FINAL
No Further Response Action Planned Decision Document Environmental Restoration Program Site 3

Former Fire Training Area
Nevada Air National Guard
Reno, Nevada

April 2007

ANG/CEVR
Andrews AFB, Maryland

FINAL
No Further Response Action Planned Decision Document Environmental Restoration Program Site 3

Former Fire Training Area
Nevada Air National Guard
Reno, Nevada

April 2007

Prepared For:

Air National Guard
3500 Fetchet Avenue
Building R-47
Andrews AFB, Maryland 20762

Prepared By:

ERM-West, Inc.
2525 Natomas Park Drive, Suite 350
Sacramento, California 95833

DECLARATION OF THE DECISION

Site Name and Location

ERP Site 3, Former Fire Training Area
Nevada Air National Guard Base
Reno, Nevada

Statement of Basis and Purpose

The purpose of this No Further Response Action Planned (NFRAP) Decision Document is to document the Air National Guard's decision for no further action at Environmental Restoration Program (ERP) Site 3, a Former Fire Training Area, at Nevada Air National Guard Base. This decision is based on review of the results of the ERP Preliminary Assessment and Site Investigation. These investigations determined that the site conditions do not pose a threat to human health or the environment.

Description of the Selected Remedy: No Further Action Planned

Based on the current conditions at ERP Site 3, it has been determined that no significant risk or threat to human health or the environment exists. Therefore, no further action under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, is recommended.

Declaration Statement

This NFRAP Decision Document represents the selected action for this site. The NFRAP was developed in accordance with the general guidelines of CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986 and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan that also applies to CERCLA response actions. This decision is also in accordance with Nevada Administrative Code 445A.226 through 445A.22755.

DECLARATION OF THE DECISION

It has been determined that the selected remedy of no further action is protective of human health and the environment. The selected remedy meets Federal and State requirements that are applicable or relevant and appropriate. The staturatory preference for further treatment is not satisfied because further treatment was not deemed necessary. Residual contaminant levels at the site have been determined to present no significant threat to human life or the environment.

SITE NAME AND LOCATION

ERP Site 3, Former Fire Training Area
Nevada Air National Guard Base
Reno, Nevada

David C. Van Gasbeck, Chief
Environmental Division
Civil Engineer Directorate

Date 19 Sep 06

Jim Najima
Chief, Bureau of Corrective Action
Nevada Division of Environmental Protection

Date Jan. 26, 2007

TABLE OF CONTENTS

	Page
LIST OF FIGURES	**iii**
LIST OF TABLES	**iv**
LIST OF ACRONYMS/ABBREVIATIONS	**v**
SECTION 1.0	**1-1**
INTRODUCTION	1-1
SECTION 2.0	**2-1**
SITE NAME, LOCATION, DESCRIPTION, AND HISTORY	2-1
2.1 Site Description	2-1
2.2 Site History and Enforcement Activities	2-4
SECTION 3.0	**3-1**
COMMUNITY PARTICIPATION	3-1
SECTION 4.0	**4-1**
SCOPE AND ROLE OF SITE	4-1
SECTION 5.0	**5-1**
SITE CHARACTERISTICS	5-1
5.1 Topography	5-1
5.2 Climate	5-1
5.3 Geology	5-2
5.3.1 Regional Geology	5-2
5.3.2 Local Geology	5-3
5.4 Hydrology	5-4
5.4.1 Surface Water Hydrology	5-4
5.4.2 Hydrogeology	5-4
5.5 Cleanup Goals for Soil and Groundwater	5-6
5.6 Nature and Extent of Contamination	5-9
5.6.1 Qualitative Data from GSM Sampling	5-11
5.6.2 Quantitative Soil Data	5-11

TABLE OF CONTENTS

	Page
5.6.3 Groundwater Monitoring	5-13
5.7 Contaminant Fate and Transport	5-13
5.8 Basis for Decision	5-16
SECTION 6.0	**6-1**
CURRENT AND POTENTIAL SITE AND RESOURCE USES	6-1
SECTION 7.0	**7-1**
SUMMARY OF SITE RISKS	7-1
SECTION 8.0	**8-1**
STATUTORY AUTHORITY FINDING	8-1
SECTION 9.0	**9-1**
DOCUMENTATION OF SIGNIFICANT CHANGES	9-1
SECTION 10.0	**10-1**
REFERENCES	10-1
APPENDIX A	
RESPONSIVENESS SUMMARY	

LIST OF FIGURES

Figure		Page
FIGURE 2-1	NVANG Location Map	2-2
FIGURE 2-2	ERP Site Location Map	2-3
FIGURE 3-1	Public Meeting Notice	3-2
FIGURE 3-2	Proof of Publication	3-3
FIGURE 4-1	Groundwater Screening Survey and Piezometer Locations	4-2
FIGURE 4-2	Soil Boring and Monitoring Well Locations	4-3
FIGURE 4-3	Monitoring Well Location Map	4-5
FIGURE 5-1	Potentiometric Map, October 2003	5-7

LIST OF TABLES

Table		Page
TABLE 4-1	Summary of Data from Sampling Locations Used as Basis of Decision for ERP Site 3	4-6
TABLE 4-2	Chronological Quantitative Sampling Summary for ERP Site 3	4-7
TABLE 5-1	Summary of Soil Cleanup Levels	5-8
TABLE 5-2	Summary of Groundwater Cleanup Levels	5-10
TABLE 5-3	GSM Survey Results	5-12
TABLE 5-4	Organic Chemical Constituents Detected in Soil	5-14
TABLE 5-5	Chemical Constituents Detected in Groundwater	5-15

LIST OF ACRONYMS/ABBREVIATIONS

ANG	Air National Guard
ASG	Automated Sciences Group, Inc.
bgs	Below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
ERM	ERM-West, Inc.
ERP	Environmental Restoration Program
°F	Degrees Fahrenheit
FTA	Fire Training Area
ft/d	Feet per day
GC	Gas chromatograph
GSM	Groundwater screening method
MCL	Maximum contaminant level
µg/kg	Micrograms per kilogram
µg/L	Microgram per liter
mg/kg	Milligram per kilogram
mg/L	Milligram per liter
NDEP	Nevada Division of Environmental Protection
NFRAP	No Further Response Action Planned
NVANG	Nevada Air National Guard Base
ORNL/ETS	Oak Ridge National Laboratory/Environmental Technology Section
PA	Preliminary assessment
PID	Photoionization detector
RCRA	Resource Conservation and Recovery Act
RI	Remedial investigation
SI	Site investigation
TCLP	Toxicity Characteristic Leaching Procedure
VOC	Volatile organic compound
USEPA	United States Environmental Protection Agency

SECTION 1.0

INTRODUCTION

This decision document describes the site-specific factors and analyses that led to the selection of No Further Action as the remedy for Environmental Restoration Program (ERP) Site 3, Former Fire Training Area (FTA), at the Nevada Air National Guard Base (NVANG), Reno, Nevada. Documents supporting the decision are identified in Section 10.

The format and organization of this decision document are based on the United States Environmental Protection Agency's (USEPA's) *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents*, dated July 1989. 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 30 December 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 1.0 - 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 2.0 - Site Name, Location, Description, and History.** Identifies and describes the site, provides location and property ownership information, and summarizes the site history, conditions, and previous investigation activities.

- **Section 3.0 - Community Participation.** Documents community participation activities throughout the decision-making process, references the Community Relations Plan in Appendix A, and describes the location and availability of the Administrative Record.

- **Section 4.0 - Scope and Role of Site.** Discusses Site 3 in relation to other sites at NVANG and identifies when and where monitoring or

remedial activities at other sites influence, or are influenced by, monitoring or remedial activities at Site 3.

- **Section 5.0 - 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 6.0 - Current and Potential Site and Resource Uses.** Discusses the current and potential future uses of the land.

- **Section 7.0 - Summary of Site Risks.** Discusses risks due to contamination present at the site.

- **Section 8.0 - Statutory Authority Finding.** States the conclusion that No Further Action is appropriate for Site 3.

- **Section 9.0 - Documentation of Significant Changes.** Describes the changes made to this decision document on the basis of comments received during the public comment period.

- **Section 10.0 - References.** Lists the sources of information used in preparing this decision document.

- **Appendix A - Responsiveness Summary.** Summarizes responses to public comments.

SECTION 2.0

SITE NAME, LOCATION, DESCRIPTION, AND HISTORY

The Reno Tahoe International Airport complex is located approximately 5 miles southeast of downtown Reno, Nevada (Figure 2-1). The NVANG presently occupies approximately 60 acres of land in the southern portion of the northwest quadrant of the airport complex (Automated Sciences Group, Inc. [ASG], 1989).

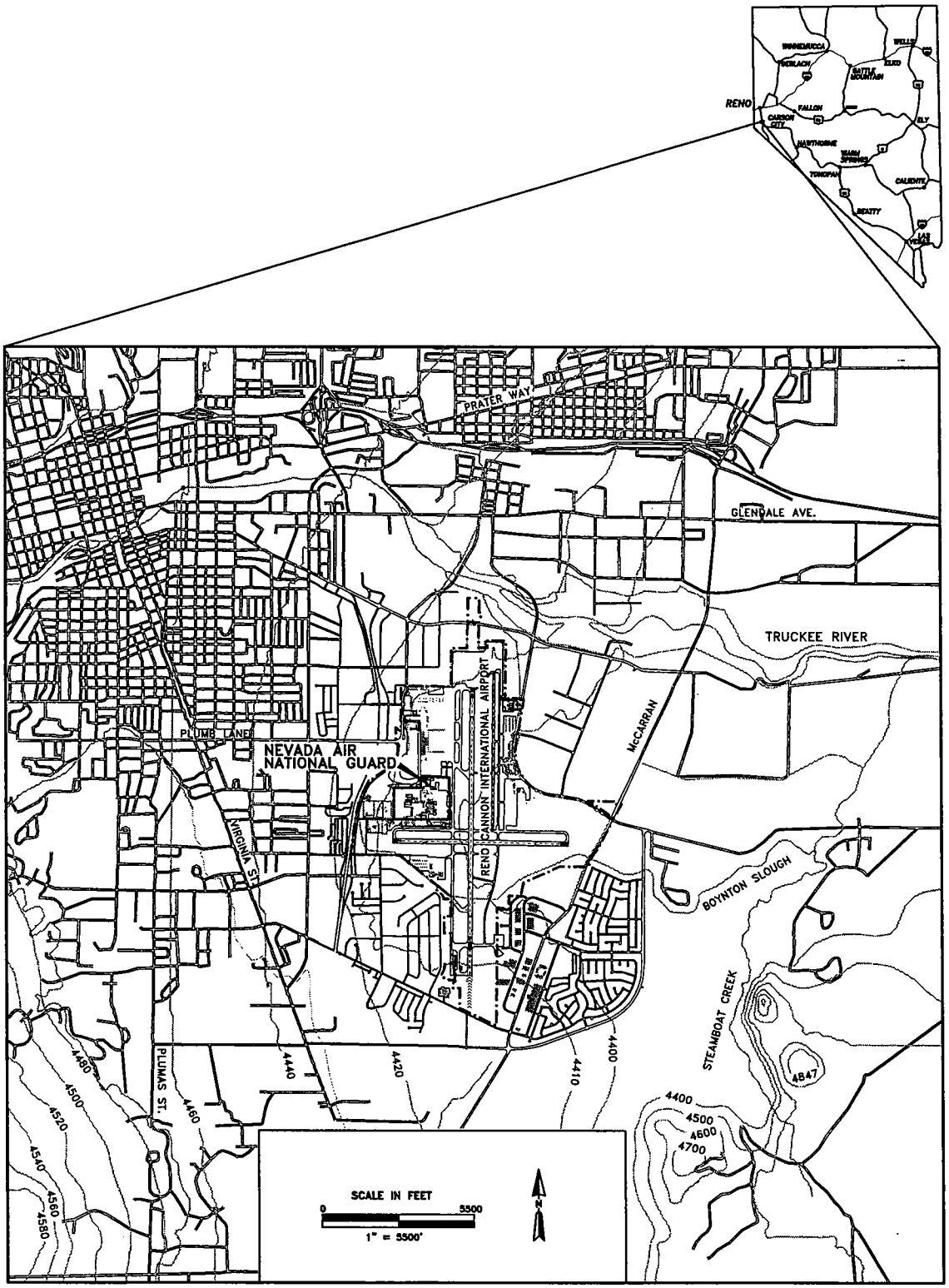
In April 1948, the NVANG was established as the 192nd Fighter Squadron. This designation was changed to the 192nd Fighter Bomber Squadron in April 1951. The unit was redesignated as the 192nd Fighter Interceptor Squadron in June 1955 and retained this designation until April 1958, when the unit was renamed the 152nd Fighter Group. In February 1961, the 152nd Fighter Group acquired the designation of the 152nd Reconnaissance Group (ASG, 1989). In 1996, the mission of the NVANG changed and it currently houses the 152nd Airlift Wing.

Initially, the NVANG was equipped with P-51 aircraft and was located at the Stead Army Air Base in Reno, Nevada. In 1953, the NVANG leased 29 acres of land at Hubbard Field (Reno/Tahoe International Airport) from the City of Reno. NVANG operations were moved from Stead Army Air Base to their present location in 1954. F-86A aircraft were assigned to the NVANG from 1956 until 1961 when the group converted to the RB-57 aircraft. In 1965, the NVANG converted to RF-101 aircraft, which were flown until 1975 when the NVANG converted to RF-4C aircraft (ASG, 1989). Because of its change in mission in 1996, the NVANG now utilizes C-130 aircraft.

2.1 Site Description

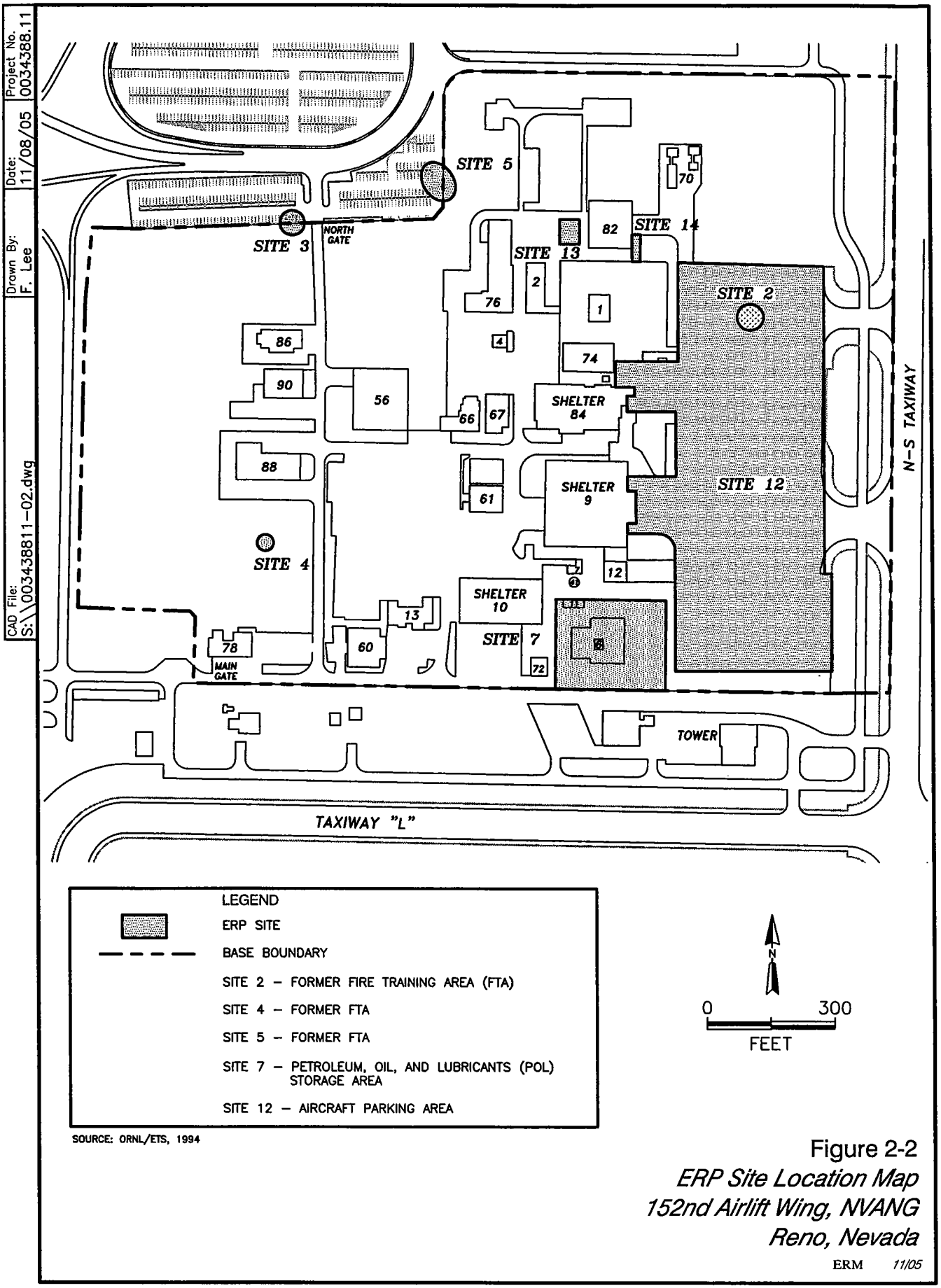
Site 3 is a former FTA adjacent to the north gate of the NVANG Base (Figure 2-2). The FTA consisted of an unlined, slightly bermed, open earthen area with a oils, and other flammables were burned during fire training exercises.

CAD File: S:\003438811-01.dwg | Drawn By: F. Lee | Date: 11/08/05 | Project No. 0034388.11



SOURCE: ORNL/ETS, 1994

Figure 2-1
NVANG Location Map
152nd Airlift Wing, NVANG
Reno, Nevada
ERM *11/05*



SOURCE: ORNL/ETS, 1994

Figure 2-2
ERP Site Location Map
152nd Airlift Wing, NVANG
Reno, Nevada

ERM 11/05

Training was generally done on a quarterly basis between 1964 and 1971, with multiple burns per excersise. During training exercises, a water base was generally applied to the FTA prior to each burn. However, one fire training excersise in 1971 involved 2,500 gallons of JP-4 fuel with no water base. An estimated 150 gallons of flammable liquids were used per burn. It is estimated that approximately 2,400 gallons of flammable liquids might have been used per year. Assuming 70 percent of the liquids were consumed, up to 720 gallons per year may have remained to either evaporate or infiltrate the ground. The preliminary assessment (PA) reported that up to 6,300 gallons may have infiltrated the ground during the 6 years this FTA was used (ASG, 1989).

2.2 Site History and Enforcement Activities

The ERP is an environmental program developed by the Department of Defense to identify, assess, characterize, and clean up or control contamination from past hazardous material spills and waste disposal activities at Department of Defense sites, including Air National Guard (ANG) facilities. As part of the voluntary ERP for NVANG, the following investigations/assessment activities were completed:

- The PA was conducted at NVANG in June 1988 (ASG, 1989). This document focused on past and present generation, use, handling, and disposal practices at seven potentially contaminated sites, including Site 3. The PA recommended Site 3 for further ERP investigation.

- A Site Investigation (SI) was completed in 1994, which included sediment/surface water sampling, soil borings, groundwater screening, piezometer and monitoring well installation, and aquifer pumping tests (Oak Ridge National Laboratory/Environmental Technology Section [ORNL/ETS], 1994). During the SI, five soil borings, four piezometers, and three monitoring wells were installed at Site 3. Based on the results of the SI, a no-further-action decision document was recommended for Site 3.

- Groundwater monitoring was conducted at Site 3 during fourth quarter 1992 and first quarter 1993. Results reported in the SI Report (ORNL/ETS, 1994) were low to non-detectable for all analytes.

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

SECTION 3.0

COMMUNITY PARTICIPATION

Community participation has been encouraged under a community relations plan drafted pursuant to Section 117 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The site-specific community relations plan prepared in October 1995 has been available for public review (along with all site reports) at the Washoe County Library in Reno, Nevada, and at the NVANG during normal business hours.

To meet the informational desires of the community and to allow the Reno, Nevada, area residents to participate in the decision-making process, the ANG held two Restoration Advisory Board meetings in the early stages of the ERP process at the NVANG. Although results from these meetings were positive, the number of interested parties was low and the ERP program at the NVANG was viewed by the community with little concern; therefore, no further meetings were scheduled.

To further inform the community about the Environmental Restoration Program and sites selected for closure, an open-house meeting was held at the NVANG on 25 July 2006. To announce the planned meeting, an advertisement was published in the *Reno Gazette Journal* on 21 and 22 July 2006 (Figures 3-1 and 3-2).

Information provided during the 25 July 2006 meeting included a visual presentation (which gave an historic overview of investigative work performed at Site 3) and printed handouts with similar information. In addition, draft copies of this decision document were available for review during the meeting. This meeting also marked the start of a 30-day public comment period to give interested parties an opportunity to review the documents supporting closure of Site 3.

There was no community attendance at the open-house meeting. Additionally, no community feedback was received during the 30-day comment period.

Public Notice
Nevada Air National Guard Base

Request for No Further Action
Open-House/Community Participation Meeting

The Nevada Air National Guard is announcing that a No Further Action status has been requested for seven environmental program sites located at the Nevada Air National Guard Base in Reno, NV. These seven sites are part of the Air National Guard's Installation Restoration Program, a nationwide effort to help seek and identify any possible environmental effects that could have resulted from past practices, accidents, or incidents on Air National Guard installations. The environmental assessment for the Air National Guard Base, Reno, NV was completed in 1989. The ground sites to be closed include several areas previously used for fire training, (training practices changed in the late 1970's) a soil area by the oil water separator (from 1975, new procedures are now in place) and areas outside the Petroleum, Oil and Lubricants Storage Facility (from the 1980's).

To promote community participation in the Installation Restoration Program, the Air National Guard has scheduled an open house/community meeting for the following location/date:

Tuesday, July 25, 2006 @ 6:00 PM - 8:00 PM
Nevada Air National Guard Base
1776 National Guard Way
Reno, Nevada

This meeting has been designed to provide information to the community about the Environmental Restoration Program and sites selected for closure.

Documents supporting the No Further Action request for the seven sites are available for public view in Building 56, Office #10 at the base. These documents will also be available for public review during the community meeting. Public comments on the No Further Action requests will be accepted for thirty days after the date of the community meeting.

Please contact Lt. Col. John Peck at (775) 788-4503 for further information.

Figure 3-1
Public Meeting Notice
152nd Airlift Wing, NVANG
Reno, Nevada

RENO NEWSPAPERS INC
Publishers of
RENO GAZETTE-JOURNAL
955 Kuenzli St. P.O.Box 22000 RENO, NV 89520 PHONE: (775) 788-6200
Legal Advertising Office (775) 788-6394

Customer Account # 313208
P.O# /ID# 0000159257
Ad Cost $2,425.50

- ERM
- 2525 Natomas Park Dr #350
- Sacramento, CA 95833
- David - Betta

STATE OF NEVADA
COUNTY OF WASHOE

ss: Julia Ketcham

Being first duly sworn, deposes and says: That as the legal clerk of the RENO GAZETTE-JOURNAL, a daily newspaper published in Reno, Washoe County, State of Nevada, that the notice:

request for no further action

has published in each regular and entire issue of said newspaper on the following dates to wit:
July 21, 22, 2006

Signed: Julia Ketcham
7-22-06
Tana Ciccotti
Notary Public

TANA CICCOTTI
Notary Public - State of Nevada
Appointment Recorded in Washoe County
No: 02-75259-2 - Expires May 16, 2010

PROOF OF PUBLICATION

Public Notice
Nevada Air National Guard Base
Request for No Further Action
Open-House/Community Participation Meeting

The Nevada Air National Guard is announcing that a No Further Action status has been requested for seven environmental program sites located at the Nevada Air National Guard Base in Reno, NV. These seven sites are part of the Air National Guard's Installation Restoration Program, a nationwide effort to help seek and identify any possible environmental effects that could have resulted from past practices, accidents, or incidents on Air National Guard installations. The environmental assessment for the Air National Guard Base, Reno, NV was completed in 1989. The ground sites to be closed include several areas previously used for fire training, training practices changed in the late 1970's) a soil area by the oil water separator (from 1975, new procedures are now in place) and areas outside the Petroleum, Oil and Lubricants Storage Facility (from the 1980's).
To promote community participation in the Installation Restoration Program, the Air National Guard has scheduled an open house/community meeting for the following location/date:

Tuesday, July 25, 2006 @ 6:00 PM - 8:00 PM
Nevada Air National Guard Base
1776 National Guard Way
Reno, Nevada

This meeting has been designed to provide information to the community about the Environmental Restoration Program and sites selected for closure.
Documents supporting the No Further Action request for the seven sites are available for public view in Building 56, Office #10 at the base. These documents will also be available for public review during the community meeting. Public comments on the No Further Action requests will be accepted for thirty days after the date of the community meeting.

Please contact Lt. Col. John Peck at (775) 788-4503 for further information.

Figure 3-2
Proof of Publication
152nd Airlift Wing, NVANG
Reno, Nevada

SECTION 4.0

SCOPE AND ROLE OF SITE

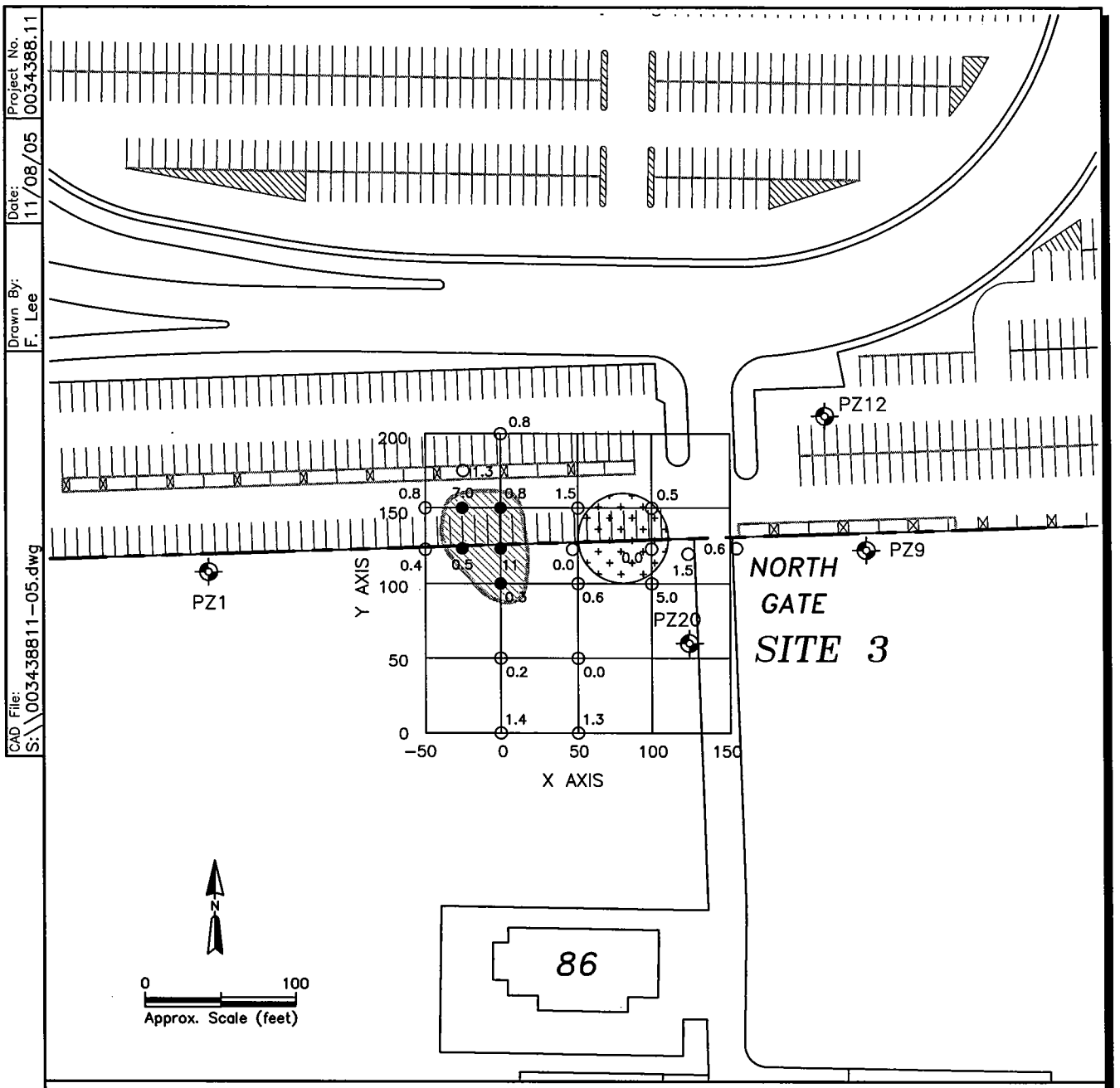
Based on the results of the PA and interviews with NVANG personnel, 14 sites were identified where past waste management and facility operations may have impacted shallow soil and groundwater. The PA recommended further investigation of Sites 2 through 7. Site 12 was investigated during the Rapid Response Site Assessment (PEER Consultants, 1992). Sites 2, 3, 4, 5, 7, 13, and 14 were investigated during the SI (ORNL/ETS, 1994); and Sites 4, 5, 7, and 14 were further investigated during the Remedial Investigation (RI) (ERM-West, Inc. [ERM], 1996). Figure 2-2 shows the location of Site 3 in relation to other ERP sites. Per agreement between the ANG and NDEP, no further action is appropriate for Sites 2, 3, 4, 5, 12, 13, and 14. Closure requests for each of these sites will be submitted under separate documents. A remedial action (that includes source removal) is ongoing at Site 7.

As shown in Figure 2-2, Site 3 is located in the northwestern portion of the NVANG near the north gate and is upgradient of Site 7, which is approximately 1,100 feet southeast of Site 3. The nearest monitoring well associated with Site 7 is MW-10, which is approximately 1,250 feet southeast and downgradient of MW-22 at Site 3. Site 4 is approximately 750 feet south of Site 3 and Sites 2, 5, 12, and 13 are approximately 350 to 900 feet east of Site 3. All of these sites are crossgradient or downgradient of Site 3.

The sampling locations used to evaluate Site 3 are as follows:

- Twenty-one groundwater screening method (GSM) sampling locations: Groundwater samples were collected from hydraulically driven, hollow steel probes that were advanced to approximately 1 foot below the top of the saturated zone. GSM sample locations at Site 3 are shown in Figure 4-1.

- Five hollow-stem auger soil borings advanced to depths ranging from 6 to 10 feet below ground surface (bgs). Soil samples were collected using a split-barrel sampler from depths ranging from 2 to 10 feet bgs. Soil boring locations are shown in Figure 4-2.



LEGEND

- Original ERP Site
- Suspected Area of Contamination From GSM Survey
- Base Boundary
- Piezometer Location
- 1.4 Negative Groundwater and PID Reading
- 11 Positive Groundwater and PID Reading

Figure 4-1
Groundwater Screening Survey and Piezometer Locations
Site 3
152nd Airlift Wing, NVANG
Reno, Nevada

ERM *11/05*

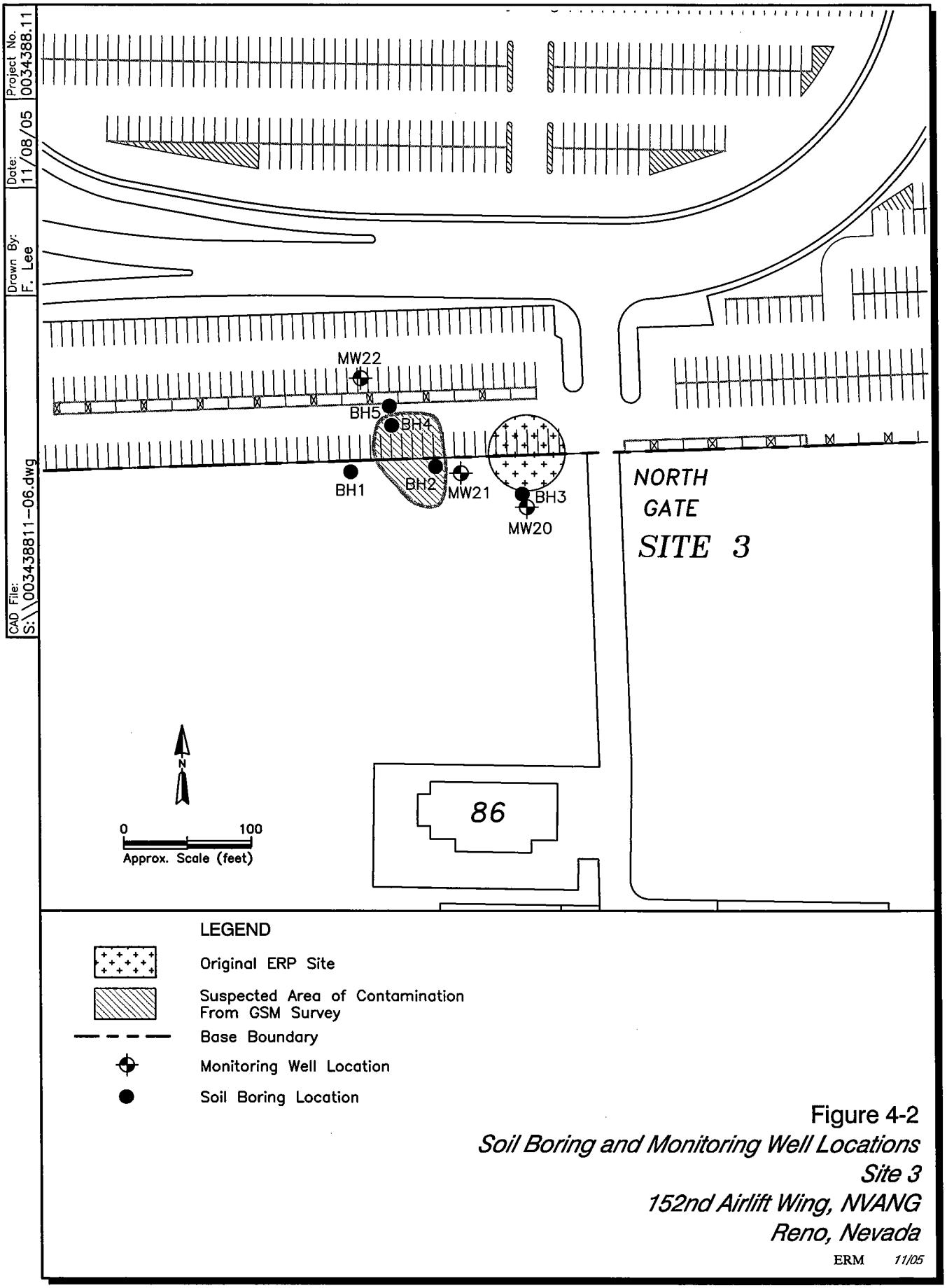


Figure 4-2
Soil Boring and Monitoring Well Locations
Site 3
152nd Airlift Wing, NVANG
Reno, Nevada
ERM *11/05*

- Four piezometers (PZ1, PZ9, PZ12, and PZ20) and three permanent monitoring wells (MW-20, MW-21, and MW-22) were installed for groundwater monitoring and sampling. Monitoring well locations are shown in Figures 4-2 and 4-3.

Sampling locations used as a basis for the decision for Site 3 are summarized on Table 4-1, along with the gradient relationships to Site 3 and the uses of the data from each location. Table 4-2 provides a chronological summary of quantitative sampling activities at each location.

The GSM locations were initially completed to qualitatively identify areas most likely to contain residual waste. Soil sampling was conducted to confirm the distribution of residual chemicals in soil and quantitatively identify the compounds present. Monitoring wells and piezometers were installed to determine direction and gradient of groundwater flow and quantitatively identify the compounds dissolved in groundwater.

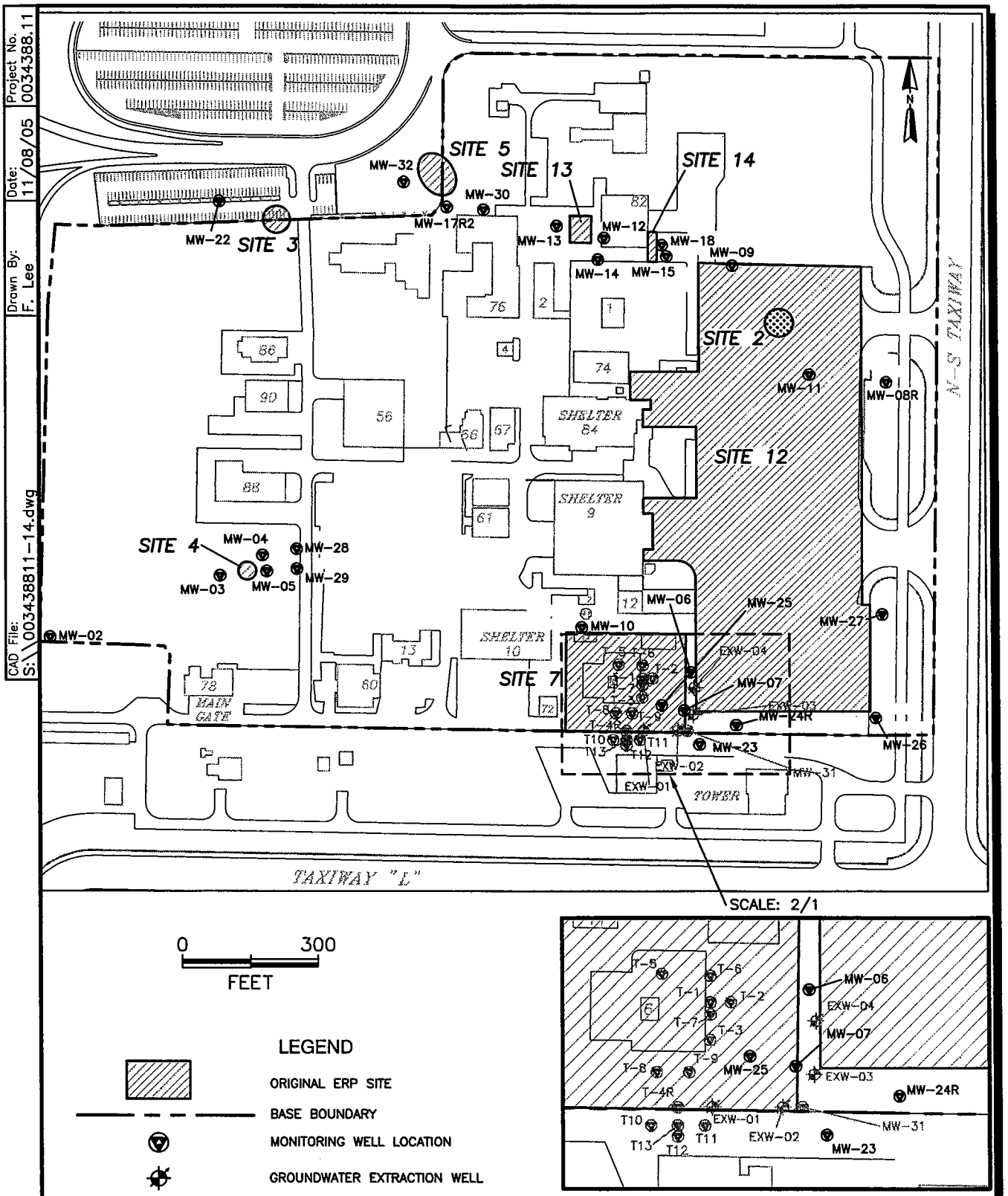


Figure 4-3
Monitoring Well Location Map
152nd Airlift Wing, NVANG
Reno, Nevada
ERM *11/05*

Table 4-1

Summary of Data from Sampling Locations Used as Basis of Decision for ERP Site 3
152nd Airlift Wing
Nevada Air National Guard
Reno, Nevada

Sampling Location	Data Type	Data Uses
Within Site 3		
Two GSM locations	Qualitative	Qualitative assessment of the extent of dissolved-phase chemicals within the suspected source area.
BH3	Quantitative	The intent of sampling at this location during the RI was to quantitatively assess the presence or absence of chemicals within the site boundaries as defined in the PA.
Upgradient or cross-gradient of Site 3		
16 GSM locations	Qualitative	Qualitative assessment of the lateral extent of dissolved-phase chemicals near the suspected source area.
BH1, BH2, BH4, BH5, MW21, MW22, PZ1	Quantitative	Quantitative assessment of lateral extent of suspected area of chemicals in soil, based on GSM survey. Determination of direction and magnitude of groundwater flow. Quantitative assessment of dissolved chemical concentrations upgradient of suspected source area.
Downgradient of Site 3		
Two GSM locations	Qualitative	Qualitative assessment of the extent of dissolved-phase chemicals downgradient of the suspected source area.
BH3 and MW20, PZ9, PZ12, PZ20	Quantitative	Quantitative assessment of lateral extent of suspected area of chemicals in soil, based on GSM survey. Determination of direction and magnitude of groundwater flow. Quantitative assessment of dissolved chemical concentrations downgradient of suspected source area.

Key:
BH - Borehole
GSM – Groundwater screening method
MW – Monitoring well
PZ - Piezometer

Table 4-2

Chronological Quantitative Sampling Summary for ERP Site 3
152nd Airlift Wing
Nevada Air National Guard
Reno, Nevada

Sampling Location	Matrix	Sampling Date(s)	Range of Analyses
BH1 through BH5	Soil	12/92	TPH, VOCs, SVOCs, metals
MW20 through MW22	Groundwater	12/92, 3/93	TPH, VOCs, SVOCs, metals

Key:
BH – Soil boring
MW – Monitoring well
SVOC – Semivolatile organic compound
TPH – Total petroleum hydrocarbons
VOC – Volatile organic compound

SECTION 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 Topography

The average elevation of Truckee Meadows, where the NVANG is located, is 4,400 feet above mean sea level. The area around Truckee Meadows is generally flat with a gentle slope to the west, although topographic relief is substantial in the surrounding mountain ranges (ASG, 1989).

5.2 Climate

The annual mean temperature for Reno, Nevada, is 49.9 degrees Fahrenheit (°F), with a maximum monthly average of 91.3°F occurring in July and a minimum monthly average of 18.9°F occurring in December. The average daily temperature change is 35°F, with a maximum daily temperature change of 43.5°F occurring in July and August (ASG, 1989).

National Oceanic and Atmospheric Administration Station No. 26-6779, located at Reno Tahoe International Airport, records an average annual precipitation of 7.49 inches for the Reno, Nevada, area. According to the Water Atlas of the United States, Plate 12, the average annual evaporation from open water surfaces is 43 inches (ASG, 1989). Using the method outlined in the Federal Register (47 Federal Regulation 31224, July 1982), the annual net precipitation for the NVANG is -35.51 inches (ASG, 1989). Rainfall intensity based on the 1-year maximum 24-hour rainfall is calculated to be 1.5 inches (ASG, 1989).

5.3 Geology

5.3.1 Regional Geology

The majority of the information presented in the following subsections was obtained from Cohen and Loeltz (1964); Bingler (1975); and the Preliminary Assessment (ASG, 1989), which contains information derived from the Nevada Bureau of Mines and Geology Report #25 (Bateman and Scheibach, 1975).

Geologic maps of the Reno and Mt. Rose quadrangles show that the northern portion of the NVANG lies on a Quaternary deposit termed "floodplain and lacustrine deposits" consisting of interbedded gray to pale grayish-yellow silt and fine-grained sand with thin lenses of peat. These are fluvial and lacustrine deposits up to 23 feet thick with little or no soil development (Bonham and Rogers, 1983). The southern portion of the airfield is underlain by deposits known as "alluvial bajada deposits" consisting of thin, sheet-like aprons of fine- to medium-grained sand with intercalated muddy, medium-pebble gravel. These deposits result from low gradient streams that have reworked older gravelly outwash and alluvial fan deposits. They are weakly weathered and largely undissected, with little or no soil development (Bonham and Rogers, 1983).

The general geology of the Reno area consists of a north-trending basin known as the Truckee Meadows. This basin is located at the western margin of the Basin and Range physiographic province just east of the Sierra Nevada. Bingler (1975) describes the Truckee Meadows as a structural depression bounded by the Carson Range on the west, the Virginia Range on the east, Steamboat Hills to the south, and the eastern part of the Peavine Mountain block to the north. These marginal blocks consist of Mesozoic metavolcanic and plutonic rocks overlain by a thick sequence of Tertiary volcanic and epiclastic rocks. The Tertiary rocks are predominantly andesite and andesite porphyry flow rock, hypabyssal intrusives, and minor siliceous welded tuff, which are commonly represented by the Kate Peak and Alta Formations.

The foothill and mountain drainages that rim the basin contain large exposures of altered volcanic rock. Along the western margin of the basin and to the north and west along the Truckee River drainage basin, tilted beds of Miocene to upper Pliocene Hunter Creek Sandstone (composed of conglomerate, sandstone, and diatomite) are exposed, marking the start of early basin-sediment accumulation. The continuation of long-established

patterns of basin-sediment accumulation is represented by the extensive Quaternary deposits exposed in the Truckee Meadows.

Bingler (1975) divided the Quaternary deposits into three major categories:

- Main stream gravel deposits of the Truckee River represented by bouldery outwash from glacial activity;
- A long and complex history of alluvial fan deposition along the margins of the Truckee Meadows that extends in time from the Pleistocene into the Holocene; and
- Reworking of older deposits and deposition of fine-grained clastic debris throughout the central part of the Truckee Meadows by low gradient streams during the Holocene and continuing to the present.

Geothermal activity in Truckee Meadows is found in two major areas known as Steamboat Springs and Moana. These activities are likely due to the cooling of an intrusive body at a depth that may be connected to groundwater resources through fault systems near these areas. Geothermal activity has a profound effect on groundwater chemistry by means of hydrothermal alteration of volcanic rocks underlying Truckee Meadows.

5.3.2 Local Geology

The soil descriptions below are based on the PA (ASG, 1989) and were derived from the *Soil Survey of Washoe County, Nevada, South Part* (Baumer, 1983).

The Truckee sandy loam, gravelly substratum covers the northern half of the airport and all of the NVANG property (Baumer 1983, Map Index No. 805). This very deep, somewhat poorly drained soil is on flood plains and is formed in alluvium derived from mixed rock sources. Typically, the surface layer is gray sandy loam about 12 inches thick. The upper 18 inches of the underlying material is gray, stratified sandy loam through silty clay loam. The lower part, to a depth of 60 inches, is a pale-brown, stratified, gravelly sand and very gravelly sandy loam. Depth to the gravelly material ranges from 30 to 40 inches.

The Vamp silt loam, which is strongly saline-alkali, covers the southern half of the airport and adjacent areas (Baumer, 1983, Map Index No. 911). This is a moderately deep, somewhat poorly drained soil found on flood

plains and terraces. The soil is formed in alluvium and is derived from mixed rock sources. Typically, the surface layer is grayish-brown silty loam about 3 inches thick. Below this is a layer of light grayish-brown and pale-brown, stratified, fine sandy loam and loam about 33 inches thick. The next layer is white, strongly cemented hardpan about 6 inches thick, which is underlain to a depth of 60 inches by yellowish-brown and light olive-gray, stratified loam, sandy loam, and loamy sand. Depth to the hardpan ranges from 20 to 40 inches. Permeability of the Vamp soil is moderate. A seasonal high water table is at a depth of 30 to 40 inches in spring and early summer.

Channeling and deposition are common along stream banks in both soil units. The risk of corrosion is high for uncoated steel and concrete structures because both soil units are strongly saline and alkaline-affected. Both soil units are subject to seasonal flooding that has been controlled around the NVANG by deepened drainage ditches.

5.4 Hydrology

The following subsections describe the surface water hydrology and the hydrogeology of the NVANG.

5.4.1 Surface Water Hydrology

Surface water in the vicinity of the NVANG occurs in both open and covered drainage ditches. Irrigation ditches fed by diversion dams on the Truckee River pass by the NVANG just east of the airfield. There are drainage ditches along the north and south sides of the NVANG that conduct water to the east, across the airfield, and into Boynton Slough, which drains into Steamboat Creek (ASG, 1989).

The Truckee Meadows is drained by the Truckee River, which flows from west to east through the Meadows. The NVANG lies 1.5 miles south of the river channel at its closest point. Steamboat Creek, the major tributary to the Truckee River within the Meadows, enters through Pleasant Valley to the south and flows north to the Truckee River. Other streams in this area flow mainly during spring runoff (ASG, 1989).

5.4.2 Hydrogeology

The potentiometric surface at the NVANG can be as shallow as 3 feet below the land surface. The fine-grained nature of the upper sediments

compared with the more permeable lower sediments may result in confined conditions across the NVANG. The proximity of the groundwater surface to the land surface is due to the area's function as a groundwater discharge point for the Truckee Meadows. Much of the NVANG and airport lie on former swampland that was filled in and drained with ditches that receive the current groundwater discharge. Cohen and Loeltz (1964) estimated the total groundwater discharge into the drainage ditches, drains, and sloughs east of the airport to be 6,500 acre-feet per year (acre-feet/year) with an additional 2,200 acre-feet/year discharged to drains immediately north of the airfield. Today, the only remaining swampland, located east of the NVANG, is found south of the confluence of Boynton Slough and Steamboat Creek.

Groundwater in the Truckee Meadows occurs under both artesian and water table conditions in the unconsolidated and partially consolidated younger and older alluvium of the valley fill. Artesian heads in the meadows area are commonly less than 20 feet above the land surface (Cohen and Loeltz, 1964). Depths to groundwater vary considerably due to the interfingering nature of the valley-fill deposits. Several public water supply wells located in the meadows are screened at depths ranging from 274 to more than 800 feet. Commonly, wells located several yards apart will tap water-bearing deposits at different depths. This trend becomes more pronounced in the area of the Truckee River, where channel shifts have left discontinuous and sinuous gravels (ASG, 1989).

Review of Nevada Department of Water Resources drilling records, stored by the United States Geological Survey Water Resources Division in Carson City, Nevada, indicates that there are 90 monitoring wells within a 1-mile radius of the NVANG. None of these wells are considered private supply wells, as they are less than 30 feet deep and constructed as monitoring wells related to environmental site assessments in the airport area. Because shallow groundwater in this area contains high concentrations of naturally occurring inorganic compounds, there are no known private drinking water wells near the NVANG.

Cohen and Loeltz (1964) suggest that 70 percent of the recharge to the groundwater in the Truckee Meadows is from infiltration by crop irrigation practices and 30 percent can be attributed to the infiltration of streamflow and underflow from tributary valleys. Increasing urbanization in the Meadows, however, has decreased the use of crop irrigation, thus decreasing the rate of recharge and consequently lowering water levels. The State engineer's office in Carson City estimates the present annual groundwater recharge to the Truckee Meadows at 20,000 to 25,000 acre-feet.

During the SI, single well pumping tests were performed on six monitoring wells, and recovery tests were performed on two wells. Transmissivity values calculated from the pump test data ranged from 39 to 3,110 square feet per day (ft/d). Hydraulic conductivities, defined as the product of the screened aquifer thickness and transmissivity, ranged from 4 to 479 ft/d. The range of values indicates the lithology of the unconfined saturated zone is very heterogeneous. This conclusion is consistent with data from borehole logs. Using an average hydraulic conductivity value of 500 ft/d, a gradient of 0.001, and effective porosity of 0.2 (fine to coarse sand), the SI Report calculated an average linear groundwater velocity of 2.5 ft/d (ORNL/ETS, 1994).

Figure 5-1 shows the potentiometric surface map developed based on the last semiannual monitoring event (third quarter 2003). As indicated, groundwater flow is east or east-southeast. The gradient in the vicinity of Site 3 is approximately 0.0024 feet per foot. These results are consistent with groundwater gradient and flow directions observed during previous events (ERM, 2003a).

5.5 Cleanup Goals for Soil and Groundwater

Cleanup levels for impacted soil and groundwater at NVANG (created for the RI/Feasibility Study) were calculated for protection of both human health (assuming direct contact with soil) and groundwater. Direct contact standards were calculated following the methodology established in Subpart S of the Resource Conservation and Recovery Act (RCRA) Corrective Action Rule (USEPA, July 1990). Cleanup levels for protection of groundwater were calculated based on (1) Toxicity Characteristic Leaching Procedure (TCLP) standards; (2) Federal Maximum Contaminant Levels (MCLs); or (3) a drinking water equivalency level using Subpart S methodology. Where available, the numeric TCLP standard (in milligrams per liter [mg/L]) was selected as the groundwater protective cleanup level (in milligrams per kilogram [mg/kg]) without any unit conversion. For compounds with no established TCLP standard, the cleanup levels were calculated by multiplying the MCL (in mg/L) by 100. For compounds with no established TCLP standard or MCL, a drinking water equivalency standard (in mg/L), calculated using Subpart S methodology, was multiplied by 100 to derive the soil cleanup level (in mg/kg). Table 5-1 summarizes cleanup levels for protection of human health and groundwater for Site 3 soils. Groundwater protective cleanup levels are preferred because they are more conservative than the human health cleanup levels for the chemicals of concern.

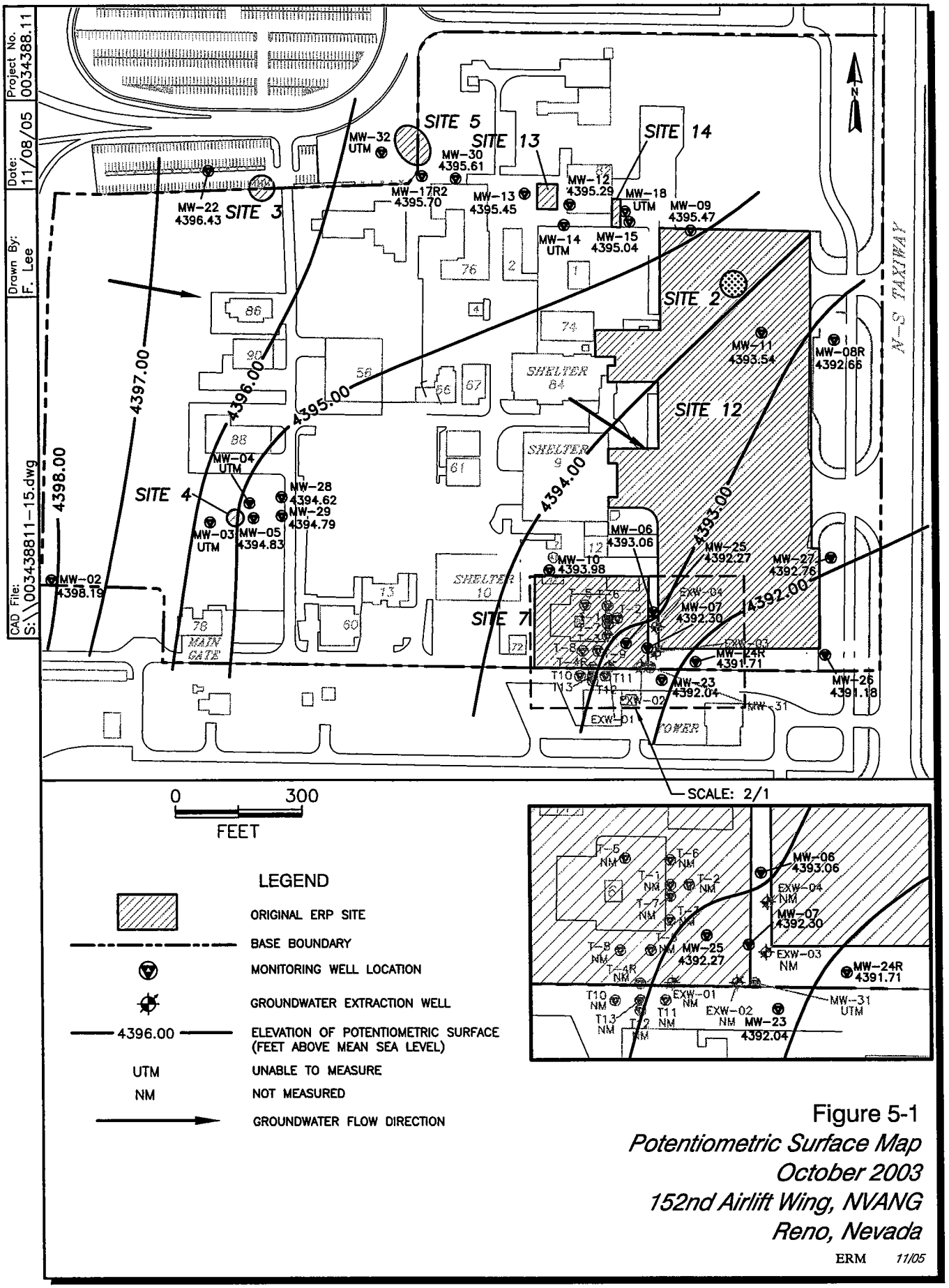


Figure 5-1
Potentiometric Surface Map
October 2003
152nd Airlift Wing, NVANG
Reno, Nevada

ERM 11/05

Table 5-1
Summary of Soil Cleanup Levels
ERP Site 3
152nd Airlift Wing, Nevada Air National Guard
Reno, Nevada

Compound	Human Health Cleanup Level (Based on Subpart S)	Groundwater Protection Cleanup Level	Groundwater Protection Cleanup Level Method
Volatile Organic Compounds (micrograms per kilogram)			
Chlorobenzene	1,600,000	100,000	TCLP
Semivolatile Organic Compounds (micrograms per kilogram)			
Bis(2-ethylhexyl)phthalate	50,000	600	MCL x 100

Key:
MCL = Maximum contaminant level
TCLP = Toxicity characteristic leaching procedure

The SI (ORNL/ETS, 1994) compared detected concentrations of inorganic constituents (metals) to background concentrations to determine whether further action was necessary to address metals in soil. Background concentrations for metals were derived from two sources: (1) the range of detected concentrations in seven soil samples taken from soil borings drilled in areas where it was reasonably certain there was no impact; and (2) crustal abundance average concentrations reported in *Abundance of Chemical Elements in Continental Crust* (Taylor, 1964). The SI concluded that concentrations of metals in ERP Sites soil were within normal background ranges. Based on these results further assessment was deemed unnecessary, and metals were not subsequently evaluated in the RI (ERM, 1996).

Consistent with NDEP guidance, potential cleanup levels identified in the SI and RI for groundwater were based primarily on Federal MCLs. For several compounds with no established MCLs, the RI derived drinking water equivalency levels using the methodology set forth in Subpart S of the proposed RCRA Corrective Action Rule (EPA, 1990). In addition, the SI compared concentrations of inorganic constituents (metals) to concentrations measured in non-impacted background wells and concentration ranges for metals and cations in groundwater determined by Welch and others (1989) for the Carson River Basin.

The cleanup levels identified in the SI and RI were used to determine whether further action was necessary. Although these cleanup levels provided the basis for recommending no further action at Sites 2, 3, and 13 in the SI and long term monitoring for Site 14 in the RI, it should be noted that the SI and RI did not identify groundwater cleanup levels for some compounds. To allow a comprehensive evaluation of all detected constituents, either the current Federal MCL or the current Region 9 PRG has been selected as the cleanup goal for these compounds. Table 5-2 summarizes cleanup goals for all constituents detected in Site 3 groundwater. The RI report (ERM, 1996) contains further details on calculation of soil and groundwater cleanup levels.

5.6 Nature and Extent of Contamination

This section summarizes results of investigations at Site 3 and discusses in detail contaminants in soil and groundwater. Investigations at the site are summarized in Section 2.

Table 5-2
Summary of Groundwater Cleanup Levels
ERP Site 3
152nd Airlift Wing, Nevada Air National Guard
Reno, Nevada

Compound	Groundwater Cleanup Level (µg/L)	Source
Volatile Organic Compounds		
Toluene	1,000	USEPA Region 9 Primary MCL
Semivolatile Organic Compounds		
Diethyl phthalate	29,000	USEPA Region 9 Tap Water PRG
Di-n-octyl phthalate	700	Subpart S
Inorganic Constituents		
Aluminum	200	USEPA Region 9 Secondary MCL
Antimony	6	USEPA Region 9 Primary MCL
Arsenic	10	USEPA Region 9 Primary MCL
Barium	2,000	USEPA Region 9 Primary MCL
Beryllium	4	USEPA Region 9 Primary MCL
Cadmium	5	USEPA Region 9 Primary MCL
Chromium	100	USEPA Region 9 Primary MCL
Cobalt	730	USEPA Region 9 Tap Water PRG
Copper	1,300	USEPA Region 9 Primary MCL
Iron	300	USEPA Region 9 Secondary MCL
Manganese	50	USEPA Region 9 Secondary MCL
Mercury	2	USEPA Region 9 Primary MCL
Nickel	730	USEPA Region 9 Tap Water PRG
Selenium	50	USEPA Region 9 Tap Water PRG
Silver	100	USEPA Region 9 Secondary MCL
Thallium	2	USEPA Region 9 Primary MCL
Vanadium	36	USEPA Region 9 Tap Water PRG
Zinc	5,000	USEPA Region 9 Secondary MCL

Key:
µg/L = Micrograms per liter
PRG = Preliminary remediation goal
MCL = Maximum contaminant level
USEPA = United States Environmental Protection Agency
PRG = Preliminary remediation goal

GSM sampling (ORNL/ETS, 1994) indicated the presence of trace concentrations of several chlorinated and fuel-related compounds in groundwater near the suspected source area. Specific compounds could not be identified because of interference effects. The area of suspected groundwater impact, which was located approximately 30 feet west of the suspected source area, was approximately 50 feet wide (east to west) by 75 feet long (north to south). SI soil samples collected within the area of groundwater impact contained trace concentrations of chloroform and bis(2-ethylhexyl)phthalate. Other organic analytes were non-detect. SI groundwater samples collected from MW-20, -21, and -22 during two quarterly monitoring events (1992 and 1993) contained trace concentrations of toluene and several phthalates, but were non-detect for other organic analytes.

5.6.1 Qualitative Data from GSM Sampling

Qualitative data were initially collected to assess the presence or absence of dissolved volatile chemicals in the general vicinity of the Site 3 suspected source area. GSM samples were collected from 1-inch-diameter hollow steel probes, which were driven to approximately 1 foot below the top of the saturated zone. Groundwater samples were placed in 40-milliliter vials, agitated to induce volatilization of dissolved volatile organic compounds (VOCs), and the headspace gas was then analyzed using a field gas chromatograph (GC). Photoionization (PID) readings were also collected from the borehole openings at each location. GC data were recorded as either positive (detectable VOCs present) or negative (detectable VOCs not present). The GC and PID data were combined to delineate the area of likely groundwater impact. The GC and PID data are summarized on Table 5-3 and the area of impact is shown in Figure 4-1. As shown in Figure 4-1, the area of likely impact was located approximately 30 feet west of the suspected source and was approximately 50 feet wide (east to west) by 75 feet long (north to south).

5.6.2 Quantitative Soil Data

Quantitative soil analytical data were collected during the SI to define the nature and extent of chemical impacts in the unsaturated zone.

During the SI, five soil borings (BH1 through BH5) were advanced within the footprint of likely groundwater impact, as defined by the GSM survey.

Table 5-3
GSM Survey Results
ERP Site 3
152nd Airlift Wing, Nevada Air National Guard
Reno, Nevada

GSM Location	Grid Coordinates (x,y)	PID (ppm)	GC Decision
S301	0,0	1.4	Negative
S302	0,50	0.20	Negative
S303	0,100	0.30	Positive
S304	0,122	11	Positive
S305	-50,122	0.40	Negative
S306	50,0	1.3	Negative
S307	50,50	0.0	Negative
S308	100,100	5.0	Negative
S309	50,122	0.0	Negative
S310	50,100	0.60	Negative
S311	100,122	0.40	Negative
S312	-25,122	0.50	Positive
S313	124,119	1.5	Negative
S314	155,122	0.60	Negative
S315	100,150	0.50	Negative
S316	50,150	1.5	Negative
S317	0,150	0.80	Positive
S318	-25,150	7.0	Positive
S319	-50,150	0.80	Negative
S320	-25,175	1.3	Negative
S321	0,200	0.80	Negative

Key:
GC = Gas chromatograph
GSM = Groundwater screening method
PID = Photoionization detector
ppm = Parts per million

Soil samples were collected for analysis at depths ranging from 2 to 10 feet bgs. Samples were analyzed for VOCs, semivolatile organic compounds, total petroleum hydrocarbons, and metals. All metals results were within the background ranges reported in the SI. Table 5-4 summarizes results for organic chemicals in soil and Figure 4-2 shows the locations of the borings. As indicated, chloroform (1 to 2 micrograms per kilogram [µg/kg]) and bis(2-ethylhexyl)phthalate (63 to 84 µg/kg) were the only organic chemicals detected in soil samples. These concentrations are well below cleanup levels for protection of human health and groundwater.

5.6.3 Groundwater Monitoring

Groundwater samples were collected from site-related monitoring wells (Figure 4-3) as part of the SI. Table 5-5 summarizes available groundwater analytical results from site-related monitoring wells. The data was collected during two quarterly monitoring events conducted during fourth quarter 1992 and first quarter 1993. MW-20 was nondetect for all organic analytes during both monitoring events. MW-21 contained trace concentrations of diethyl phthalate (1 micrograms per liter [µg/L]) and di-n-butyl phthalate (1 µg/L), but was nondetect for all other organic analytes. MW-22 contained detectable toluene (2 µg/L), but was nondetect for other organic analytes.

Concentrations of aluminum, antimony, arsenic, cadmium, manganese, and thallium in SI groundwater samples exceeded cleanup levels. However, only aluminum, antimony, cadmium, and manganese exceeded the range of concentrations in background groundwater samples. Based on comparison to dissolved inorganic concentrations documented by Welch and Others (1989) for the Carson River Basin, the SI concluded that all detected inorganic analytes were within naturally occurring background ranges (ORNL/ETS, 1994).

5.7 Contaminant Fate and Transport

The RI Report (ERM, 1996) evaluated the fate and transport of JP-4 constituents and TCE present in soil and groundwater beneath the NVANG. The evaluation assessed potential routes of migration, contaminant persistence, and migration of these compounds.

Table 5-4
Organic Chemical Constituents Detected in Soil
ERP Site 3
152nd Airlift Wing, Nevada Air National Guard
Reno, Nevada

Chemical	BH03		BH04		BH05	
	6 ft	8 ft	4 ft	6 ft	6 ft	7 ft
Volatile Organic Compounds (µg/kg)						
Chloroform	2.0 J	2.0 J	1.0 J	ND	ND	ND
Semivolatile Organic Compounds (µg/kg)						
bis(2-Ethylhexyl)phthalate	ND	ND	84 J	ND	63 J	83 J

Notes:

J = Reported value is below the contract required detection limit, but above the instrument detection limit for volatile organic compounds and semivolatile organic compounds.

Abbreviations:

µg/kg = Micrograms per kilogram
ft = Feet
ND = Not detected

Table 5-5

Chemical Constituents Detected in Groundwater
ERP Site 3
152nd Airlift Wing, Nevada Air National Guard
Reno, Nevada

Chemical	Background Range	MW-20		MW-21				MW-22	
		Dec-92	Mar-93	Dec-92	Dec-92 (D)	Mar-93	Mar-93 (D)	Dec-92	Mar-93
Volatile Organic Compounds (µg/L)									
Toluene	NA	ND	ND	ND	ND	ND	ND	2.0 J	ND
Semivolatile Organic Compounds (µg/L)									
Diethyl phthalate	NA	ND	ND	ND	ND	1.0	ND	ND	ND
Di-n-octyl phthalat	NA	ND	ND	1.0 J	ND	ND	ND	ND	ND
Inorganic Analytes (µg/L)									
Aluminum	305 - 568	194	ND	178	**202**	ND	ND	196	ND
Antimony	ND	ND	**30**	ND	ND	ND	ND	ND	ND
Arsenic	84.5 - 152	**37.9 J**	**38.7 J**	**39 J**	**32 J**	**30.3 J**	**26.7**	**23.2 J**	**15.8**
Barium	17.7 - 39.4	53.2	83.6	43.7	44.1	52.4	50.4	66.5	63.1
Beryllium	ND	ND	1.0	ND	ND	ND	ND	ND	ND
Cadmium	ND	ND	**5.0**	ND	ND	ND	ND	ND	ND
Calcium	18,600 - 47,400	45,400	47,535	44,100	43,700	490,000	48,900	57,400	62,900
Chromium	ND	ND	6.0	ND	ND	ND	ND	ND	ND
Cobalt	ND	ND	9.0	ND	ND	ND	ND	ND	ND
Copper	6.6 - 11.9	8.2	4.0	ND	9.6	6.2	ND	11	ND
Iron	55.9 - 360	75.2	ND	ND	ND	ND	ND	75.2	ND
Magnesium	40 - 6,880	16,000	15,178	12,800	12,800	14,100	14,000	18,100	17,900
Manganese	15.6 - 172	**258**	**239.8**	27	26.4	17.1	15.3	**328**	**236**
Mercury	ND	ND	0.20 J	ND	ND	ND	ND	ND	ND
Nickel	ND	ND	13	ND	ND	ND	ND	ND	ND
Potassium	2,850 - 14,500	11,000	7,997	9,030	10,300	9,330	8,460	14,800	11,700
Selenium	4.2 - 5.5	ND	3.0	ND	ND	ND	ND	ND	ND
Silver	ND	ND	5.0	ND	ND	ND	ND	ND	ND
Sodium	16,500 - 443,000	297,000	268,990	221,000	223,000	233,000	227,000	304,000	280,000
Thallium	ND	ND	**3.0**	ND	ND	ND	ND	ND	ND
Vanadium	12.5 - 15	9.7	8.28	10.6	10.3	7.3	9.2	6.7	6.2
Zinc	3.8 - 4.2	7.0	ND	4.8	5.6	ND	ND	4.2	ND

Notes:
Bold = Result exceeds cleanup level.
Shading = Result exceeds background range reported in SI (ORNL/ETS, 1994)
J = Reported value is below the contract required detection limit, but above the instrument detection limit for volatile organic
For inorganics, the reported value is estimated because the associated matrix spike was out of control limits. Values are
(D) = Duplicate sample.

Abbreviations:
µg/L = Micrograms per liter
ND = Not detected

Trace concentrations of JP-4 constituents, including toluene and polynuclear aromatic hydrocarbons (which are produced during combustion of JP-4) have been detected in vadose zone soils and groundwater at Site 3. Potential routes of migration for JP-4 constituents include the following:

- Lateral flow of floating nonaqueous-phase liquid on the water table;
- Volatilization of free-phase or adsorbed chemicals into soil gas;
- Transport of dissolved and adsorbed chemicals in surface water runoff;
- Leaching of adsorbed or free-phase chemicals in soil to groundwater;
- Volatilization of dissolved chemicals from groundwater to soil gas;
- Release of chemicals in soil gas to ambient air; and
- Transport of dissolved chemicals via groundwater flow.

Both transport and transformation processes are important in determining fate of chemicals in soil and groundwater. Biodegradation of fuel constituents in soil or groundwater is considered the most important transformation process. Volatilization of VOCs in soil or groundwater to soil gas, migration of VOCs in soil gas to ambient air, leaching of VOCs and other fuel constituents from soil to groundwater, and movement of dissolved chemicals with groundwater flow are considered the most important transport processes.

Analytical data from soil samples collected at Site 3 indicated residual concentrations are all well below cleanup levels for protection of human health and the environment. Dissolved concentrations were also less than cleanup levels and, if still present, are very unlikely to migrate or impact groundwater in other areas.

5.8 Basis for Decision

The ANG has selected No Further Action as the preferred alternative for Site 3 for the following reasons:

- All reported concentrations of organic analytes in soil were less than soil cleanup levels for protection of groundwater and human health.

- The dissolved-phase impacts were limited to trace concentrations of toluene and phthalates detected in MW-21 and MW-22. In both wells, the compounds were detected during only one of the two monitoring events. All results were less than cleanup levels.

- The ANG does not expect any change in the use of Site 3, or of the surrounding area, in the foreseeable future.

In summary, No Further Action is recommended for this site because there appears to be no significant ongoing source of contamination and the site does not present a risk to human health or the environment. Additionally, concentrations of organic chemicals dissolved in groundwater are below applicable cleanup levels.

SECTION 6.0

CURRENT AND POTENTIAL SITE AND RESOURCE USES

NVANG currently serves as the home of the Air National Guard's 152nd Airlift Wing, which services and operates C-130E and C-130H aircraft. The NVANG occupies approximately 60 acres of land in the northwest quadrant of the Reno Tahoe International Airport Complex. The land to the south and west of the NVANG is primarily industrial and residential. The land east and north of the NVANG is occupied by the Reno Tahoe International Airport. Use of Site 3 is not expected to change and the ANG does not expect to use groundwater for any purpose in the foreseeable future.

SECTION 7.0

SUMMARY OF SITE RISKS

Analytical results from soil samples obtained in 1992 indicated only trace concentrations chloroform and bis(2-ethylhexyl)phthalate. All detectable concentrations were well below cleanup levels for the protection of human health and groundwater.

Groundwater samples collected during 1992 and 1993 contained trace concentrations of toluene, diethyl phthalate, and di-n-octyl phthalate. All reported concentrations were below cleanup levels. Shallow groundwater beneath the site is not used as a potable water source. Based on these considerations, exposure to impacted groundwater is not a complete pathway.

In summary, there is no unacceptable risk to human health or the environment associated with any of the chemicals potentially attributable to releases at Site 3. Therefore, the preferred alternative for Site 3 is No Further Action.

SECTION 8.0

STATUTORY AUTHORITY FINDING

Analytical results from soil samples collected at Site 3 were below soil established cleanup levels for protection of human health and groundwater. In addition, all reported concentrations of organic chemicals dissolved in groundwater were also below cleanup levels.

Based on these observations and conditions, Site 3 does not pose an unacceptable risk to human health or the environment. Accordingly, no further action is recommended at this site. This action is in accordance with and complies with applicable statutes and regulations.

SECTION 9.0

DOCUMENTATION OF SIGNIFICANT CHANGES

No changes were made to this document following the open house community meeting and subsequent 30-day comment period.

SECTION 10.0

REFERENCES

This document was prepared with the use of information contained in the Administrative Record for Site 3, former FTA, which is available for review at NVANG, Reno, Nevada. The primary documents used as sources of the information contained in this decision document are listed below.

Automated Sciences Group (ASG). 1989. *Installation Restoration Program Preliminary Assessment for the Nevada Air National Guard 152nd Tactical Reconnaissance Group (TRG), Reno Cannon International Airport, Reno Nevada.*

Bateman, R.L. and R.B. Scheibach. 1975. *Evaluation of Geothermal Activity in the Truckee Meadows, Washoe County, Nevada.* Nevada Bureau of Mines and Geology Report #25, University of Nevada, Reno, Nevada.

Bingler, E.C. 1975. *Guidebook to the Quaternary Geology Along the Western Flank of the Truckee Meadows, Washoe County, Nevada.* Nevada Bureau of Mines and Geology Report #22, University of Nevada, Reno, Nevada.

Bonham, H.F. and D.K. Rogers. 1983. *Mt. Rose NE Quadrangle Geologic Map 4Bg.* Nevada Bureau of Mines and Geology, University of Nevada, Reno, Nevada.

Baumer, O.W. 1983. *Soil Survey of Washoe County, Nevada, South Part.* Soil Conservation Service.

Cohen, P. and O.J. Loeltz. 1964. *Evaluation of Hydrogeology and Hydrogeochemistry of Truckee Meadows Area, Washoe County, Nevada.* Water Supply Paper #1779-S, U.S. Geological Survey.

ERM-West, Inc. (ERM). 1996. *Installation Restoration Program (IRP) Final Remedial Investigation Report for IRP Sites Nos. 4, 5, 7, and 14, 152nd Tactical Reconnaissance Group (Currently 152nd Airlift Wing), Nevada Air National Guard, Reno Cannon International Airport, Reno, Nevada.*

ERM. 1997. *Final February 1997 Semiannual Groundwater Monitoring Report, Nevada Air National Guard Base, Reno, Nevada.* 2 July 1997.

ERM. 1998a. *Final August 1997 Semiannual Groundwater Monitoring Report, Nevada Air National Guard Base, Reno, Nevada.* 23 February 1998.

ERM. 1998b. *Final March 1998 Semiannual Groundwater Monitoring Report, Nevada Air National Guard Base, Reno, Nevada.* 22 June 1998.

ERM. 1999a. *Final August 1998 Semiannual Groundwater Monitoring Report, Nevada Air National Guard Base, Reno, Nevada.* 28 May 1999.

ERM. 1999b. *Final May 1999 Semiannual Groundwater Monitoring Report, 152nd Airlift Wing, Nevada Air National Guard, Reno Tahoe International Airport, Reno, Nevada.* September 1999.

ERM. 2000a. *Final November 1999 Semiannual Groundwater Monitoring Report, 152nd Airlift Wing, Nevada Air National Guard, Reno Tahoe International Airport, Reno, Nevada.* 25 April 2000.

ERM. 2000b. *Final May 2000 Semiannual Groundwater Monitoring Report, 152nd Airlift Wing, Nevada Air National Guard, Reno Tahoe International Airport, Reno, Nevada.* September 2000.

ERM. 2001. *Final November 2000 Semiannual Groundwater Monitoring Technical Memorandum, Nevada Air National Guard Base.* 11 April 2001.

ERM. 2002a. *Final September 2001 Semiannual Groundwater Monitoring Technical Memorandum, Nevada Air National Guard Base.* 13 February 2002.

ERM. 2002b. *Final March 2002 Semiannual Groundwater Monitoring Technical Memorandum, Nevada Air National Guard Base.* 19 June 2002.

ERM. 2003a. *Final October 2002 Semiannual Groundwater Monitoring Technical Memorandum, Nevada Air National Guard Base.* 2 April 2003.

ERM. 2003b. *April 2003 Semiannual Groundwater Monitoring at the Reno Nevada Air National Guard Base.* 13 August 2003.

ERM. 2004. *October 2003 Semiannual Groundwater Monitoring at the Reno Nevada Air National Guard Base.* 15 March 2004.

Nevada Division of Environmental Protection (NDEP). 1998. *Requirements for IRP Decision Documents*, transmitted in a letter dated 30 December 1998.

Oak Ridge National Laboratory (ORNL/ETS). 1994. *Installation Restoration Program Final Site Investigation Report, 152nd Tactical Reconnaissance Group Nevada Air National Guard Base, Reno, Nevada.*

Oak Ridge National Laboratory (ORNL/ETS). 1992. *Rapid Response Initiative Closure Assessment Report, 152nd Tactical Reconnaissance Group Nevada Air National Guard, Reno Cannon International Airport, Reno, Nevada.*

PEER Consultants. 1992. *Rapid Response Initiative Spill Investigation, Final Site Assessment Report, Nevada Air National Guard, 152nd Tactical Reconnaissance Group, Reno Air National Guard Base, Reno, Nevada.* April 1992.

Taylor, S. R. 1964. *Abundance of Chemical Elements in Continental Crust.* Geochemica et Cosmochimica Acta, 28: 1273-1285.

United States Environmental Protection Agency (USEPA). 1988. *Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA.* Office of Emergency and Remedial Response.

USEPA. 1989. *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents*. July 1989.

USEPA. 1990. Subpart S of the Resource Conservation and Recovery Act (RCRA) Corrective Action Rule. July 1990.

USEPA. 2004. USEPA Region 9 Preliminary Remediation Goals.

Welch, A. H., R. W. Plume, E. A. Frick, and J. L. Hughes. 1989. *Ground-Water-Quality Assessment of the Carson River Basin, Nevada and California: Analysis of Available Water-Quality Data Through 1987.* Open-File Report 89-382. U.S. Geological Survey.

APPENDIX A

RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY

Notice of the open house meeting and public comment period was published in the *Reno Gazette Journal* on 21 and 22 July 2006. The public comment period extended from 25 July through 24 August 2006. The public meeting presenting the proposed site closure was held at the Nevada Air National Guard Base in Reno, Nevada, on 25 July 2006. As of 25 August 2006, the ANG had received no public comments on the proposed closure of Site 3.

Based on the low community response to the Restoration Advisory Board meetings, no attendance at the 25 July 2006 open house meeting, and the lack of community feedback during the 30-day comment period, there appears to be little to no community concern regarding the closure of Site 3.