Decision Document
for
Site 23, Shipping and Receiving Disposal Area

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.

White Shield, Inc.

Boateng & Associates

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EnvirolSsues

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DECLARATION OF THE DECISION

SITE NAME AND LOCATION

Site 23, Shipping and Receiving Disposal Area
Naval Air Station Fallon
Fallon, Nevada

CERCLIS Identification Number
NV9170022173

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedy for Site 23, the Shipping and Receiving Disposal Area, 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 the Shipping and Receiving Disposal Area (Installation Restoration [IR] Site 23), NAS Fallon, Nevada. Data collected within, adjacent to, and downgradient of Site 23 do not indicate the presence of contaminants above state action levels or unacceptable risk levels. Pesticides and petroleum hydrocarbons were detected in soil, but at concentrations well below unacceptable risk levels or state action levels. Some petroleum hydrocarbon contamination has been observed in groundwater beneath the site in the past, which is attributable to petroleum hydrocarbon release(s) at IR Site 16, the Old Fuel Farm, located upgradient (north-northwest) of Site 23. However, the detected concentrations were either below state guidance levels or state action levels, and no contamination was detected during the most recent sampling event, which occurred in 1999.

STATUTORY DETERMINATIONS

The selected remedy for Site 23, No Further Action, is protective of human health and the environment and in compliance with federal and state applicable or relevant and appropriate requirements (ARARs). Excavation restrictions will be used to prevent excavation in the area of the shipping and receiving disposal trenches and the asbestos burial area at Site 23. The site may be reopened for further evaluation and, if necessary, cleanup, based on newly discovered information that leads the Navy and the Nevada Decision of Environmental Protection to determine that the remedy may not be protective of human health and the environment.

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

26 Nov 03
Date

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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
DRMO	Defense Reutilization and Marketing Office
EPA	U.S. Environmental Protection Agency
FS	feasibility study
GC	gas chromatograph
HBP PHC	high-boiling-point petroleum hydrocarbons
HI	hazard index
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
PCB	polychlorinated biphenyl
PID	photoionization detector
POL	petroleum, oil, and lubricant
PRG	Preliminary Remediation Goal
RAB	Restoration Advisory Board
RI	remedial investigation

ABBREVIATIONS AND ACRONYMS (Continued)

SI	site inspection
TCLP	toxicity characteristics leaching procedure
SVOC	semivolatile organic compound
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 23, the Shipping and Receiving Disposal Area, at Naval Air Station (NAS) Fallon, in Fallon, Nevada. The decision summary includes information regarding site background, the nature and extent of contamination, current and potential site and resource uses, and the assessment of human health and environmental risks. It also describes the involvement of the public throughout the process.

This decision document supersedes and replaces the *Draft Final Decision Document, Site 23, Shipping and Receiving Disposal Area*, 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. The content of 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 23 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 23

- **Section 5—Site Characteristics.** Summarizes the regional, facility, and site-specific characteristics and conditions, including concentrations and distribution of contaminants and fate and transport of contaminants

- **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 23

- **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.** Provides a list of references used in the 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 as 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.

2.1 SITE DESCRIPTION

Site 23, the Shipping and Receiving Disposal Area, is located in the southeastern portion of NAS Fallon, north of Site 19 (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 23 was investigated as one of the Group IV sites: nine sites that were grouped together during the RI because of their proximity to one another and the potential for commingled contaminated areas. The Group IV sites occupy a majority of the southern station area. Site 23 is located in the northeastern corner of the Group IV assemblage. Site 23 consists of the shipping and receiving disposal area (south of Building 375), the aircraft burial area, asbestos burial area, former transformer storage area, and the burn pits (Figure 2-3). Each of these areas is described below. The surface of Site 23 consists generally of paved areas in the north around Building 375, gravel areas, and areas of vegetation that have grown since disposal activities were discontinued.

In 1968, an estimated 1,300 cubic yards of debris (described as scrap metal and "junk," or material typically found in a junkyard) was pushed by heavy equipment into four trenches south of Building 375, compacted, and buried. Buried wastes reportedly included junk, debris, metal, rubble, paints, thinners, petroleum liquids, oil, and lubricant. It is believed that the buried debris originated from various Department of Public Works shops at the station and possibly from aircraft maintenance operations. Disposal activities in these trenches were discontinued in 1968. The Site 23 disposal trenches were closed prior to the Federal Facility Compliance Act. No closure standards had been promulgated when the disposal trenches were closed (1968). No disposal activities have occurred at the site since 1968.

In 1977, the burned fuselage of a DC-3 airplane was reportedly buried in the area shown in Figure 2-3. One hundred gallons of fuel (either aviation gasoline or jet petroleum No. 5 [JP-5]), lube oil, and hydraulic fluid may have been in the tanks or the engines of the airplane; however, no definitive information on these materials exists. It is thought that the aircraft fuselage was burned prior to burial. Burning should have depleted most, if not all, of the residual hydrocarbons within the fuselage, rendering the burnt fuselage inert. However, it is possible that leakage of residual fluids could have resulted in soil contamination, groundwater contamination, or both.

In the late nineteen seventies or early eighties, approximately 9 cubic yards of asbestos from buildings and pipe insulation throughout the station were buried at Site 23, in the location shown in Figure 2-3. Prior to burial, the materials were put in double bags and placed in crates. Therefore, these materials are considered to have been properly disposed of, and asbestos contamination of soil at Site 23 is unlikely.

Transformers with fluids possibly containing polychlorinated biphenyls (PCBs) were also stored at the site in Building 289. Currently, PCB-contaminated equipment/materials is stored in the PCB Storage Building, north of Building 289, as shown in Figure 2-3.

In 1995, burn pits were observed at the site; the exact burning activities are unknown. The exact location of the burn pits is also not known.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The purpose of the U.S. Navy's (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, NAS Fallon conducted the following investigations:

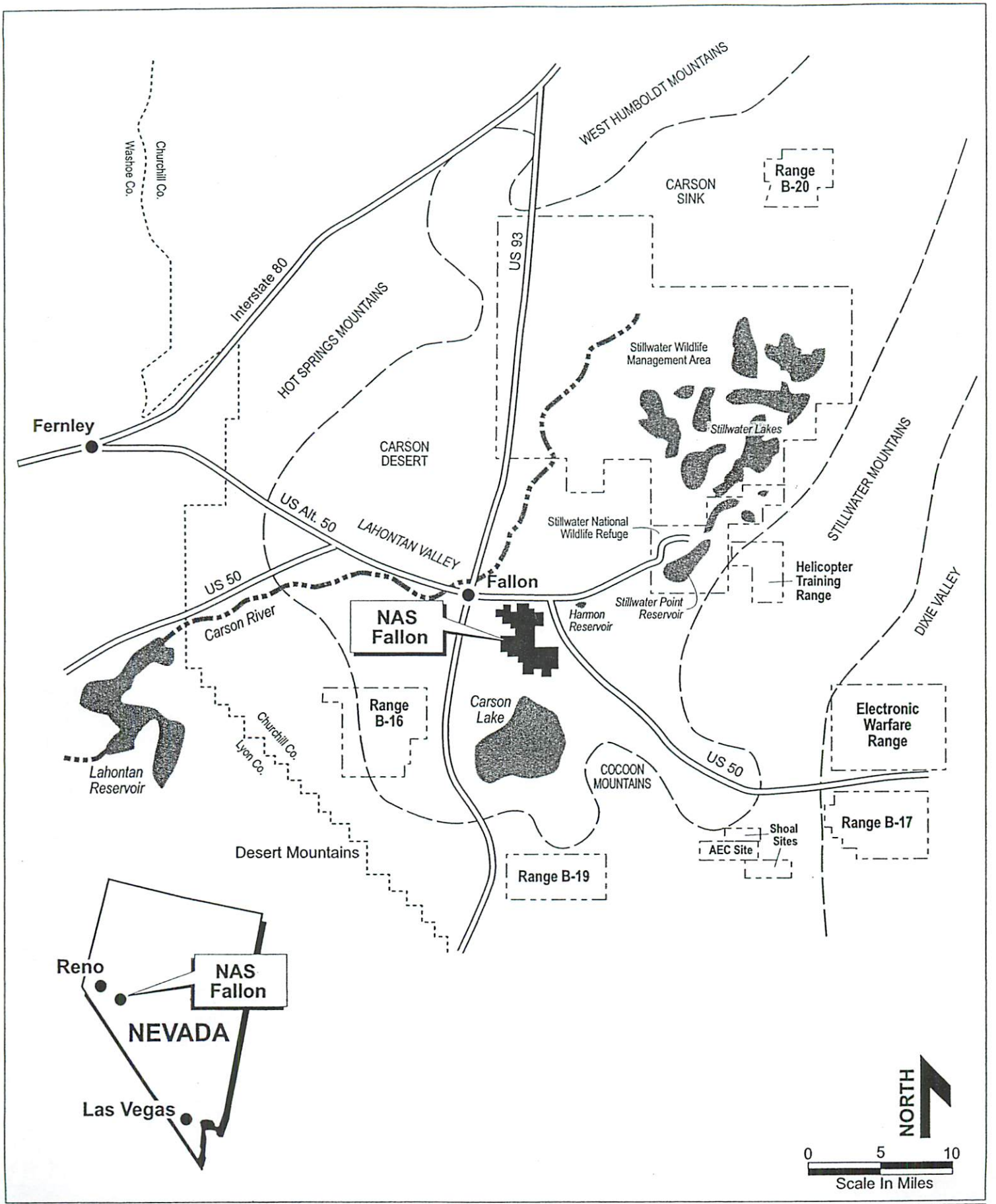
- The preliminary assessment (PA)/site inspection (SI) constituted Phase I of three investigation and assessment activities conducted at the site. During Phase I, information was gathered by means of employee interviews, site inspections, and record searches. The PA/SI reported that debris and junk was buried in four trenches south of Building 375. Buried wastes potentially included junk, debris, metal, rubble, paints, thinners, petroleum liquids, oils, and lubricants. A burned DC-3 airplane was reportedly buried south of the disposal trenches. Fuel, lube oil, and hydraulic fluid may have still been in the plane at the time of burial. Asbestos from building and pipe insulation was also buried at the site according to the PA/SI. The recommendations of the PA/SI included a geophysical study to locate the burial trenches and the reported DC-3 fuselage and the installation of groundwater monitoring wells to analyze soil and groundwater samples.

- Phase II consisted of a remedial investigation (RI) that included a baseline risk assessment conducted in 1994. During the RI, an additional area of concern was identified, a PCB transformer storage area. Fourteen groundwater test holes and four boreholes were installed/completed during the RI, and soil samples were obtained. A geophysical study was performed in the aircraft burial area. No magnetic anomalies potentially related to a buried airplane were observed during the geophysical study. The RI concluded that there was no threat to human health or the environment; therefore, the recommendation was No Further Action.

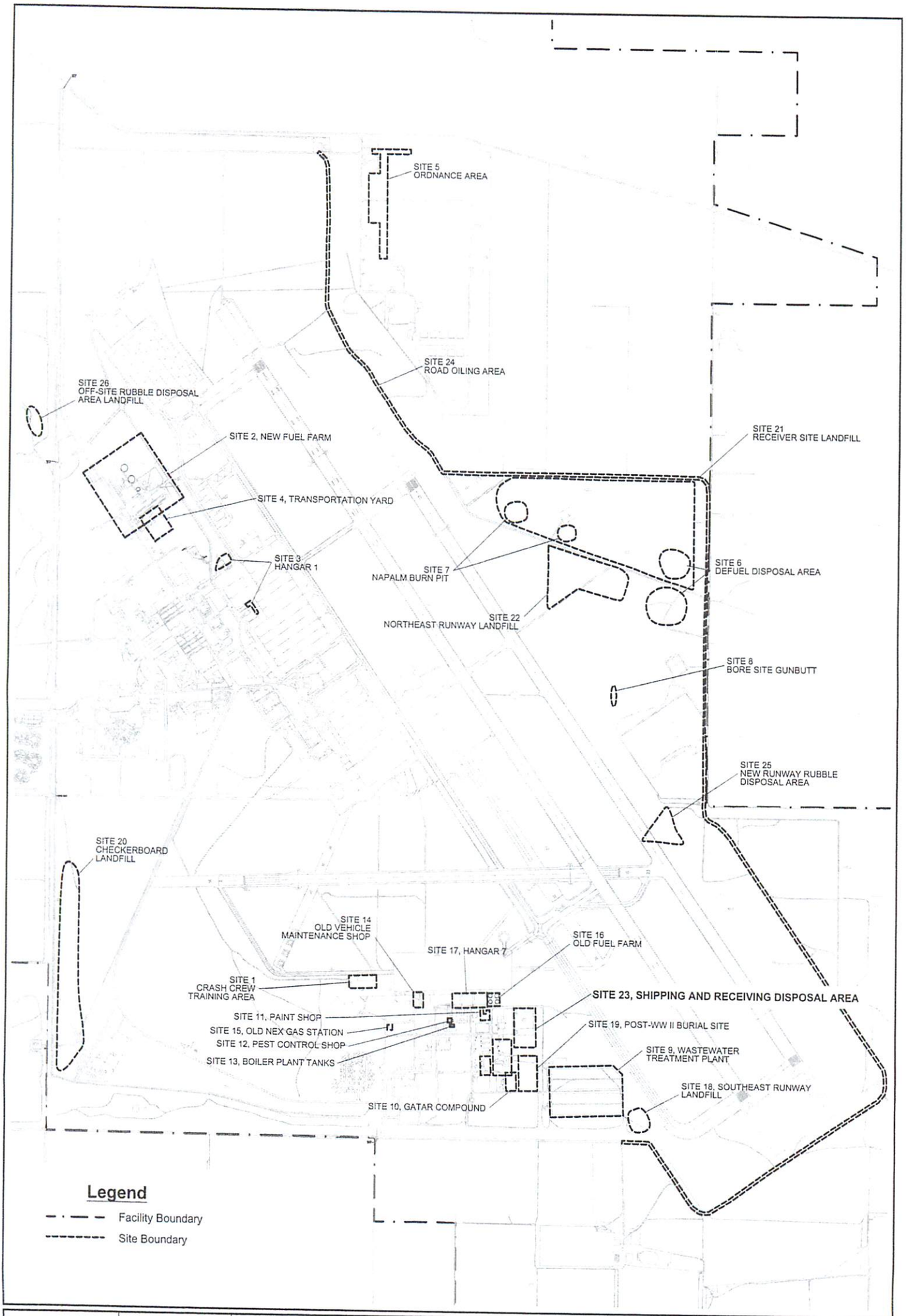
- Phase III was conducted to collect additional site characterization data in response to an NDEP request. Additional data were collected from three groundwater monitoring wells drilled or otherwise installed within the boundaries of or immediately outside the boundaries of Site 23. Data were also collected from two burn pits that were observed in 1995. Two soil samples were obtained from each of the burn pits, together with a third background sample. Two additional near-surface soil samples were obtained in 2002 in the area of the burn pits. Chemicals were not detected above the state action levels in any of the samples collected. All sampling locations relevant to Site 23 are shown and discussed in Section 5.

After the RI was published, the Navy prepared a draft decision document (in June 1998) for Site 23 presenting a decision of No Further Action. The NDEP provided comments on the draft decision document. A draft final decision document for Site 23 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 23. 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	Delivery Order 0029 NAS Fallon DECISION DOCUMENT SITE 23



U.S. NAVY

0 350 700 1400
SCALE IN FEET

Figure 2-2
NAS Fallon Facility Map

Delivery Order 0029
NAS Fallon
DECISION DOCUMENT
SITE 23

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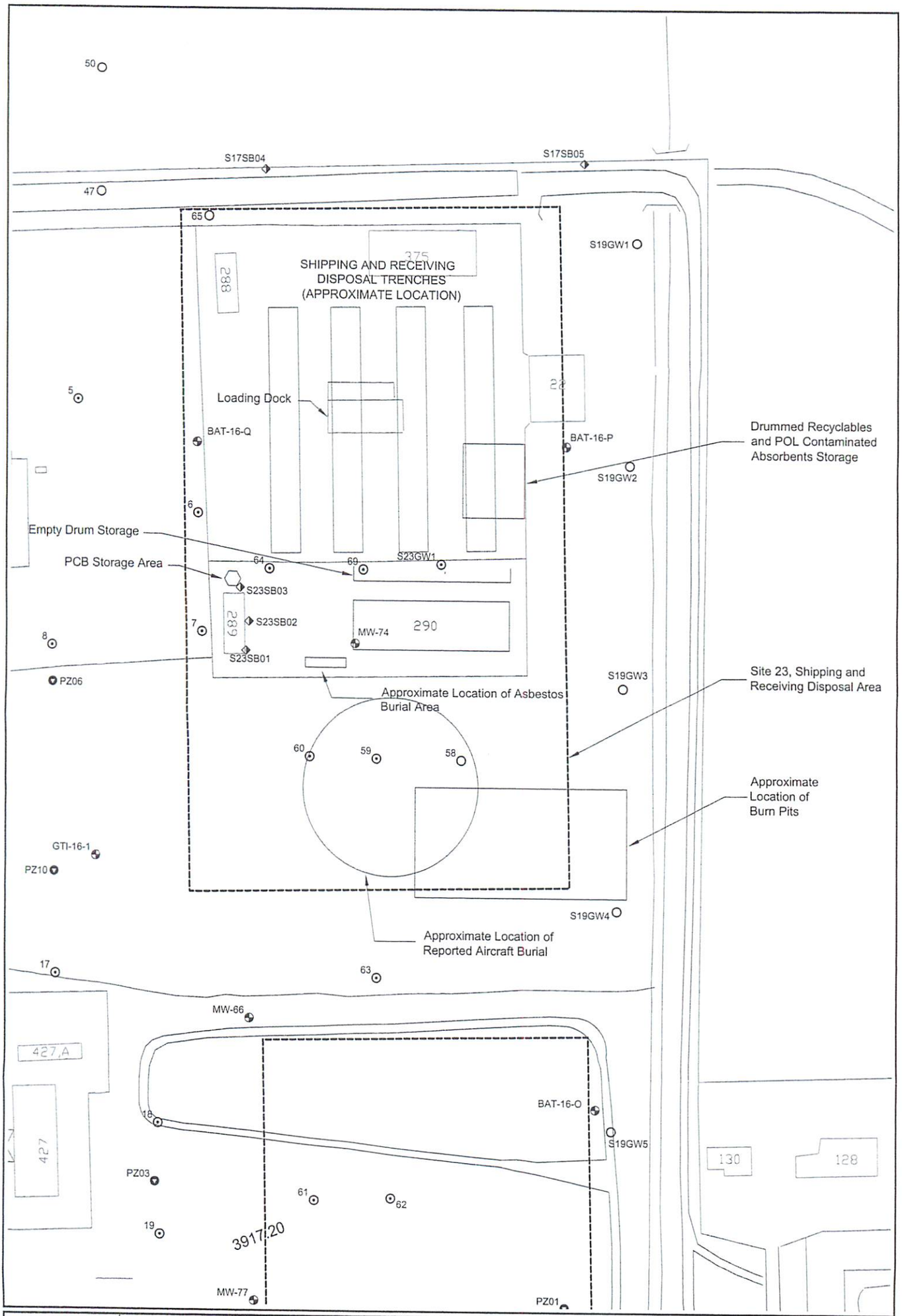

U.S. NAVY

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SCALE IN FEET

Figure 2-3
Site 23, Shipping and Receiving Disposal Area

Delivery Order 0029
NAS Fallon
DECISION DOCUMENT
SITE 23

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3.0 COMMUNITY PARTICIPATION

Community participation is being carried out 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 NAS Fallon's 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 23, 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 a community audience. 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. Intrinsic remediation is being implemented at Site 1 to address hydrocarbon and volatile organic impacts. 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. A feasibility study will be completed in late 2003 to evaluate alternatives for product recovery and dissolved hydrocarbon impacts at Site 2. Site 3 (Hangar 1) consists of two areas located southeast of the Group I Sites. Site 5 (Ordnance Area) is a no further action site 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 7 is a no further action site. Alternatives for Sites 21 and 22 are currently being evaluated. Site 8 (Bore Site Gunbutt) is a no further action site 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. Air-sparging is being conducted within the source area of Site 14 to address petroleum hydrocarbon and volatile organic impacts to groundwater at Site 14. Intrinsic remediation is planned for the downgradient extent of the plume originating from Site 14. Intrinsic remediation is also planned for the hydrocarbon plume originating from Site 16. 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 in the 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 results associated with some of the surrounding sites are relevant to Site 23. Sampling results for Site 16 are important to Site 23, because Site 16 is located immediately upgradient of Site 23 and operations at Site 16 (Old Fuel Farm) have affected downgradient groundwater, including groundwater beneath Site 23. Releases of petroleum hydrocarbons at Site 16 have resulted in exceedances of state action levels.

The sampling locations used to evaluate Site 23 are as follows:

- Fourteen auger-boring sampling locations within or adjacent to Site 23 from which groundwater samples were collected for qualitative analysis (these locations sometimes referred to as "groundwater test holes") and two soil samples collected for quantitative analysis
- Four auger-boring locations adjacent to Building 289 from which soil samples were collected
- Three permanent monitoring wells located within or immediately outside the boundaries of Site 23 from which soil (one well) and groundwater (three wells) samples were collected
- Two surface-soil sampling locations in the burn pits from which soil samples were collected
- One surface-soil sampling location from which a background soil sample was obtained
- Two additional near-surface soil sampling locations in the burn pits from which soil samples were collected

The sampling locations used as a basis for the decision for Site 23 are summarized in Table 4-1, together with the gradient relationships to Site 23 and the uses of data from each location. Table 4-2 provides a chronological summary of quantitative sampling activities at each location.

Because of the nature of activities at the site, potential contaminants of concern at the site include petroleum hydrocarbons, VOCs, SVOCs, PCBs and metals. Fourteen groundwater test holes were initially completed to qualitatively evaluate potential contamination related to Site 23, as well as to Site 16, the Old Fuel Farm. The four auger boreholes were used to assess the presence of contaminants in the soil at the location of the former transformer storage area. The permanent groundwater monitoring wells were installed to evaluate the lateral extent of contamination related to Site 16 and to determine if Site 23 was contributing to groundwater contamination. The five surface-soil and near-surface soil sampling locations were used to assess the presence of contaminants in the soil in the area of the former burn pits. No sampling was conducted in the aircraft burial area, since no evidence of a buried fuselage was found during the geophysical examination. Sampling was also not performed in the asbestos burial area, since asbestos materials were disposed of properly.

Table 4-1
Summary of Data From Sampling Locations Used as Basis of Decision for Site 23, Shipping and Receiving Disposal Area

Sampling Location	Data Type	Data Uses
Locations Within Site 23		
Groundwater test holes 58, 59, 60, 64, 69, S23GW1	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 S23SB01 (BH-01), S23SB02 (BH-02), S23SB03 (BH03), and BH04	Quantitative	Quantitative assessment of presence or absence of potential contaminants in soil related to the former transformer storage area
Well MW-74	Quantitative	Quantitative assessment of presence or absence of potential contaminants in groundwater and soil related to the shipping and receiving disposal area
Three surface soil sampling locations—two from burn pit and one background	Quantitative	Quantitative assessment of presence or absence of potential contaminants in soil related to the burn pits
Surface soil sampling locations 23000 and 23001	Quantitative	Quantitative assessment of presence or absence of potential contaminants in soil related to the burn pits
Locations Upgradient of Site 23		
Groundwater test holes 6, 7, and 65	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
Well BAT-16-Q	Quantitative	Quantitative assessment of contaminants migrating on to Site 23
Locations Downgradient of Site 23		
Groundwater test holes 63, S19GW1, S19GW2, S19GW3, and S19GW4	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
Well BAT-16-P	Quantitative	Quantitative assessment of potential contaminants migrating from the shipping and receiving disposal area

Note:
LNAPL - light nonaqueous-phase liquid

Table 4-2
Chronological Quantitative Sampling Summary

Sampling Location	Matrix	Sampling Date	Range of Analyses[a]
S23SB01(BH01), S23SB02 (BH02), S23SB03 (BH03)	Soil	3/91	Petroleum hydrocarbons, PCBs, and pesticides
BH04	Soil	12/91	PCBs, Pesticides, TCLP—pesticides
MW-74	Soil	3/96	Petroleum hydrocarbons, VOCs, and total organic carbon
MW-74	Groundwater	9/96, 3/97, 9/97, 12/99	Petroleum hydrocarbons, VOCs, metals (iron and manganese only), water quality parameters
Three surface soil sampling locations—two from burn pit and one background	Soil	1995	SVOCs, Metals, TCLP—Lead
23000 and 23001	Soil	4/02	Petroleum hydrocarbons and TCLP—chromium
BAT-16-Q	Groundwater	9/97	Petroleum hydrocarbons, VOCs, metals (iron and manganese only), and water quality parameters
BAT-16-P	Groundwater	9/97, 11/99	Petroleum hydrocarbons, VOCs, metals (iron and manganese only), and water quality parameters
SW-6	Surface Water	8/89, 9/89 (two samples), 10/89	Petroleum hydrocarbons, VOCs, SVOCs, PCBs, pesticides, metals, and anions
SD-6	Sediment	8/89	Petroleum hydrocarbons, VOCs, SVOCs, PCBs, pesticides, and metals
LD Sewer	Surface Water	4/00, 3/01	Petroleum hydrocarbons, VOCs, and TDS

[a]Not all analyses in the range shown were performed on each sampling date.

Notes:
BH - borehole
LD – lower diagonal
MW – monitoring well
PCBs – polychlorinated biphenyls
SVOCs - semivolatile organic compounds
TDS- total dissolved solids
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 conduct the water away from the drained areas. Conversely, the irrigation ditches deliver water to the fields. In the process of removing excess surface water and shallow groundwater, the drains also 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 Sites 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 23 Physical Setting

Site 23, the Shipping and Receiving Disposal Area, is located in the southeastern portion of NAS Fallon north of the Post-World War II Burial Site (Site 19) and southeast of the Old Fuel Farm (Site 16) (Figure 2-2). Site 23 encompasses approximately 5 acres, extending approximately 600 feet north to south and 350 feet from east to west. Six buildings are located on the site: PCB Storage Building, Building 22, Building 288, Building 289, Building 290, and Building 375 (Figure 2-3). PCB-contaminated equipment/materials are stored in the PCB Storage Building. Building 22 houses the hazardous waste offices and storage. Building 289 was used historically to store hazardous waste and PCB transformers. It currently is used as a storage area for spill response equipment and empty drums. Building 29 is the current hazardous waste containment building. Building 375 houses shipping (Defense Reutilization and Marketing Office [DRMO]) offices. Non-PCB transformers are currently stored between the PCB Storage Building and Building 288. Other facilities at the site include a loading dock, a drummed recyclables and petroleum, oil, and lubricant (POL) contaminated absorbents storage area, and an empty drum storage area. The site surface consists generally of paved areas, gravel areas, and areas of vegetation that have grown since disposal activities were discontinued.

The site is also the location of three disposal areas: the shipping and receiving disposal area, the aircraft burial area, and the asbestos burial site. Unsalvageable material and equipment formerly stored at the site were buried in the four bulldozed trenches of the shipping and receiving disposal area. These trenches were located south of Building 375. In 1977, the burned fuselage of a DC-3 airplane was reportedly buried in the area south of Building 290. Approximately 9

cubic yards of asbestos from buildings and pipe insulation throughout the station were buried at Site 23, southwest of Building 290. There are no areas of archaeological or historical significance at Site 23.

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, 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 egrets.

5.2.5 Endangered Animal Species

Federally listed endangered and threatened animal species that may utilize the NAS Fallon and range areas include the 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 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 interfingered 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 Study*. 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 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 Wyemaha 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 derives all of its domestic water from this aquifer utilizing 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 23 Geology and Hydrogeology

The geologic information for Site 23 was obtained by soil sampling or cone penetrometer investigation during the installation of monitoring wells GTI-16-1, MW-25L, MW-25U, MW-65, MW-66, MW-74, BAT-16-O, BAT-16-P, and BAT-16-Q. 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. MW-74 and BAT-16-Q are located within the site boundaries, although BAT-16-Q is on the upgradient side of the site. Well BAT-16-P is located immediately outside the site boundary downgradient of the site. Wells GTI-16-1, MW-65, and MW-66 are located crossgradient of the site. Wells MW-25L and MW-25U are located upgradient of the site. Well BAT-16-O is located downgradient of the site.

These monitoring wells penetrate the entire Fallon Formation and from 2 to 10 feet of the Sehoo Formation (Figure 5-1). Borings for these wells were completed to depths between 14 and 25 feet.

Sand and silty sand was generally encountered above the silt-to-clay aquitard. The clay aquitard was generally observed at depths ranging from 15 to 19 feet bgs. Soil at locations BAT-16-O, BAT-16-P, and BAT-16-Q was described by means of cone penetrometer methods rather than split-spoon sampling methods. Cone penetrometer methods are interpretive methods that describe soil without direct sampling and visual inspection of the soil. Split-spoon methods physically collect a soil sample for visual inspection. Soils described at the BAT series locations generally show increased silt content relative to the MW and GTI series wells.

A generalized fence diagram is provided as Figure 5-2. The fence diagram shows a sand layer from the ground surface to the clay aquitard (approximately 12 to 16 feet bgs) at MW-25L and GTI-16-1. A silt is observed from the ground surface to a depth of approximately 6 to 12 feet bgs at BAT-16-Q, BAT-16-P, BAT-16-O, MW-66, and MW-74. This silt is interpreted to pinch out to the northwest towards MW-25. The sand is interpreted to dip beneath surficial silt to the southeast. Silt is observed below the sand and on top of the clay layer in the southern portion of the site.

Groundwater surface elevation contours for November 2002 data indicate a gradient and flow direction at Site 23 consistent with the regional flow direction, which is to the southeast. Depth to groundwater in wells used to evaluate conditions at Site 23 varies seasonally and ranges from 4.0 to 6.0 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 are shown in Figure 5-3.

Bail tests were conducted on selected wells at the Group IV sites in April 1991 and June 1992. The two wells closest to Site 23, Wells MW-65 and MW-66, 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-65: 3.1 feet/day, or 1.1×10^{-3} cm/sec
- MW-66: 2.6 feet/day, or 9.2×10^{-4} cm/sec

Assuming a porosity of 30 percent, the range of groundwater velocities across the site is estimated at 1.9 to 2.3 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 W-20 is similar to that observed in the area of Site 23. Pumping-test-derived hydraulic conductivities were estimated at 38.9 to 61.6 feet per day. These estimates are 13 to 21 times higher than the highest bail-test-based estimate of 3.1 feet per day at wells near Site 23, suggesting that groundwater velocity across the site could be as high as 48 feet per year. These velocity estimates are for groundwater and do not necessarily represent contaminant transport velocities, which are 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. Contaminant velocities are typically slower than groundwater velocities because of chemical retardation.

5.4 NUMERICAL VALUES FOR COMPARISON TO CONTAMINANT CONCENTRATIONS

Potential contaminants that could have been released as a result of activities at Site 23 include petroleum hydrocarbons, VOCs, SVOCs, PCBs, and metals. Comparative numerical values for action decisions are provided in the Nevada Administrative Code (NAC), which states the following:

- The "soil state 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 Environmental Protection Agency, 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 generally assumed by NDEP to be EPA Region 9 PRGs).

The Nevada Administrative Code does not provide a state action level for TPH in groundwater. The Nevada Division of Environmental Protection 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. For the petroleum constituents benzene, toluene, ethylbenzene, and total xylenes (BTEX), the MCLs for groundwater established by the EPA are 0.005, 1.0, 0.70, and 10.0 mg/L, respectively. The MCLs for other VOCs, semivolatile organic chemicals (SVOCs), and metals are discussed as appropriate in the following subsections.

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 material that was or could have been disposed of at the Site 23 disposal trenches as junk, debris, metal, rubble, paints, thinners, petroleum liquids, oils, and lubricants. The PA/SI also indicated that a burned fuselage of a DC-3 airplane was reportedly buried at the site. One hundred gallons of fuel (either aviation gasoline or JP-5), lube oil, and hydraulic fluid may have been in the tanks or the engines of the airplane at the time of burial. Transformers with fluids possibly containing PCBs were stored at the site, and burn pits were observed at the site in 1995. The use/purpose of the burn pits is not known. These types of sources generally result in impacts on the subsurface due to petroleum hydrocarbons, VOCs, SVOCs, PCBs, and metals.

5.5 NATURE AND EXTENT OF CONTAMINATION

This section discusses the results of the investigations conducted relative to Site 23. Investigations at the site include the following:

- A geophysical survey to confirm the presence or absence of the burned DC-3 fuselage

- Qualitative analysis of groundwater test holes to assess the presence or absence of volatile contaminants throughout the site
- Soil sampling to determine the presence of contaminants in the former transformer storage area and the burn pits
- Soil sampling downgradient of the shipping and receiving disposal area to determine if disposal activities have impacted soils at Site 23
- Groundwater sampling upgradient and downgradient of the shipping and receiving disposal area to determine if disposal activities have impacted site groundwater

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

Contaminant concentrations in soil have not exceeded the state action levels in any of the samples collected on site or immediately adjacent to the site. Contaminant concentrations in groundwater have not exceeded the state guidance level for total petroleum hydrocarbons or the state action levels for all other contaminants in any of the samples obtained from the site or downgradient of the site during any of the sampling events. In addition, petroleum hydrocarbons and VOCs have not been detected in the most recent round of sampling conducted in 1999. Two samples were obtained during this event, one from the on-site well (MW-74) and one from the downgradient well (BAT-16-P).

5.5.1 Geophysical Survey

An electromagnetic geophysical survey was performed in the aircraft burial area. The geophysical survey did depict some minor surface anomalies, which were attributed to surficial metal debris. The anomalies were not of sufficient magnitude to mask a buried DC-3 fuselage. The results of the geophysical survey suggest that a DC-3 fuselage was not buried at the site. Since no evidence of the fuselage was found, no soil or groundwater sampling was performed in the aircraft burial area or downgradient of the aircraft burial area.

5.5.2 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 23. 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.

Fourteen groundwater test holes were positioned within or adjacent to Site 23 as shown in Figure 5-4. The groundwater test holes provided screening-level data to assess the presence or absence of volatile contaminants that could be related to Site 23, or migrating onto and across Site 23 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 5-4 for the groundwater test holes to indicate whether volatile contaminants were present or absent during sampling. Contamination was not found to be present in 8 of the 14 groundwater test holes (Figure 5-4). Test holes along the western boundary, in the middle of the site, and in the southwestern portion of Site 23 displayed contamination. One location, south and downgradient of Site 23, also displayed contamination. Test holes along the northern boundary and the eastern or downgradient boundary did not display contamination.

5.5.3 Quantitative Soil Data

In March of 1991, soil samples were collected from three auger-boring locations: S23SB01 (BH-01), S23SB02 (BH-02), and S23SB03 (BH-03). These samples were obtained from the northeast side, the east side, and the southeast corner of Building 289, where PCB transformers had been stored in the past (former transformer storage area). Samples from these three locations were collected from two depth intervals (0 to 2 feet bgs and 2 to 4 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), and PCB/pesticides (EPA Method 3550/8080). One additional soil sample was collected in December of 1991 from location BH04, which was drilled in the vicinity of the previously drilled BH-02 and BH-03. The soil sample was collected from 0 to 2 feet bgs. This sample was analyzed for PCB/pesticides and TCLP to determine leachable quantities of pesticides. The results of the TCLP test were not reported in the RI. The analytical results are summarized in Table 5-1.

During a site inspection in 1995, the NDEP representative observed several burn pits with soil staining and requested that the burn pits be sampled to evaluate the extent of contamination.

Two soil samples were subsequently collected from the burn pits, along with a third background sample. The samples were analyzed for SVOCs and metals. A sample was also analyzed using the TCLP extraction method to evaluate the leachability of lead. The sampling results are not available for the samples obtained during this sampling event. In 2002, near-surface soil samples (locations 23000 and 23001) were obtained from the two former burn pit locations. The soil samples were collected from 1.5 and 1 feet bgs, respectively, and analyzed for total petroleum hydrocarbons—extractable (TPH-E [EPA Method 8015D]), TPH—purgeable (TPH-P [EPA Method 8015G]), and TCLP chromium (EPA Method 6010). The analytical results are summarized in Table 5-1.

In 1996, soil samples were obtained from one monitoring well MW-74 and two groundwater test holes, S19GW3 and S19GW4. These samples were obtained to the south and southeast of the shipping and receiving disposal area. In March of 1996, one soil sample was obtained from MW-74, adjacent to Building 290. The soil sample was collected from 5.5 to 6 feet bgs, and analyzed for VOCs (EPA Method 8240), TPH-E (EPA Method 8015D), and total organic carbon (EPA Method 9060). In September of 1996, one soil sample was obtained from the auger-boring location S19GW3. This boring location is east of Site 23. No sampling depth was provided, and the sample was only analyzed for metals (EPA Method 6000/7000). In November of 1996, one soil sample was obtained from the auger-boring location S19GW4. This boring location is southeast of Site 23. No sampling depth was provided, and the sample was only analyzed for TCLP-lead (EPA Method TCLP-7421). Lead was not detected above the detection limit of 200 µg/L. The analytical results for MW-74 are summarized in Table 5-1, and the analytical results for S19GW3 are summarized in Table 5-2.

TPH-E, or total HBP PHC, was detected in only one of the 9 samples analyzed for this range of petroleum hydrocarbons. The near-surface soil sample collected from location 23000 in the former burn pit contained TPH-E, at a concentration of 46 mg/kg. This is below the 100 mg/kg state action level for TPH in soil. TPH-P, or total LBP PHC, was not detected at concentrations above 5 mg/kg in any of the 8 samples analyzed for this range of petroleum hydrocarbons. Three pesticides, 4,4-DDD, 4,4-DDE, and 4,4-DDT, were detected in 3 of the 7 samples collected from boreholes BH-01, BH-02, BH-03, and BH-04, in the former transformer storage area. Samples from 0 to 2 feet bgs from BH-02, BH-03, and BH-04 contained concentrations of these compounds ranging from 11 to 100 µg/kg. State action levels for these pesticides range from 1,700 to 2,400 µg/kg. These pesticides were detected at concentrations at least an order of magnitude below the state action levels. No pesticides were detected in the soil samples collected from 2 to 4 feet from the boreholes BH-02 and BH-03. VOCs were not detected in the sample analyzed for these compounds. Results of metals analyses were only available for one sample, S19GW3, and metals were detected at concentrations consistent with naturally occurring background concentrations.

The absence of soil contamination at Site 23 that could potentially contaminate groundwater is inferred on the basis of these data and the groundwater monitoring data from downgradient monitoring wells (see Section 5.4.5).

5.5.4 Groundwater Monitoring

Groundwater sampling was performed at three wells; MW-74, BAT-16-P, and BAT-16-Q. These wells were located upgradient and downgradient of the shipping and receiving disposal area and were used to assess if disposal activities had impacted the groundwater at the site. MW-74 was sampled four times, once in 1996, twice in 1997, and once in 1999. BAT-16-Q was sampled once in 1997, and BAT-16-P was sampled twice, once in 1997 and once in 1999.

In 1996, a groundwater sample was collected from one monitoring well, MW-74. This sample was analyzed for the water quality parameter, sulfate, during this sampling event. This same well was also sampled in March of 1997. The sample was analyzed for TPH-E (EPA Method 8015D), TPH-P (EPA Method 8015G), VOCs (EPA Methods 8260, 8240, and 8020), metals (iron and manganese only) (EPA Method 6010), and water quality parameters (EPA Methods RSK-175, 120.1, 300, 310.1, 375.1, 376.1, 410.1, and 2520C). The 1997 and 1999 analytical results for organic compounds are summarized in Tables 5-3 and 5-4, respectively.

In September of 1997, groundwater samples were collected from MW-74, BAT-16-P, and BAT-16-Q. The sample from MW-74 was analyzed for TPH-E (EPA Method 8015D) and VOCs (EPA Method 8240). The sample from BAT-16-P was analyzed for TPH-E (SW-846 8015B/CA LUFT), TPH-P (SW-846 8020A/CA LUFT), VOCs (SW-846 8260A), metals (iron and manganese only) (SW-846 Method 6010A), and water quality parameters (EPA Methods 300.0 and 310.1). The sample from BAT-16-Q was analyzed for all the same parameters. In addition, the sample from BAT-16-Q was analyzed for ethane, ethene, methane, and propane (SW-846 8000). The 1997 and 1999 analytical results for organic compounds are summarized in Tables 5-3 and 5-4, respectively.

BAT-16-P and MW-74 were sampled again in 1999. BAT-16-P was sampled in November of 1999, and the sample was analyzed for TPH-P (EPA Method 8015G), TPH-E (EPA Method 8015D), and VOCs (EPA Method 8260). MW-74 was sampled in December of 1999, and this sample was analyzed for the same parameters as the sample from BAT-16-P. TPH-diesel, TPH-gasoline, and VOCs were not detected at concentrations above the detection limit in either sample (Table 5-4).

TPH-diesel was detected in three of the six groundwater samples analyzed for this range of compounds. TPH—diesel was detected at a concentration of 300 µg/L in a sample collected

from MW-74 in March of 1997. TPH—diesel was also detected in samples collected from BAT-16-P and BAT-16-Q in September of 1997 at concentrations of 570 µg/L and 510 µg/L, respectively. TPH-gasoline was detected in two of the five groundwater samples analyzed for this range of compounds. In the two samples obtained from BAT-16-P and BAT-16-Q in September of 1997, TPH—gasoline was detected at concentrations of 30 and 50 µg/L, respectively. The concentrations of petroleum hydrocarbons are all below the state guidance concentration of 1,000 µg/L. Total xylenes were detected in the two samples obtained from BAT-16-P and BAT-16-Q in September of 1997. This compound was detected at concentrations of 1.1 and 7 µg/L, respectively. Both of these concentrations are below the state action level of 10,000 µg/L for total xylenes. Benzene, ethylbenzene, and toluene were also detected in the sample from BAT-16-Q obtained in September of 1997. The concentrations of these chemicals were 0.2, 1, and 2 µg/L, which are all below their respective state action levels of 5, 700, and 1,000 µg/L. Petroleum hydrocarbons were not detected in samples collected from MW-74 or BAT-16-P when they were resampled in 1999 (Table 5-4).

VOCs were detected in two of the seven groundwater samples analyzed for this range of compounds. Chlorobenzene was detected at a concentration of 40 µg/L in the sample obtained from MW-74 in March of 1997. This concentration is below the state action level of 100 µg/L. Ethane, 1,2,4-trimethylbenzene, m+p-xylene, and o-xylene were detected in the sample obtained from BAT-16-Q in September of 1997. Ethane was detected at a concentration of 1.2 µg/L, and 1,2,4-trimethylbenzene, m+p-xylene, and o-xylene were all detected at a concentration of 1 µg/L. A state action level for ethane has not been established (no MCL or PRG). The 1,2,4-trimethylbenzene detection of 1 µg/L is below the state action level of 52 µg/L. M+p-xylene and o-xylene were detected at concentrations below the state action level of 10,000 µg/L for total xylenes. VOCs were not detected in samples collected from MW-74 or BAT-16-P when they were resampled in 1999 (Table 5-4).

5.6 CONTAMINANT FATE AND TRANSPORT

Potential contaminants that could have been released as a result of activities at Site 23 include petroleum hydrocarbons, VOCs, SVOCs, PCBs and metals. Petroleum hydrocarbons, VOCs, and SVOCs have not been detected in soil or groundwater at concentrations above the state guidance level or action levels on site or downgradient of the site. Metals were detected at concentrations consistent with naturally occurring background concentrations. Although pesticides were not originally thought to be a contaminant of concern, three soil samples in the vicinity of Building 289 contained pesticides above detection limits. However, the concentrations were extremely low, less than or equal to 100 µg/kg, which are below state action levels of 1,700 to 2,400 µg/kg.

As discussed above, no contaminants in soil or groundwater were detected at concentrations above state action levels. Therefore, there are no contaminants in soil or groundwater which are expected to migrate off-site at concentrations above action levels.

5.7 BASIS OF DECISION

The Navy has selected No Further Action as the preferred alternative for Site 23 for the following reasons:

- The human health baseline risk assessment conducted as part of the RI concluded that the cancer risks and the hazard indexes (HIs) due to exposure to pesticides in site soils near Building 289 for both current and future exposure scenarios were well below 10^{-6} and 1.0, respectively.

- The ecological baseline risk assessment conducted as part of the RI concluded that the HIs due to exposure to pesticides in site soils near Building 289 are below 1.0 for all species.

- Migration of detected pesticides to groundwater is not expected because of the immobility of the compounds, which was confirmed by the site sampling data. Pesticides were only detected in the top 0 to 2 feet. None were detected at 2 to 4 feet. Groundwater is observed at depths of approximately 5 to 7 feet below ground surface (bgs).

- The asbestos was properly disposed of. Therefore, asbestos contamination of soil is not expected.

- No evidence of a buried aircraft was found during the geophysical survey conducted at the site as part of the RI.

- The soil concentration of petroleum hydrocarbons detected in the former burn pits was below the state action level.

- Concentrations of petroleum hydrocarbons, detected in groundwater at three wells located onsite or immediately adjacent to the site in 1997, were below the state guidance level (for total petroleum hydrocarbons) or the state action levels (for specific contaminants). This contamination is most likely attributable to Site 16, the Old Fuel Farm, because contamination was detected in the upgradient well at concentrations similar to the on-site well and downgradient well. (Note:

Hydrocarbon release(s) affecting Site 23 and associated with Site 16, which is located upgradient of Site 23, will be addressed as part of the ongoing cleanup efforts related to Site 16.)

- No groundwater contamination was detected in the most recent sampling event, which occurred in 1999. Therefore, if potential contaminants are present at Site 23, they are not impacting groundwater at the site. In addition, these sampling results indicate that Site 16 may no longer be impacting groundwater at Site 23.

- Site 23 is currently the shipping and receiving area for NAS Fallon. NAS Fallon does not expect any change in the use of this land or that of the surrounding sites in the near future.

In summary, No Further Action is proposed for this site because soil and groundwater at the site does not exceed the regulatory action levels, and site soil does not pose an unacceptable risk to human health or the environment. This conclusion is based on four soil sampling events and five groundwater sampling events. In addition, no petroleum hydrocarbons or VOCs were detected in groundwater during the most recent sampling event.

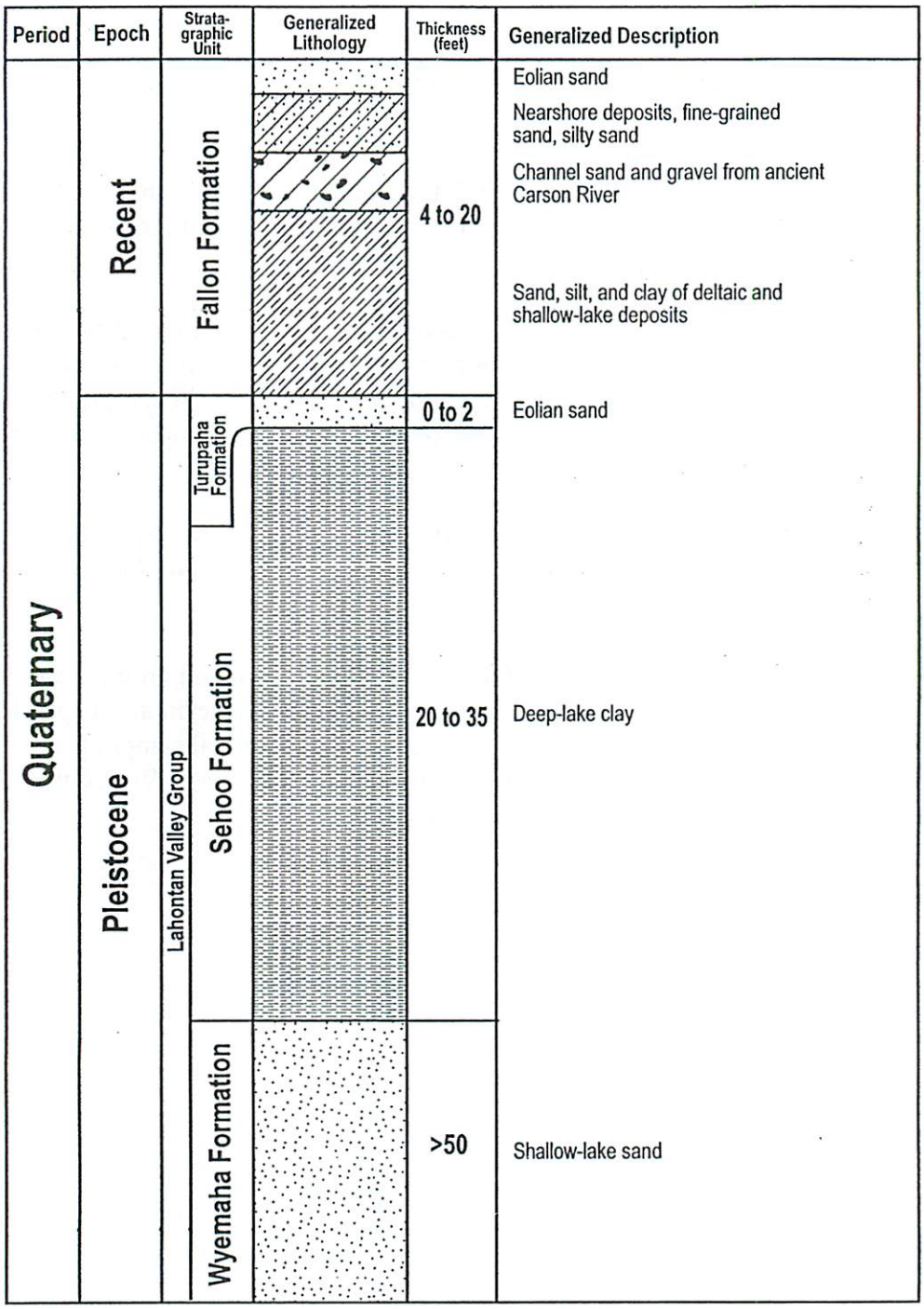

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Figure 5-1
Generalized Stratigraphy of NAS Fallon

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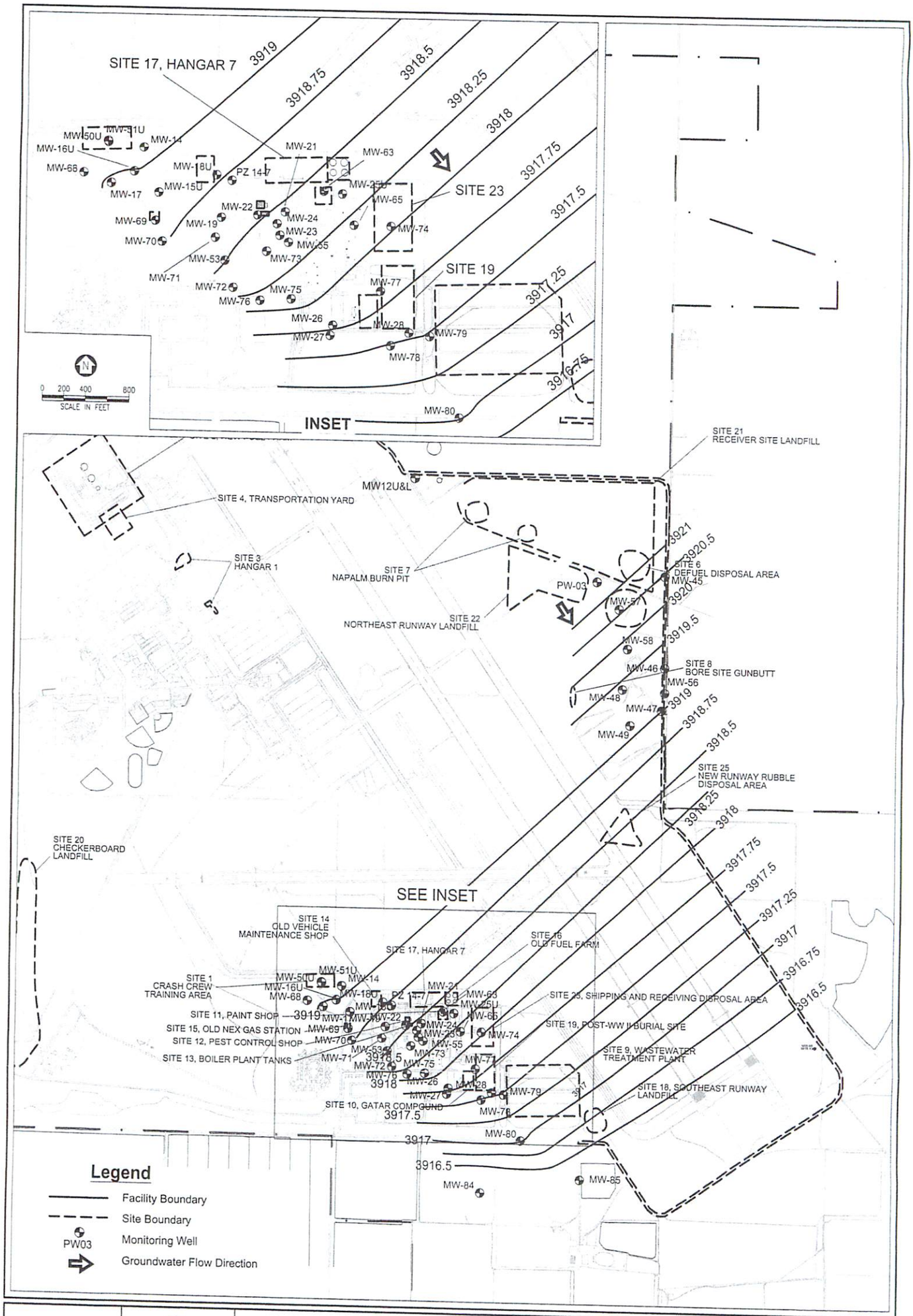

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Figure 5-3
Groundwater Surface Elevation Contours, November 2002, NAS Fallon

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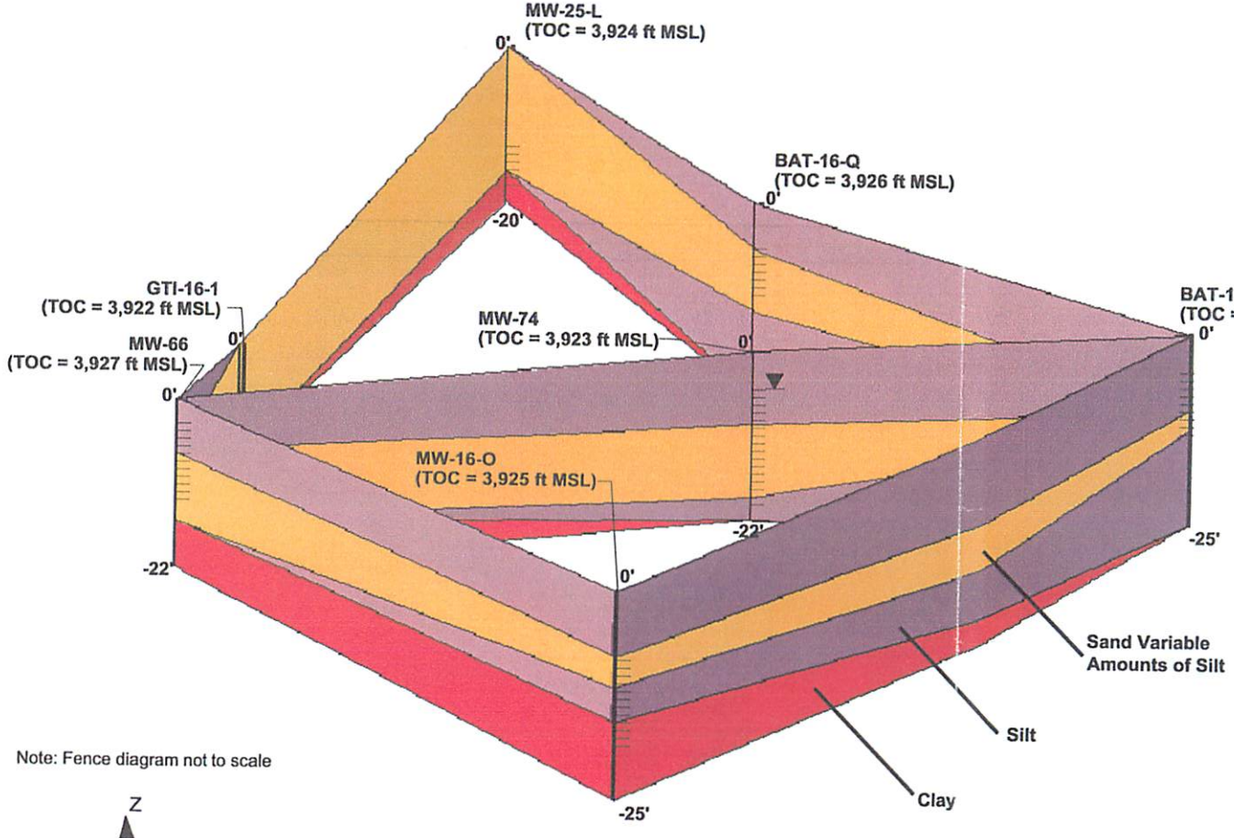
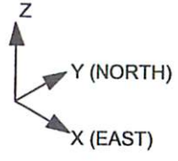
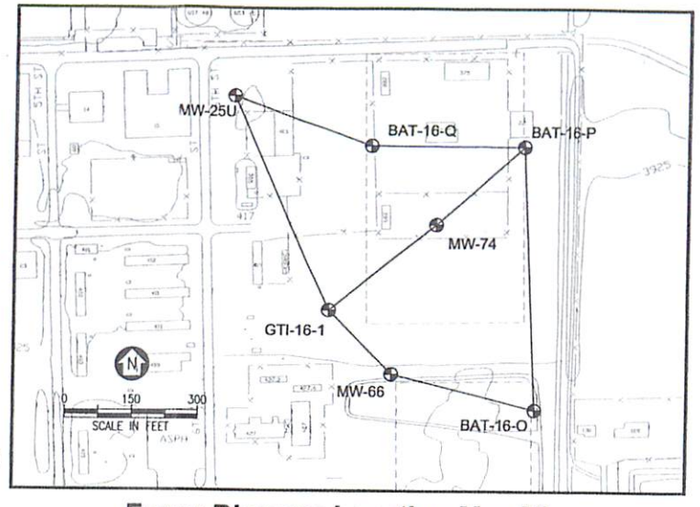


Note: Fence diagram not to scale





Fence Diagram Location Map View

Legend

- Monitoring Well
- Ft MSL — Feet Mean Sea Level
- Screen Interval
- Depth to Water Measured in Well (November 2002)
- TOC — Top of Casing

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Figure 5-2
Generalized Fence Diagram
Site 23

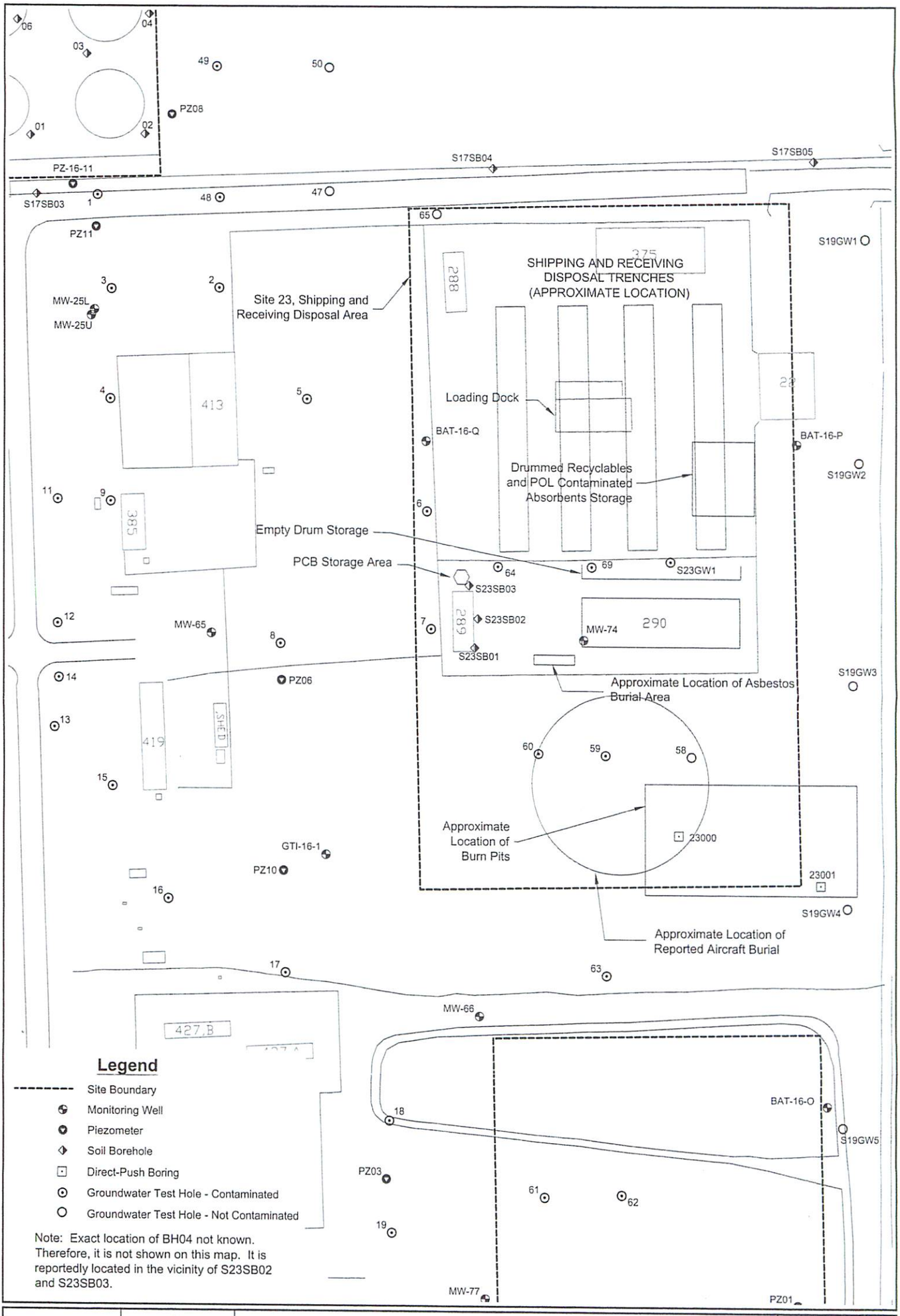

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Figure 5-4
Sampling Locations at Site 23
Shipping and Receiving Disposal Area

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Table 5-1
Soil Analytical Results for Organic Compounds at Site 23, Shipping and Receiving Disposal Area

Sampling Location	Sample No.	Depth (feet bgs)	Total HBP PHC (mg/kg)[a]	Total LBP PHC (mg/kg)[b]	PCB/Pesticides (µg/kg)[c]	Volatile Organic Compounds (µg/kg)[d]	Total Organic Carbon (mg/kg)[e]
BH-01	3681	0 to 2	10U	5U	None detected	Not analyzed	Not analyzed
BH-01	3682	2 to 4	10U	5U	None detected	Not analyzed	Not analyzed
BH-02	3683	0 to 2	10U	5U	4,4-DDD[f]: 11J 4,4-DDE[g]: 76 4,4-DDT[h]: 64	Not analyzed	Not analyzed
BH-02	3684	2 to 4	10U	5U	None detected	Not analyzed	Not analyzed
BH-03	3685	0 to 2	10U	5U	4,4-DDD[f]: 12J 4,4-DDE[g]: 87 4,4-DDT[h]: 44	Not analyzed	Not analyzed
BH-03	3686	2 to 4	10U	5U	None detected	Not analyzed	Not analyzed
BH-04	3967	0 to 2	Not analyzed	Not analyzed	4,4-DDD[f]: 22J 4,4-DDE[g]: 86J 4,4-DDT[h]: 100	Not analyzed	Not analyzed
MW-74	MW74-2-2	5.5 to 6	10U	Not analyzed	Not analyzed	None detected	470
23000[i]	221994	1.5	46	6.2U	Not analyzed	Not analyzed	Not analyzed
23001[i]	221996	1	29U	5.5U	Not analyzed	Not analyzed	Not analyzed

Table 5-1 (Continued)
Soil Analytical Results for Organic Compounds at Site 23, Shipping and Receiving Disposal Area

[a]EPA Method 8015 Modified, state action level = 100 mg/kg (NDEP)
[b]EPA Method 8015/8020, state action level = 100 mg/kg (NDEP)
[c]EPA Method 3550/8080, laboratory reporting limit of 8.3 µg/kg
[d]EPA Method 8240, laboratory reporting limit of 5 µg/kg
[e]EPA Method 9060
[f]State action level for 4,4-DDD is 2,400 µg/kg (EPA Region 9 PRG – residential soil)
[g]State action level for 4,4-DDE is 1,700 µg/kg (EPA Region 9 PRG – residential soil)
[h]State action level for 4,4-DDT is 1,700 µg/kg (EPA Region 9 PRG – residential soil)
[i]TCLP chromium was not detected at concentrations greater than the reporting limit, 10 µg/l, in this sample.

Notes:
bgs - below ground surface
DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenyldichloroethene
DDT - dichlorodiphenyltrichloroethane
EPA - U.S. Environmental Protection Agency
HBP PHC - high-boiling-point petroleum hydrocarbons
J - associated numerical value is an estimate
LBP PHC - low-boiling-point petroleum hydrocarbons
µg/kg - microgram per kilogram
mg/kg - milligram per kilogram
NDEP - Nevada Division of Environmental Protection
TCLP – toxicity characteristic leaching procedure
U - analyte not detected above the laboratory reporting limit

Table 5-2
Soil Analytical Results from Location S19GW3 for Metals at Site 23, Shipping and Receiving Disposal Area

Compound	Analytical Result (mg/kg)[a]
Chromium	0.014
Cobalt	0.0086
Copper	0.03
Lead	0.019
Nickel	0.011
Vanadium	0.054
Zinc	0.088
Barium	0.13

[a]EPA Method 6000/7000, laboratory reporting limit of 0.005 mg/kg

Note:
mg/kg - milligram per kilogram

Table 5-3
1997 Groundwater Analytical Results for Organic Compounds at Site 23, Shipping and Receiving Disposal Area

Sampling Location	Sampling Date	TPH-Extractable (µg/L)	TPH-Purgeable (µg/L)	VOCs[a] (µg/L)[e]
MW-74	March 1997	TPH-Diesel: 300[b]	Not detected	Chlorobenzene: 40
BAT-16-P	September 1997	TPH-Diesel: 570[c]	TPH-gasoline: 30J[d] Total xylenes: 1.1J[e]	Not detected
BAT-16-Q	September 1997	TPH-Diesel: 510[c]	TPH-gasoline: 50J[d] Benzene: 0.2J[e] Ethylbenzene: 1J[d] Toluene: 2[e] Total xylenes: 7[e]	Ethane: 1.2J 1,2,4-Trimethylbenzene: 1J m+p xylene: 1J o xylene: 1J

[a]EPA Methods 8240, 8260, SW-846 8020A, SW-846 8260A, SW-846 8000; laboratory reporting limits 1 to 10 µg/L
[b]EPA Method 8015D, laboratory reporting limit of 500 µg/L
[c]SW-846 8015B/CA LUFT, laboratory reporting limit of 200 µg/L
[d]SW-846 8020A/CA LUFT, laboratory reporting limit of 100 µg/L
[e]SW-846 8020A/CA LUFT, laboratory reporting limit 1µg/L

Notes:

EPA - U.S. Environmental Protection Agency
J - associated numerical value is an estimate
µg/L - microgram per liter
TPH – total petroleum hydrocarbons
VOCs – volatile organic compounds

Table 5-4
1999 Groundwater Analytical Results for Organic Compounds at Site 23, Shipping and Receiving Disposal Area

Sampling Location	Sampling Date	TPH-Extractable (µg/L)	TPH-Purgeable (µg/L)	VOCs (µg/L)
MW-74	December 1999	TPH-JP-5: 500U TPH-Extractable: 500U	500U	Not detected at reporting limits of 1 to 10 µg/L
BAT-16-P	November 1999	TPH-JP-5: 500U TPH-Extractable: 500U	500U	Not detected at reporting limits of 1 to 10 µg/L

Notes:
JP-5 - jet petroleum No. 5
TPH – total petroleum hydrocarbons
µg/L - microgram per liter
U – analyte not detected at specified reporting limit
VOCs – volatile organic compound

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. The Navy is expected to maintain NAS Fallon in the future. Site 23 is used as the shipping and receiving area, as described in Section 5. NAS Fallon does not expect any change in the use of this land or that of the surrounding sites in the foreseeable future.

Excavation restrictions have also been established for former disposal sites at NAS Fallon as part of the facility Master Plan. The Master Plan for NAS Fallon includes a discussion of all potentially contaminated areas in the IR Program and their locations. Activities that involve excavation at Site 23 will be prohibited as part of the master planning process. Any future construction projects conducted at Site 23 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 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. Excavation restrictions will be enforced for the area shown in Figure 6-1.

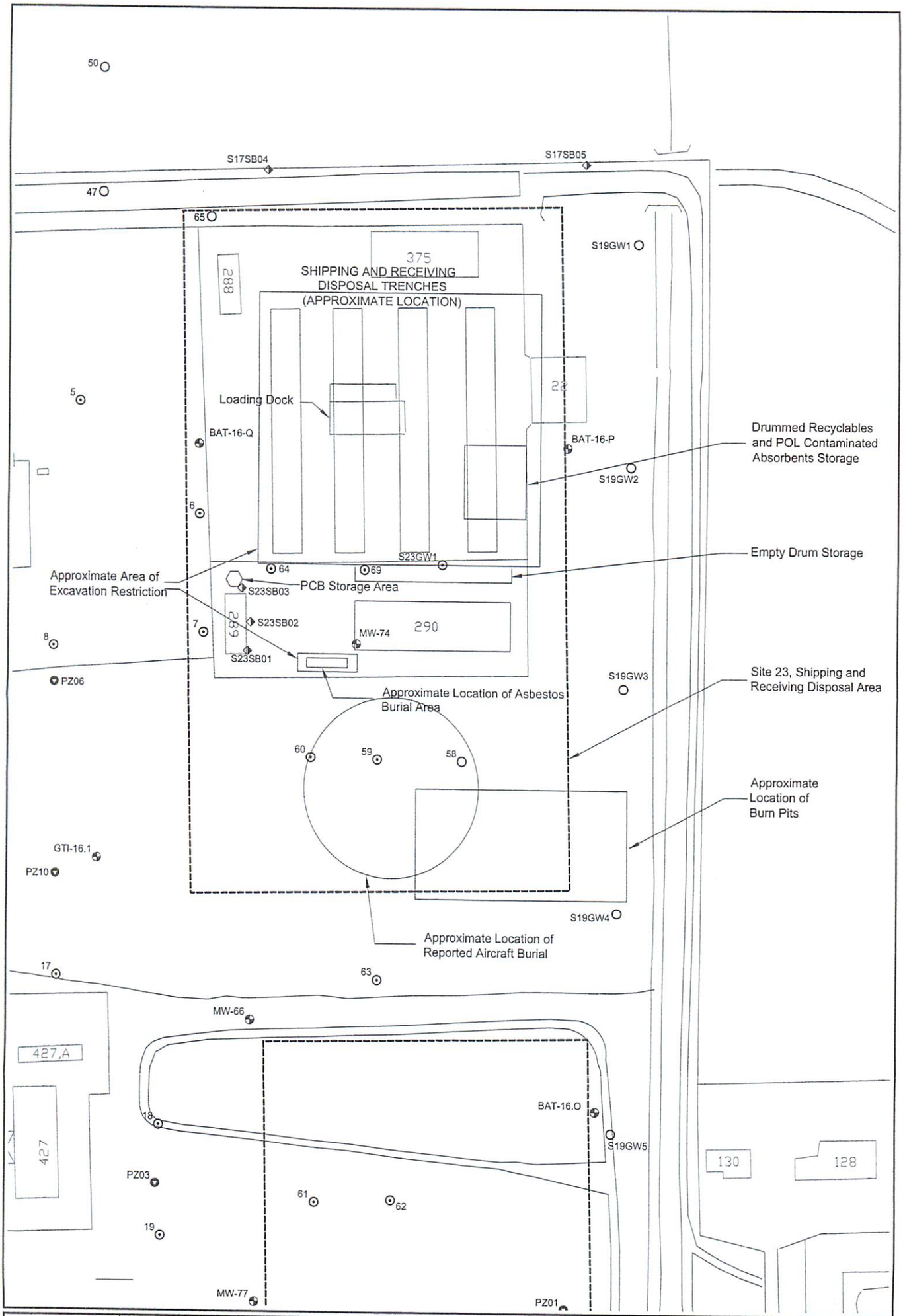

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Figure 6-1
Excavation Restrictions Map, Site 23,
Shippping and Receiving Dispoal Area

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SITE 23

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7.0 SUMMARY OF SITE RISKS

Site 23 was examined during the human health and ecological baseline risk assessments conducted under the RI. Exposure pathways associated with possible contamination were evaluated for soil at Site 23 and the groundwater plume associated with Site 16. Petroleum hydrocarbons and VOCs were not detected in groundwater samples collected from MW-74 and BAT-16-P during the most recent sampling event (November and December of 1999). This indicates that the groundwater plume emanating from Site 16 is not currently impacting Site 23. In addition, concentrations of contaminants detected in groundwater in 1997 were either below the state guidance level or the state action levels for all compounds. Therefore, further discussion of the groundwater risk assessment performed for the Group IV Sites is not necessary for Site 23. The results of the soil risk assessment for Site 23 are presented below.

Current and future human exposure to contaminated soil is possible only for construction workers at Site 23, since the site is covered with clean soil, asphalt, or gravel. The exposure pathways evaluated were incidental ingestion of soil, dermal contact, and inhalation of VOCs and fugitive dust. Using the maximum soil concentrations detected at Site 23, the cancer risk and hazard index value for soil were well below 10^{-6} and 1.0, respectively.

The ecological baseline risk assessment for contaminated soil was also evaluated. Contaminated soils were evaluated only for invading plant species, vagrant rodents, and three raptors (peregrine falcon, golden eagle, and red-tailed hawk). The phytotoxicity to plants was also assessed. The exposure pathways evaluated for the rodent were direct exposures due to incidental ingestion of, dermal contact with, and inhalation of contaminants and indirect exposures to surface and subsurface soils via the food chain (plant and invertebrate ingestion). The exposure pathways evaluated for raptors included only indirect exposures to surface and subsurface soils via the food chain (bird and rodent ingestion). Using the maximum soil concentrations detected at Site 23, the hazard index values for soil were well below 1.0 at Site 23.

8.0 STATUTORY AUTHORITY FINDING

Historical and recent groundwater sampling shows that contaminant concentrations in groundwater have not exceeded the state guidance level (for total petroleum hydrocarbons) or state action levels (for VOCs, and SVOC). In fact, petroleum hydrocarbons and VOC's were not detected at Site 23 during the most recent groundwater sampling event, which occurred in 1999. Soil sampling shows that contaminant concentrations in soil have not exceeded the state action level for petroleum hydrocarbons. In addition, risks to human health and ecological receptors due to exposure to soil contaminated with pesticides were found to be acceptable in the baseline risk assessment performed as part of the RI. 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 23, the Shipping and Receiving Disposal Area, 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.

Naval Energy and Environmental Support Activity (NEESA). 1988. *Preliminary Assessment/ Site Inspection, Naval Air Station Fallon, Fallon, Nevada.* April 1988.

Nevada Department of Environmental Protection (NDEP). 2000. *NDEP Comments on Draft Final Decision Document, Site 23, Shipping and Receiving Disposal Area.* April 12, 2001.

———. 1999. *Comments on Site 23, Post–World War II Burial Site, Draft Record of Decision.* February 10, 1999.

———. 1989. *NDEP Comments on Remedial Investigation/Feasibility Study Work Plan.* July 5, 1989.

Oak Ridge National Laboratory (ORNL). 1994. *Naval Air Station Fallon, Remedial Investigation, Remedial Investigation Report, Final.* September 1994.

———. 1992. *Preliminary Site Characterization Summary, Installation Restoration Program, Naval Air Station Fallon, Fallon, Nevada.* January 1992.

———. 1989. *Draft Project Work Plan (WP); Work Plan, Health and Safety Plan (HASP), Community Relations Plan (CRP); for the Evaluation of Potential Environmental Contamination.* January 1, 1989.

———. 1989. *Volume I—Work Plan (WP) for the Remedial Investigation/Feasibility Study (RI/FS).* August 1, 1989.

———. 1989. *Volume II—Health and Safety Plan (HASP) for the Remedial Investigation/ Feasibility Study (RI/FS).* August 1, 1989.

———. 1989. *Volume III—Sampling and Analysis Plan (SAP) for the Remedial Investigation/ Feasibility Study (RI/FS).* August 1, 1989.

———. 1989. *Volume IV—Community Relations Plan (CRP) for the Remedial Investigation/ Feasibility Study (RI/FS).* August 1, 1989.

U.S. Navy. 2001. *Response to NDEP Comments on Draft Final Decision Document, Site 23, Shipping and Receiving Disposal Area.* April 30, 2001.

———. 1999. *Draft Final Decision Document, Site 23, Shipping and Receiving Disposal Area, Naval Air Station Fallon.* August 27, 1999.

———. 1998. *Draft Record of Decision, Sites 4, 5, 7, 8, 9, 10, 11, 12, 15, 17, 18, 19, 23, 24, 25, 26, & 27.* June 5, 1998.

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 unnammed 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

TAKE PRIDE IN AMERICA

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

File
copy - Joe Farry
Chuck
Ron
Captain G.

October 29, 2003
File No. EC 14.5

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.

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 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.

Site 17, Hanger 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 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.

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.

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 Judy E. Brown

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

<< File: pic26500.gif >>

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

11/19/2003 12:04 PM

To: Laurie Sada/RENO/R1/FWS/DOI@FWS
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,
(Embedded image moved to file: pic26500.gif)

Damian K. Higgins
Environmental Contaminants Biologist

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