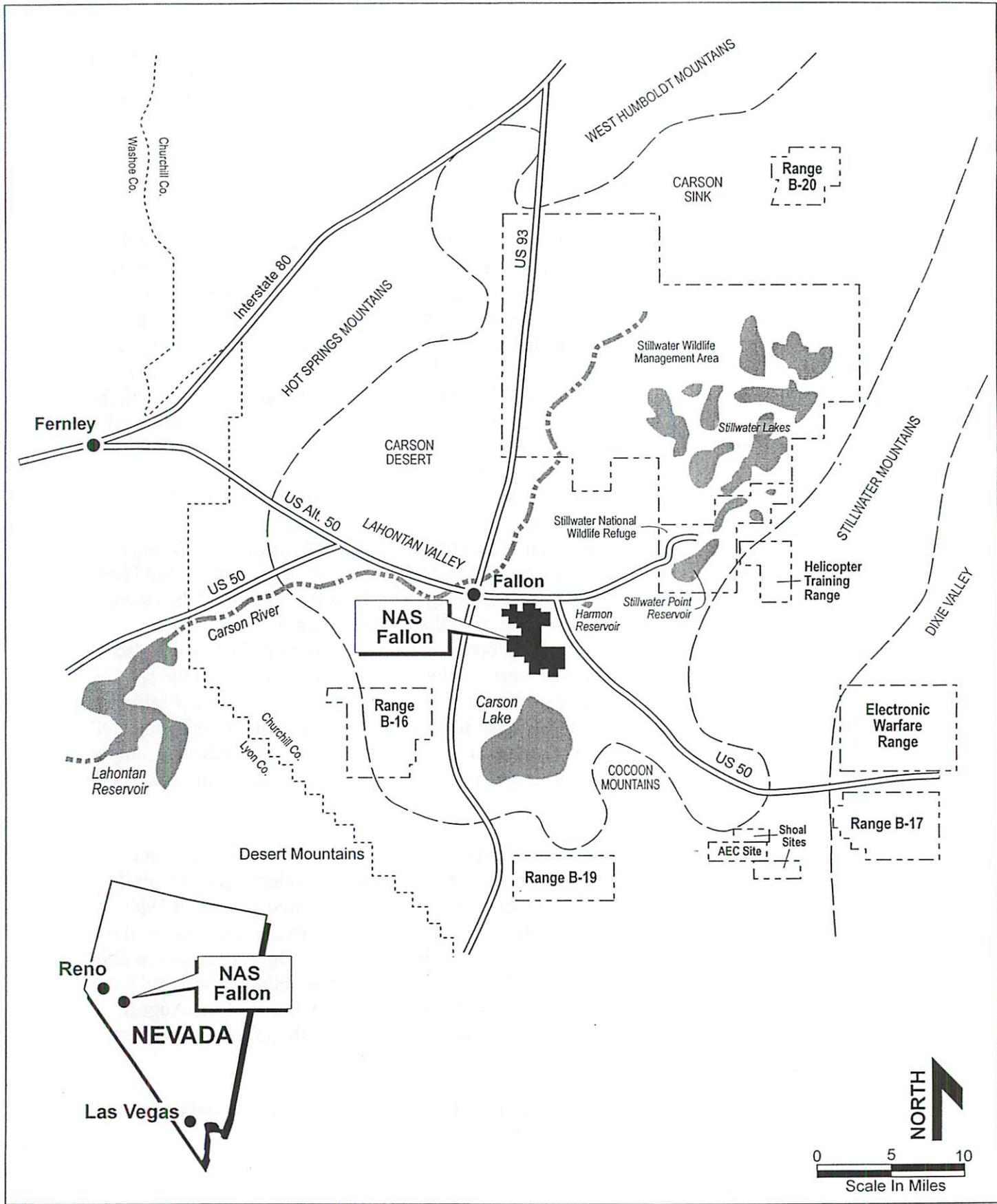
- Phase I consisted of a PA/SI, which comprised a records search, a site visit, employee interviews, collection of three surficial soil samples, and recommendations for further study or immediate mitigating action. The three soil samples were collected in the runoff area immediately south and southeast of the site. These soil samples were analyzed for total petroleum hydrocarbons (TPH) according to EPA Method 418.1 and for volatile organic compounds (VOCs) according to EPA Method 8240. TPH was detected in all three samples at concentrations of 57, 83, and 350 mg/kg; acetone was detected in two of the samples at concentrations of 0.12 and 0.71 mg/kg; and trace amounts of trichloroethene (TCE) and dichloroethane (DCE) were detected in one sample. Additional remedial investigation in the form of soil borings, downgradient soil-gas testing, and monitoring wells was recommended to assess the vertical and lateral extent of contamination.
- Phase II consisted of a preliminary site characterization summary (PSCS). The purpose of the PSCS for the Group IV sites (which includes Site 17) was to further assess the extent of contamination. Five soil borings (S17SB01 through

S17SB05) were drilled to a depth of 7 feet below ground surface (bgs) along the east-west drainage swale leading from Site 17 to the unnamed drainage ditch east of Site 16. Only S17SB01 and S17SB02 are located within the site boundaries. The other three samples are located east of the site within an area impacted by Site 16. The soil sample collected from S17SB03 at 5 to 7 feet bgs contained the gasoline components: benzene, toluene, ethylbenzene, and total xylenes (BTEX). The fuel-related contaminants in S17SB03 were believed to be associated with the Site 16 contaminated groundwater plume to the immediate north. No additional investigations were recommended for Site 17.

- No remedial investigation (Phase III) activities were conducted at Site 17.
- Phase IV (supplemental sampling) was conducted in 2002 to collect additional site characterization data in response to an NDEP request. The scope of the Phase IV activities was negotiated with and approved by NDEP. Additional data were collected from two direct-push borings in the unpaved area south of Hangar 7. Soil and groundwater samples were obtained from each boring. Data were also collected from three direct-push borings along the eastern boundary of the site. Soil samples were collected from each of the borings, and a groundwater sample was obtained from one of the borings. In addition, a groundwater monitoring well was installed in the southwest corner of Site 17 from which a groundwater sample was obtained. All sampling locations relevant to Site 17 are shown and discussed in Section 5.

After the RI was published, the Navy prepared a draft decision document for Site 17 (in June 1998) presenting a decision of No Further Action. The NDEP provided comments on the draft decision document. A draft final decision document for Site 17 was prepared in August 1999, and the NDEP provided comments on the draft final document. Responses to comments on the draft final decision document were presented to the NDEP in April 2001. During the review and response process with the NDEP, the NDEP and the Navy agreed to substantially revise the decision document and to include additional data collected after the preparation of the August 1999 draft final decision document for Site 17. This decision document, therefore, supersedes and replaces all previous versions.

NAS Fallon is not listed on the National Priorities List therefore NDEP provides regulatory oversight. There have been no enforcement activities at the site.



U.S. NAVY

**Figure 2-1
Location Map, NAS Fallon**

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SITE 17

U.S. NAVY

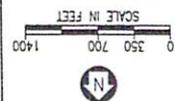
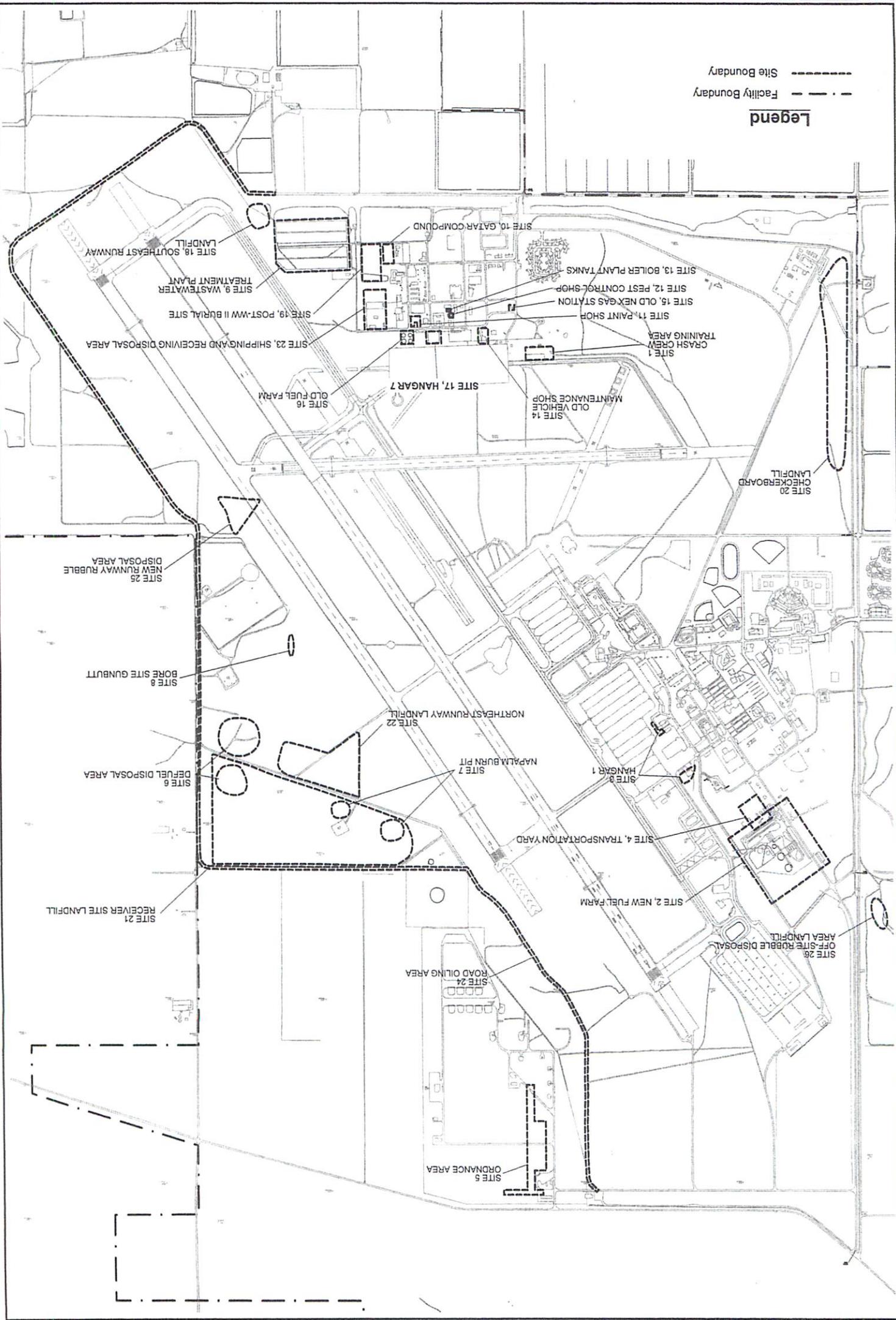
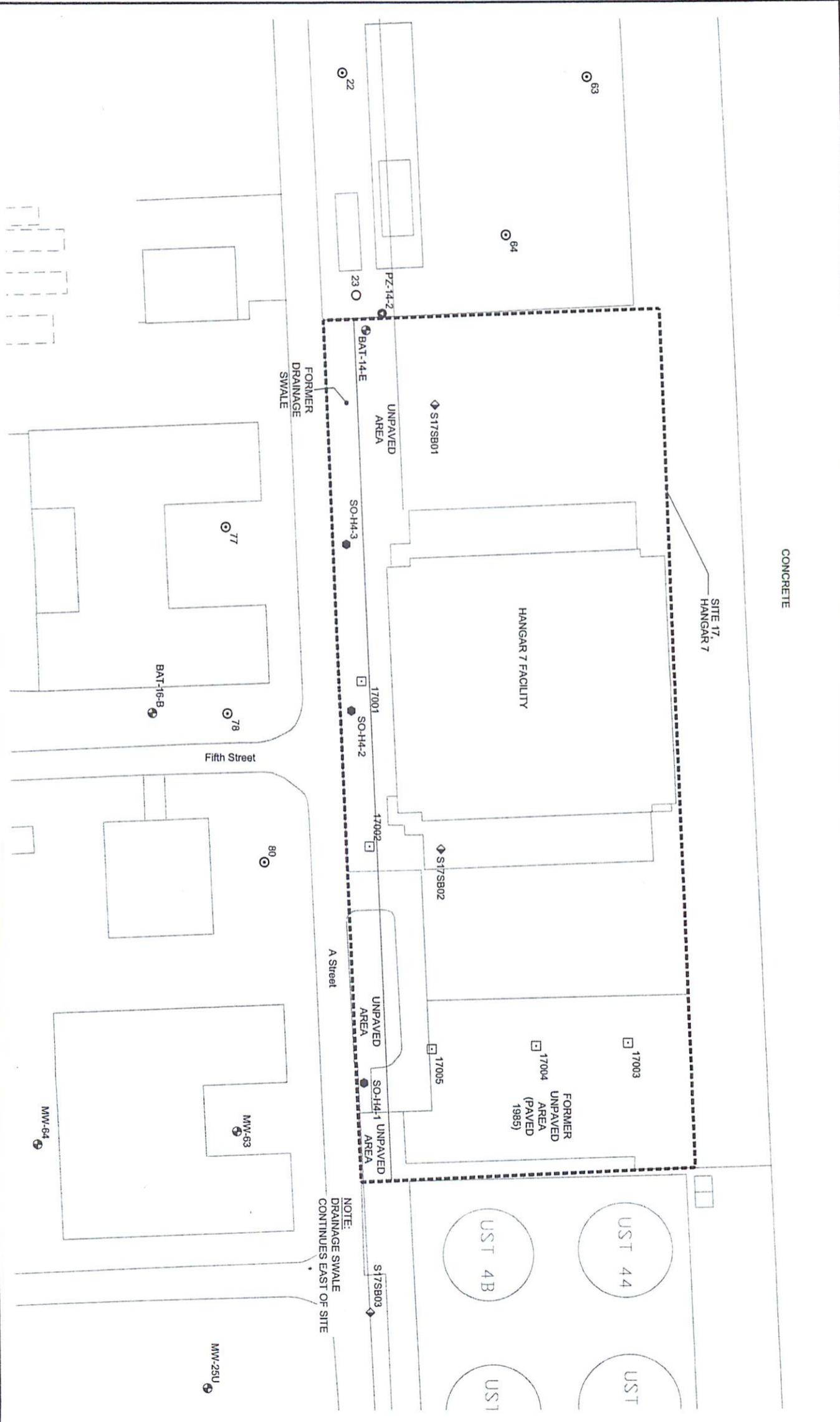


Figure 2-2
NAS Fallon Facility Map

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SITE 17

Legend
- - - - - Facility Boundary
- - - - - Site Boundary





CONCRETE

SITE 17
HANGAR 7

HANGAR 7 FACILITY

FORMER
UNPAVED
AREA
(PAVED
1985)

NOTE:
DRAINAGE SWALE
CONTINUES EAST OF SITE

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U.S. NAVY

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 SITE 17

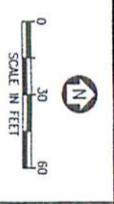


Figure 2-3
 Site 17, NAS Fallon

3.0 COMMUNITY PARTICIPATION

Community participation is being encouraged under a community relations plan (CRP) drafted pursuant to Section 117 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA).

In 1989, a Technical Review Committee (TRC) was formed in an effort to increase community participation and awareness regarding the IR Program and to provide comments on proposed actions under the NAS Fallon IR Program. The TRC consisted of state and local regulatory representatives and NAS Fallon personnel. The TRC met in June 1989 to discuss potential requirements for future PA/SI or RI and feasibility study (FS) activities at NAS Fallon. This meeting provided an opportunity for the regulatory agencies to comment on and provide input to the proposed IR Program at NAS Fallon.

In August 1994, a Restoration Advisory Board (RAB) was established to replace the TRC. The RAB meets once a year and consists of members originally on the TRC and representatives from the local community.

All documents associated with this site, such as the PA/SI report, the RI report, the CRP and the Proposed Plan for Site 17, were made available to the public in the Administrative Record at NAS Fallon (Fallon, Nevada), the Churchill County Public Library (Fallon, Nevada), the University of Nevada Reno Library (Reno, Nevada), and at the Engineering Field Activity, Northwest, offices (Poulsbo, Washington). The notice of the availability of these documents was published in the *Lahontan Valley News* on October 3, 2003. Notices were also sent to the RAB Co-Chair. A public comment period was held from October 8 through November 7, 2003. In addition, a public meeting was held on October 15, 2003, to present the Proposed Plan to the community. At this meeting, representatives from NAS Fallon and the NDEP presented the Proposed Plan.

4.0 SCOPE AND ROLE OF SITE

There are 27 IR sites at NAS Fallon. The locations of all 27 IR sites are shown on Figure 2-2. Site 1 (Crash Crew Training Area) is located in the southern station area northwest of Site 14. Site 2 (New Fuel Farm) and Site 4 (Transportation Yard) are combined in the RI as Group I Sites and are located in the northwestern portion of the station. Site 3 (Hangar 1) consists of two areas located southeast of the Group I Sites. Site 5 (Ordnance Area) is located in the extreme northern portion of the station. Site 6 (Defuel Disposal Area), Site 7 (Napalm Burn Pit), Site 21 (Receiver Site Landfill), and Site 22 (Northeast Runway Landfill) are combined in the RI as Group II Sites and are located in the eastern portion of the station. Site 8 (Bore Site Gunbutt) is located in the eastern portion of the station just south of the Group II Sites. Site 9 (Wastewater Treatment Plant) and Site 18 (Southeast Runway Landfill) are combined in the RI as Group III Sites and are located in the southeastern portion of the station. Site 10 (GATAR Compound), Site 11 (Paint Shop), Site 12 (Pest Control Shop), Site 13 (Boiler Plant tanks), Site 14 (Old Vehicle Maintenance Shop), Site 15 (Old NEX Gas Station), Site 16 (Old Fuel Farm), Site 17 (Hangar 7), Site 19 (Post-WW II Burial Site), and Site 23 (Shipping and Receiving Disposal Area) are combined in the RI as Group IV Sites and are located in the southern portion of the station. Site 20 (Checkerboard Landfill) is located in the southeastern portion of the station. Site 24 (Road Oiling Area) is a road located along the eastern perimeter of the station. Site 25 (New Runway Disposal Area) is a no further action site located along the eastern boundary of the station. Site 26 (Off-Site Rubble Disposal Area Landfill) is a no further action site located along the western border of the station. Site 27 (Diesel Fuel Spill Site) is a no further action site located along the access road to bombing range B-17.

The sampling locations used to evaluate Site 17 are as follows:

- Eight auger-boring locations adjacent to Site 17 from which groundwater samples were collected for qualitative analysis (these locations are sometimes referred to as "groundwater test holes")
- Three surface soil sampling locations south of Hangar 7 from which soil samples were collected
- Five auger-boring locations along the east-west drainage swale leading from Site 17 to the unnamed drainage ditch east of Site 16 from which soil samples were collected (two locations within Site 17 and the remaining three locations to the east of Site 17)

- One permanent monitoring well located in the southwest corner of Site 17 from which a groundwater sample was collected (BAT-14-E)
- Five direct-push sampling locations to the east and south of Hangar 7 from which soil (five locations) and groundwater (three locations) samples were collected

The sampling locations used as a basis for the decision for Site 17 are summarized in Table 4-1, together with the gradient relationships to Site 17 and the uses of the data from each location. Table 4-2 provides a chronological summary of quantitative sampling activities at each location.

The eight groundwater test holes were initially completed to qualitatively evaluate potential contamination related to Site 17, as well as to other Group IV Sites. The surface soil samples were used to assess the presence of contaminants in the soil resulting from the servicing and washing of aircraft at Hangar 7. The five auger-boring locations were installed to evaluate the impacts of Site 17 activities on the east-west drainage swale leading from the site to the unnamed drainage ditch east of Site 16. However, three of the borings were located in an area east of Site 17, which has been impacted by Site 16. The permanent monitoring well was used to assess the presence of contaminants in the groundwater at Site 17. The five auger-boring locations to the east and south of Hangar 7 were installed to evaluate the impacts of Site 17 activities on the unpaved area and the formerly unpaved area at the site.

**Table 4-1
 Summary of Data From Sampling Locations Used as the
 Basis of Decision for Site 17, Hangar 7**

Sampling Location	Data Type	Data Uses
Locations Within Site 17		
SO-H4-1, SO-H4-2, and SO-H4-3	Quantitative	Quantitative assessment of presence or absence of potential contaminants in surface soil related to the activities at the hangar
Boreholes S17SB01 (BH01) and S17SB02 (BH02)	Quantitative	Quantitative assessment of presence or absence of potential contaminants in soil related to the activities at the hangar
Boreholes 17001 through 17005	Quantitative	Quantitative assessment of presence or absence of potential contaminants in soil and groundwater related to the activities at the hangar
Well BAT-14-E	Quantitative	Quantitative assessment of contaminants crossgradient to Site 17
Locations Upgradient of Site 17		
Groundwater test holes 23 and 64	Qualitative/ screening	Visual inspection for presence or absence of LNAPL on groundwater surface and qualitative assessment of volatile contaminants in groundwater, used to site permanent groundwater monitoring wells
Locations Downgradient of Site 17		
Groundwater test holes 77, 78, and 80	Qualitative/ screening	Visual inspection for presence or absence of LNAPL on groundwater surface and qualitative assessment of volatile contaminants in groundwater, used to site permanent groundwater monitoring wells
Boreholes S17SB03 (BH03), S17SB04 (BH04), and S17SB05 (BH05)	Quantitative	Quantitative assessment of presence or absence of potential contaminants in soil downgradient of the hangar

Notes:

- BH - borehole
- LNAPL - light nonaqueous-phase liquid
- MW - monitoring well

**Table 4-2
 Chronological Quantitative Sampling Summary**

Sampling Location	Matrix	Sampling Date	Range of Analyses ^a
SO-H4-1, SO-H4-2, and SO-H4-3	Soil	11/87	Petroleum hydrocarbons and VOCs
S17SB01 (BH01), S17SB02 (BH02), S17SB03 (BH03), S17SB04 (BH04), and S17SB05 (BH05)	Soil	3/91	Petroleum hydrocarbons, VOCs, SVOCs, and metals
17001, 17002, 17003, 17004, and 17005	Soil	4/02	Petroleum hydrocarbons, VOCs, and SVOCs
17001, 17002, and 17004	Groundwater	4/02	Petroleum hydrocarbons, VOCs, SVOCs, and water quality parameters
BAT-14-E	Groundwater	9/97	Petroleum hydrocarbons, VOCs, and water quality parameters

^aAll analyses in the range shown were not necessarily performed on each sampling date.

Notes:

- BH - borehole
- SVOCs - semivolatile organic compounds
- VOCs - volatile organic compounds

5.0 SITE CHARACTERISTICS

This section summarizes the characteristics and conditions of the region, the facility, and the site. It describes the physical and ecological setting, climate, surface water patterns, and geology and hydrogeology, as well as the nature and extent of contamination and the fate and transport of chemicals of concern.

5.1 PHYSICAL SETTING

5.1.1 Physical Setting of Facility

NAS Fallon lies on a broad, flat alluvial plain in the southern Carson Desert referred to as the Lahontan Valley. The Carson Desert is part of the Basin and Range geological province. Carson Lake, a series of ditches and small marshes, is a few miles south of the facility. The Stillwater Lakes, a chain of small lakes, ponds, and marshes, extend for 20 miles south of the Carson Sink in the northern half of the Carson Desert (Figure 2-1). Carson Lake and the Stillwater Lakes are two wetland areas that serve as an important stopover for migratory birds during the spring and fall.

The Carson Desert is a hydrologically closed depression that forms the sink for the Carson River. The entire area is in the rain shadow of the Sierra Nevada Mountains; consequently, precipitation is about 5 inches per year. About 80 percent of the Carson Desert surface consists of the Carson River floodplain, with the rest composed of playas and alluvial fans. The surface soils are enriched with salts and cations such as arsenic, lithium, mercury, and molybdenum that have been transported to the basin by the river and have been concentrated as a result of evaporation of ancient Lake Lahontan.

The Carson River, augmented by the Truckee River via the Truckee canal (part of the Newlands Irrigation Project), provides more than 95 percent of all surface runoff received by the Carson Desert. Much of the area around the facility is irrigated; several irrigation ditches deliver water, and drainage canals remove excess water. The drainage canals generally intersect the shallow water table aquifer and drain excess water from the farmland.

There are two major drainage canals at NAS Fallon:

- The "lower diagonal (LD) drain," the alignment of which is along the southwestern edge of the facility and east along the southern boundary of the facility proper

- The “LD #1 drain,” which crosses onto the facility just north of Site 2 (the New Fuel Farm), drains to the east from the west side of the facility, and then drains to the south

The most important distinction between the irrigation ditches and the drainage canals (drains) is that the drains intersect the shallow groundwater as well as surface water and to conduct the water away from the drained areas. Conversely, the irrigation ditches deliver water to the fields. In the process of carrying off excess surface water and shallow groundwater, the drains remove minerals or salts leached from the farmland. The drains carry water southeastward to Carson Lake and northeastward to the Harmon and Stillwater Point Reservoirs.

The LD drain is approximately 500 feet south of the Group IV sites. In addition, an unnamed drain is located just east of Group IV Site 23 and 19. The primary source of water in this drain is backflow from the LD drain during the irrigation season. During rare storm events, stormwater in small ditches may enter the unnamed drain.

5.1.2 Site 17 Physical Setting

Site 17, Hangar 7, is located in the southern portion of NAS Fallon, west of Site 16 and east of Site 14 (Figure 2-2). Site 17 encompasses approximately 3.5 acres, extending approximately 600 feet from east to west and 250 feet from north to south. Hangar 7 is the only building located at the site. Currently, Strike and Search and Rescue are housed in the hangar. The site surface consists generally of paved areas. However, the area directly south of the hangar along the road is unpaved. The area east of the hangar was unpaved until 1985, when all but the extreme southern portion was paved with asphalt. NAS Fallon does not expect any change in the use of this land, or that of the surrounding sites in the near future. There are no areas of archaeological or historical significance at Site 17.

5.2 ECOLOGY

5.2.1 Vegetation

NAS Fallon was originally a greasewood community typical of alkali valley bottom lands, portions of which have since been irrigated and used as pasture. Typical plants for this area include saltbush, shadscale, quailbush, halogeton, greasewood, milkweed, poverty weed, alkali sacaton, rabbitbrush, saltgrass, and alkali seepweed.

The flat, alkali bottom lands making up the southern portion of the Carson Sink currently receive sufficient irrigation return flow and Carson River water to be recognized as a wetland habitat,

especially for waterfowl. Vegetation typical of these areas includes bullbush, cattail, pondweed, widgeon grass, muskgrass, and coontail. Cottonwoods and willows occupy portions of the banks of various ponds, ditches, and drains.

5.2.2 Endangered and Threatened Plant Species

No endangered or threatened plant species designated by the state or federal government are known or likely to occur in the region.

5.2.3 Wildlife

Terrestrial wildlife in the region consists of species adapted to the desert or dependent on wetlands. About 67 species of mammals inhabit the area. Mountain ranges in the region, outside of the area of human impact, support large mammals such as mountain lions and mule deer. Common mammals of the area include bats, coyote, kit fox, jackrabbit, deer mouse, ground squirrel, and kangaroo rat.

More than 252 species of birds have been recorded regionally. Upland game birds of the desert are the ring-necked pheasant, sage grouse, the introduced chukar partridge, quail, and mourning dove. A variety of raptors and songbirds are also present.

The Stillwater National Wildlife Management Area, 7 miles east of NAS Fallon, and Carson Lake, 4 miles south of NAS Fallon, support the two largest concentrations of waterfowl and shorebirds in the state. Important game birds include canvasbacks, whistling swans, and Canada geese. Nongame species include the American avocet, black-necked stilt, white-faced ibis, and dowitchers.

5.2.4 Aquatic Life

The drains at NAS Fallon may be inhabited by mosquito fish, carp, bullhead, catfish, sunfish, muskrats, herons, and eagles.

5.2.5 Endangered Animal Species

Federally listed endangered and threatened animal species that may utilize the NAS Fallon and range areas include bald eagle. These species are most likely to be found hunting the wetland portions of the area but may occasionally be seen elsewhere. The nearest breeding habitat is to the northwest, outside the boundaries of the NAS Fallon facility.

5.3 GEOLOGY AND HYDROGEOLOGY

5.3.1 Regional and Facility Geology

The area within and surrounding NAS Fallon consists of an intermontane valley. The mountains near NAS Fallon are composed primarily of a variety of consolidated igneous, sedimentary, and metamorphic rocks that range in age from Triassic to Quaternary in age.

The Basin and Range faulting that occurred during the Cenozoic Era probably formed the bedrock surface below the valley fill sediments. This formation of the intermontane valley was accompanied by deposition of valley-fill sediments on the floor to depths of several thousand feet. Sediment composing the valley fill was derived from three primary sources:

- Upstream valleys of the Carson River drainage
- Upstream valleys of the Humbolt River basin
- Mechanical weathering of consolidated rocks within the Carson Desert itself

It appears that most of the valley-fill sediments in and around NAS Fallon were transported into the valley by the ancestral Carson River.

The depositional character of the valley-fill sediments at NAS Fallon was greatly influenced by the presence of the ancient Lake Lahontan, a Quaternary-age lake that was subject to numerous cycles of advancement and retreat. Regional climatic changes caused dramatic oscillations of lake stages and shorelines throughout the Pleistocene Epoch. Subsurface stratigraphic evidence also suggests the existence of pre-Quaternary-age lakes in the valley. The pluvial influences on sediment deposition were extensive and probably varied during the greater part of Cenozoic time. The alternating influences of wave action, standing water, flowing water, and wind on the sediment transported into the valley by the Humbolt and Carson Rivers resulted in a complex sequence of interfingering and interbedded deposits of fluvial, deltaic, lacustrine, and eolian deposits.

Previously published descriptions of these deposits were generally confirmed during the installation of monitoring wells across the facility. However, the highly transmissive, coarse-grained deposits were found to be both laterally and vertically discontinuous. Below the upper 20 feet of interbedded coarse-grained and fine-grained deposits, a laterally continuous bed of fine-grained silts and clays forms an aquitard, providing a natural barrier to the downward migration of groundwater and contaminants.

A generalized geologic cross section showing the stratigraphy beneath NAS Fallon is provided in Figure 5-1.

5.3.2 Regional and Facility Hydrogeology

Abundant groundwater is present in the valley-fill sediments and the underlying volcanic strata of the Carson Desert as a result of the closed nature of the hydrologic basin and the remnants of Pleistocene Lake Lahontan that once covered the entire area. Groundwater occurs in three principal aquifer systems: (1) a shallow alluvial aquifer, (2) intermediate and deep alluvial aquifers, and (3) a basalt aquifer.

The shallow water-table aquifer occupies the alluvium from near the ground surface to about 25 feet bgs. Many residents living outside of the city of Fallon have shallow wells in this aquifer, which are used for domestic water, livestock watering, and irrigation. The shallow aquifer is composed of many interconnected zones of varying permeability, ranging from highly transmissive channel sands to less-transmissive silty clay floodplain and lake deposits. The water quality is generally poor because the water has a high concentration of dissolved solids; however, freshwater recharge from the surface-water irrigation system helps maintain water quality in some parts of the valley.

Reports of regional water quality in the shallow alluvial aquifer and irrigation return flows contain information on the range of concentrations of various metals and anions. This information is summarized in the *Preliminary Site Characterization Summary*. Although the concentrations of these constituents vary considerably, there is a trend of increasing concentrations toward discharge areas at the Stillwater Lakes and Carson Lake. Concentrations of many trace metals exceed various criteria for the protection of aquatic life and crops, effect levels for fish reproduction, and limits for the propagation of wildlife. For example, background concentrations of boron in surface water often exceed the effect level for fish reproduction of 200 µg/L, and concentrations of arsenic in groundwater and surface water often exceed the Nevada criterion for the protection of aquatic life of 40 µg/L and the drinking water standard of 50 µg/L.

The regional groundwater flow direction is to the east and southeast toward Grimes Point and slightly diagonal to the drainage ditches that cross the facility. The velocity of the regional groundwater flow has been estimated to be 35 feet per year. The site-specific groundwater flow velocities from numerous aquifer tests are highly variable.

Intermediate and deep alluvial aquifers are present beneath the shallow alluvial aquifer in the Wymaha Formation. The boundary between the shallow and the intermediate aquifer is a

relatively impermeable clay layer (Sehoo Formation), approximately 20 feet thick. The water in the intermediate and deep aquifers is generally of better quality than the water in the shallow aquifer. The boundary between the intermediate and deep aquifers is defined primarily on the basis of water quality, rather than the presence of a physical boundary. Water quality in the intermediate and deep alluvial aquifers generally improves with depth.

The deep alluvial aquifer extends to approximately 2,200 feet bgs near the center of the basin. The basalt aquifer lies within the intermediate and deep alluvial aquifers at a depth of approximately 600 feet bgs, within an approximately 4-mile radius around Rattlesnake Hill, a small volcanic cone that outcrops just north of the city of Fallon. The basalt aquifer is the only source of municipal domestic water in the area and is recharged from the intermediate and deep alluvial aquifers. The basalt aquifer is not present beneath NAS Fallon except possibly in the extreme northwest corner of the facility. However, NAS Fallon obtains all of its domestic water from this aquifer using deep wells northwest of the facility.

Three monitoring wells penetrating the intermediate aquifer on the facility indicate a head difference of about 5 to 9 feet between the shallow unconfined aquifer and the intermediate confined aquifer. The head is higher in the intermediate aquifer, indicating artesian conditions that retard or preclude downward migration of groundwater at the facility. Because of this upward hydraulic gradient, investigations at the facility have focused on the shallow water-table aquifer, with three widely spaced wells drilled into the intermediate aquifer.

5.3.3 Site 17 Geology and Hydrogeology

The geologic information for Site 17 was obtained by soil sampling or cone penetrometer investigation during the installation of monitoring well BAT-14-E and soil borings 17001 through 17005 (Figure 5-2). Subsurface investigations at the site were limited to the shallow alluvial aquifer, because of the presence of a silty clay aquitard at the base of this aquifer. BAT-14-E is located just west of the southwestern corner of the site boundary. Soil borings 17001 through 17005 were located within the site boundaries. Soil borings 17001 and 17002 were located along the southern boundary, and 17003 through 17005 were located in the eastern portion of the site.

A generalized fence diagram is provided as Figure 5-3. Subsurface soil at locations 17001 through 17005 is mainly sand with minor amounts of silt. A clayey silt to silty clay is observed at all locations from 2 to 4 feet bgs. This layer is approximately 2 to 3 feet thick in the south and increases to a thickness of approximately 9 feet to the north at location 17003. A second deeper clayey silt to silty clay layer is observed at location 17001 only from 6 to 10 feet bgs. This layer

is interpreted to pinch out to the east between locations 17001 and 17002. The total depth of the on-site investigation was from 9 to 13 feet bgs, depending upon the location.

Groundwater surface elevation contours indicate a gradient and flow direction at Site 17 that are consistent with the regional flow direction, which is to the southeast. Depth to groundwater in wells used to evaluate conditions at Site 17 varies seasonally and ranges from 5.0 to 8.0 feet bgs. The average hydraulic gradient across the site was approximately 0.0006 in November 2002. Groundwater surface elevation contours for data collected in November 2002 is shown in Figure 5-4.

Bail tests were conducted on selected wells at the Group IV sites in April 1991 and June 1992. The two wells closest to Site 17, wells MW-63 and MW-64, were bail-tested in June 1992. Multiple bail tests were conducted at each location. The highest calculated hydraulic conductivity for each well location follows:

- MW-63: 1.9 feet/day, or 6.7×10^{-4} cm/sec
- MW-64: 12.5 feet/day, or 4.4×10^{-3} cm/sec

The highest bail-test-derived hydraulic conductivity was observed at well MW-64, and the lowest hydraulic conductivity was observed at Well MW-63. Assuming a porosity of 30 percent, the range of groundwater velocities across the site is 1.4 to 9.1 feet per year. Appendix E of the RI indicates that bail tests may underestimate the hydraulic conductivity of materials at the facility from 5 to 125 times. Pumping tests were conducted in the area of Site 2. The lithology in the area of well MW-20 is similar to that observed in the area of Site 17. Pumping-test-derived hydraulic conductivities were estimated at 38.9 to 61.6 feet per day. These estimates are 3 to 5 times higher than the highest bail-test-based estimate of 12.5 feet per day at wells near Site 17, suggesting that groundwater velocity across the site could be as high as 45 feet per year. These velocity estimates are for groundwater and do not necessarily represent contaminant transport velocities, which are usually slower than groundwater velocity. The degree to which contaminant velocity is "retarded" relative to groundwater depends on the amount of organic carbon in the saturated formation and the contaminant type. Because of retardation, contaminant velocities are typically slower than groundwater velocities.

5.4 NUMERICAL VALUES FOR COMPARISON TO CONTAMINANT CONCENTRATIONS

Potential contaminants that could have been released as a result of activities at Site 17 include petroleum hydrocarbons, VOCs, and SVOCs. Comparative numerical values for action decisions are provided in the Nevada Administrative Code (NAC), which states the following:

- The “soil action level” established by NAC 445A.2272 is 100 mg/kg for petroleum substances (typically referred to as total petroleum hydrocarbons [TPH]).
- For contaminants in soil, compare the toxicity characteristics leaching procedure (TCLP)-allowable levels listed in 40 CFR Part 261.24 and the state action level pursuant to NAC 445A.2272 to contaminant concentrations detected during the investigation and/or remedial activities.
- If inhalation, ingestion, or dermal exposure is the primary pathway of concern or an applicable level of concentration is not listed in the Toxicity Characteristics Leaching Rule, the presence of a hazardous substance, hazardous waste, or a regulated substance in the soil at an appropriate level of concentration that is based on the protection of public health and safety and the environment. The appropriate level of concentration must be determined by the division using the Integrated Risk Information System, adopted by the EPA, as it existed on October 3, 1996, or an equivalent method chosen by the division. (Note: The equivalent method is generally assumed by NDEP to be EPA Region 9 Preliminary Remediation Goals [PRGs]).
- Except as otherwise provided by NAC 445A.2272, if more than one action level for soil may be established using the criteria set forth in subsection 1, the most restrictive action level must be used. In no case may the action level be more restrictive than the background concentration of the hazardous substance, hazardous waste or regulated substance.
- If contaminated soil is to be left in place, provide an A through K analysis pursuant to NAC 445A.227 to determine if corrective action is required.
- The presence of 1/2 inch or more of a petroleum substance that is free-floating on the surface of the water of an aquifer, using a measurement accuracy of 0.01 foot (NAC 445A.22735).

- For contaminants in groundwater, compare the maximum contaminant levels (MCLs) listed in the EPA Drinking Water Regulations and Health Advisories to contaminant concentrations detected during the investigation and/or remedial activities (NAC 445A.22735).
- The action level may be set at a level of concentration equal to the background concentration of a hazardous substance, hazardous waste or a regulated substance, if that level of concentration is greater than the maximum contaminant level for that hazardous substance, hazardous waste, or regulated substance.
- In the absence of an MCL, compare a level of concentration equal to the background concentration of a hazardous substance or an appropriate level of concentration that is based on the protection of public health and safety and the environment. The appropriate level of concentration must be determined by the division using the Integrated Risk Information System, adopted by reference in NAC 445A.2272, or an equivalent method approved by the division. (Note: The equivalent method is assumed by NDEP to be EPA Region 9 PRGs).

The NAC does not provide a state action level for TPH in groundwater. The NDEP provided a guidance concentration of 1,000 µg/L in comments to the PA/SI. As a result, 1,000 µg/L has been used consistently as guidance for TPH in groundwater in various reports prepared by the Navy for work conducted at NAS Fallon.

In the absence of an MCL for groundwater, the Navy will use EPA Region 9 PRGs as goals. In the absence of a NAC specified state action level for soil, the Navy will use EPA Region 9 PRGs as goals.

The PA/SI identified waste materials that may have been released to unpaved areas at Site 17 as wash solvents (Turco™), lube oil, hydraulic fluid, grease, aviation gasoline, jet petroleum No. 4 (JP-4), JP-5, methyl ethyl ketone, isopropyl alcohol, and PD-680. These types of sources generally result in impacts to the subsurface due to petroleum hydrocarbons, VOCs, and SVOCs.

5.5 NATURE AND EXTENT OF CONTAMINATION

This section first summarizes results of Investigations at Site 17, then discussed in detail (in the following subsections) contaminants in soil and groundwater. Investigations at the site include the following:

- Soil sampling to determine the presence of contaminants in the runoff area immediately south and southeast of the site
- Qualitative analysis of groundwater test holes to assess the presence or absence of volatile contaminants downgradient of the site
- Soil sampling to determine impacts from Site 17 along the east-west drainage swale leading from the site to the unnamed drainage ditch east of Site 16
- Soil sampling in the unpaved area immediately south of Hangar 7 and in the formerly unpaved area to the east of the hangar
- Groundwater sampling in a monitoring well in the southwest corner of Site 17

The data are summarized below and discussed in detail in the following subsections.

TPH was detected in 7 of 34 soil samples at concentrations greater than the state action level. With the exception of one sample, the samples that exceeded the state action level were collected from depths of less than 1.5 feet. VOCs and semivolatile organic compounds (SVOCs) were detected in soil at concentrations less than the state action levels. The asphalt cap in the areas where the highest TPH concentrations were observed, and the arid climate will minimize the potential for future leaching of TPH from soil to groundwater. TPH was detected in groundwater at a concentration above the guidance concentration (1,000 µg/L) in 1 of 4 samples from Site 17. VOCs and SVOCs were detected at concentrations above the state action level in 1 of 4 samples.

Total metals concentrations observed in soil at Site 17 fall within the range of background concentrations and are not considered to be the result of any activities at NAS Fallon.

5.5.1 Qualitative Data From Groundwater Test Holes

Qualitative data was initially collected to assess the presence or absence of volatile contaminants in the general vicinity of the Group IV sites, including Site 17. Sampling locations were then selected for quantitative analysis of soil and groundwater samples on the basis of the qualitative results and the regional groundwater flow direction. The sampling locations from which qualitative data were collected, called groundwater test holes, consisted of hollow-stem auger borings from which one-time groundwater samples were collected. Each groundwater test hole was screened with the use of a hand-held photoionization detector (PID) to analyze the air space of the open boring. Then a groundwater sample was collected from the boring, and an aliquot of air from the headspace above the groundwater sample was analyzed with the use of a portable field gas chromatograph (GC). The generated data consisted of "presence or absence"

indicators, including detect or nondetect records for each instrument at each sampling location. The rationale and methodology for sampling from the groundwater test holes is described in detail in Appendix C of the RI report.

Eight groundwater test holes were positioned upgradient, crossgradient, or downgradient of Site 17 as shown in Figure 5-2. The groundwater test holes provided screening-level data to assess the presence or absence of volatile contaminants that could be related to Site 17 or migrating onto and across Site 17 from upgradient sources. More specifically, results from the groundwater test holes were typically used as yes or no responses to the question "is contamination present or absent?" Different symbols were used on Figure 5-2 for the groundwater test holes to indicate whether volatile contaminants were present or absent during sampling. Contamination was found to be present in 3 of the groundwater test holes (Figure 5-2).

5.5.2 Quantitative Soil Data

In November of 1987 during the PA/SI, three surficial soil samples were collected in the runoff area immediately south and southeast of the site. These soil samples were analyzed for TPH according to EPA Method 418.1 and for VOCs according to EPA Method 8240. The analytical results for all sampling events are summarized in Table 5-1.

In March of 1991, soil samples were collected from five auger-boring locations: S17SB01 (BH01), S17SB02 (BH02), S17SB03 (BH03), S17SB04 (BH04), and S17SB05 (BH05). These samples were obtained from the east-west drainage swale leading from the site to the unnamed drainage ditch east of Site 16. Only S17SB01 and S17SB02 are located within the site boundaries. The other three samples are located east of the site within an area impacted by Site 16. Samples from BH01, BH03, BH04, and BH05 were collected from two depth intervals (0 to 1 foot and 5 to 7 feet bgs), and samples from BH02 were collected from 0 to 2 and 5 to 7 feet bgs. The soil samples were analyzed for total high-boiling-point petroleum hydrocarbons (HBP PHC) (EPA Method 8015 Modified), total low-boiling-point petroleum hydrocarbons (LBP PHC) (EPA Method 8015/8020), SVOCs (EPA Method 3550/8270), VOCs (EPA Method 8240), and metals (EPA Method 6010). The analytical results for organic compounds are summarized in Table 5-1, and the analytical results for the metals are summarized in Table 5-2.

In 2002, soil samples were collected from five direct-push locations: 17001 through 17005. These samples were obtained from borings in the unpaved area immediately south of Hangar 7 and in the paved area (formerly unpaved area) to the east of Hangar 7. The soil samples from location 17001 were collected from 1 to 1.25, 2.5 to 3, 5 to 7, 7.5 to 9.5, and 10 to 11 feet bgs. The soil samples from location 17002 were collected from 1.2 to 1.5, 2.5 to 3, 5 to 7, and 7 to

8.25 feet bgs. The soil samples from location 17003 were collected from 1 to 1.25, 2.5 to 3, 5 to 7, 7 to 9, and 9 to 10.5 feet bgs. The depth intervals for the soil samples collected from 17004 were 1 to 1.25, 2.5 to 3, 5 to 7, and 7.5 to 9.5 feet bgs. Finally, the depth intervals for the soil samples collected from 17005 were 1 to 1.25, 2.5 to 3, and 5 to 6.5 feet bgs. The soil samples were analyzed for TPH—extractable (TPH-E) and TPH—purgeable (TPH-P; EPA Method 8015 Modified), VOCs (EPA Method 8260) and SVOCs (EPA Method 8270). The analytical results are summarized in Table 5-1.

A total of 34 soil samples were collected and analyzed for TPH. Of those samples, TPH was detected in a total of 14 samples, of which 7 of the detected concentrations were above the 100 mg/kg TPH state action level. TPH was detected in the three samples collected during 1987 and analyzed for TPH using EPA Method 418.1. TPH was detected in the surface soil sample collected from S0-H4-2 at a concentration of 350 mg/kg, which is above the state action level of 100 mg/kg. Petroleum hydrocarbons were not detected in any of the ten soil samples collected in March 1991.

TPH-E was detected in 6 of 21 samples collected in 2002. Concentrations ranged from 39 to 810 mg/kg, with five of the six detections exceeding the action level of 100 mg/kg. All detected concentrations of TPH-E were in samples collected from between 1 and 3 feet bgs. Groundwater was observed at these locations at depths of 7 to 10 feet bgs. Exceedances of the state action level were found in all five boreholes (17001 through 17005) drilled in 2002, and all exceedances were in samples collected at depths less than 1.5 feet. Although TPH-E was detected in these near-surface samples, the samples collected below these samples within the same borehole had no detectable concentrations of TPH-E. TPH-P was detected in 7 of the 21 samples collected in 2002. Concentrations ranged from 8.4 to 290 mg/kg, with 1 of the 7 detections exceeding the state action level of 100 mg/kg. TPH-P was not detected in samples collected at depths less than 3 feet. Generally, samples collected from between 5 and 10 feet had detectable concentrations of TPH-P with the exception of the samples collected from borehole 17002 between 5 and 7 feet, borehole 17003 between 9 and 10 feet, and borehole 17004 between 7.5 and 9.5 feet. Samples collected from these depth intervals at these locations did not contain detectable concentrations of TPH-P. The only TPH-P exceedance of the state action level in soil occurred in a sample collected from borehole 17005 from the 5- to 6.25-foot depth interval. In conclusion, soil contaminated with TPH-E above the state action level appears to be confined to near-surface soil, and the soil near the groundwater surface appears to have been impacted with TPH-P at concentrations exceeding the state action level at one location.

A total of 34 soil samples were collected and analyzed for VOCs. The state action levels were not exceeded for any of the VOCs detected at Site 17. Acetone, benzene, ethylbenzene, n-propylbenzene, o-xylene, isopropylbenzene, n-butylbenzene, total xylenes, toluene, sec-butylbenzene, 1,1-dichloroethane, and 1,1,1-trichloroethane were detected in one or more of

the samples collected at Site 17. Acetone was detected in 5 of the 34 samples, at concentrations ranging from 0.044 mg/kg to 1.1 mg/kg. These concentrations are less than the state action level of 1,600 mg/kg. In addition, acetone was flagged a suspected laboratory contaminant for two of the five samples where the compound was detected. Benzene was detected in 2 of the 34 samples at concentrations of 0.0083 and 0.022 mg/kg. Both of these concentrations are below the state action level of 0.6 mg/kg. Ethylbenzene was detected in 3 of the 34 samples at concentrations ranging from 0.0077 to 0.041 mg/kg. These concentrations are less than the state action level of 8.9 mg/kg. N-propylbenzene was detected in 2 of the 34 samples at concentrations of 0.034 and 0.043 mg/kg, both of which are below the state action level of 240 mg/kg. O-xylene was detected in 3 of 34 samples at concentrations ranging from 0.049 to 0.26 mg/kg. These concentrations are less than the state action level of 270 mg/kg. Isopropylbenzene, n-butylbenzene, total xylenes, toluene, sec-butylbenzene, 1,1-dichloroethane, and 1,1,1-trichloroethane were all detected in one of the 34 samples collected at a concentration of 0.083, 0.035, 3.2, 0.34, 0.03, 0.025, and 0.025 mg/kg, respectively. All of these concentrations were below the respective state action levels for the given compound (Table 5-1).

A total of 31 soil samples were collected and analyzed for SVOCs. SVOCs were detected in 7 of these samples. The state action levels were not exceeded for any of the SVOCs detected at Site 17. All of the samples with detected concentrations were collected in March of 1991. Bis(2-ethylhexyl)phthalate was detected in 7 samples collected in 1991. Concentrations ranged from 0.14 to 2.4 mg/kg, with none of the detected concentrations exceeding the state action level of 35 mg/kg. In addition, bis(2-ethylhexyl)phthalate was flagged as a suspected laboratory contaminant for two of the seven samples where the compound was detected. Di-n-octylphthalate was detected in one of the samples collected in 1991 at a concentration of 0.078 mg/kg. This concentration is less than the state action level of 2,400 mg/kg. SVOCs were not detected in any of the other samples collected at the site including samples collected during the 2002 sampling event. Because soil with TPH above state action levels is to remain in place, an A-K analysis was performed in accordance with NAC 445A.227 and is presented in Section 5.6.

5.5.3 Groundwater Monitoring

Groundwater sampling was performed at the monitoring well BAT-14-E, which is immediately adjacent to the site. Well BAT-14-E was sampled once in 1997 and was used to assess the impacts of Site 17 activities on the groundwater. Groundwater sampling was also performed in three soil borings (17001, 17002, and 17004). Groundwater sampling at these borings occurred in 2002 and was used to assess impacts of site activities on groundwater. Table 5-3 provides a summary of detected analytes in groundwater.

Well BAT-14-E was sampled in September of 1997. This well was sampled for TPH-diesel-range organics (DRO) (EPA Method 8015B), TPH-gasoline-range organics (GRO) (EPA Method 8020A), VOCs (EPA Methods 8260 and 8020), and water quality parameters (EPA Methods 300 and 310.1). Groundwater from boreholes 17001, 17002, and 17004 was sampled in April of 2002. The samples were analyzed for TPH-E (EPA Method 8015D), TPH-P (EPA Method 8015G), VOCs (EPA Method 8260), SVOCs (EPA Method 8270), and water quality parameters (EPA Method 160.1). The analytical results are summarized in Tables 5-3.

TPH-E was detected in all four of the groundwater samples collected from Site 17 or immediately adjacent to the site. The concentration of TPH-E ranged from 250 to 520 $\mu\text{g/L}$. The concentration of TPH-E in groundwater at the site was below the guidance level of 1,000 $\mu\text{g/L}$. TPH-P was detected in two of the four groundwater samples collected at concentrations of 130 and 1,400 $\mu\text{g/L}$. The 1,400- $\mu\text{g/L}$ detection at location 17002 is greater than the guidance level of 1,000 $\mu\text{g/L}$. This laboratory result was qualified with a "Y," which means that the chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard. This is interpreted as weathered TPH. In summary, only TPH-P exceeded the guidance level in the one sample from 17002. No other exceedances were measured.

VOCs were detected in three of the four groundwater samples analyzed for this range of compounds, and exceedances of the state action levels occurred in only two of the groundwater samples. 1,2,4-Trimethylbenzene was detected in BAT-14-E and 17002 at concentrations of 2 and 59 $\mu\text{g/L}$, respectively. The detected concentration in 17002 exceeded the state action level of 12 $\mu\text{g/L}$. 1,3,5-Trimethylbenzene was detected in 17002 at a concentration of 21 $\mu\text{g/L}$. This exceeds the 1,3,5-trimethylbenzene state action level of 12 $\mu\text{g/L}$. Finally, naphthalene was detected in one of the four groundwater samples collected at the site. Naphthalene was detected at a concentration of 33 $\mu\text{g/L}$ in the sample from 17002. This concentration is above the state action level of 6.2 $\mu\text{g/L}$.

1,2-Dichloroethane was detected in one sample obtained for 17001 at a concentration of 0.97 $\mu\text{g/L}$, less than the state action level of 5 $\mu\text{g/L}$. Toluene was detected in samples obtained from 17002 and 17004 at concentrations of 0.53 and 4.8 $\mu\text{g/L}$, respectively. Both the detected concentrations were less than the state action level of 1,000 $\mu\text{g/L}$. 1,1-Dichloroethane, 1,1-dichloroethene, benzene, ethylbenzene, isopropylbenzene, m,p-xylenes, n-butylbenzene, n-propylbenzene, and o-xylene were detected in the sample obtained from 17002. None of the detections were above the state action levels (Table 5-3). Bromomethane was detected in the sample obtained from 17004 at a concentration less than the state action level, and chloroform was detected in the sample obtained from BAT-14-E at a concentration less than the state action level. In summary, the VOCs 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and naphthalene were detected above the state action levels in the sample obtained from 17002.

SVOCs were detected in one of the three groundwater samples analyzed for this range of compounds. Naphthalene was the only detected SVOC, and it was detected at a concentration of 13 µg/L in the sample obtained from 17002. This concentration is above the state action level of 6.2 µg/L for naphthalene.

5.6 FATE AND TRANSPORT

Potential contaminants that could have been released as a result of activities at Site 17 include TPH, VOCs, and SVOCs.

TPH-E was detected in near-surface soil samples and TPH-P was detected in one soil sample at the groundwater surface. TPH-P was also detected in one of three groundwater samples. These results indicate that TPH-E is adsorbed to near-surface soil and has not migrated vertically to groundwater. TPH-P at the groundwater surface is a result of TPH-P in groundwater at the sampled location. These results also show that TPH-P impacts to groundwater are not laterally extensive.

Three VOCs and one SVOC were detected in groundwater above state action levels in one sample, but were not detected in soil above state action levels or in groundwater at adjacent sampling locations. These results show that VOC and SVOC impacts to groundwater are not laterally extensive.

The low annual precipitation in this area (approximately 5 inches per year) and the high evaporation rate minimizes the potential for future leaching of organics detected in soil at the site into groundwater. In addition, an asphalt cap in the area of locations 17003, 17004, and 17005 will further limit the potential for future leaching at these locations.

The results of a limited A through K analysis (NAC 445A.227) indicated that the absence of TPH in soil at concentrations above the state action level in depth intervals other than 0 to 1.5 feet and 5 to 6.25 feet confirms that TPH impacts are not laterally or vertically extensive. The maximum volume of soil with TPH contamination above the state action level is estimated to be approximately 800 cubic yards. This volume estimate assumes that contaminated soil is limited to the first 1.5 feet of soil in the area marked on Figure 5-5. It also assumes that contaminated soil from 5 to 6.25 feet is limited to a circular area with a 70-foot diameter as shown on Figure 5-5. This is based on data from borings 17002 and 17004, where contaminated soil above state action levels was not found below 1.5 feet. The measured soil TPH concentrations do not pose a potential hazard for fire, vapor, or explosion. The closest building

is approximately 20 feet north of boring 17001, which is the closest location with soil contamination above the state action levels.

Areally extensive contamination of groundwater has not been found at the site. Groundwater flow is to the southeast. The distance to the closest downgradient receptor is a NAS Fallon domestic water well, located at the May Ranch approximately 3,600 feet south-southeast. There are two wells located greater than 1.5 miles away, almost directly south of the site and outside the boundary of NAS Fallon. In addition, there is a well approximately 1.8 miles southeast of the site, also outside the facility boundary. These wells are reportedly screened below the shallow saturated zone. Based on experience with similar compounds in groundwater, it is expected that measured TPH, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and naphthalene concentrations in groundwater at Site 17 will be below state action levels well before reaching the nearest downgradient receptor(s).

5.7 BASIS FOR DECISION

The Navy has selected No Further Action for Site 17 for the following reasons:

- Site 17 has no ongoing contaminant sources. Aircraft maintenance and cleaning practices have been revised such that wash solvents and petroleum hydrocarbons are no longer released to the environment.
- Although TPH, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and naphthalene were detected in groundwater above the state guidance or action levels, these compounds were detected at concentrations above the state action levels in only two samples as discussed in Section 5.
- Soil containing TPH at concentrations above the state action level is generally limited to depths less than 1.5 feet. The concentration of TPH in soil below this depth was less than the state action level, with the exception of one sample obtained from 17005. The TPH state action level was exceeded in the sample collected from the 5- to 6.25-foot depth interval in this borehole. This indicates that downward migration of contaminants is limited at Site 17.
- The presence of an asphalt cap and the arid climate will minimize the potential for future migration of soil impacts to groundwater.
- Petroleum hydrocarbons and VOCs are readily biodegradable, especially at the low concentrations found at the site.

- The Navy does not expect any change in land use at Site 17 or that of the surrounding sites.
- Shallow groundwater at Site 17 (and NAS Fallon) is not currently used for domestic purposes. The naturally occurring high TDS concentrations will make this shallow groundwater a poor choice for future residential use. Site 17 is also an industrial area and will remain active as an industrial area in the foreseeable future.

In summary, No Further Action is recommended for this site, because there is no ongoing source of contamination at the site and the area of groundwater contamination that is above the state action levels is limited. With the exception of one soil sample, soil contamination is confined to the first 1.5 feet of the soil column indicating that downward migration of contamination is limited at Site 17. In addition, the presence of an asphalt cap and the arid climate will minimize the potential for future migration of soil impacts to groundwater.

Period	Epoch	Stratigraphic Unit	Generalized Lithology	Thickness (feet)	Generalized Description
Quaternary	Pleistocene	Lahontan Valley Group		0 to 2	Eolian sand
		Wyemaha Formation	Sehoo Formation		
	Recent	Fallon Formation	Turupaha Formation	4 to 20	Eolian sand Nearshore deposits, fine-grained sand, silty sand Channel sand and gravel from ancient Carson River
			Wyemaha Formation	>50	Shallow-lake sand
				20 to 35	Deep-lake clay

Figure 5-1
Generalized Stratigraphy of NAS Fallon

CONCRETE

SITE 17
HANGAR 7

HANGAR 7 FACILITY

FORMER
UNPAVED
AREA
(PAVED
1985)

UST 4B

UST 44

UST

UST

UNPAVED
AREA

UNPAVED
AREA

UNPAVED
AREA

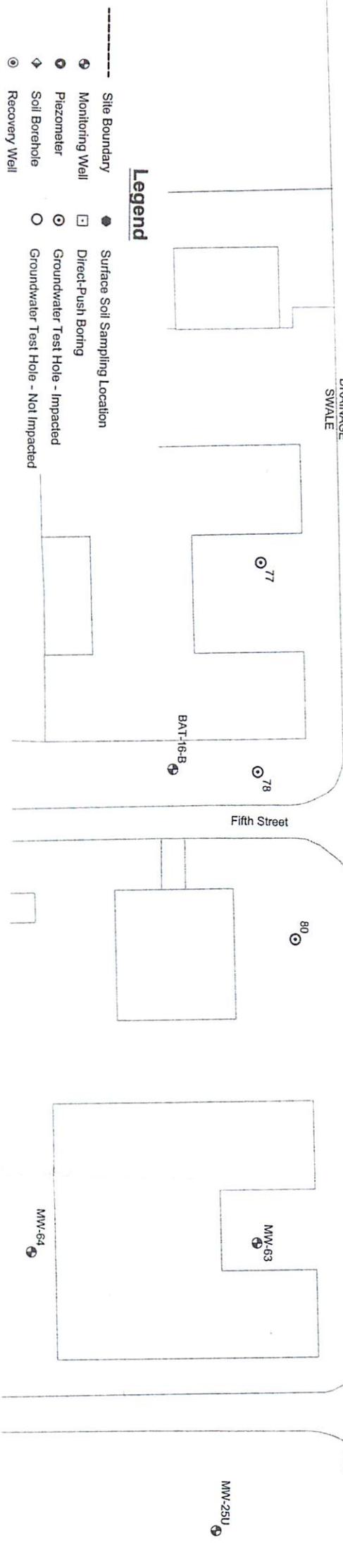
UNPAVED
AREA

FORMER
DRAINAGE
SWALE

A Street

Fifth Street

NOTE:
DRAINAGE SWALE
CONTINUES EAST OF SITE



Legend

- Site Boundary
- Surface Soil Sampling Location
- ⊕ Monitoring Well
- ⊞ Direct-Push Boring
- ⊙ Piezometer
- ⊙ Groundwater Test Hole - Impacted
- ⊙ Soil Borehole
- ⊙ Groundwater Test Hole - Not Impacted
- ⊙ Recovery Well

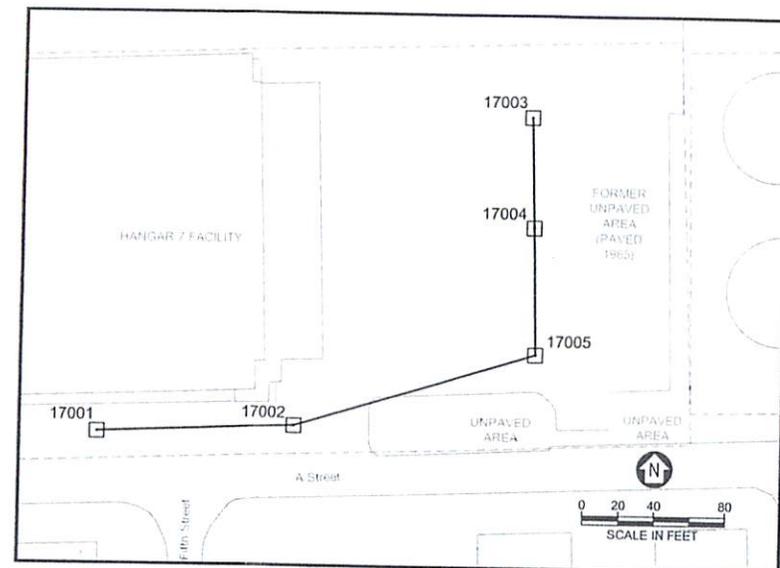
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EDIT DATE: 05/10/03 AT 17:29

U.S. NAVY

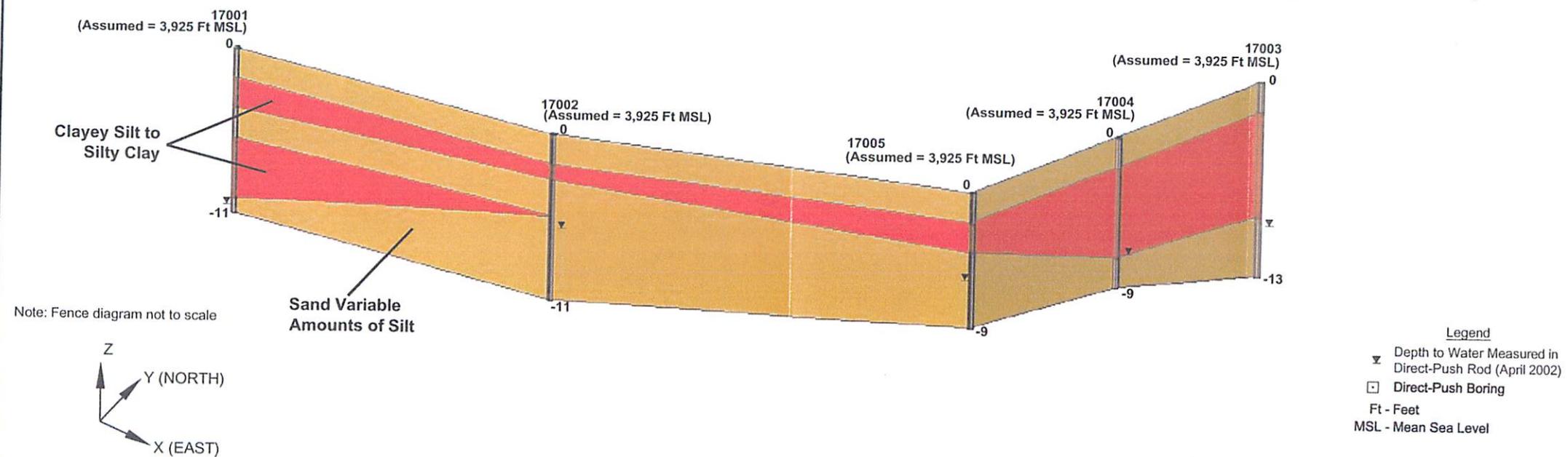
Delivery Order 0029
NAS Fallon
DECISION DOCUMENT
SITE 17



Figure 5-2
Sampling Locations at Site 17, NAS Fallon



Fence Diagram Location Map View



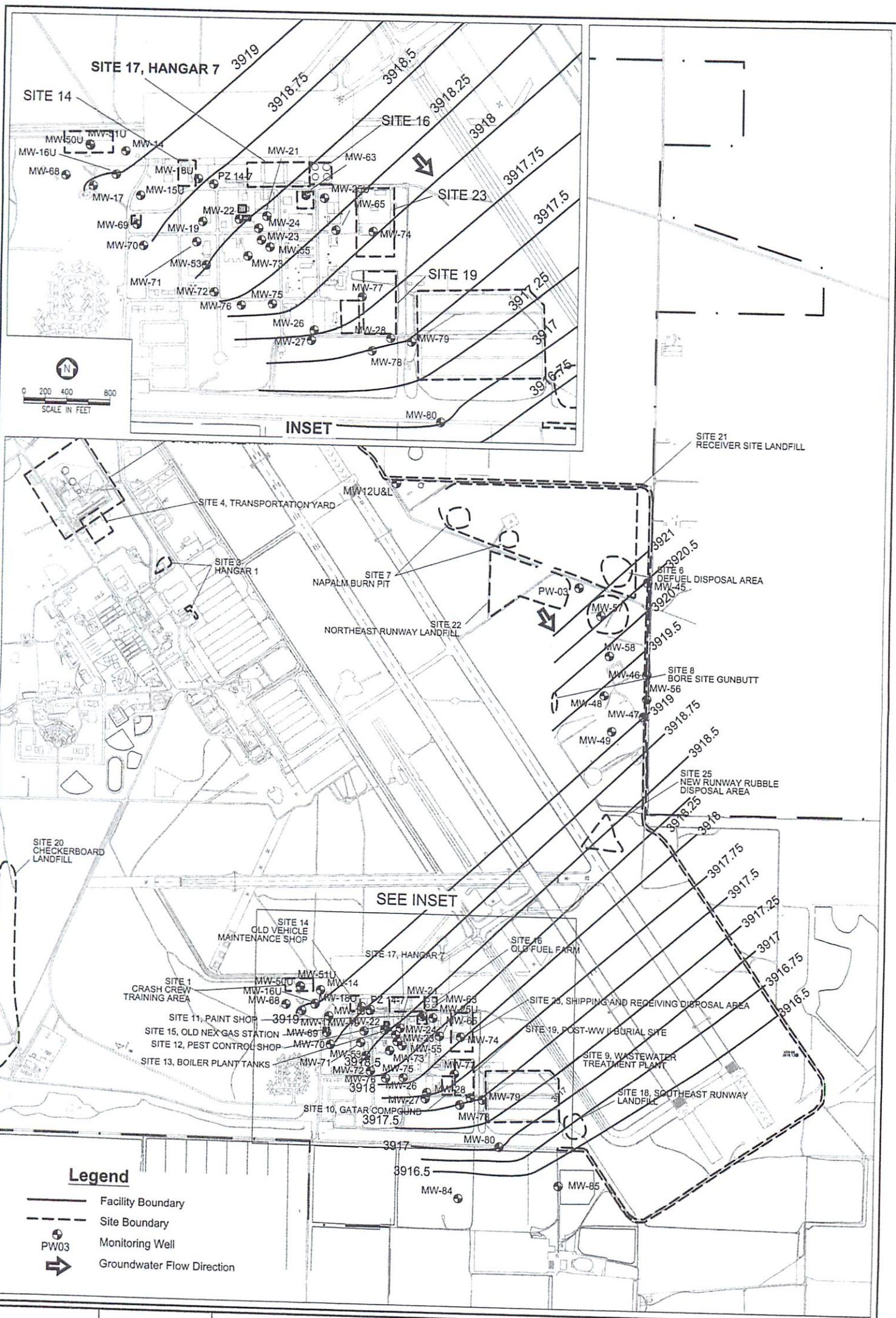
FILENAME: F:\NAVY\Fallon\Sub-Tasks\00 29\DECISION DOC\Site 17\Fence Diagram.dwg
 EDIT DATE: 07/25/03 AT: 11:13

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 NAS Fallon
 DECISION DOCUMENT
 Site 17

Scale as Shown

Figure 5-3
 Generalized Fence Diagram
 Site 17



U.S. NAVY



Figure 5-4
Groundwater Surface Elevation Contours, November 2002, NAS Fallon

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SITE 17

CONCRETE

SITE 17
HANGAR 7

HANGAR 7 FACILITY

UST 44
UST 4B
UST

FORMER UNPAVED AREA (PAVED 1985)

UNPAVED AREA

FORMER DRAINAGE SWALE

A Street

80

78

77

77

77

77

77

NOTE:
DRAINAGE SWALE
CONTINUES EAST OF SITE

Legend

- Site Boundary
- ⊕ Monitoring Well
- ⊙ Piezometer
- ⊕ Soil Borehole
- ⊙ Recovery Well
- Surface Soil Sampling Location
- Direct-Push Boring
- ⊙ Groundwater Test Hole - Impacted
- Groundwater Test Hole - Not Impacted
- ▨ Estimated Area of Contamination at Depths of 0 to 1.5 Feet bgs
- ▩ Estimated Area of Contamination at Depths of 5 to 6.25 Feet bgs

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Delivery Order 0029
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DECISION DOCUMENT
SITE 17



Figure 5-5
Estimated Area of Contamination at Site 17, Hangar 7

Table 5-1
Summary of Detected Organic Compounds in Soil at Site 17, Hangar 7

Analyte	No. of Samples Tested	No. of Detections	Minimum Concentration (mg/kg)	Average Concentration (mg/kg)	Maximum Concentration (mg/kg)	State Action Level (mg/kg)	No. of Detections Greater Than Action Level	Location(s) With Detections Greater Than Action Level
Petroleum Hydrocarbons								
TPH	3	3	57	163	350	100 ^a	1	SO-H4-2
TPH-extractable	21	6	39	405	810	100 ^a	5	17001, 17002, 17003, 17004, 17005
TPH-purgeable	21	7	8.4	71.1	290	100 ^a	1	17005
Total HBP PHC	10	0	NA	NA	NA	100 ^a	0	None
Total LBP PHC	10	0	NA	NA	NA	100 ^a	0	None
Semivolatile Organic Compounds								
Bis(2-ethylhexyl)phthalate	31	7	0.14	0.66	2.4	35 ^b	0	None
di-n-Octylphthalate	31	1	0.0078	0.078	0.078	2,400 ^b	0	None
Volatile Organic Compounds								
Acetone	34	5	0.044	0.41	1.1	1,600 ^b	0	None
Benzene	34	2	0.0083	0.015	0.022	0.6 ^b	0	None
1,1-Dichloroethane	34	1	0.025	0.025	0.025	510 ^b	0	None
Ethylbenzene	34	3	0.0077	0.14	0.041	8.9 ^b	0	None
Isopropylbenzene	34	1	0.083	0.083	0.083	160 ^b	0	None
n-Butylbenzene	34	1	0.035	0.035	0.035	240 ^b	0	None
n-Propylbenzene	34	2	0.034	0.0385	0.043	240 ^b	0	None
o-Xylene	34	3	0.049	0.129	0.26	270 ^b	0	None
Toluene	34	1	0.34	0.34	0.34	520 ^b	0	None

Table 5-1 (Continued)
Summary of Detected Organic Compounds in Soil at Site 17, Hangar 7

Analyte	No. of Samples Tested	No. of Detections	Minimum Concentration (mg/kg)	Average Concentration (mg/kg)	Maximum Concentration (mg/kg)	State Action Level (mg/kg)	No. of Detections Greater Than Action Level	Location(s) With Detections Greater Than Action Level
Volatile Organic Compounds (Continued)								
Total xylenes	34	1	3.2	3.2	3.2	270 ^b	0	None
1,1,1-Trichloroethane	34	1	0.025	0.025	0.025	1,200 ^b	0	None
sec-Butylbenzene	34	1	0.03	0.03	0.03	220 ^b	0	None

^aNevada Administrative Code

^bU.S. Environmental Protection Agency Region 9 Preliminary Remedial Goals - Residential Soil

Notes:

mg/kg - milligram per kilogram

TPH - total petroleum hydrocarbons

HBP PHC - High Boiling Point Petroleum Hydrocarbons

LBP PHC - Low Boiling Point Petroleum Hydrocarbons

Table 5-2
Summary of Detected Total Metals in Soil at Site 17, Hangar 7

Analyte	No. of Tests	No. of Detections	Detection Frequency	Minimum Detection (mg/kg)	Average Detection (mg/kg)	Maximum Detection (mg/kg)	Location With Maximum Detection	State Action Level or PRG (mg/kg)	Naturally Occurring Background (mg/kg)	No. of Detections Greater Than PRG	Locations with Detections Greater Than PRG
Aluminum	10	10	100%	3,050	7,453	18,700	BH-01	76,000 ^a	1,800 to 20,700	0	None
Antimony	10	0	0%	NA	NA	NA	NA	31 ^a	0.4 to 5	0	None
Arsenic	10	10	100%	0.37	11	22.4	BH-01	0.39 ^a	1.1 to 64.2	9	BH-01, BH-02, BH-03, BH-04, BH-05
Barium	10	10	100%	15.6	112	260	BH-01	5,400 ^a	0.13 to 387	0	None
Beryllium	10	10	100%	0.14	0.34	0.87	BH-01	150 ^a	0.11 to 1.5	0	None
Boron	10	10	100%	6.0	26	102	BH-01	16,000 ^a	0.0023 to 117	0	None
Cadmium	10	1	10%	0.57	0.57	0.57	BH-01	37 ^a	0.57 to 1.2	0	None
Calcium	10	10	100%	1,390	14,611	61,400	BH-03	NE	4.1 to 61,400	NA	NA
Chromium	10	10	100%	4.0	7	14.4	BH-01	100,000 ^{a,b}	0.014 to 64	0	None
Cobalt	10	10	100%	3.0	6	11.5	BH-01	900 ^a	0.0086 to 15.9	0	None
Copper	10	10	100%	10.7	41	71.7	BH-04	3,100 ^a	0.024 to 320	0	None
Iron	10	10	100%	7,800	13,305	28,200	BH-01	23,000 ^a	5,060 to 29,500	1	BH-01
Lead	10	10	100%	1.8	11	30.7	BH-04	400 ^a	0.019 to 55	0	None
Lithium	10	10	100%	4.7	19	50.4	BH-03	1,600 ^a	0.018 to 50.4	0	None
Magnesium	10	10	100%	1,220	5,083	11,000	BH-03	NE	1.2 to 11,300	NA	NA
Manganese	10	10	100%	64.5	354	989	BH-02	1,800 ^a	54.7 to 1,560	0	None
Mercury	10	1	10%	0.06	0.06	0.06	BH-04	6.1 ^{a,c}	0.02 to 1	0	None

Table 5-2 (Continued)
Summary of Detected Total Metals in Soil at Site 17, Hangar 7

Analyte	No. of Tests	No. of Detections	Detection Frequency	Minimum Detection (mg/kg)	Average Detection (mg/kg)	Maximum Detection (mg/kg)	Location With Maximum Detection	State Action Level or PRG (mg/kg)	Naturally Occurring Background (mg/kg)	No. of Detections Greater Than PRG	Locations with Detections Greater Than PRG
Molybdenum	10	0	0%	NA	NA	NA	NA	390 ^a	2.5 to 7.5	0	None
Nickel	10	10	100%	2.9	7	15.2	BH-01	1,600 ^a	0.011 to 23	0	None
Potassium	10	10	100%	701	2,234	4,850	BH-01	NE	3.09 to 5,880	NA	NA
Selenium	10	0	0%	NA	NA	NA	NA	390 ^a	3 to 140	0	None
Silver	10	0	0%	NA	NA	NA	NA	390 ^a	0.56 to 3	0	None
Sodium	10	10	100%	418	3,104	9,930	BH-01	NE	7.3 to 13,400	NA	NA
Thallium	10	0	0%	NA	NA	NA	NA	5.2 ^a	0.27 to 0.3	0	None
Vanadium	10	10	100%	19.7	29	57.9	BH-01	550 ^a	0.054 to 74	0	None
Zinc	10	10	100%	28.8	58	89.4	BH-04	23,000 ^a	0.88 to 382	0	None

^aEPA Region 9 Preliminary Remedial Goals - residential soil

^bAssumes chromium II

^cAssumes methylmercury

Notes:

mg/kg - milligram per kilogram

NA - not applicable

NE - not established

Table 5-3
Summary of Detected Analytes in Groundwater Samples From Site 17, Hangar 7

Analyte	Unit	No. of Samples Tested	No. of Detections	Minimum Concentration	Average Concentration	Maximum Concentration	State Action Level	No. of Detections Greater Than MCL/PRG	Location(s) With Detections Greater Than MCL/PRG
Petroleum Hydrocarbons									
TPH-extractable	µg/L	4	4	250	383	520	1,000 ^a	0	None
TPH-purgeable	µg/L	4	2	130	765	1,400	1,000 ^a	1	17002
Volatile Organic Compounds									
1,1-Dichloroethane	µg/L	4	1	0.92	0.92	0.92	810 ^c	NA	None
1,1-Dichloroethene	µg/L	4	1	1.6	1.6	1.6	7 ^b	0	None
1,2,4-Trimethylbenzene	µg/L	4	2	2	31	59	12 ^c	1	17002
1,2-Dichloroethane	µg/L	4	1	0.97	0.97	0.97	5 ^b	0	None
1,3,5-Trimethylbenzene	µg/L	4	1	21	21	21	12 ^c	1	17002
Benzene	µg/L	4	1	0.63	0.63	0.63	5 ^b	0	None
Bromomethane	µg/L	4	1	0.53	0.53	0.53	8.7 ^c	0	None
Chloroform	µg/L	4	1	6	6	6	6.2 ^c	0	None
Ethylbenzene	µg/L	4	1	21	21	21	700 ^b	0	None
Isopropylbenzene	µg/L	4	1	7.1	7.1	7.1	660 ^c	0	None
m,p-Xylenes	µg/L	4	1	69	69	69	10,000 ^b	0	None
Naphthalene	µg/L	4	1	33	33	33	6.2 ^c	1	17002
n-Butylbenzene	µg/L	4	1	5.7	5.7	5.7	240 ^c	0	None
n-Propylbenzene	µg/L	4	1	11	11	11	240 ^c	0	None
o-Xylene	µg/L	4	1	23	23	23	10,000 ^b	0	None
Toluene	µg/L	4	2	0.53	2.67	4.8	1,000 ^b	0	None

Table 5-3 (Continued)
Summary of Detected Analytes in Groundwater Samples From Site 17, Hangar 7

Analyte	Unit	No. of Samples Tested	No. of Detections	Minimum Concentration	Average Concentration	Maximum Concentration	State Action Level	No. of Detections Greater Than MCL/PRG	Location(s) With Detections Greater Than MCL/PRG
Semivolatile Organic Compounds									
Naphthalene	µg/L	3	1	13	13	13	6.2 ^c	1	17002
Water Quality									
Total dissolved solids	mg/L	3	3	25,700	56,400	114,000	10,000 ^d	3	17001, 17002, 17004

^aNevada Division of Environmental Protection guidance concentration

^bMaximum contaminant level

^cU.S. Environmental Protection Agency Region 9 Preliminary Remedial Goal - Tap water

^dNevada Administrative Code – potability criteria

Notes:

µg/L - microgram per liter

mg/L - milligram per liter

NA - not applicable

TPH - total petroleum hydrocarbons

6.0 CURRENT AND POTENTIAL SITE AND RESOURCE USES

NAS Fallon currently serves primarily as an aircraft weapons delivery and tactical air combat training facility. Site 17 is used for aircraft maintenance and repair, as described in Section 2.

The Master Plan for NAS Fallon includes a discussion of all potentially contaminated areas in the IR Program and their locations. Any future construction projects conducted at Site 17 will be subjected to an environmental review. The Environmental Department at NAS Fallon oversees the environmental review process. Relevant projects are reviewed by the Occupational Safety and Health Office, Fire Department, Security Department, the Engineering and Planning Divisions of Public Works, and the Environmental Department. This review process is included in all relevant NAS Fallon planning activities. Information provided by the Environmental Department relates to potential contact with contaminated soil and groundwater as a result of these projects.

7.0 SUMMARY OF SITE RISKS

The analytical results from sampling have confirmed the presence of only one contaminant, TPH, above the state action levels in soil as a result of past activities at Site 17. An asphalt cap is present in the area where the highest TPH concentrations were observed, and Site 17 is a secured hangar within NAS Fallon. Therefore, exposure to any residual TPH in soil is minimal. In addition, the potential for future leaching of TPH from soil to groundwater is small, the presence of the asphalt cap in the areas of highest concentrations and the arid environment. Detections of TPH, SVOCs, and VOCs in groundwater at concentrations greater than state action or guidance levels are present at Site 17. However, these detections were limited to two of the four sampling locations, suggesting that the lateral extent of impacts to groundwater by these compounds is limited. In addition, total dissolved solids measured at the site is greater than the potability standard of 10,000 mg/L (NAC 445A.22725). Because of this, site groundwater is unlikely to be used as a drinking water source in the future. No baseline risk assessment was performed for Site 17 during the RI and the results of subsequent sampling activities indicated no identifiable exposure pathways or receptors. This being the case, there is no risk posed by Site 17 to human health and the environment. In addition, the results of a limited A through K analysis (presented in Section 5.6) suggest that the limited volume of soil with concentrations above the state action level does not pose a threat to groundwater or potential downgradient receptors. Therefore, No Further Action is recommended at this site.

8.0 STATUTORY AUTHORITY FINDING

TPH and was detected in groundwater at a concentration above the state guidance level in one sample from Site 17 (17002). VOCs and SVOCs were detected at concentrations above the state action level in one sample (17002). This suggests that the lateral extent of impacts to groundwater is limited. On the basis of the limited lateral extent of groundwater impacts, no significant groundwater contamination was found. TPH was detected in soil at concentrations above the state action levels in soil samples obtained from borings 17001 through 17005 and in surface soil sample SO-H4-2. However, no other contaminants were detected above the state action levels in soil samples collected from the site. With the exception of one sample, TPH contamination above the state action level was limited to the first 1.5 feet of the soil column, indicating that significant downward migration of contamination has not occurred. The presence of an asphalt cap in the areas of highest concentration and the arid environment minimize the future migration of TPH to groundwater. Finally, aircraft maintenance and cleaning practices have been changed from historical procedures, such that wash solvents and petroleum hydrocarbons are no longer released to the environment. Because contaminated soil and groundwater are localized at this secured facility, exposures to the contamination are not expected and, therefore, risks to human health are expected to be acceptable. Based on these observations and conditions, current or potential future site conditions pose no unacceptable risk to human health or the environment. Accordingly, no further action is required at this site.

9.0 DOCUMENTATION OF SIGNIFICANT CHANGES

United States Fish and Wildlife comments to the Draft Decision Document were received by the Navy. Responses to these comments are provided in Appendix A (Responsiveness Summary). The comments and responses resulted in no significant change to the Declaration of the Decision or the Decision Summary.

10.0 BIBLIOGRAPHY

This document was prepared with the use of information contained in the Administrative Record for Site 17, Hangar 7, NAS Fallon, Nevada. The Administrative Record is available at the Churchill County Public Library in Fallon, Nevada; at the University of Nevada Reno Library in Reno, Nevada; at NAS Fallon; and at Engineering Field Activity, Northwest, offices in Poulsbo, Washington. The primary documents used as sources of the information contained in this decision document are listed below.

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APPENDIX A
Responsiveness Summary

RESPONSIVENESS SUMMARY

Notice of the public comment period was published in the *Lahontan Valley News* on October 3, 2003. The public comment period extended from October 8 through November 7, 2003. The public meeting presenting the Proposed Plan was held at the Fallon Convention Center in Fallon, Nevada, on October 15, 2003. As of November 7, 2003, the Navy had public comments from United States Fish and Wildlife. The comments from the letter are summarized below followed by the Navy's responses. A copy of the letter from USFW dated October 29, 2003 is provided at the end of this section along with USFW concurrence to the responses provided.

RESPONSES TO UNITED STATES FISH AND WILDLIFE COMMENTS

General Comments

Diagonal drain flows along the southern boundary of NAS Fallon and eventually terminates at the Stillwater National Wildlife Refuge, an area of considerable importance to migratory birds in Nevada. Several of the sites proposed for no further action appear to be within one-half mile of Diagonal Drain, with portions of Site 24 paralleling the drain. The groundwater gradient on NAS Fallon flows toward Diagonal Drain. Due to the risks of contamination of Diagonal Drain from various contaminated sites, including infiltration into the drain from contamination of the shallow ground water table, it is essentially important to continue monitoring for various contaminants in groundwater on NAS Fallon for the long term, with emphasis on sampling of groundwater wells near the drain. This type of monitoring would hopefully allow for identification and remediation of contaminant issues in the drain before they affect trust resources. We ask that you inform us and Stillwater National Wildlife Refuge if contaminated groundwater is found in the wells closest to the drain so that we can meet and discuss the possible need for additional sampling, which may include sampling of surface water in the Diagonal Drain.

Response

The Navy appreciates and shares the U.S. Fish and Wildlife's concern regarding the sensitivity of the trust resources downgradient of NAS Fallon. The Navy has a groundwater and surface water monitoring program in place at NAS Fallon and is providing results of the most recent events for U.S. Fish and Wildlife review. The Navy welcomes comments on the current monitoring programs at NAS Fallon and looks forward to working with U.S. Fish and Wildlife to insure that the NAS Fallon monitoring programs are protective of all resources.

Site 9, Wastewater Treatment Plant

We have no concerns specific to this site.

Site 12, Pest Control Shop

We noted that pesticides, volatile organic compounds (VOCs), and semivolatile organic compounds (SVOCs) were present in some groundwater samples. The presence of solvent-like compounds with pesticides could result in increased risk of movement of pesticides in the groundwater. Groundwater sampling in the downgradient monitoring wells is needed in the future to determine if this is occurring.

Response

VOCs and SVOCs were detected in groundwater samples collected from monitoring wells and other sampling points at Site 12. However, soil samples collected from Site 12 indicate that Site 12 is not the source of these contaminants in groundwater. Soil and groundwater sampling conducted at Site 14, located directly upgradient of Site 12, indicates that Site 14 is the source of these contaminants in groundwater. Groundwater sampling is being conducted on an annual basis to monitor conditions relative to Site 14. The Navy is currently evaluating cleanup alternatives for Site 14, which would include remediation of groundwater beneath Site 12.

The pesticides lindane and alpha-BHC were detected in the groundwater sample collected from well MW-22 in 1991. These concentrations were below the EPA Region 9 Preliminary Remedial Goals (PRGs) for tap water. Subsequent groundwater samples from well MW-22 collected in 1993 and 2002 did not contain any pesticide compounds at concentrations greater than reporting limits. In addition a groundwater sample collected from well MW-24 in 2002 did not contain pesticides at concentrations above reporting limits. Well MW-24 is located approximately 190 feet downgradient of well MW-22. The relationship between wells MW-22 and MW-24 is shown on Figure 5-2 of the draft decision document. Soil samples collected from Site 12 at depths of 2 feet or less did contain pesticides at concentrations below PRGs. Soil samples collected below 2 feet did not contain pesticides at concentrations above reporting limits. Based on these results, the Navy is confident that Site 12 does not pose a threat to human health or the environment relative to pesticides.

Site 17, Hangar 7

The information provided for this site mentions a drainage swale leading from the site to an unnamed drainage ditch east of Site 16. We recommend the collection and analysis of surface water samples from such ditches on NAS Fallon following major precipitation events when water is present in them. We are concerned about the possible transport of contaminants from various sites to the Diagonal Drain and eventually to Stillwater National Wildlife Refuge. If past sampling of surface water from such sites has occurred, we would appreciate a copy of the results.

Response

The Navy has a surface water monitoring program in place at NAS Fallon. One of the sampling locations is positioned just downgradient of the intersection of the unnamed drain and the east-west trending section of the southernmost drain at the station. The Navy is providing results of the most recent events for U.S. Fish and Wildlife review. The Navy welcomes comments on the

current monitoring programs at NAS Fallon and looks forward to working with U.S. Fish and Wildlife to insure that the NAS Fallon monitoring programs are protective of all resources.

Site 23, Shipping and Receiving Disposal Area

We have no concerns specific to this site.

Site 24, Road Oiling Area

A significant portion of this area is immediately adjacent to Diagonal Drain, thereby increasing risks for contamination of the Drain. Aroclor 1254, a class of polychlorinated biphenyls (PCBs), was detected in soil at one site (i.e., 24000) immediately adjacent to Diagonal Drain. No groundwater sampling was conducted near this site. Therefore, we recommend that additional soil samples (minimum of five locations at more than one depth) be collected along the road where it parallels Diagonal Drain. Furthermore, groundwater sampling should be initially conducted adjacent to site 24000 and at additional sites if PCB contamination is found in soil at additional sites. Future samples should also be analyzed for VOCs and petroleum hydrocarbons due to their presence in some past samples.

Response

Aroclor 1254 was detected in the soil sample from 0.5 feet bgs, at location 24000, at a concentration of 0.96 mg/kg, which is greater than the EPA Region 9 Preliminary Remedial Goal (PRG) for residential soil of 0.22 mg/kg. The soil samples collected from this location at depths of 1 and 2 feet did not contain Aroclor 1254 or any other PCBs at concentrations above the PRG for residential soil. Soil samples collected from the other four sampling locations at the same depths did not contain PCBs at concentrations above reporting limits. The soil PRG takes into account potential risks to groundwater. In addition, PCBs are particularly resistant to mobilization with a strong tendency to remain adsorbed to soil particles.

The Navy appreciates U.S Fish and Wildlife's concern regarding Site 24, however based on the current data, there is no threat to human health or the environment. The Navy will discuss options for surface water monitoring adjacent to location 24000 as part of the station-wide surface water monitoring program. As stated in the Declaration of the Decision for Site 24 (page 1), the site may be reopened for further evaluation and, if necessary, cleanup, on the basis of newly discovered information that leads the U.S. Navy (Navy) and the Nevada Division of Environmental Protection (NDEP) to determine that the remedy may not be protective of human health and the environment.

Summary

We concur with plans for No Further action at each of the sites listed above, with the exception of Site 24, where additional sampling is needed prior to closure. We also strongly recommend the additional monitoring of ground and surface water as outlined above as provided under our discussion of Sites 12 and 17.

Response

PCBs detected in soil samples collected from location 24000 at Site 24 do not extend beyond 0.5 feet below ground surface at concentrations above PRGs for residential soil. The soil PRG for Aroclor 1254 takes into account potential risks to groundwater. Based on station-wide data, groundwater is expected to be at approximately 5 to 7 feet deep in this area of the station. In addition, PCBs are particularly resistant to mobilization with a strong tendency to remain adsorbed to soil particles. Based on these data, Site 24 does not pose a threat to human health or the environment. The Navy will discuss options for surface water monitoring adjacent to location 24000 as part of the station-wide surface water monitoring program. If the surface water monitoring program suggests that PCBs are leaching into the drain, the site will be reopened for further evaluation and, if necessary, cleanup.

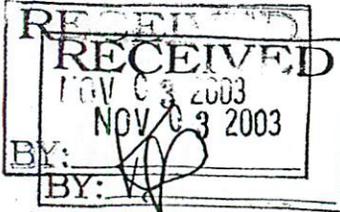
With respect to Sites 12 and 17, regular groundwater and surface water monitoring is being conducted on a station-wide basis. Results of the most recent groundwater and surface monitoring events are being provided to U.S. Fish and Wildlife for review.



UNITED STATES DEPARTMENT of the INTERIOR



FISH AND WILDLIFE SERVICE
Nevada Fish and Wildlife Office
1340 Financial Boulevard, Suite 234
Reno, Nevada 89502-7147
(775) 861-6300 ~ Fax: (775) 861-6301



October 29, 2003
File No. EC 14.5

*file copy - Joe Farry
Chuck Roy
Captain G.*

Joe Farry, Environmental Protection Specialist
Naval Air Station Fallon
Environmental Department (Code N45F)
4755 Pasture Road, Building 307, 3rd Deck
Fallon, Nevada 89496-5000

Dear Mr. Farry:

We have reviewed information on the proposed plans for No Further Action at Installation Restoration Program Sites at Naval Air Station (NAS) Fallon that was provided at the public meeting on October 15, 2003. We have the following general and specific comments and recommendations in relation to the proposed actions.

General Comments

Diagonal Drain flows along the southern boundary of NAS Fallon and eventually terminates at Stillwater National Wildlife Refuge, an area of considerable importance to migratory birds in Nevada. Several of the sites proposed for no further action appear to be within one-half mile of Diagonal Drain, with portions of Site 24 paralleling the drain. The groundwater gradient on NAS Fallon flows toward Diagonal Drain. Due to the risks of contamination of Diagonal Drain from various contaminated sites, including infiltration into the drain from contamination of the shallow ground water table, it is especially important to continue monitoring for various contaminants in groundwater on NAS Fallon for the long term, with emphasis on sampling of groundwater wells near the drain. This type of monitoring would hopefully allow identification and remediation of contaminant issues in the drain before they affect trust resources. We ask that you inform us and Stillwater National Wildlife Refuge if contaminated groundwater is found in the wells closest to the drain so that we can meet and discuss the possible need for additional sampling, which may include sampling of surface water in the Diagonal Drain.

Specific Comments

Site 9, Wastewater Treatment Plant

We have no concerns specific to this site.

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We noted that pesticides, volatile organic compounds (VOCs), and semivolatile organic compounds (SVOCs) were present in some groundwater samples. The presence of solvent-like compounds with pesticides could result in the increased risk of movement of pesticides in the groundwater. Groundwater sampling in down-gradient monitoring wells is needed in the future to determine if this is occurring.

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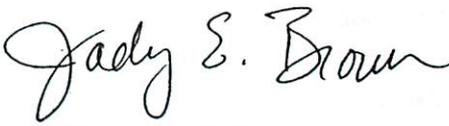
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Summary

We concur with plans for No Further Action at each of the sites listed above, with the exception of Site 24, where additional sampling is needed prior to closure. We also strongly recommend the additional monitoring of ground and surface water as outlined above as provided under our discussion of Sites 12 and 17.

We appreciate the opportunity to comment on the proposed plans. Please contact me or Stanley Wiemeyer at (775) 861-6300 if you have any questions or would like to meet with us.

Sincerely,


for Robert D. Williams
Field Supervisor

cc:

Nevada Division of Environmental Protection, Bureau of Federal Facilities, Carson City, Nevada

(Attn: Ramon Naranjo)

Project Leader, Stillwater National Wildlife Refuge, Fish and Wildlife Service, Fallon, Nevada

Farry, Joseph A (NASF N45F)

From: Farry, Joseph A (NASF N45F)
Sent: Thursday, November 20, 2003 7:29
To: 'Laurie_Sada@r1.fws.gov'
Cc: Said Seddiki (EFANW) (E-mail); Richard Powell (E-mail); Deverin, Chuck CIV (NASF N45F)
Subject: RE: Draft Decision Documents, Site 24- NAS Fallon Response to FWS Comments

Ms. Laurie Sada and Mr. Damian K. Higgins - USFW

The Navy appreciates you expedited review and attention to our responses and additional documentation. Per Mr. Higgin's response below, the Navy agrees to conduct the additional surface water sampling for PCBs during our annual surface water sampling effort. The Navy will include your office in review of the work plan to ensure that USFW's concerns are addressed.

Joseph A. Farry, PE-IRP Team Leader
NAS Fallon - Environmental Department (N45F)
4755 Pasture Road
Fallon, NV 89496
Phone: 775-426-2772
FAX: 775 - 426-2663
Email: joseph.farry@navy.mil

-----Original Message-----

From: [Laurie Sada@r1.fws.gov](mailto:Laurie_Sada@r1.fws.gov) [mailto:Laurie_Sada@r1.fws.gov]
Sent: Wednesday, November 19, 2003 14:34
To: [Damian Higgins@r1.fws.gov](mailto:Damian_Higgins@r1.fws.gov); Farry, Joseph A (NASF N45F)
Subject: Draft Decision Documents, Site 24- NAS Fallon Response to FWS Comments

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Joseph - I concur with Damian's recommendations outlined below. I understand that he spoke with you today and that you are willing to work with us to modify your surface water monitoring program to meet our request. Please accept this email as formal notification that you have satisfied our concerns regarding the No Further Action Decision. If you have further questions, please contact me or Damian Higgins of our staff.

Sincerely,

Laurie Sada
Assistant Field Supervisor
Nevada Fish and Wildlife Office
1340 Financial Blvd., Suite 234
Reno, Nevada 89509
Phone: (775) 861-6300
Fax: (775) 861-6301

----- Forwarded by Laurie Sada/RENO/R1/FWS/DOI on 11/19/2003 01:39 PM -----

Damian Higgins

To: Laurie Sada/RENO/R1/FWS/DOI@FWS
11/19/2003 12:04 PM **cc:** Stanley Wiemeyer/RENO/R1/FWS/DOI@FWS
Subject: Draft Decision Documents, Site 24- NAS Fallon
Response to FWS Comments

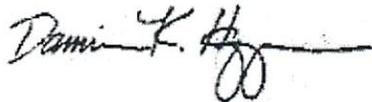
Laurie:

I have reviewed the letter from NAS Fallon dated November 13, 2003, that provides responses to our October 29, 2003, comments regarding the No Further Action decision for Sites 9, 12, 17, 23, and 24. In our letter, we concurred with those plans for no further action with the exception of Site 24. We did not concur with the action for site 24 due to concerns regarding the detection of PCB at one location (i.e, 24000) and the potential for adverse impacts to Diagonal Drain and our trust resources down-gradient. Upon reviewing our historical files, associated sampling that has been conducted previously at this site, and the additional monitoring information that you provided on November 17, 2003, it is my recommendation that we concur with no further action at Site 24. My recommendation for this is based upon the following:

- 1) Recent soil samples at different depths at four other locations at Site 24 did not detect PCB exceeding 0.22mg/kg (EPA Preliminary Remedial Goal);
- 2) Sampling conducted in 1991 for PCB's and VOC's at Site 24 did not detect these contaminants (Oak Ridge National Laboratory's Preliminary Site Characterization Summary for NAS Fallon Installation Restoration Program, January 1992); and
- 3) PCB detections in soil at location 24000 appears to be strongly absorbed to soil particles and is not expressed beyond 0.5 feet bgs.

However, as a condition to our concurrence for no further action on Site 24, I recommend that an analysis of surface water in Diagonal Drain be conducted for total PCB's furthest downgradient on NAS Fallon property during the period at which groundwater contributes to surface water flow. This should be done on an annual basis and if PCB is not detected, the sampling can be terminated. Hopefully this sampling may be achieved through their existing surface water monitoring program.

Sincerely,
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Damian K. Higgins
Environmental Contaminants Biologist

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