

Decision Document
for
Site 24,
Road Oiling 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.

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EnviroIssues

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DECLARATION OF THE DECISION

SITE NAME AND LOCATION

Site 24, Road Oiling 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 24, Road Oiling 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.

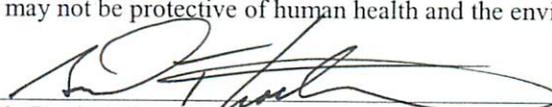
The U.S. Navy selected the remedy, and the State of Nevada concurs with the selected remedy.

DESCRIPTION OF THE SELECTED REMEDIES

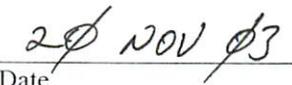
Based on the following observations and data, No Further Action is required at the Road Oiling Area (Installation Restoration [IR] Site 24), NAS Fallon, Nevada. One soil sample contained a concentration of a contaminant (polychlorinated biphenyl [PCB] Aroclor 1254) above the state action level that is attributable to past activities at the site. This sample was collected from a depth of 0.5 feet. Soil samples collected from this location at depths of 1 and 2 feet did not contain PCBs at concentrations greater than the state action level. This observation suggests that PCBs are not migrating vertically. The low mobility of PCBs in soil and the low precipitation at NAS Fallon will limit the potential for future vertical migration of PCBs in soil. Therefore, exposure via a groundwater pathway is not considered to be complete. The area is a fenced and secured area with access limited to security and maintenance personnel. These conditions further limit human exposure. Other contaminants detected in groundwater are attributable to adjacent upgradient sites.

STATUTORY DETERMINATIONS

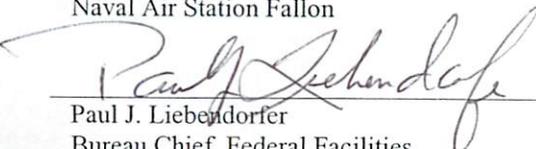
The selected remedy for Site 24 is protective of human health and the environment and complies with federal and state applicable or relevant and appropriate requirements (ARARs). Although soil at one sampling location contains a concentration of a PCBs 0.74 mg/kg above the state action level, the vertical extent of PCBs in exceedance of the state action level is limited to the upper 0.5 feet. Impacts to groundwater are not expected, since PCBs have low mobility in the soil and the annual precipitation at NAS Fallon is very low. Additionally the dense subsurface soil will limit the potential for the PCBs to become airborne if disturbed by vehicle traffic or high winds. 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.



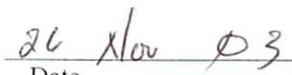
Captain Brad T. Goetsch
Commanding Officer
Naval Air Station Fallon



Date



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



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
CFR	Code of Federal Regulations
cm/sec	centimeter per second
CRP	community relations plan
DCA	dichloroethane
EPA	U.S. Environmental Protection Agency
ER, N	Environmental Restoration, Navy
FS	feasibility study
GC	gas chromatograph
HBP PHC	high-boiling-point petroleum hydrocarbons
IR	Installation Restoration
LBP PHC	low-boiling-point petroleum hydrocarbons
LD	lower diagonal
MCL	maximum contaminant level
µg/L	microgram per liter
mg/kg	milligram per kilogram
mg/L	milligram per liter
NAC	Nevada Administrative Code
NAS	Naval Air Station Fallon
Navy	U.S. Navy
NDEP	Nevada Division of Environmental Protection
NPL	National Priorities List
PA	preliminary assessment
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PID	photoionization detector
RAB	Restoration Advisory Board
RI	remedial investigation
SI	site inspection

ABBREVIATIONS AND ACRONYMS (Continued)

SVOC	semivolatile organic compound
TCA	trichloroethane
TCE	trichloroethene
TCLP	toxicity characteristics leaching procedure
TPH	total petroleum hydrocarbons
TPH-D	total petroleum hydrocarbons in the diesel range
TPH-E	total petroleum hydrocarbons—extractable
TPH-G	total petroleum hydrocarbons in the gasoline range
TPH-P	total petroleum hydrocarbons—purgeable
TRA	Technical Review Committee
VOC	volatile organic compound
WET	Waste Extraction Test

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 24, the Road Oiling Area at Naval Air Station (NAS) Fallon, in Fallon, Nevada. This 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 24, the Road Oiling 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. This decision document includes the pertinent elements of Nevada Division of Environmental Protection's (NDEP's) *Requirements for IRP 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 24 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 24
- **Section 5—Site Characteristics.** Summarizes the regional, facility, and site-specific characteristics and conditions, including the concentrations and distribution of contaminants and their fate and transport
- **Section 6—Current and Potential Site and Resource Uses.** Discusses the current and potential future uses of the land
- **Section 7—Summary of Site Risks.** Discusses risks due to contamination present at the site
- **Section 8—Statutory Authority Finding.** States the conclusion that no further action is necessary at Site 24
- **Section 9—Documentation of Significant Changes.** Describes the changes made to this decision document on the basis of comments received during the public comment period
- **Section 10—Bibliography.** Lists the sources of information used in preparing this decision document

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 24, the Road Oiling Area, consists of the unpaved portion of Perimeter Road that runs along the north, east, and southeast boundaries of NAS Fallon (Figure 2-2). The road is 25,500 feet in length and approximately 25 feet wide. Road oiling activities occurred between 1943 and 1946 and 1951 to 1981 for dust suppression. 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 Nevada Division of Environmental Protection (NDEP) serves as the lead regulatory agency. The Navy does not expect any change in land use at Site 24 or that of the surrounding sites.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

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

- Phase I consisted of a preliminary assessment/site inspection (PA/SI). The PA/SI was performed at Site 24 in 1987. It consisted of the following elements: records searches, an on-site survey, ranking of the site (based on characteristics of the wastes, the potential migration pathways from the site, and possible receptors), and recommendations for further study or immediate mitigating action. Additional investigation of Site 24, including PCB analysis, was recommended in the PA/SI. This additional investigation was recommended to assess the reported historical disposal of waste oil by application of the oil to the unpaved road for dust control.
- Phase II consisted of a preliminary site characterization summary (PSCS) at Site 24 to assess the presence or absence and extent of soil and groundwater contamination. The elements of the PSCS information used in the RI included the drilling of groundwater test holes and monitoring wells intended primarily to investigate unrelated conditions at the adjacent sites. Soil borings were drilled at Road Oiling Area (Site 24) to investigate the site directly.
- Phase III consisted of performing a risk assessment under the remedial investigation (RI).
- Phase IV consisted of a supplemental sampling program to fill data gaps (for PCBs specifically) identified in responses to comments from the NDEP regarding NAS Fallon's draft final decision document. The scope of the supplemental sampling was negotiated with and approved by NDEP. Five soil borings were completed for the supplemental sampling program performed in April 2002. Three boring locations were at intersections along Perimeter Road where heavier road oiling was likely to have occurred.

In 1999, the Navy prepared a draft decision document for Site 24 presenting a decision of No Further Action. The NDEP provided comments on the draft decision document. A draft final decision document for Site 24 was prepared, and the NDEP provided comments on the draft final decision document. Responses to comments on the draft final decision document were presented to the NDEP. 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 24 (Phase IV described above). This version, 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.

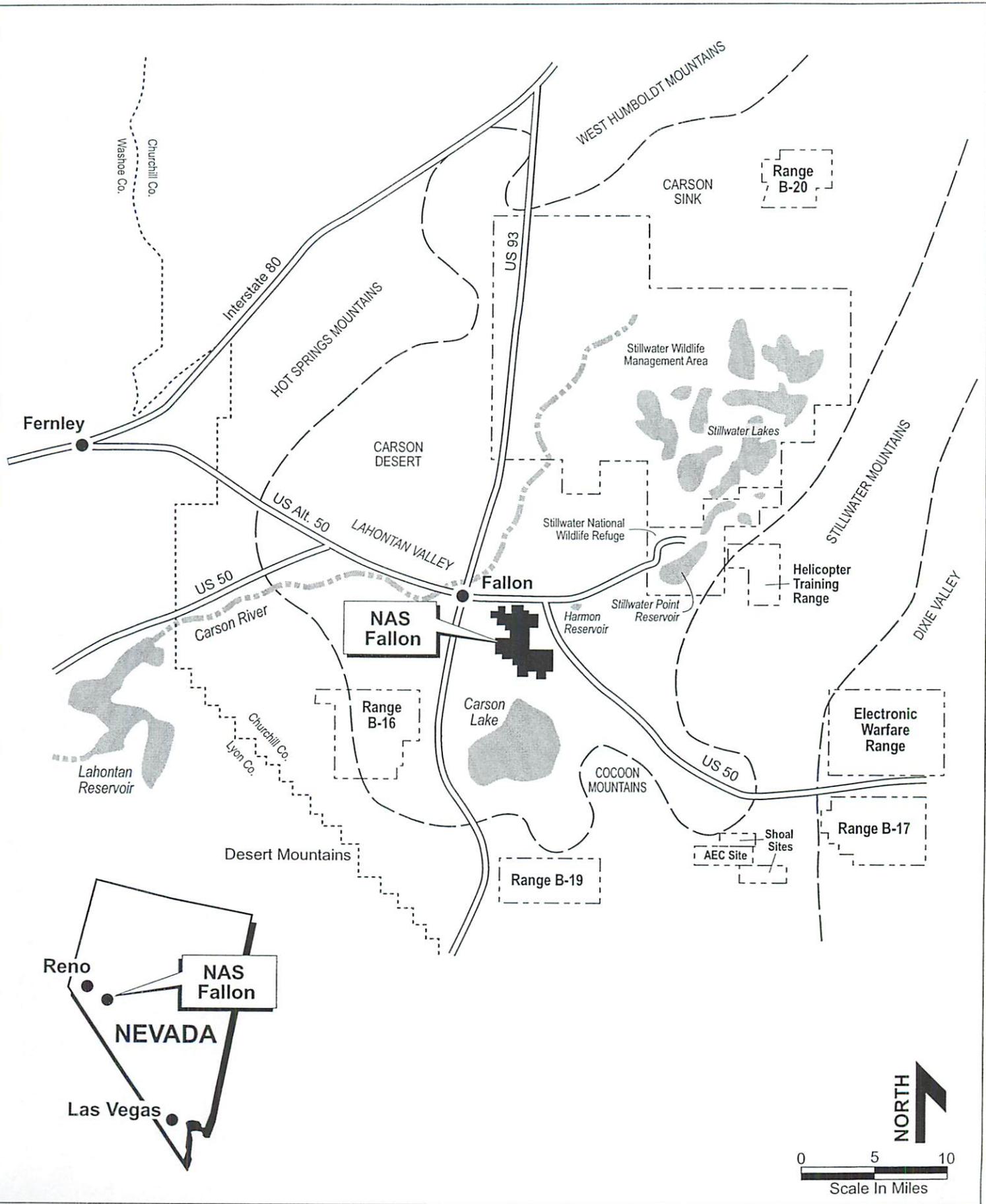
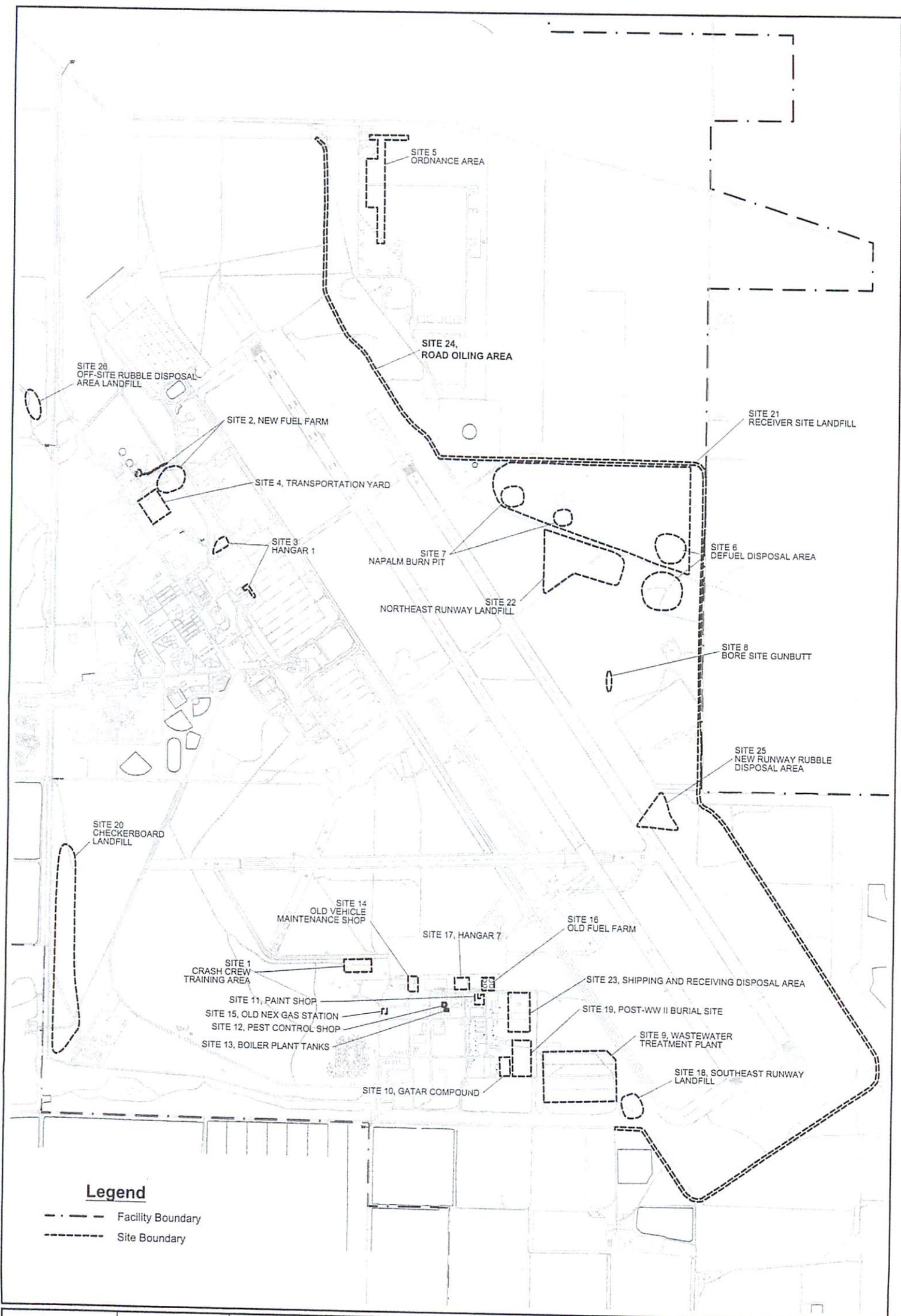


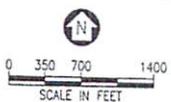
Figure 2-1
Location Map, NAS Fallon

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NAS Fallon
DECISION DOCUMENT
SITE 24

U.S. NAVY



U.S. NAVY



**Figure 2-2
NAS Fallon Facility Map**

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DECISION DOCUMENT
SITE 24

3.0 COMMUNITY PARTICIPATION

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

In 1989, a Technical Review Committee (TRC) was formed in an effort to increase community participation and awareness regarding the IR Program and to provide comments on proposed actions under the NAS Fallon'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 PSCS report, the CRP, and the Proposed Plan for Site 24, 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, (Poulsbo, Washington). The notice of the availability of these documents was published in the *Lahontan Valley News* on October 3, 2003. Notices were also sent to the RAB Co-Chair. A public comment period was held from October 8 through November 7, 2003. In addition, a public meeting was held on October 15, 2003 to present the Proposed Plan to the community. At this meeting, representatives from NAS Fallon and the NDEP presented the Proposed Plan.

4.0 SCOPE AND ROLE OF SITE

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

The Group II sites described above are intersected or abutted by Perimeter Road. Groundwater test holes and monitoring wells drilled along Perimeter Road during the PSCS were intended primarily to investigate unrelated conditions at these sites. However the sampling results associated with some of the sampling locations are also relevant to Site 24.

The sampling locations used to evaluate Site 24 are as follows:

- Twenty-four auger-boring locations along Perimeter Road (investigation of Group II sites) from which groundwater samples were collected for qualitative analysis (these locations are sometimes referred to as "groundwater test holes")
- Five permanent monitoring wells located along Perimeter Road (investigation of Group II sites) from which groundwater samples were collected

- Five shallow soil borings along Perimeter Road
- Five near-surface soil sampling locations along Perimeter Road

The sampling locations used as a basis for the decision for Site 24 are summarized in Table 4-1, along with the uses of the data from each location. Table 4-2 provides a chronological summary of quantitative sampling activities.

Twenty-four groundwater test holes were initially completed specifically to qualitatively evaluate potential contamination related to Group II sites. The five permanent groundwater monitoring wells were installed to quantify groundwater conditions related to adjacent Group II sites. The five shallow soil borings were installed within the boundaries of Site 24 to evaluate the potential impacts from road oiling activities. Near-surface soil samples were collected within the boundaries of Site 24 at five locations to address the presence or absence of PCBs. Three of the near-surface sampling locations were positioned at road intersections where it is assumed that double oiling may have occurred. Sampling locations are spread over a wide area to provide representative coverage of the site. Road oiling activities were performed using reasonably uniform source materials and processes, therefore sampling locations are considered to be sufficiently positioned to evaluate conditions at Site 24 and support a decision.

**Table 4-1
 Summary of Data From Sampling Locations Used as
 Basis of Decision for Site 24, Road Oiling Area**

Sampling Location	Data Type	Data Uses
Locations Adjacent to Site 24 as Group II Sites		
Groundwater test holes 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 37, 38, 39, 41, 44, 45, 46, 47, 48, 49, 50, and 51	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
Wells MW-45, MW-46, MW-47, MW-56, and MW-94	Quantitative	Quantitative assessment of presence or absence of potential contaminants in soil or groundwater related to Group II sites and Site 24
Locations Within Site 24		
Soil Borings BH-01, BH-02, BH-03, BH-04, and BH-05	Quantitative	Quantitative assessment of presence or absence of potential contaminants in vadose zone soil related to Site 24 activities
Hand excavation locations 24000, 24001, 24002, 24003, and 24004	Quantitative	Quantitative assessment of presence or absence of PCBs in vadose zone soil related to Site 24 activities

Note:

BH - borehole

LNAPL - light nonaqueous-phase liquid

MW - monitoring well

PCBs – polychlorinated biphenyls

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

Sampling Location	Matrix	Sampling Dates	Range of Analyses ^a
BH-01	Soil	4/91	TPH, VOCs, SVOCs, and Metals
BH-02	Soil	4/91	TPH, VOCs, SVOCs, and Metals
BH-03	Soil	4/91	TPH, VOCs, SVOCs, and Metals
BH-04	Soil	4/91	TPH, VOCs, SVOCs, and Metals
BH-05	Soil	4/91	TPH, VOCs, SVOCs, and Metals
MW-45	Soil	3/91	TPH, VOCs, and SVOCs
MW-45	Groundwater	4/91, 9/96, and 4/02	TPH, VOCs, SVOCs, pesticides/PCBs, metals, and water quality parameters
MW-46	Soil	3/91	TPH, VOCs, and SVOCs
MW-46	Groundwater	4/91, 8/91, 10/93, 3/95, 9/96, 3/97, 9/97, and 11/99	TPH, VOCs, BTEX, SVOCs, pesticides/PCBs, metals, and water quality parameters
MW-47	Soil	3/91	TPH, VOCs, SVOCs
MW-47	Groundwater	4/91, 10/93, 3/95, 9/96, 3/97, 9/97, 3/98, 9/98, 4/99, 9/99, 11/99, and 4/02	TPH, VOCs, BTEX, SVOCs, pesticides/PCBs, metals, and water quality parameters
MW-56	Soil	11/91	TPH, VOCs, and SVOCs
MW-56	Groundwater	12/91, 10/93, 3/95, 9/96, 3/97, and 11/99	TPH, VOCs, BTEX, SVOCs, metals, and water quality parameters
MW-94	Soil	3/96	TPH, VOCs, and physical characteristics
MW-94	Groundwater	9/96 and 9/97	TPH, VOCs, BTEX, metals, and water quality parameters
24000	Soil	4/02	PCBs
24001	Soil	4/02	PCBs
24002	Soil	4/02	PCBs
24003	Soil	4/02	PCBs
24004	Soil	4/02	PCBs

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

Notes:

- BH - borehole
- BTEX – benzene, toluene, ethylbenzene, and xylenes
- MW - monitoring well
- PCBs – polychlorinated biphenyls
- TPH – total petroleum hydrocarbons
- SVOCs - semivolatile organic compounds
- VOCs - volatile organic compounds

5.0 SITE CHARACTERISTICS

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

5.1 PHYSICAL SETTING

5.1.1 Physical Setting of Facility

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

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

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

There are two major drainage canals at NAS Fallon:

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

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

The most important distinction between the irrigation ditches and the drainage canals (drains) is that the drains intersect the shallow groundwater, as well as surface water, and to conduct the water away from the drained areas. Conversely, the irrigation ditches deliver water to the fields. In the process of 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 intersects Perimeter Road near the middle of the site, just north of the Group II sites.

5.1.2 Site 24 Physical Setting

Site 24 is a fairly level gravel road that runs along the north, east, and southeast boundaries of NAS Fallon (Figure 2-2). Site 24 encompasses approximately 25,500 feet of roadway. The roadway is secured and access is limited to security personnel and persons working at the remote buildings in the area. NAS Fallon does not expect any change in the use of this land, or that of the surrounding sites in the near future. There are no areas of archaeological or historical significance at Site 24.

5.2 ECOLOGY

5.2.1 Vegetation

NAS Fallon was originally a greasewood vegetation community, typical of alkali valley bottomlands, 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 bottomlands 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, supports 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 in age from Triassic to Quaternary.

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

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

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

The depositional character of the valley-fill sediments at NAS Fallon was greatly influenced by the presence of the ancient Lake Lahontan, a Quaternary-age lake that was subject to numerous cycles of advancement and retreat. Regional climatic changes caused dramatic oscillations of lake stages and shorelines throughout the Pleistocene Epoch. Subsurface stratigraphic evidence also suggests the existence of pre-Quaternary-age lakes in the valley. The pluvial influences on sediment deposition were extensive and probably varied during the greater part of Cenozoic time.

The alternating influences of wave action, standing water, flowing water, and wind on the sediment transported into the valley by the Humbolt and Carson Rivers resulted in a complex sequence of interfingering and interbedded deposits of fluvial, deltaic, lacustrine, and eolian deposits.

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

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

5.3.2 Regional and Facility Hydrogeology

Abundant groundwater is present in the valley-fill sediments and the underlying volcanic strata of the Carson Desert because 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 below ground surface (bgs). Many residents living outside of the city of Fallon have shallow wells in this aquifer, which are used for domestic water, livestock watering, and irrigation. The shallow aquifer is composed of many interconnected zones of varying permeability, ranging from highly transmissive channel sands to less-transmissive silty clay floodplain and lake deposits. The water quality is generally poor because the water has a high concentration of dissolved solids; however, freshwater recharge from the surface-water irrigation system helps maintain water quality in some parts of the valley.

Reports of regional water quality in the shallow alluvial aquifer and irrigation return flows contain information on the range of concentrations of various metals and anions. This information is summarized in the *Preliminary Site Characterization Summary*. Although the concentrations of these constituents vary considerably, there is a trend of increasing concentrations toward discharge areas at the Stillwater Lakes and Carson Lake. Concentrations of many trace metals exceed various regulatory 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 $\mu\text{g/L}$, and concentrations of arsenic in groundwater and surface water often exceed the Nevada criterion for the protection of aquatic life of 40 $\mu\text{g/L}$ and the drinking water standard of 50 $\mu\text{g/L}$.

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

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

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

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

5.3.3 Site 24 Geology and Hydrogeology

Subsurface investigations at Site 24 were limited to vadose zone soil only. Subsurface investigations for most Group II sites were limited to the shallow alluvial aquifer because of the presence of a silty clay aquitard at the base of this aquifer. The geologic information for Site 24 was obtained by soil sampling during the installation of monitoring wells for Group II sites located within the boundaries of Site 24. Monitoring wells MW-45, MW-46, MW-47, MW-56 and MW-94 were used to evaluate the site.

The shallow monitoring wells listed in the previous paragraph typically penetrated the entire Fallon Formation and from 1 to 5 feet of the Sehoo Formation (see Figure 5-1 for the generalized stratigraphy in the area of NAS Fallon). Split-spoon methods were used to physically collect a soil sample for visual inspection. Borings for these wells were completed to depths between 16 and 20 feet. Sand with minor amounts of clay and silt was generally encountered above the silt-to-clay aquitard. The aquitard was observed at depths ranging from 8.5 to 15 feet bgs.

Monitoring wells MW-12U, MW-45, MW-46, MW-47, MW-49, and PW-03 were used to assess groundwater flow direction. Groundwater surface elevation contours in November 2002 indicate a gradient and flow direction at the Group II sites and Site 24 that are consistent with the regional flow direction, which is to the southeast. Depth to groundwater in wells used to evaluate conditions at the Group II sites and Site 24 varies seasonally and ranges from 3.5 to 11 feet bgs. The groundwater surface elevation contours for data collected in November 2002 are shown in Figure 5-2.

Bail tests were conducted on selected wells at the site in July 1990, April 1991, and June 1992. Well MW-12U was bail tested in July 1990. Wells MW-46, MW-47, and MW-48 were bail tested in April 1991. Wells MW-56 and PW-03 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-12U: 0.08 foot/day, or 2.7×10^{-5} cm/sec
- MW-46: 0.05 foot/day, or 1.7×10^{-5} cm/sec
- MW-47: 0.06 foot/day, or 2.0×10^{-5} cm/sec
- MW-48: 0.45 foot/day, or 1.6×10^{-4} cm/sec
- MW-56: 0.22 foot/day, or 7.5×10^{-5} cm/sec
- PW-03 0.38 foot/day, or 1.3×10^{-4} cm/sec

The highest bail-test-derived hydraulic conductivity was observed at a well upgradient of Site 24 (MW-48), and the lowest hydraulic conductivity was observed at a well within the Site 24 boundaries (MW-46). Using results of bail testing, an assumed porosity of 20 percent (used for PW-03 in the RI), and the average November 2002 hydraulic gradient (0.000624 from Figure 5-2), the range of groundwater velocities across the site is estimated at 0.1 to 0.5 foot 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 at well PW-03. The lithology in the area of well PW-03 was described in the RI as being very fine grained, and pumping rates were below 0.5 gallon per minute. Pumping-test-derived hydraulic conductivity was estimated at 1.77 feet per day. This estimate is approximately 3 times higher than the estimate from the bail test. Assuming a porosity of 20 percent, the groundwater velocity calculated from the pumping test is estimated at 2 feet per year. These velocity estimates are for groundwater and do not necessarily represent contaminant transport velocities, which are usually slower than groundwater velocity. The degree to which contaminant velocity is "retarded" relative to groundwater depends on the amount of organic carbon in the saturated formation and the contaminant type. Because of retardation, contaminant velocities are typically slower than groundwater velocities.

5.4 NUMERICAL VALUES FOR COMPARISON TO CONTAMINANT CONCENTRATIONS

Potential contaminants that could have been released because of activities at Site 24 include petroleum hydrocarbons, VOCs, SVOCs, metals, and PCBs. Comparative numerical values for action decisions are provided in the Nevada Administrative Code (NAC), which states the following:

- The “soil action level” established by NAC 445A.2272 is 100 mg/kg for petroleum substances (typically referred to as total petroleum hydrocarbons [TPH]).
- For contaminants in soil, compare the toxicity characteristics leaching procedure (TCLP)-allowable levels listed in 40 CFR Part 261.24 and the state action level pursuant to NAC 445A.2272 to contaminant concentrations detected during the investigation and/or remedial activities.
- If inhalation, ingestion or dermal exposure is the primary pathway of concern or an applicable level of concentration is not listed in the Toxicity Characteristics Leaching Rule, the presence of a hazardous substance, hazardous waste or a regulated substance in the soil at an appropriate level of concentration that is based on the protection of public health and safety and the environment. The appropriate level of concentration must be determined by the division using the Integrated Risk Information System, adopted by the 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.
- 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 U.S. Environmental Protection Agency (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, a level of concentration equal to the background concentration of a hazardous substance or an appropriate level of concentration that is based on the protection of public health and safety and the environment. The appropriate level of concentration must be determined by the division using the Integrated Risk Information System, adopted by reference in NAC 445A.2272, or an equivalent method approved by the division. (Note: The equivalent method is assumed by NDEP to be EPA Region 9 Preliminary Remediation Goals [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.

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 used to oil roads at Site 24 as waste oils, hydraulic fluids, antifreeze, leaded gasoline, carbon tetrachloride, motor vehicle gasoline, jet petroleum No. 4 (JP-4), jet petroleum No. 5 (JP-5), trichlorethene (TCE), and trichloroethane (TCA). These types of sources generally result in impacts on the subsurface due to petroleum hydrocarbons, VOCs, SVOCs, and metals.

5.5 NATURE AND EXTENT OF CONTAMINATION

This section first summarizes the data related to Site 24, then discusses in detail (in the following subsections) measured concentrations of contaminants in soil and groundwater and the analytical results of the sampling.

Organic contaminants (VOCs and SVOCs) detected in soil have not been detected at concentrations above state action levels. One organic contaminant, trichloroethene (TCE), has been detected in one groundwater sample at Site 24 at a concentration above the state action level. The TCE contamination is associated with Group II activities. Fifteen soil samples were analyzed for PCBs across the site. One PCB (Aroclor 1254) was detected in 2 of the 15 soil samples. Aroclor 1254 was detected at a concentration above the state action level in one sample collected from a depth of 0.5 feet bgs. Samples collected from 1.0 and 2.0 feet bgs at the same location did not contain PCBs at concentrations above state action levels.

Total metals concentrations observed in soil and groundwater at Site 24 are within the range of naturally occurring background concentrations and are not considered a result of Site 24 activities.

5.5.1 Qualitative Data From Groundwater Test Holes

As discussed in Section 4, qualitative data was initially collected to assess the presence or absence of volatile contaminants in the general vicinity of the Group II sites. Twenty-four groundwater test holes were located adjacent to Site 24. 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 were called "groundwater test holes;" they 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.

The groundwater test hole data relevant to Site 24 are shown in Figure 5-3, which indicates by symbol type at each groundwater test hole location whether volatile contaminants were present or absent during sampling. The groundwater test holes provided screening-level data to assess the presence or absence of volatile contaminants that could be related to Site 24 or migrating onto and across Site 24 from Group II sources.

Results from the groundwater test holes were typically used as yes or no responses to the question "Is contamination present or absent?" Contamination was present in 1 of the 24 groundwater test holes adjacent to Site 24 (Figure 5-3). This groundwater test hole (location 37)

is located at the downgradient edge of the Group II (Site 6). MW-56 was subsequently installed near this location.

5.5.2 Quantitative Soil Data

There are limited quantitative analytical data for soil at Site 24. Soil samples directly associated with Site 24 are located thousands of feet from each other. However, since road oiling activities were performed using the same source materials and processes, sampling locations are considered representative to evaluate Site 24 conditions. In addition, sampling was conducted at intersections where oiling may have been heavier. Figure 5-4 depicts the sampling locations used to assess the qualitative soil data.

In 1991, soil samples were collected from Site 24 borings BH-01 (0 to 2 and 8 to 10 feet bgs), BH-02, (0 to 2 and 8 to 10 feet bgs) BH-03 (0 to 2 and 5 to 7 feet bgs), BH-04 (0 to 2 and 5 to 7 feet bgs), and BH-05 (0 to 2 and 5 to 7 feet bgs). These samples were analyzed for the following:

- Total high-boiling-point petroleum hydrocarbons (HBP PHC) (EPA Method 8015 Modified)
- Total low-boiling-point petroleum hydrocarbons (LBP PHC) (EPA Method 8015/8020)
- VOCs (EPA Method 8240)
- SVOCs (EPA Method 8270)
- Metals (EPA method 6010)

Soil samples were also collected from five permanent groundwater monitoring wells (MW-45, MW-46, MW-47, MW-56, and MW-94) installed to quantify groundwater conditions related to adjacent Group II sites. These five permanent groundwater wells were installed immediately adjacent to Site 24, and the sampling results are therefore relevant to Site 24. In 1991, soil samples were collected from MW-45 (9 to 11 feet bgs), MW-46 (7 to 9 feet bgs), MW-47 (7 to 9 feet bgs), and MW-56 (5 to 6.5 feet bgs). These samples were analyzed for the following:

- HBP PHC (EPA Method 8015 Modified)
- LBP PHC (EPA Method 8015/802)

- VOCs (EPA Method 8240)
- SVOCs (EPA Method 8270).

In 1996, one soil sample was collected from MW-94 (11 to 11.5 feet bgs). This sample was analyzed for the following:

- TPH in the diesel range (TPH-D) (EPA Method 8015D)
- VOCs (EPA Method 624)
- total organic carbon (EPA Method 9060)

In 2002, near-surface soil samples were collected at locations 24000, 24001, 24002, 24003, and 24004. All samples were collected at 0.5, 1, and 2 feet bgs and analyzed for PCBs (EPA Method 8082). The analytical results for all soil samples are summarized in Tables 5-1 and 5-2.

TPH was not detected at concentrations above the reporting limits in any soil samples collected. The SVOC bis(2-ethylhexyl)phthalate was detected in 2 of the 15 samples analyzed at a maximum concentration of 6,300 $\mu\text{g}/\text{kg}$ at location MW-56. The maximum detected concentration is lower than the 35,000 $\mu\text{g}/\text{kg}$ state action level for the compound. This compound is a suspected laboratory contaminant. The VOCs acetone and methylene chloride were detected in soil samples. Acetone was detected in 3 of the 16 samples analyzed at a maximum concentration of 24 $\mu\text{g}/\text{kg}$ at location BH-01. The maximum detected concentration is lower than the state action level of 1.6×10^6 $\mu\text{g}/\text{kg}$. Two of the three detected acetone concentrations were flagged as laboratory contaminants due to method blank contamination. The third acetone detection is therefore a suspected laboratory contaminant. Methylene chloride was detected in 1 of 16 samples analyzed at a concentration of 9 $\mu\text{g}/\text{kg}$ at location MW-56. The detected concentration is less than the state action level of 9,100 $\mu\text{g}/\text{kg}$. This compound is a suspected laboratory contaminant. No other VOCs or SVOCs were detected in these soil samples at concentrations above the reporting limit. The PCB Aroclor 1254 was detected in 2 of the 15 samples collected during the 2002 sampling event. Both samples with detected concentrations were collected at location 24000. The maximum detected concentration was 0.96 mg/kg at a depth of 0.5 feet bgs. This concentration is above the state action level of 0.22 mg/kg. The other detected concentration of Aroclor 1254 (0.18 mg/kg from 2 feet bgs) was below the state action level. One metal, arsenic, was detected in all 11 samples at concentrations above the state action level of 0.39 mg/kg. The maximum detected concentration of arsenic was 12.3 mg/kg at BH-04. However, the arsenic concentrations, as do all the other metals concentrations, fall within the range of naturally occurring background concentrations and are not considered a result of Site 24 activities.

5.5.3 Groundwater Monitoring

Groundwater in the shallow alluvial aquifer at Site 24 is monitored by sampling 5 permanent groundwater monitoring wells. Site 24 locations and associated sampling dates are indicated in Table 4-1, under the category "Location adjacent to Site 24 as Group II Site." A more detailed summary of the groundwater sampling is provided in Table 5-3. Included on this table are the dates that each well was sampled and the chemical analyses that were performed. Analytical results (for detected analytes) for groundwater samples are summarized in the following subsections by chemical group. Tables 5-4 and 5-5 provide a summary of detected analytes in groundwater.

Petroleum Hydrocarbons

A summary of detected petroleum hydrocarbons is provided in Table 5-4. TPH-D was detected in 7 of the 26 analyzed samples at concentrations ranging from 0.028 to 0.18 mg/L. TPH-heavy fraction was detected in 2 of the 26 analyzed samples, at concentrations of 0.052 and 0.053 mg/L. TPH—purgeable (TPH-P) was detected in 1 of the 14 analyzed samples, at a concentration of 0.086 mg/L. No detected concentrations of petroleum hydrocarbons exceeded the state guidance level of 1 mg/L. Methane was detected in 1 of 2 analyzed samples at a concentration of 0.067 mg/L. No state action level has been established for this compound.

Volatile Organic Compounds

A summary of detected volatile organic compounds is provided in Table 5-4. Chlorobenzene was detected in 3 of 19 samples analyzed. The detected concentrations did not exceed the state action level of 100 µg/L. All three detected concentrations were 40 µg/L and were collected during the same sampling round in 1997. Since the analyte was detected at the same concentration, it is assumed to be a laboratory contaminant. TCE was detected in 1 of 19 samples analyzed at a concentration of 7 µg/L. This detected concentration exceeded the state action level of 5 µg/L. The sample was collected from MW-45 in 1996. Well MW-45 is located approximately 300 feet downgradient of Site 6. Two subsequent groundwater samples collected in October 2002 and March 2003 from MW-45 did not contain TCE at concentrations above the reporting limit of 0.12 and 1 µg/L, respectively.

Semivolatile Organic Compounds

No SVOCs were detected in 8 samples analyzed.

Pesticides/PCBs

No pesticides or PCBs were detected in 3 samples analyzed.

Total Metals

A summary of detected total metals is provided in Table 5-5. Total metals samples were collected from wells at different frequencies. Eight samples were analyzed for the entire metals suite during 1991 and 1992. Three groundwater samples were analyzed between 1996 and 1998 for a partial metals suite. Six samples were analyzed between 1997 and 1999 for iron and manganese.

Five metals were detected above their respective state action levels. Antimony was detected in all 3 samples analyzed with a maximum concentration of 0.038 mg/L. All three samples exceeded the state action level of 0.006 mg/L. Arsenic was detected in all 6 samples analyzed with a maximum concentration of 4.02 mg/L. All six of the detected concentrations exceeded the state action level of 0.05 mg/L. Boron was detected in all six samples analyzed, with a maximum concentration of 104 mg/L. All six of the detected concentrations exceeded the state action level of 7.3 mg/L. Molybdenum was detected in 5 of the 6 samples analyzed, with a maximum concentration of 1.44 mg/L. All five of the detected concentrations exceeded the state action level of 0.18 mg/L. Finally, vanadium was detected in all six samples analyzed, with a maximum concentration of 1.3 mg/L. All six of the detected concentrations exceeded the state action level of 0.26 mg/L. Although five metals analyte concentrations exceeded the state action level, they fall within the range of naturally occurring background concentrations and are not considered to be related to the Site 24 activities.

5.6 CONTAMINANT FATE AND TRANSPORT

Potential contaminants that could have been released as a result of activities at Site 24 include petroleum hydrocarbons, VOCs, and SVOCs, PCBs and metals.

No petroleum hydrocarbons were detected in soil samples collected at the site. The VOCs acetone and methylene chloride and the SVOC bis(2-ethylhexyl)phthalate were detected in soil samples below state action levels and were flagged as suspected laboratory contaminants. Detected metals concentrations fall within the range of naturally occurring background concentrations.

The PCB Aroclor 1254 was detected in two samples collected from one location. One detected concentration was above the state action level (EPA Region 9 PRG for residential soil). These

samples were not collected near the groundwater surface. PCBs are nearly insoluble compounds and are relatively immobile in the environment. The dense gravel road bed and the low annual precipitation in this area (approximately 5 inches per year) minimize the potential for future leaching of PCBs into groundwater.

No other potential contaminants have been detected in soil or groundwater above state action levels because of Site 24 activities. The potential contaminants attributed to Site 24 are either low mobility contaminants such as oils and hydraulic fluids, or volatile contaminants such as TCE, TCA and gasoline. Low-mobility contaminants, if present, would likely remain near the surface since the site is composed of a dense gravel road. Volatile contaminants, if present, would likely be dispersed quickly in the arid environment at NAS Fallon.

5.7 BASIS OF DECISION

The Navy has selected No Further Action for Site 24 for the following reasons:

- Site 24 has no ongoing contaminant sources.
- On the basis of past practices at Site 24, possible contaminants are total petroleum hydrocarbons (TPH), volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and metals. Data collected within and adjacent to Site 24 do not indicate the presence of TPH, VOCs, SVOCs, and metals at concentrations greater than state action or guidance levels. PCBs were detected above state action levels in one soil sample, as discussed below.
- Soil samples collected at Site 24 indicate minimal impacts from past activities. One soil sample contained a concentration of contaminant (PCB Aroclor 1254) above the state action level that is attributable to past activities at the site. The vertical extent of Aroclor 1254 in soil above the state action level at this location is limited to the upper 0.5 feet. The low mobility of PCBs in soil and the low precipitation at NAS Fallon would tend to limit the potential for future vertical migration of PCBs in soil.
- Exposure to contaminated soil is not anticipated because the site will continue to be used as a secured gravel road for patrolling the perimeter of the base.

Based on these observations, Site 24 does not pose a risk to human health or the environment. Therefore, No Further Action is recommended for the site.

Period	Epoch	Stratigraphic Unit	Generalized Lithology	Thickness (feet)	Generalized Description
Quaternary	Pleistocene	Lahontan Valley Group			
		Wyemaha Formation	Sehoo Formation		>50
		Turupaha Formation		0 to 2	Eolian sand
		Recent	Fallon Formation		4 to 20

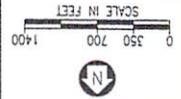
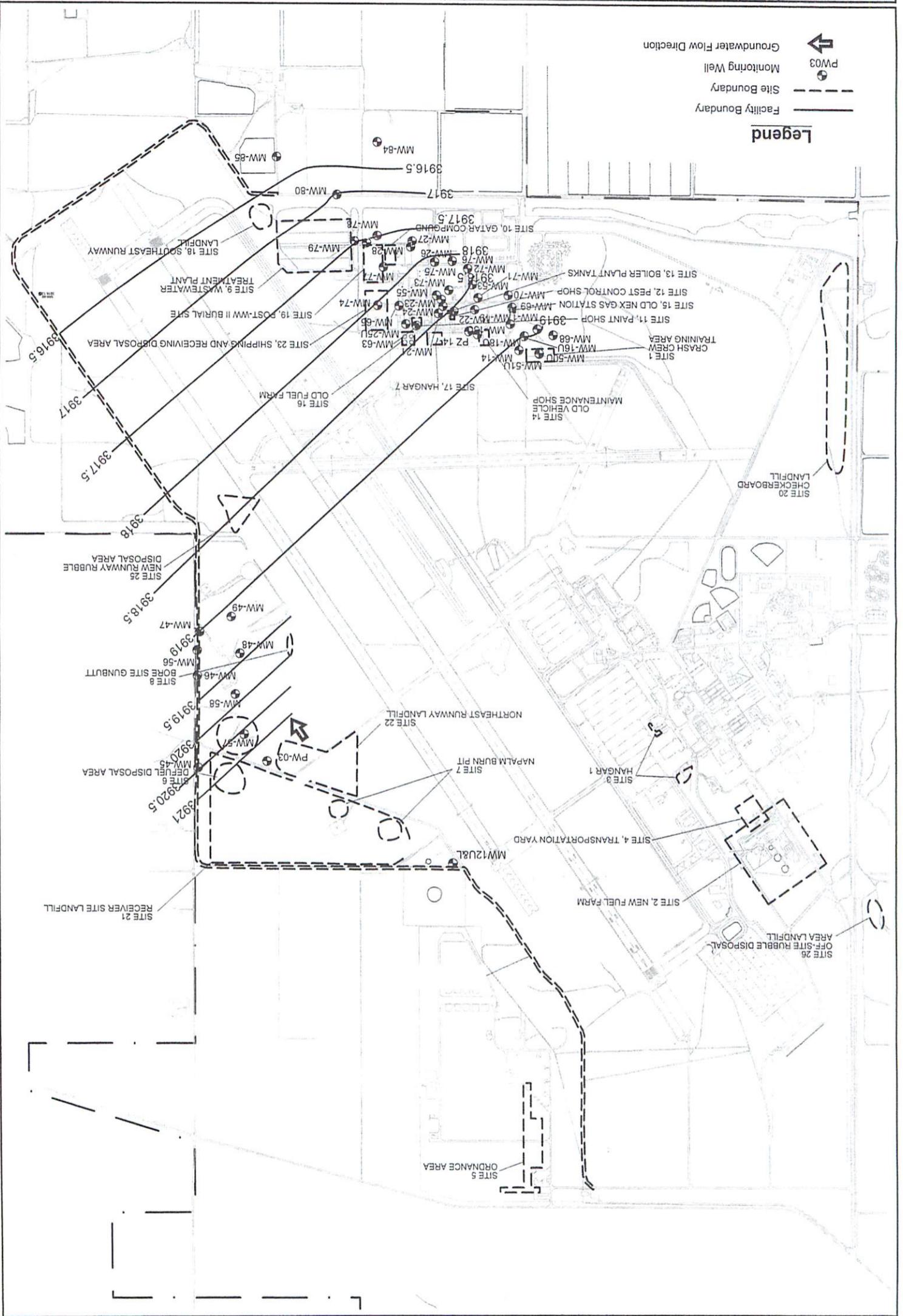


Figure 5-2
Groundwater Surface Elevation Contours, November 2002, NAS Fallon

Delivery Order 0029
NAS Fallon
DECISION DOCUMENT
SITE 24



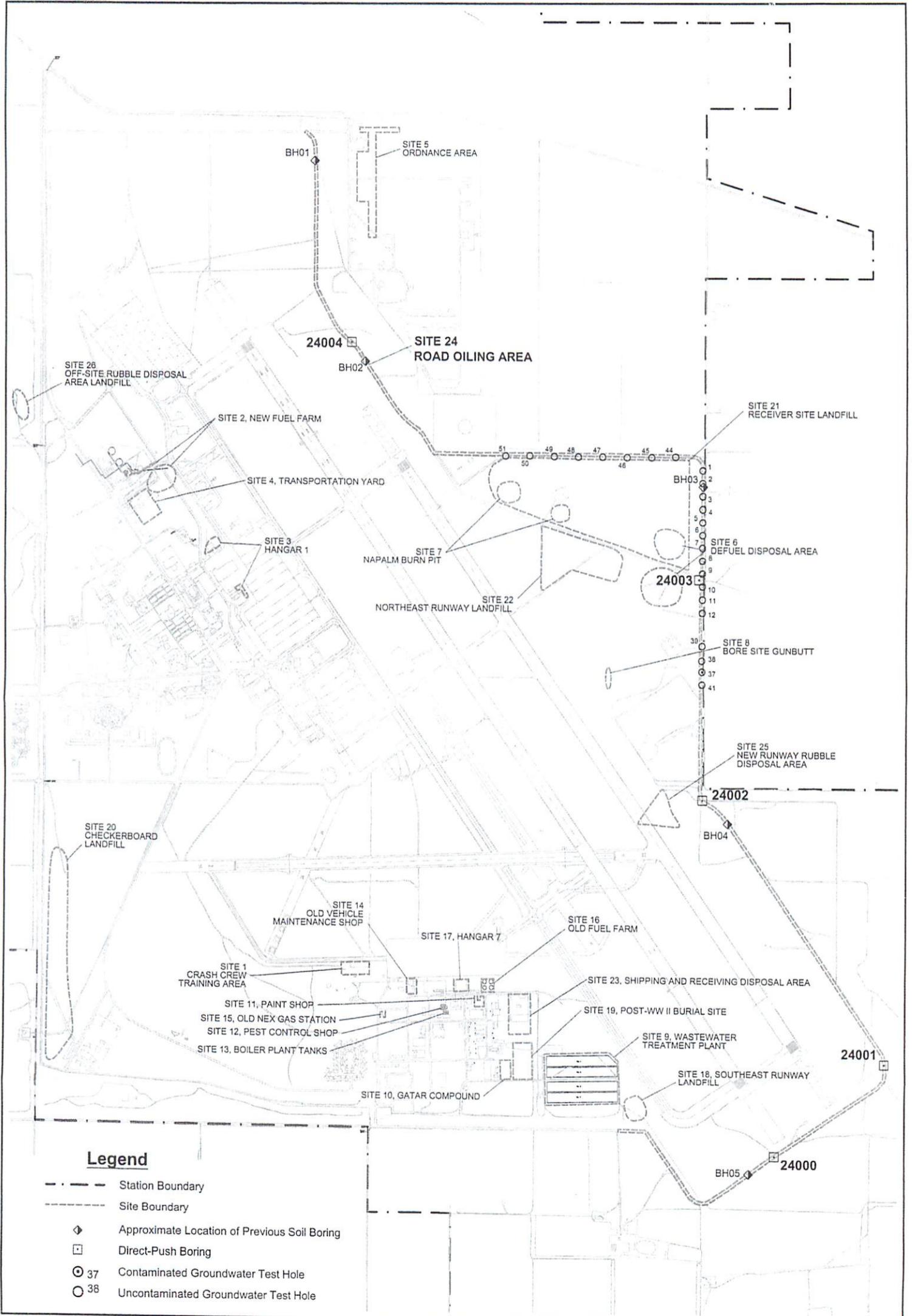
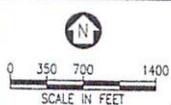


Figure 5-3
Groundwater Test Hole Sampling Locations at Site 24,
Road Oiling Area

Delivery Order 0029
NAS Fallon
DECISION DOCUMENT
SITE 24

U.S. NAVY



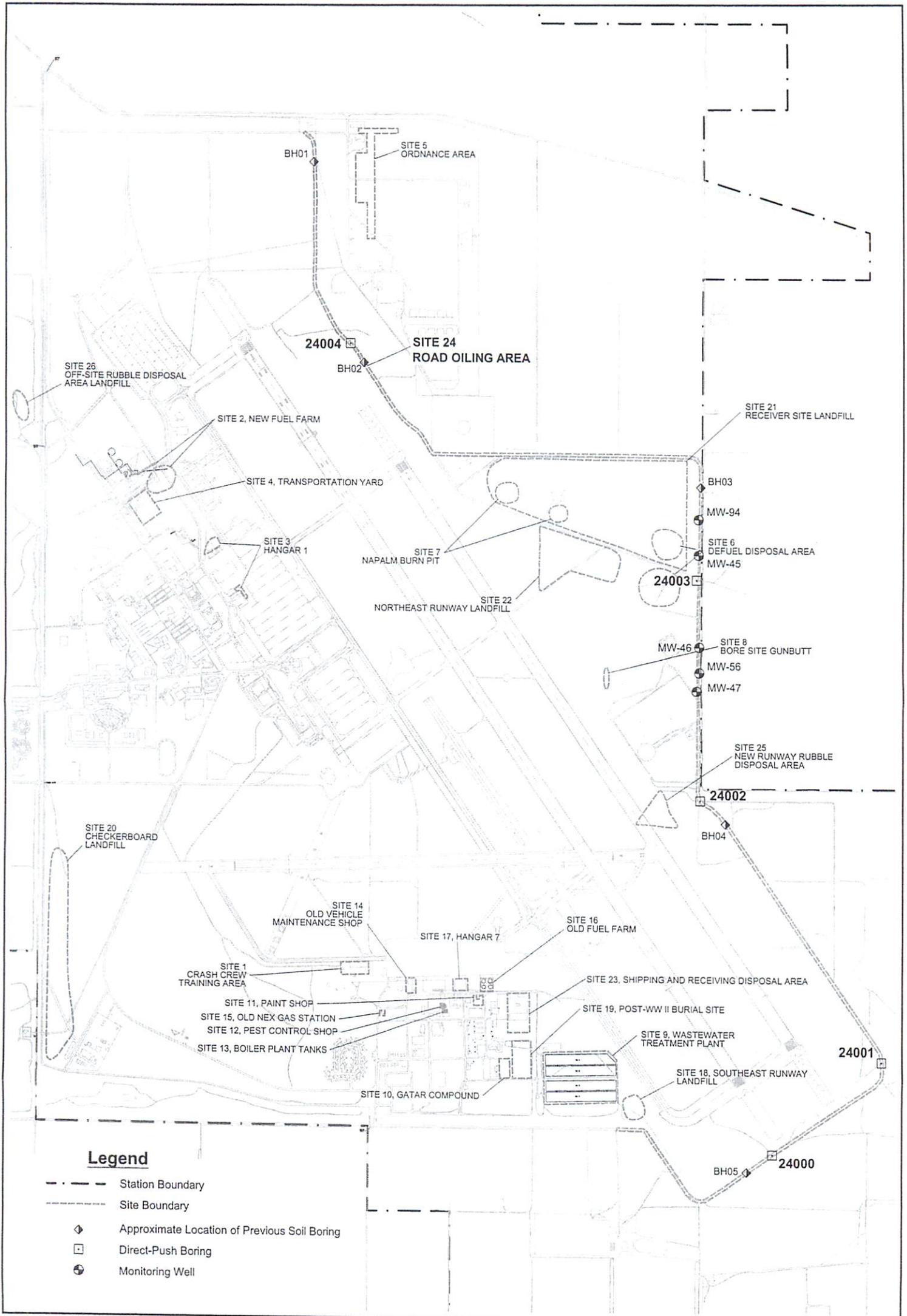


Figure 5-4
 Sampling Locations at Site 24,
 Road Oiling Area

Delivery Order 0029
 NAS Fallon
 DECISION DOCUMENT
 SITE 24

U.S. NAVY

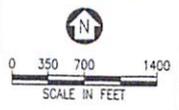


Table 5-1
Analytical Results of Soil Sampling at Site 24, Road Oiling Area

Sampling Location	Sample No.	Depth (feet bgs)	Total HBP PHC/TPH-D (mg/kg) ^a	Total LBP PHC (mg/kg) ^b	Semivolatile Organic Compounds (µg/kg) ^c	Volatile Organic Compounds (µg/kg) ^d	PCBs (mg/kg) ^e
BH-01	223138	0-2	10U	5U	350 U	22/Acetone ^f	NA
BH-01	223139	8-10	10U	5U	350 U	24/Acetone ^f	NA
BH-02	223140	0-2	10U	5U	350 U	8 J/Acetone ^f	NA
BH-02	223141	8-10	10U	5U	350 U	5 U	NA
BH-03	223142	0-2	10U	5U	800 J/ bis (2-ethylhexyl) phthalate ^g	5 U	NA
BH-03	223143	5-7	10U	5U	350 U	5 U	NA
BH-04	223144	0-2	10U	5U	350 U	5 U	NA
BH-04	223145	0-2	10U	5U	350 U	5 U	NA
BH-04	223146	5-7	10U	5U	350 U	5 U	NA
BH-05	223147	0-2	10U	5U	350 U	5 U	NA
BH-05	223148	5-7	10U	5U	350 U	5 U	NA
MW-45	223028	9-11	10U	5U	350 U	5 U	NA
MW-46	223029	7-9	10U	5U	350 U	5 U	NA
MW-47	223030	7-9	10U	5U	350 U	5 U	NA
MW-56	223307	5-6.5	10U	5U	6,300/ bis (2-ethylhexyl) phthalate ^g	9/Methylene Chloride ^h	NA
MW-94	222584	11-11.5	10U	NA	NA	20 U	NA
24000	221977	0.5	NA	NA	NA	NA	0.96/ Aroclor 1254 ⁱ
24000	221978	1	NA	NA	NA	NA	0.11-0.22 U
24000	221979	2	NA	NA	NA	NA	0.18 /Aroclor 1254 ⁱ
24001	221980	0.5	NA	NA	NA	NA	0.11-0.21 U
24001	221981	1	NA	NA	NA	NA	0.11-0.21 U
24001	221982	2	NA	NA	NA	NA	0.11-0.22 U
24002	221983	0.5	NA	NA	NA	NA	0.11-0.22 U

Table 5-1 (Continued)
Analytical Results of Soil Sampling at Site 24, Road Oiling Area

Sampling Location	Sample No.	Depth (feet bgs)	Total HBP PHC/TPH-D (mg/kg) ^a	Total LBP PHC (mg/kg) ^b	Semivolatile Organic Compounds (µg/kg) ^c	Volatile Organic Compounds (µg/kg) ^d	PCBs (mg/kg) ^e
24002	221984	1	NA	NA	NA	NA	0.11-0.21 U
24002	221985	2	NA	NA	NA	NA	0.11-0.21 U
24003	221986	0.5	NA	NA	NA	NA	0.11-0.21 U
24003	221987	1	NA	NA	NA	NA	0.11-0.21 U
24003	221988	2	NA	NA	NA	NA	0.11-0.21 U
24004	221990	0.5	NA	NA	NA	NA	0.11-0.21 U
24004	221991	1	NA	NA	NA	NA	0.11-0.21 U
24004	221992	2	NA	NA	NA	NA	0.11-0.22 U

^aEPA Method 8015 Modified, state action level = 100 mg/kg (NDEP)

^bEPA Method 8015/8020, state action level = 100 mg/kg (NDEP)

^cEPA Method 3550/8270, laboratory reporting limit of 350 µg/kg

^dEPA Method 8240, laboratory reporting limit of 5 µg/kg

^eEPA Method 8082, laboratory reporting limit between 0.11 and 0.22 mg/kg

^fSuspected laboratory contaminant, state action level (EPA Region 9 Preliminary Remedial Goal for residential soil) = 1.6×10^6 µg/kg

^gSuspected laboratory contaminant, state action level (EPA Region 9 Preliminary Remedial Goal for residential soil) = 35,000 µg/kg

^hSuspected laboratory contaminant, state action level (EPA Region 9 Preliminary Remedial Goal for residential soil) = 9,100 µg/kg

ⁱState action level (EPA Region 9 Preliminary Remedial Goal for residential soil) = 0.22 mg/kg

Table 5-1 (Continued)
Analytical Results of Soil Sampling at Site 24, Road Oiling Area

Notes:

bgs - below ground surface

HBP PHC - high-boiling-point petroleum hydrocarbons

J - associated numerical value is an estimate

LBP PHC - Low-boiling-point petroleum hydrocarbons

NA- not analyzed

µg/kg - microgram per kilogram

mg/kg - milligram per kilogram

NDEP - Nevada Division of Environmental Protection

U - analyte not detected above the specified reporting limit

Table 5-2
Summary of Detected Total Metals in Soil at Site 24, Road Oiling Area

Chemical	Unit	No. of Tests	No. of Detections	Detection Frequency (%)	Minimum Detection	Average Detection	Maximum Detection	Location With Maximum Detection	PRG	Naturally Occurring Background	No. of Detections Greater Than PRG	Locations with Detections Greater Than PRG
Aluminum	mg/kg	11	11	100	2,020	6,339	11,800	BH-02	76,000 ^a	1,800 to 20,700	0	None
Antimony	mg/kg	11	0	0	NA	NA	NA	NA	31 ^a	0.4 to 5	0	None
Arsenic	mg/kg	11	11	100	3.0	5	12.3	BH-04	0.39 ^a	1.1 to 64.2	11	BH-01, BH-02, BH-03, BH-04, BH-05
Barium	mg/kg	11	11	100	29.9	87	213.0	BH-02	5,400 ^a	0.13 to 387	0	None
Beryllium	mg/kg	11	9	82	0.11	0	0.49	BH-03	150 ^a	0.11 to 1.5	0	None
Boron	mg/kg	11	10	91	7.7	30	105	BH-02	16,000 ^a	0.0023 to 117	0	None
Cadmium	mg/kg	11	0	0	NA	NA	NA	NA	37 ^a	0.57 to 1.2	0	None
Calcium	mg/kg	11	11	100	1,530	11,455	40,600	BH-04	NE	4.1 to 61,400	NA	NA
Chromium	mg/kg	11	11	100	2.7	6	9.3	BH-02	100,000 ^{a,b}	0.014 to 64	0	None
Cobalt	mg/kg	11	11	100	2.7	5	8.4	BH-02	900 ^a	0.0086 to 15.9	0	None
Copper	mg/kg	11	11	100	9.4	70	316	BH-02	3,100 ^a	0.024 to 320	0	None
Iron	mg/kg	11	11	100	5,060	11,145	19,200	BH-02	23,000 ^a	5,060 to 29,500	0	None
Lead	mg/kg	11	11	100	0.82	4	7.8	BH-05	400 ^a	0.019 to 55	0	None
Lithium	mg/kg	11	11	100	2.8	15	39	BH-03	1,600 ^a	0.018 to 50.4	0	None
Magnesium	mg/kg	11	11	100	903	3887	8030	BH-02	NE	1.2 to 11,300	NA	NA
Manganese	mg/kg	11	11	100	57.3	246	777	BH-02	1,800 ^a	54.7 to 1,560	0	None
Mercury	mg/kg	11	5	45	0.03	0.27	1	BH-05	6.1 ^{a,c}	0.02 to 1	0	None
Molybdenum	mg/kg	11	0	0	NA	NA	NA	NA	390 ^a	2.5 to 7.5	0	None
Nickel	mg/kg	11	11	100	2.5	5.0	9.7	BH-02	1,600 ^a	0.011 to 23	0	None
Potassium	mg/kg	11	11	100	487	1,904	3,800	BH-02	NE	3.09 to 5,880	NA	NA
Selenium	mg/kg	11	0	0	NA	NA	NA	NA	390 ^a	3 to 140	0	None

Table 5-2 (Continued)
Summary of Detected Total Metals in Soil at Site 24, Road Oiling Area

Chemical	Unit	No. of Tests	No. of Detections	Detection Frequency (%)	Minimum Detection	Average Detection	Maximum Detection	Location With Maximum Detection	PRG	Naturally Occurring Background	No. of Detections Greater Than PRG	Locations with Detections Greater Than PRG
Silver	mg/kg	11	6	55	0.56	1.0	1.5	BH-05	390 ^a	0.56 to 3	0	None
Sodium	mg/kg	11	11	100	271	2,831	6,940	BH-02	NE	7.3 to 13,400	NA	NA
Thallium	mg/kg	11	1	9	0.3	0.3	0.3	BH-03	5.2 ^a	0.27 to 0.3	0	None
Vanadium	mg/kg	11	11	100	9.7	23	30.9	BH-02	550 ^a	0.054 to 74	0	None
Zinc	mg/kg	11	11	100	25	72	308	BH-02	23,000 ^a	0.88 to 382	0	None

^aEPA Region 9 Preliminary Remedial Goals - residential soil

^bAssumes chromium II

^cAssumes methylmercury

Notes:

mg/kg - milligram per kilogram

NA - not applicable

NE - not established

**Table 5-3
 Groundwater Sampling Summary**

Date	MW-45	MW-46	MW-47	MW-56	MW-94
4/91	HBP PHC (EPA Method 8015 Mod) LBP PHC (EPA Method 8015/8020) PCB/Pesticide (EPA Method 608) SVOCs (EPA Method 625) VOCs (EPA Method 624) Metals (EPA Method 6010) Water Quality Parameters	HBP PHC (EPA Method 8015 Mod) LBP PHC (EPA Method 8015/8020) PCB/Pesticide (EPA Method 608) SVOCs (EPA Method 625) VOCs (EPA Method 624) Metals (EPA Method 6010) Water Quality Parameters	HBP PHC (EPA Method 8015 Mod) LBP PHC (EPA Method 8015/8020) PCB/Pesticide (EPA Method 608) SVOCs (EPA Method 625) VOCs (EPA Method 624) Metals (EPA Method 6010) Water Quality Parameters	Not Sampled	Not Sampled
8/91	HBP PHC (EPA Method 8015 Mod) LBP PHC (EPA Method 8015/8020) SVOCs (EPA Method 625) VOCs (EPA Method 624) Metals (EPA Method 6010) Water Quality Parameters	HBP PHC (EPA Method 8015 Mod) LBP PHC (EPA Method 8015/8020) TPH-G (EPA Method 8015G) SVOCs (EPA Method 625) VOCs (EPA Method 624) Metals (EPA Method 6010) Water Quality Parameters	HBP PHC (EPA Method 8015 Mod) LBP PHC (EPA Method 8015/8020) SVOCs (EPA Method 625) VOCs (EPA Method 624) Metals (EPA Method 6010) Water Quality Parameters	Not Sampled	Not Sampled
12/91	Not Sampled	Not Sampled	Not Sampled	HBP PHC (EPA Method 8015 Mod) LBP PHC (EPA Method 8015/8020) SVOCs (EPA Method 625) VOCs (EPA Method 624) Metals (EPA Method 6010) Water Quality Parameters	Not Sampled

Table 5-3 (Continued)
Groundwater Sampling Summary

Date	MW-45	MW-46	MW-47	MW-56	MW-94
4/92	Not Sampled	Not Sampled	Not Sampled	HBP PHC (EPA Method 8015 Mod) LBP PHC (EPA Method 8015/8020) SVOCs (EPA Method 625) VOCs (EPA Method 624) Metals (EPA Method 6010) Water Quality Parameters	Not Sampled
10/93	Not Sampled	BTEX (EPA Method 8240) TPH-G (EPA Method 8015G)	BTEX (EPA Method 8240) TPH-G (EPA Method 8015G)	BTEX (EPA Method 8240) TPH-G (EPA Method 8015G)	Not Sampled
3/95	Not Sampled	BTEX (EPA Method 624) TPH-D (EPA Method 8015D)	BTEX (EPA Method 624) TPH-D (EPA Method 8015D)	BTEX (EPA Method 624) TPH-D (EPA Method 8015D)	Not Sampled
9/96	Metals (EPA Method 6000/7000) ^a VOCs (EPA Method 8240) Water Quality Parameters	Water Quality Parameters	Water Quality Parameters	Water Quality Parameters	Metals (EPA Method 6000/7000) ^a Metals (EPA Method 6010) ^a VOCs (EPA Method 624) Water Quality Parameters
3/97	Not Sampled	TPH-D (EPA Method 8015D) VOCs (EPA Method 8260) BTEX (EPA Method 8240) Metals (EPA Method 6010) ^b Water Quality Parameters	TPH-D (EPA Method 8015D) VOCs (EPA Method 8260) BTEX (EPA Method 8240) Metals (EPA Method 6010) ^b Water Quality Parameters	TPH-D (EPA Method 8015D) VOCs (EPA Method 8260) BTEX (EPA Method 8240) Metals (EPA Method 6010) ^b Water Quality Parameters	Not Sampled
9/97	Not Sampled	BTEX (EPA Method 8240) TPH-D (EPA Method 8015D)	BTEX (EPA Method 8240) TPH-D (EPA Method 8015D)	Not Sampled	BTEX (EPA Method 8240) TPH-D (EPA Method 8015D) Metals (EPA Method 6010) ^a

**Table 5-3 (Continued)
 Groundwater Sampling Summary**

Date	MW-45	MW-46	MW-47	MW-56	MW-94
3/98	Not Sampled	Not Sampled	TPH-D (EPA Method 8015D) VOCs (EPA Method 8260) Metals (EPA Method 6010) ^b Water Quality Parameters	Not Sampled	Not Sampled
9/98	Not Sampled	Not Sampled	TPH-D (EPA Method 8015D) VOCs (EPA Method 8260) Metals (EPA Method 6010) ^b Water Quality Parameters	Not Sampled	Not Sampled
4/99	Not Sampled	Not Sampled	TPH-D (EPA Method 8015D) VOCs (EPA Method 8260) Metals (EPA Method 6010) ^b Water Quality Parameters	Not Sampled	Not Sampled
9/99	Not Sampled	Not Sampled	TPH-D (EPA Method 8015D)	Not Sampled	Not Sampled
11/99	Not Sampled	TPH-G (EPA Method 8015G) TPH-D (EPA Method 8015D) VOCs (EPA Method 8260)	TPH-G (EPA Method 8015G) TPH-D (EPA Method 8015D) VOCs (EPA Method 8260)	TPH-G (EPA Method 8015G) TPH-D (EPA Method 8015D) VOCs (EPA Method 8260)	Not Sampled
4/02	TPH (EPA Method 8015 Mod) Water Quality Parameters	Not Sampled	TPH (EPA Method 8015 Mod) Water Quality Parameters	Not Sampled	Not Sampled

^aAnalysis of selected metals only

^bIron and manganese only

Table 5-3 (Continued)
Groundwater Sampling Summary

Notes:

BTEX - benzene toluene, ethylbenzene, and total xylenes

EPA - U.S. Environmental Protection Agency

HBP PHC - high-boiling-point petroleum hydrocarbons

LBP PHC - low-boiling-point petroleum hydrocarbons

TPH-D - total petroleum hydrocarbons in the diesel range

TPH-G - total petroleum hydrocarbons in the gasoline range

SVOCs - semivolatile organic compounds

VOCs - volatile organic compounds

Table 5-4
Summary of Detected Organics in Groundwater at Site 24, Road Oiling Area

Chemical	Unit	No. of Tests	No. of Detections	Detection Frequency (%)	Minimum Detection	Average Detection	Maximum Detection	State Action Level	No. of Detection Greater Than State Action Level	Location With Maximum Detection	Locations With Detections Greater Than State Action Level
TPH-D	mg/L	26	7	27	0.028	0.11	0.18	1 ^a	0	MW-47	None
TPH-heavy fraction	mg/L	26	2	8	0.052	0.053	0.053	1 ^a	0	MW-47	None
Methane	mg/L	2	1	50	0.067	0.067	0.067	NE	NA	MW-47	NA
TPH-P	mg/L	14	1	7	0.086	0.086	0.086	1 ^a	0	MW-46	None
Chlorobenzene	µg/L	21	3	16	40	40	40	100 ^b	0	multiple	None
Trichloroethene	µg/L	21	1	5.3	7	7	7	5 ^b	1	MW-45	MW-45

^aNDEP Nevada Division of Environmental Protection guidance concentration

^bMaximum contaminant level

Notes:

MCL - maximum contaminant level (National Primary Drinking Water Regulations)

mg/L - milligram per liter

NA - not applicable

NE - not established

TPH-D - total petroleum hydrocarbons in the diesel range

TPH-P - total petroleum hydrocarbons—purgeable

µg/L - microgram per liter

Table 5-5
Summary of Detected Total Metals in Groundwater at Site 24, Road Oiling Area

Chemical	Unit	No. of Tests	No. of Detections	Detection Frequency (%)	Minimum Detection	Average Detection	Maximum Detection	MCL/PRG	Naturally Occurring Background	No. of Detections Greater Than MCL/PRG	Locations with Detections Greater Than MCL/PRG
Aluminum	mg/L	3	3	100	0.0455	0.0728	0.121	36 ^a	0.041 to 1.46	0	None
Antimony	mg/L	3	3	100	0.015	0.0285	0.0377	0.006 ^b	0.007 to 0.06	3	MW-46, MW-47, MW-94
Arsenic	mg/L	6	6	100	0.6	2.65	4.02	0.05 ^b	0.006 to 21	6	MW-45, MW-46, MW-47, MW-94
Barium	mg/L	6	5	83.3	0.0204	0.1375	0.44	2 ^b	0.0068 to 0.66	0	None
Beryllium	mg/L	1	0	0	NA	NA	NA	0.004 ^b	0.0012 to 0.18	0	None
Boron	mg/L	6	6	100	11	78.45	104	7.3 ^a	0.57 to 240	6	MW-45, MW-46, MW-47, MW-94
Calcium	mg/L	3	3	100	1.33	2.1167	3.22	NE	1.33 to 616	NA	NA
Chromium	mg/L	3	2	66.7	0.019	0.025	0.031	0.1 ^b	0.005 to 0.031	0	None
Copper	mg/L	3	3	100	0.0226	0.0394	0.0498	1.3 ^c	0.01 to 0.333	0	None
Iron	mg/L	9	3	33.3	0.0231	0.0384	0.0475	11 ^a	0.011 to 3.04	0	None
Lead	mg/L	1	0	0	NA	NA	NA	0.015 ^c	0.002 to 2.39	0	None
Lithium	mg/L	3	3	100	0.123	0.1413	0.175	0.73 ^a	0.028 to 0.875	0	None
Magnesium	mg/L	3	3	100	3.63	4.1233	4.74	NE	0.97 to 812	NA	NA
Manganese	mg/L	9	8	88.9	0.0048	0.0096	0.023	0.88 ^a	0.002 to 8.95	0	None
Molybdenum	mg/L	6	5	83.3	0.42	0.808	1.44	0.18 ^a	0.023 to 5.2	5	MW-45, MW-46, MW-47, MW-94
Nickel	mg/L	2	1	50	0.041	0.041	0.041	0.73 ^a	0.005 to 0.178	0	None
Potassium	mg/L	3	3	100	78.8	164.6	250	NE	5.63 to 487	NA	NA
Selenium	mg/L	1	0	0	NA	NA	NA	0.05 ^b	0.003 to 0.14	0	None
Silver	mg/L	3	3	100	0.0059	0.0078	0.0088	0.18 ^a	0.002 to 0.022	0	None
Sodium	mg/L	3	3	100	4930	11010	15900	NE	128 to 22,500	NA	NA

Table 5-5 (Continued)
Summary of Detected Total Metals in Groundwater at Site 24, Road Oiling Area

Chemical	Unit	No. of Tests	No. of Detections	Detection Frequency (%)	Minimum Detection	Average Detection	Maximum Detection	MCL/PRG	Naturally Occurring Background	No. of Detections Greater Than MCL/PRG	Locations with Detections Greater Than MCL/PRG
Vanadium	mg/L	6	6	100	0.726	0.9983	1.3	0.26 ^a	0.007 to 2.6	6	MW-45, MW-46, MW-47, MW-94
Zinc	mg/L	3	3	100	0.0336	0.09617	0.221	11 ^a	0.006 to 0.338	0	None

^aU.S. Environmental Protection Agency (EPA) Region 9 Preliminary Remedial Goal - tap water

^bMaximum contaminant level National Primary Drinking Water Regulations

^cEPA state action level

Notes:

mg/L - milligram per liter

NA - not applicable

NE - not established

6.0 CURRENT AND POTENTIAL SITE AND RESOURCE USES

NAS Fallon currently serves primarily as an aircraft weapons delivery and tactical air combat training facility. Site 24 is a secured gravel road used to patrol the perimeter of the base or to access remote buildings. The Navy is expected to maintain NAS Fallon in the foreseeable future.

The Master Plan for NAS Fallon includes a discussion of all potentially contaminated areas in the IR Program and their locations. Any future construction projects conducted at Site 24 will be subjected to an environmental review. The Environmental Department at NAS Fallon oversees the environmental review process. Relevant projects are reviewed by the Occupational Safety and Health Office, Fire Department, Security Department, the Engineering and Planning Divisions of Public Works, and the Environmental Department. This review process is included in all relevant NAS Fallon planning activities. Information provided by the Environmental Department relates to potential contact with contaminated soil and groundwater as a result of these projects.

7.0 SUMMARY OF SITE RISKS

The analytical results from sampling have confirmed only the presence of PCBs above state action levels because of past activities at Site 24. The PCB Aroclor 1254 was detected above the state action level in one of the 15 samples obtained from the site. The detected concentration of 0.96 mg/kg was higher than the state action level of 0.22 mg/kg. Since Site 24 is a secured gravel road that is only used to patrol the perimeter of the base, exposure to any residual PCBs is not likely. In addition, PCBs are also relatively immobile in soil, particularly in dense soil and in an arid climate. PCBs have not been detected above the state action level below 0.5 feet bgs indicating that vertical migration to the groundwater surface is not likely. This condition eliminates exposure via groundwater. Some organic contaminants in groundwater are present above state action levels or MCLs because of activities at Group II sites. VOCs, which may or may not have been present in oil applied to the road, would have likely volatilized in the arid climate. This would minimize the mobilization of VOCs to groundwater at the site. Metals concentrations for soil and groundwater are in the range of naturally occurring background concentrations. No baseline risk assessment for Site 24 was performed during the RI, and the results of subsequent sampling activities indicated no identifiable exposure pathways or receptors. Therefore, there is no risk posed by Site 24 to human health or the environment, and accordingly no further action is required.

8.0 STATUTORY AUTHORITY FINDING

One soil sample collected from a depth of 0.5 feet, contained the PCB aroclor 1254 at a concentration of 0.96 mg/kg, which is above the state action level of 0.22 mg/kg. State action levels were not exceeded in any of the other 14 soil samples collected at Site 24 and analyzed for PCBs. Therefore, widespread PCB contamination above state action levels is not indicated by the sampling results. In addition, PCBs are low-mobility contaminants that would likely remain near the surface and have little potential for impacting groundwater. Therefore, risks to human health are expected to be acceptable because no exposure to the PCB-contaminated soils is anticipated. Site 24 is a secured gravel road, which is only used to patrol the perimeter of the base. Potential contaminants of concern directly related to Site 24 were not detected in groundwater at concentrations above state action levels or, in most cases, above reporting limits. Therefore, conditions observed at Site 24 and described herein do not pose a threat 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 24 Road Oiling 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, 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.
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APPENDIX A

Responsiveness Summary

RESPONSIVENESS SUMMARY

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

RESPONSES TO UNITED STATES FISH AND WILDLIFE COMMENTS

General Comments

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

Response

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

Site 9, Wastewater Treatment Plant

We have no concerns specific to this site.

Site 12, Pest Control Shop

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

Response

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

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

Site 17, Hangar 7

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

Response

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

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

Site 23, Shipping and Receiving Disposal Area

We have no concerns specific to this site.

Site 24, Road Oiling Area

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

Response

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

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

Summary

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

Response

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

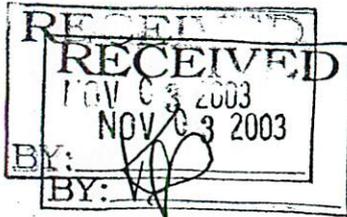
With respect to Sites 12 and 17, regular groundwater and surface water monitoring is being conducted on a station-wide basis. Results of the most recent groundwater and surface monitoring events are being provided to U.S. Fish and Wildlife for review.



UNITED STATES DEPARTMENT of the INTERIOR



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



October 29, 2003
File No. EC 14.5

*File copy - Joe Farry
Chuck
Ray
Capt. G.*

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

Dear Mr. Farry:

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

General Comments

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

Specific Comments

Site 9, Wastewater Treatment Plant

We have no concerns specific to this site.

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

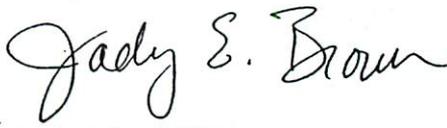
A significant portion of this area is immediately adjacent to Diagonal Drain, thereby increasing risks for contamination of the Drain. Aroclor 1254, a class of polychlorinated biphenyls (PCBs), was detected in soil at one site (i.e., 24000) immediately adjacent to Diagonal Drain. No groundwater sampling 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 Robert D. Williams
Field Supervisor

cc:

Nevada Division of Environmental Protection, Bureau of Federal Facilities, Carson City, Nevada
(Attn: Ramon Naranjo)
Project Leader, Stillwater National Wildlife Refuge, Fish and Wildlife Service, Fallon, Nevada

Farry, Joseph A (NASF N45F)

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

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

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

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

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

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

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

Sincerely,

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

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

Damian Higgins

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

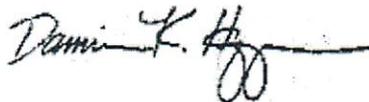
Laurie:

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

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

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

Sincerely,
(Embedded image moved to file: pic26500.gif)



Damian K. Higgins
Environmental Contaminants Biologist

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