MEMORANDUM

TO: Julie Jacobs, New Mexico Environment Department
FROM: Chris Larson, Radian International
DATE: 27 August 1996
SUBJECT: 1996 Decision Documents
13 Installation Restoration Program Sites
Holloman AFB, New Mexico
cc: Warren Neff, Holloman AFB (1)
Tom Holcomb, Radian (1)

Enclosed are two copies of the 1996 Decision Documents for 13 Installation Restoration Program sites at Holloman AFB. An electronic copy of the documents has also been provided in WordPerfect 5.1/5.2. If you have questions regarding these documents, or require additional information, please contact Warren Neff at (505) 475-5395.

enclosure: 1996 Decision Documents (2)
3.5 inch disk (1)
DECISION DOCUMENTS

INSTALLATION RESTORATION PROGRAM
HOLLOMAN AIR FORCE BASE, NEW MEXICO

Prepared for
49 CES/CEV
Holloman Air Force Base, NM

Prepared by:
Foster Wheeler
Environmental Corporation
143 Union Blvd., Suite 1010
Lakewood, Colorado 80203
303/988-2202

and

Radian Corporation
8501 North Mopac Blvd.
P.O. Box 201088
Austin, Texas 78720-1088
512/454-4797

Under Contract No. DACW45-94-D-0003, DO No. 2, WAD 03 with:

U.S. Army Corps of Engineers
Omaha District
Omaha, Nebraska

September 1996
A. These Decision Documents present a summary of background, risks, the selected remedy, and community participation for 13 Installation Restoration Program (IRP) sites at Holloman Air Force Base (AFB). The remedies were selected on the basis of investigations and risk assessments conducted for each site. This document was prepared for, and in cooperation with, the Environmental Flight Office: 49 CES/CEV, 550 Tabosa Avenue, Holloman, AFB, New Mexico, 505/475-5395.

B. The decision documents are required as part of the Comprehensive Environmental Responsibility, Compensation and Liability Act (CERCLA).

C. These decision documents provide the rationale for the selected no action remedy at 11 IRP sites and remedial action at 2 IRP sites.
Holloman AFB under the guidance of the U.S. Environmental Protection Agency Region VI (EPA Region VI) and the New Mexico Environment Department (NMED) presents these Decision Documents as part of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA). These Decision Documents summarize information and data found in the reports listed at the end of this section.

The reports have been placed in the Administrative Record, is available at the following locations:

Base Library
955 First Street
Holloman AFB, NM 888310-8037

Alamogordo Public Library
920 Oregon
Alamogordo, NM 88310

In 1983, Holloman AFB entered into the Air Force's IRP by conducting the IRP Phase I Records Search (Holloman AFB, 1993). The IRP is a phased investigation and remediation program that follows the protocols of CERCLA and the statutory amendments (SARA) to CERCLA requiring that federal facilities comply with the National Contingency Plan. Since 1987, Holloman AFB has been actively implementing their IRP through investigations (RIs), feasibility studies (FSs), and remedial actions.

In 1991, U.S. EPA Region VI issued Holloman AFB the Hazardous and Solid Waste Amendments (HSWA) portion of their Resource Conservation and Recovery Act (RCRA) permit (Permit No. NM 657212442). The permit required Holloman AFB to investigate approximately 240 solid waste management units (SWMUs) and areas of concern (AOCs).

Many of the IRP sites included in this document are also RCRA SWMUs or AOCs. Table 1-1 presents the IRP sites and corresponding RCRA site number, and Figure 1-1 shows the location of the sites on Holloman AFB, and Figure 1-2 shows the surface drainages. Since its HSWA permit was issued, Holloman AFB has integrated the two regulatory programs to reduce duplicative efforts. This approach has been embraced by the U.S. EPA Region VI and the New Mexico Environmental Department (NMED). Because the two programs did not begin concurrently, the terminology used to describe the site activities depends on...
### Table 1-1

<table>
<thead>
<tr>
<th>IRP Site Number</th>
<th>IRP Site Name</th>
<th>RCRA Unit Number</th>
<th>Selected Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS-06</td>
<td>POL Fuel Line</td>
<td></td>
<td>No Action</td>
</tr>
<tr>
<td>SD-15</td>
<td>Refrigeration/Heat Shop Washrack</td>
<td></td>
<td>No Action</td>
</tr>
<tr>
<td>OT-16</td>
<td>Existing Entomology Shop Area</td>
<td>118, 132, and AOC-A</td>
<td>No Action</td>
</tr>
<tr>
<td>SS-17</td>
<td>BX Service Station</td>
<td></td>
<td>Soil Vapor Extraction</td>
</tr>
<tr>
<td>OT-24</td>
<td>Former Equipment Maintenance</td>
<td>134</td>
<td>No Action</td>
</tr>
<tr>
<td>SD-27</td>
<td>Pad 9 Washrack Area</td>
<td>141</td>
<td>No Action</td>
</tr>
<tr>
<td>LF-29</td>
<td>Former Army Landfill</td>
<td>104</td>
<td>No Action</td>
</tr>
<tr>
<td>SS-36</td>
<td>Unconventional Fuels Area Spill Site</td>
<td></td>
<td>No Action</td>
</tr>
<tr>
<td>SS-39</td>
<td>Missile Fuel Spill Site</td>
<td>129 and 178</td>
<td>No Action</td>
</tr>
<tr>
<td>OT-45</td>
<td>Old AGE Refueling Station</td>
<td></td>
<td>No Action</td>
</tr>
<tr>
<td>SD-47</td>
<td>POL Washrack Discharge Area</td>
<td></td>
<td>Bioventing</td>
</tr>
<tr>
<td>SS-56</td>
<td>West Ramp Fuel Spill</td>
<td>165, 177, 179, and L</td>
<td>No Action</td>
</tr>
<tr>
<td>LF-58</td>
<td>Incinerator/Landfill</td>
<td>231</td>
<td>No Action</td>
</tr>
</tbody>
</table>
Figure 1-1. Location of 13 IRP Sites at Holloman AFB
Figure 1-2. Surface Drainage Features at Holloman AFB
the time of the investigation and how the program was funded by the Department of Defense. All investigations and studies conducted for the sites in this document have met the requirements of the IRP and RCRA program. Following are some of the issues that may cause some confusion between the two programs:

- Similar phases of the RCRA corrective action program and IRP have unique names and have both been used (i.e., RI vs. RFI).
- IRP sites and RCRA SWMUs have unique names and unique numerical or alphanumerical identifications. Both are provided initially in this report, but the IRP name and identification will be used subsequently.
- Some IRP sites consist of multiple SWMUs, some of which are on different Tables in the HSWA permit. Holloman AFB made efforts to rectify this through Class I permit modifications, but some SWMUs still remain on separate Tables although they constitute only one IRP site.

Efforts are made in these decision documents to clarify the history and terminology. All references in these documents are cited using the IRP terminology.

For the site investigations, evaluation of the data to determine the selected alternative involved completion of a quantitative risk assessments, and a comparison of results to health-based action levels and Base-wide background concentrations for naturally occurring constituents (e.g., inorganics). Risk assessments were conducted using the guidelines provided in the Risk Assessment Guidance for Superfund (EPA, 1989). The background levels were established during two separate studies at Holloman AFB: the Phase I RI Report (Holloman AFB, 1992) and the Base-wide Background Study (Holloman AFB, 1993).

The cleanup of petroleum-contaminated soil and groundwater is guided by an agreement between Holloman AFB and the NMED. This agreement is based on the fact that groundwater beneath Holloman AFB is considered unfit for human consumption and not a source of drinking water because the total dissolved solid and the sulfate concentrations exceed human health standards.

The agreement states that Holloman AFB is not required to remediate groundwater at the Base unless the contamination presents a potential risk to human health or environment. Holloman AFB, however, is required to prevent further degradation of groundwater. To achieve this objective, the NMED established 1000 mg/kg as the Base-specific cleanup level for total recoverable petroleum hydrocarbons (TRPH) in soil. TRPH concentrations in soil exceeding this level must be remediated.
As part of the selected remedy, all construction activities at IRP sites must be coordinated and approved by Holloman AFB Environmental Flight prior to initiation. As a branch of the Federal government, Holloman AFB must comply with the procedures outlined in the National Environmental Protection Act (NEPA). Proposed projects at Holloman AFB must go through the Environmental Impact Analysis Process (EIAP), which includes a review of former or closed IRP sites that may impact the project.
The Decision Documents for Sites SS-06, SD-15, OT-16, SS-17, OT-24, SD-27, LF-29, SS-36, SS-39, OT-45, SD-47, LF-56, and LF-58 use similar terms and acronyms. To eliminate redundancy in the reference to these shared terms and acronyms, the glossary shown below gives a complete list of the acronyms used in the document.

- AFB—Air Force Base
- ARARs—Applicable or Relevant and Appropriate Requirements
- bgl—Below ground level
- BTEX—Benzene, Toluene, Ethylbenzene, and Xylenes
- CERCLA—Comprehensive Environmental Response, Compensation and Liability Act
- EPA—U.S. Environmental Protection Agency
- GAC—Granular Activated Carbon
- HDPE—High-density Polyethylene
- IRP—Installation Restoration Program
- NMED—New Mexico Environment Department
- NM WQCC—New Mexico Water Quality Control Commission
- O&M—Operation & Maintenance
- PCBs—Polychlorinated Biphenyls
- POL—Petroleum, Oil, and Lubricant
- RCRA—Resource Conservation and Recovery Act
- RFI—RCRA Facility Investigation
- RI—Remedial Investigation
- SVE—Soil Vapor Extraction
- SVOCs—Semivolatile Organic Compounds
- SWMU—Solid Waste Management Unit
- TPH—Total Petroleum Hydrocarbons
- TRPH—Total Recoverable Petroleum Hydrocarbons
- VOCs—Volatile Organic Compounds
References

Documents used to prepare these 1996 Decision Documents are contained in the Administrative Record and are listed below:

- The Technical Report—Site 17: BX Service Station (Holloman AFB, November 1988);
- The Installation Restoration Program Remedial Investigation Report (Holloman AFB, 1989);
- The draft Preliminary Investigation and Site Characterization, West Ramp Fuel Contamination, Holloman AFB, New Mexico (Holloman AFB, 1991);
- The Final Corrective Action Plan—Site 17: BX Service Station (Holloman AFB, September 1992);
- The Installation Restoration Program—Decision Document for Site 51 (Holloman AFB, 1992);
- The draft final Risk Assessment Report for the Remedial Investigation—Investigation, Study and Recommendation for 29 Waste Sites (Holloman AFB, June 1992);
- The Remedial Investigation (RI) Report—Investigation, Study and Recommendation for 29 Waste Sites (Holloman AFB, October 1992);
- The revised final Decision Document—Site SS-17: BX Service Station (Holloman AFB, May 1993);
- The draft final Preliminary Assessment and Site Investigation Report—Investigation of Four Waste Sites (Holloman AFB, November 1993);
- The A-E Sample Quality Control Summary Report—SS-17: BX Service (Holloman AFB, December 1993);
- The RI/RFI Investigation Report for SD-47 (Holloman AFB, 1994);
- The Bioventing Initiative Work Plan, Sites SD-47 and FT-31 (Holloman AFB, 1995);
- The Site Investigation Report—Waste Sites SS-06, SD-15, AOC-RR, and AOC-BBMS (Holloman AFB, 1995);
- The draft final Phase II RCRA Facility Investigation Report—Table 1 Solid Waste Management Units (Holloman AFB, July 1995)
The 100% Engineering Plans and Specifications for BX Service Station Remediation System (Holloman AFB, August 1995);

The draft final *Phase I RCRA Facility Investigation Report—Table 2 Solid Waste Management Units* (Holloman AFB, December 1995); and

Declaration

Statutory Preference for Treatment as a Principal Element is not Applicable and a Five-Year Review is not Required

Site Name and Location
IRP Site SS-06
POL Fuel Line Spill Site #2
Holloman Air Force Base, New Mexico

Statement of Basis and Purpose
This decision document presents the selected remedial action for the referenced site, chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan. This decision is based on the administrative record file for this site.

The State of New Mexico concurs on the remedy.

Description of the Selected Remedy: No Action
Information contained in the administrative record for Site SS-06 indicated that no action is necessary to protect human health and the environment.

Declaration Statement
The site investigations and associated risk assessment conducted for the site indicate that conditions at the site do not require action to ensure the protection of human health and the environment. Because no hazardous substances are present on site above health-based levels, a five-year review is not necessary.

If new evidence becomes available and suggests the need for further action, the site closeout decision may be reversed. Likewise, future changes in land use, environmental regulations, or environmental laws may reverse the closeout decision.

Mark Weidler, Cabinet Secretary
New Mexico Environment Department

Date

Dennis R. Larsen
Brigadier General, USAF Commander

Date

September 1996
Decision Summary

Site Name and Location

IRP Site SS-06, the POL Fuel Line Spill Site #2, is located approximately 200 ft south of the POL storage yard in the Main Base area. The site is sparsely vegetated, and the topography gently slopes from the northwest to the southwest. East of the site, the land surface dips rather steeply into a surface drainage feature. The drainage feature, Dillard Draw, is located adjacent to the eastern boundary of the Base. Figure 1-1 shows the location of Site SS-06 at Holloman AFB, and Figure 2-1 shows the site layout.

Soils at the site consist of interbedded sands, silts, and clays. The soils are low to moderately permeable and mildly alkaline. Groundwater flow direction is controlled by southwest-trending arroyos, and is to the southwest, following the Dillard Draw surface drainage system (see Figure 1-2). At Site SS-06, groundwater occurs at approximately 9 to 13 ft bgl and flows to the east, toward Dillard Draw.

The unconfined aquifer beneath the site, as well as the remainder of Holloman AFB, exceeds the New Mexico Human Health Standards for total dissolved solids and sulfate concentrations and has been designated as unfit for human consumption, based on NM WQCC 82-1, as amended through August 18, 1991, Parts 3-100 through 3-103. On the basis of the Guidelines for Groundwater Classification Under the EPA Groundwater Protection Strategy (EPA, 1986), the unconfined aquifer beneath Holloman AFB is classified as Class III B aquifer and is considered nonpotable.

Site History and Enforcement Activities

The site was identified as a potential contaminant source during an IRP records search in 1983. Results of records search indicated that a Base road grader ruptured a JP-4 pipeline leading to the POL storage yard. Approximately 8000 gal. of JP-4 spilled onto the ground before the release could be stopped. Most of the fuel was reportedly recovered during the cleanup response effort. The site was not considered to present a significant concern to human health or the environment but was recommended for future investigation to determine the presence or absence of contamination in the soil and groundwater at the site.

A site investigation was conducted in 1995 to determine the presence or absence of contamination due to the fuel spill. No petroleum constituents were detected in the soil or groundwater during the investigation.

Highlights of Community Participation

Copies of the following report, which contains information pertaining to the site, are available to the public through the administrative record located at the Holloman AFB and Alamogordo libraries:

Figure 2-1. Map of IRP Site SS-06
Public meetings are held semiannually by Holloman AFB to announce the availability of reports and present issues pertaining to the IRP sites on the Base. Representatives from Holloman AFB and the U.S. Army Corps of Engineers (Omaha District) are present at these meetings to address public comments. No comments were received regarding the site at these meetings.

This decision document presents the selected remedial action for the site as chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan.

Scope and Role of the Response Action

The site investigation conducted for Site SS-06 indicates that no action is necessary to protect human health and the environment under CERCLA, as amended by SARA, and to the extent practicable, the National Contingency Plan.

Summary of Site Characteristics

As a result of the IRP records search, a site investigation was conducted in 1995 to determine the presence or absence of contamination at the site. The investigation activities included a soil vapor survey, soil sampling, and groundwater sampling. A summary of the investigation is presented below.

Soil Gas
Soil gas samples were collected from 36 locations distributed across the site in a grid pattern. Soil gas samples were collected every 2 ft to a total depth of 12 ft bgl. The soil gas samples were analyzed in an on-site mobile laboratory for TRPH and BTEX. TRPH was detected in only one sample (22 μg/L) above the detection limit (20 μg/L). BTEX concentrations in the samples ranged from 0.24 to 2.05 μg/L, but could not be distinguished from the total BTEX concentrations in equipment blanks (0.45 to 1.13 μg/L).

Soil
During the site investigation, six borings were drilled to 12 ft bgl. Samples were collected from the interval intersecting the water table and from the interval exhibiting the highest headspace reading. The samples were analyzed by a certified laboratory for VOCs, TRPH, and metals.

No VOCs or TRPH were measured in the samples above their analytical detection limits. Several metals were detected above established Basewide background levels in at least one sample, but below health-based levels.

Groundwater
Six temporary standpipes were installed to collect groundwater samples from the site. Five standpipes were installed along the pipeline and one standpipe was installed upgradient of the site. The standpipes were installed to a depth of 14 ft bgl; however, only three of the six standpipes had sufficient water to collect a sample. The samples were analyzed by a certified laboratory for VOCs and metals.

Acetone (17 μg/L) was detected in one sample. No other VOCs were detected in the samples. Lead (140 μg/L) and zinc (3400 μg/L) were detected above the background levels established for Holloman AFB.
Aluminum (ranging from 40,000 to 72,000 μg/L) was detected above the Basewide background level and above health-based levels. It is unlikely that the aluminum concentrations are a result of the fuel spill at the site. Aluminum is not a typical constituent of POL wastes and is likely naturally-occurring in the soils.

Summary of Site Risks

The results of the site investigation indicated that no petroleum-related constituents were detected in the soil or groundwater samples and, therefore, the site does not pose an unacceptable risk to human health or the environment. In addition, the investigation indicated that no complete exposure pathways to groundwater are present.

Description of the Selected Alternative

The site investigation conducted for the site indicates that no further action is necessary to protect human health and the environment.

Responsiveness Summary

Restoration Advisory Board meetings were held semiannually to present information about the site to the public. Representatives from Holloman AFB and the U.S. Army Corps of Engineers (Omaha District) were present at these meetings to answer questions pertaining to the site. No comments were received during the meetings; therefore, no significant changes to the selected remedial action, as presented, were necessary.
Declaration

Statutory Preference for Treatment as a Principal Element is not Applicable and a Five-Year Review is not Required

Site Name and Location
IRP Site SD-15
Refrigeration/Heat Shop Washrack
Holloman Air Force Base, New Mexico

Statement of Basis and Purpose
This decision document presents the selected remedial action for the referenced site, chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan. This decision is based on the administrative record file for this site.

The State of New Mexico concurs on the remedy.

Description of the Selected Remedy: No Action
Information contained in the administrative record for Site SD-15 indicates that no action is necessary to protect human health and the environment.

Declaration Statement
The investigations conducted for the site indicate that conditions at the site do not require action to ensure the protection of human health and the environment. Because no hazardous substances are present on site above health-based levels, a five-year review is not necessary.

If new evidence becomes available and suggests the need for further action, the site closeout decision may be reversed. Likewise, future changes in land use, environmental regulations, or environmental laws may reverse the closeout decision.

Mark Weidler, Cabinet Secretary
New Mexico Environment Department

9/30/96

Dennis R. Larsen
Brigadier General, USAF Commander

September 1996
Decision Summary

Site Name and Location

IRP Site SD-15, the Refrigeration/Heat Shop Washrack, is located within the Civil Engineering Yard in the Main Base area. The washrack is approximately 25 by 40 ft and is constructed of concrete. The washrack drains to an oil/water separator (SWMU 1) located approximately 40 ft northeast of the washrack.

The majority of the area surrounding the washrack is paved and the topography is flat. An area filled with landscaping rock is located just east of the washrack. Figure 1-1 shows the location of Site SD-15 at Holloman AFB, and Figure 2-1 shows the site layout.

Soil at the site consists of interbedded sands, silts, and clays. The soils are low to moderately permeable and mildly alkaline. Regional groundwater flow is controlled by southwest-trending arroyos, and is to the southwest, following the Dillard Draw drainage system (see Figure 1-2). At Site SD-15, groundwater occurs at approximately 3 to 7 ft bgl. The site-specific groundwater flow direction has not been determined.

The unconfined aquifer beneath the site, as well as the remainder of Holloman AFB, exceeds the New Mexico Human Health Standards for total dissolved solids and sulfate concentrations and has been designated as unfit for human consumption, based on NM WQCC 82-1, as amended through August 18, 1991, Parts 3-100 through 3-103. On the basis of the Guidelines for Groundwater Classification Under the EPA Groundwater Protection Strategy (EPA, 1986), the unconfined aquifer beneath Holloman AFB is classified as Class III B aquifer and is considered nonpotable.

Site History and Enforcement Activities

The washrack was identified as a potential contaminant source during an IRP records search in 1983. Results of the records search indicated that the washrack periodically overflowed and that petroleum products (i.e., oils, greases) are potential contaminants. Also, a sulphuric acid solution used to de-scale cooling equipment was discharged to the washrack from 1971 to 1981.

To determine the presence as well as the nature and extent of contamination associated with the washrack, a site investigation was conducted in 1995. The investigation indicated that there was no evidence of a release to the soil or groundwater by site activities.

The oil/water separator associated with the washrack is listed as SWMU 1 on the Hazardous and Solid Waste Amendments permit issued to Holloman AFB by the U.S. EPA Region VI in 1987. This SWMU was investigated during a RFI conducted in 1994; the RFI did not include Site SD-15. Petroleum contamination associated with SWMU 1 was detected during the RFI, and a voluntary remedial action (i.e., excavation) was recommended in the RFI Report, Table 3 RCRA Facility Investigation (Holloman AFB, July 1995).
Figure 2-1. Map of IRP Site SD-15

LEGEND

- Radian Sample Locations (1994)
- Radian Sample Locations (1994)
- Sl Boring Locations
- Sl Groundwater

Note:
1. Site Features Are Approximate.
Highlights of Community Participation

Copies of the following report, which contains information pertaining to the site, are available to the public through the administrative record located at the Holloman AFB and Alamogordo libraries:


Public meetings are held semiannually by Holloman AFB to announce the availability of reports and present issues pertaining to the IRP sites on the Base. Representatives from Holloman AFB and the U.S. Army Corps of Engineers (Omaha District) are present at these meetings to address public comments. No comments were received regarding the site at these meetings.

This decision document presents the selected remedial action for the site as chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan.

Scope and Role of the Response Action

The site investigation conducted for Site SD-15 indicates that no action is necessary to protect human health and the environment under CERCLA, as amended by SARA, and to the extent practicable, the National Contingency Plan.

Summary of Site Characteristics

As a result of the IRP records search, a site investigation was conducted in 1995 to determine the presence as well as the nature and extent of contamination. A summary of the investigation is presented below.

Soil

During the site investigation, six borings were drilled to groundwater. Samples were collected from the interval intersecting the water table and from the interval exhibiting the highest headspace reading. The samples were analyzed by a certified laboratory for VOCs, TRPH, pH, and metals.

No VOCs or TRPH were measured in the samples above their analytical detection limits. Several metals, including lead (23 mg/kg) and mercury (0.45 mg/kg), were detected below health-based levels but above established Basewide background levels in at least one sample. With the exception of one sample (pH, 5.75), pH values ranged from 6 to 7.91.

Groundwater

Six groundwater samples were collected from the site with DPT sampling probes. Five samples were collected around the washrack and one sample was collected upgradient of the washrack. The samples were analyzed by a certified laboratory for VOCs, pH, and metals.
With the exception of carbon disulfide (maximum concentration, 20 μg/L), which is a common laboratory contaminant, no VOCs were measured in the groundwater samples above their analytical detection limits. Manganese was the only metal detected at a concentration (3.4 mg/L) exceeding health-based levels. However, manganese is not considered a site-related contaminant. Groundwater pH values ranged from 7.08 to 7.69, which is within the acceptable range of 6 to 9.

Summary of Site Risks

The results of the site investigation indicated that the site does not pose an unacceptable risk to human health or the environment because no petroleum-related constituents were detected in the soil or groundwater samples.

Description of the Selected Alternative

The site investigation conducted for the site indicates that no further action is necessary at the site to protect human health and the environment.

Responsiveness Summary

Restoration Advisory Board meetings were held semiannually to present information about the site to the public. Representatives from Holloman AFB and the U.S. Army Corps of Engineers (Omaha District) were present at these meetings to answer questions pertaining to the site. No comments were received during the meetings; therefore, no significant changes to the selected remedial action, as presented, were necessary.
Declaration

Statutory Preference for Treatment as a Principal Element is Applicable and a Five-Year Review is not Required

Site Name and Location
IRP Site OT-16 (RCRA SWMU 118, SWMU 132, and AOC-A) (Existing) Entomology Shop Area Holloman Air Force Base, New Mexico

Statement of Basis and Purpose
This decision document presents the selected remedial action for the referenced site, in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan. This decision is based on the administrative record file for this site.

The State of New Mexico concurs on the remedy.

Description of the Selected Remedy: No Action
Information contained in the administrative record for Site OT-16 indicates that no action is necessary to protect human health and the environment. As part of the no action remedy, a voluntary remedial action to remove petroleum-contaminated soils exceeding the regulatory cleanup level will be conducted for Holloman AFB. Additionally, a long-term groundwater monitoring program will be initiated at the site to ensure the effectiveness of the remedy.

Declaration Statement
The remedial investigation and risk assessment conducted for the site indicate that conditions at the site do not require further action to ensure the protection of human health and the environment. Because no hazardous substances will remain on site above health-based levels, a five-year review is not necessary.

If new evidence suggesting the need for further action becomes available, the site closeout decision may be changed. Likewise, future changes in land use, environmental regulations, or environmental laws may reverse the closeout decision.

Mark Weidler, Cabinet Secretary
New Mexico Environment Department

Dennis R. Larsen
Brigadier General, USAF Commander

September 1996
Holloman Air Force Base

Decision Summary

Site Name and Location

IRP Site OT-16, the (Existing) Entomology Shop Area, is located at Building 21 in the southeastern part of Holloman AFB. The topography of the site is relatively flat and is covered with gravel. No vegetation exists on site. Figure 1-1 shows the location of the site at Holloman AFB, and Figure 2-1 shows the site layout.

The near-surface geology at Holloman AFB consists of interbedded sands, silts, and clays. Soils are low to moderately permeable and mildly alkaline. Groundwater occurs at approximately 5 ft below ground surface at Site OT-16. Local and regional groundwater flow direction is controlled by southwest-trending arroyos. In the southern portion of Holloman AFB, regional groundwater flow is to the southwest, following the Dillard Draw surficial drainage system (see Figure 1-2).

The unconfined aquifer beneath the site, as well as the remainder of Holloman AFB, exceeds the New Mexico Human Health Standards for total dissolved solids and sulfate concentrations and has been designated as unfit for human consumption, based on NM WQCC 82-1, as amended through August 18, 1991, Parts 3-100 through 3-103. On the basis of the Guidelines for Groundwater Classification Under the EPA Groundwater Protection Strategy (EPA, 1986), the unconfined aquifer beneath Holloman AFB is classified as a Class III B aquifer and is considered nonpotable.

Site History and Enforcement Activities

Prior to its conversion to an entomology shop, former Building 21 contained six diesel generators and several transformers used for power generation. After being converted to the existing Entomology Shop, rinse water from washing of pesticide mixing equipment was discharged from 1977 to 1980 to a septic tank leach field located in back of the building. Diesel fuel may have been used to solubilize pesticides and may also have been discharged to the leach field. From 1980 until the building was connected to the Base sewer system in 1988, rinse water from washing of mixing equipment did not go to a septic tank, but was instead discharged into a pit/boring on the northwest side of the building. A pesticide holding tank is located on the southwest side of Building 21, and the tank is housed in a concrete containment box. No spills were reported or documented at the pesticide holding tank or containment box.

IRP Site OT-16 was identified as a potential contaminant source during an IRP records search conducted in 1983. As a result, the site was included in a Phase I RI completed in 1992. Results of the Phase I RI indicated that further investigation was required to delineate soil and groundwater contamination. Upon reviewing the Phase I RI report, U.S. EPA Region VI agreed with the recommendation for additional investigation. Holloman AFB completed a Phase II RFI in 1994 that fully delineated soil and groundwater contamination. Soils from the site with TRPH levels greater than 1000 mg/kg will be excavated in accordance with the Base-Wide POL Remediation Plan (Holloman, 1995).
Figure 2-1. Map of IRP Site OT-16
The site is also listed as SWMU 118, SWMU 132, and AOC-A on the Hazardous and Solid Waste Amendment permit issued to Holloman AFB by U.S. EPA Region VI. The SWMUs were included in a RCRA Facilities Assessment in 1987. The investigation and studies performed for the site met the requirements of both the IRP and RCRA program.

Highlights of Community Participation

Copies of the following reports, which contain information pertaining to the site, are available to the public through the administrative record located at the Holloman AFB and Alamogordo libraries:

- Remedial Investigation Report—Investigation, Study and Recommendation for 29 Waste Sites (Holloman AFB, October 1992);
- Risk Assessment Report for the Remedial Investigation—Investigation, Study and Recommendation for 29 Waste Sites (Holloman AFB, June 1992); and
- Phase I RCRA Facility Investigation Report, Table 2 Solid Waste Management Units, Draft Final (Holloman AFB, December 1995).

Public meetings are held semiannually by Holloman AFB to announce the availability of reports and present issues pertaining to the IRP sites on the Base. Representatives from Holloman AFB and the U.S. Army Corps of Engineers (Omaha District) are present at these meetings to address public comments. No comments were received regarding the site at these meetings.

This decision document presents the selected remedial action for the site as chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan.

Scope and Role of the Response Action

The remedial investigations and the risk assessment conducted for Site OT-16 indicated that no action is necessary at the site to protect human health and the environment under CERCLA, as amended by SARA, and to the extent practicable, the National Contingency Plan. However, because petroleum-contaminated soils exceeding the Base-specific cleanup level for TRPH were detected at the site, Holloman AFB will conduct a voluntary remedial action (i.e., excavation) to remove those soils.

Summary of Site Characteristics

The IRP record search for Site OT-16 indicated that small amounts of pesticides and PCBs may be present at the site. To determine the presence or absence of contamination at Site OT-16, Holloman AFB conducted a Phase I RI in July 1991 to delineate the nature and extent of contamination; Holloman AFB completed a Phase II RFI in 1994. A summary of field investigation results is presented in the following subsections.
Soil
The Phase I RI of SWMU 132 and AOC-A focused on the former disposal pit/boring and the pesticide tank containment box. One boring to groundwater was drilled in the middle of the drainage pit, and two samples were collected from the boring. One sample was collected from just below the top of the pit, and one was collected from the bottom of the boring. Soil samples were analyzed by a certified laboratory for VOCs, petroleum hydrocarbons, organochlorine pesticides, organophosphorus pesticides, and chlorinated herbicides. Pesticides and VOCs detections in soil samples from the Phase I investigation indicated that a release had occurred from activities at the Entomology Shop. 4,4'-DDT (12 µg/kg), alpha-BHC (0.19 µg/kg), delta-BHC (0.65 µg/kg), and methyl parathion (1.5 µg/kg) were detected in the surface soil sample, but none of these analytes were detected in the underlying sample. No analytes were detected at concentrations above soil action levels.

During the Phase II RFI, five soil borings were drilled at SWMU 118, four soil borings were drilled at SWMU 132, eight soil borings were drilled around the former Building 21 generator slabs, and six hand auger samples were collected at the former transformer pad. Soil samples from SWMU 118 were analyzed for TRPH, VOCs, organochlorine pesticides, organophosphorus pesticides and PCBs, and chlorinated herbicides. Soil samples from SWMU 132 were analyzed for organochlorine pesticides and PCBs. Soil samples from AOC-A were analyzed for TRPH and VOCs.

Three analytes were detected above trigger criteria. PCB-1260 was detected at a maximum concentration of 639 µg/kg. TRPH was detected at concentrations as high as 10,300 mg/kg. Heptachlor epoxide was detected at an unconfirmed concentration of 386 µg/kg.

Groundwater
Four monitor wells were sampled and analyzed by a certified laboratory for VOCs, organochlorine pesticides, organophosphorus pesticides, chlorinated herbicides, anions, and total dissolved solids. Organochlorine pesticides and VOCs were detected in all four monitor wells. The highest concentrations and most numerous detections of pesticides and VOCs were in samples from the upgradient monitor well. Benzene (0.0023 mg/L), dieldrin (0.00015 mg/L), trichloroethene (0.0042 mg/L), alpha-BHC (0.0015 mg/L), and gamma-BHC (0.001 mg/L) were all detected in the upgradient well.

During the Phase II investigation, groundwater samples were collected for laboratory analysis from the four existing monitor wells and from seven temporary sampling points using direct push technology. Groundwater samples from monitor wells were analyzed for VOCs, and groundwater samples from Geoprobe locations were analyzed for organochlorine pesticides. Heptachlor epoxide and gamma-BHC were detected above trigger criteria at maximum concentrations of 0.0315 and 0.372 µg/L, respectively. Figure 2-2 shows the location of the Phase I RFI groundwater sample locations.

Summary of Site Risks
As part of the Phase I RI, a quantitative risk assessment was conducted to estimate the potential consequences to human health and the environment that could result if the soil contamination at this site is not remediated. The risk assessment consisted of four basic steps: 1) data analysis and selection of chemicals of concern; 2) identification of exposure pathways and receptors (i.e., dermal contact, ingestion, or inhalation); 3) toxicity
Figure 2-2. Phase II Groundwater Sample Locations
assessment of each contaminant; and 4) quantification of potential carcinogenic, noncarcinogenic, and ecological risks. Results of the risk assessment are summarized below.

A quantitative risk assessment was conducted for IRP Site 16 using data collected during the Phase I and Phase II investigations. The risk assessment methodology is presented in the *Risk Assessment Report for the Investigation—Investigation, Study and Recommendations for 29 Waste Sites* (Holloman AFB, 1992b).

**Human Health Risks**

Generally, a total carcinogenic risk of less than $10^{-6}$ for each chemical contaminant is considered acceptable. This is equivalent to a one-in-one-million excess cancer risk from exposure to that chemical at the site. In addition, the combined carcinogenic risk from all chemical contaminants must be equal to or less than $10^{-4}$, a one-in-ten thousand excess cancer risk. Noncarcinogenic risk is assessed on the basis of a hazard index, which is the ratio of potential daily chemical intake to an acceptable dose. For a noncarcinogenic risk to be acceptable, the hazard index cannot exceed a value of 1.0.

Risk values for all scenarios evaluated were within the range considered acceptable and are presented in the table below.

**Summary of Estimated Human Health Risks for Site OT-16**

<table>
<thead>
<tr>
<th>Exposure Scenario</th>
<th>Estimated Carcinogenic Risk</th>
<th>Estimated Hazard Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average</td>
<td>Reasonable Maximum</td>
</tr>
<tr>
<td>Recreational child</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Residential child or adult</td>
<td>4x10^{10}</td>
<td>3x10^{9}</td>
</tr>
<tr>
<td>Construction worker</td>
<td>3x10^{4}</td>
<td>1x10^{-7}</td>
</tr>
</tbody>
</table>

**Ecological Risk**

Ecological risk was evaluated using an ecological quotient. The ecological quotient estimates the potential risks associated with contaminants of concern primarily through ingestion of soil and/or contaminated plants by native biota. A quotient of less than 1 indicates a low probability of adverse effects. An ecological quotient between 1 and 10 indicates that there is a possibility of adverse ecological effects.

The environmental evaluation for this site determined an ecological quotient for the black-tailed jackrabbit of 0.05, indicating low probability of adverse environmental effects on native fauna.

**Description of the Selected Alternative**

The remedial investigations and associated risk assessments conducted for the site indicated that no action is necessary to protect human health and the environment. However, a limited amount of petroleum-contaminated soil exceeding the Base-specific cleanup level of 1000 mg/kg for TRPH was detected at the site. Holloman AFB will conduct a voluntary remedial action (i.e., excavation) in 1996. The excavation will be
performed in accordance with the approved Base-Wide POL Remediation Plan (Holloman AFB, 1995), and the results of the excavation will be submitted to the NMED.

Although the remedial investigation and risk assessment indicated PCBs levels at the site do not pose a risk to human health or the environment, PCB-contaminated soil will be remediated concurrently with TRPH-contaminated soils.

As part of the no action remedy, a long-term groundwater monitoring program will be initiated to ensure that the remedy continues to provide adequate protection of human health and environment. A long-term monitoring program will be submitted by Holloman AFB to NMED.

Responsiveness Summary

Restoration Advisory Board meetings were held semiannually to present information about the site to the public. Representatives from Holloman AFB and the U.S. Army Corps of Engineers (Omaha District) were present at these meetings to answer questions pertaining to the site. No comments were received during the meetings; therefore, no significant changes to the selected remedial action, as presented, were necessary.
Declaration

Statutory Preference for Treatment as a Principal Element is Applicable and a Five-Year Review is not Required

Site Name and Location
IRP Site SS-17
BX Service Station
Holloman Air Force Base, New Mexico

Statement of Basis and Purpose
This decision document presents the selected remedial action for the referenced site, chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan. This decision is based on the administrative record file for this site.

The State of New Mexico concurs on the remedy.

Assessment of the Site
Actual or threatened releases of hazardous substances from this site do not present a current or potential threat to public health, welfare, or the environment. However, petroleum-contaminated soils exceeding the NMED-cleanup level for TRPH were detected at the site.

Description of the Selected Remedy: Soil Vapor Extraction
The selected remedy will reduce the concentration of petroleum hydrocarbons in the soil to the NMED-cleanup level established for Holloman AFB. The remediation of petroleum hydrocarbons in the soil will limit further degradation of groundwater beneath the site. The major component of the selected remedy is the installation of a soil vapor extraction system. In addition to the selected remedy, a long-term groundwater monitoring program will be conducted at the site to ensure the effectiveness of the remedy.

Declaration Statement
The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practical and satisfies the statutory preferences for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because no hazardous substances are present on site above health-based levels, a five-year review of the site is not required.

Mark Weidler, Cabinet Secretary
New Mexico Environment Department

Dennis R. Larsen
Brigadier General, USAF Commander

Date

September 1996
Holloman Air Force Base

Site Name and Location

IRP Site SS-17, the BX Service Station, is located on First Street in the Main Base area, approximately 1500 ft from the main gate. The site topography is relatively flat and the site is covered with concrete, asphalt, or gravel. Figure 1-1 shows the location of Site SS-17 at Holloman AFB, and Figure 2-1 shows the site layout.

Soils at the site consist of interbedded sands, silts, and clays. The soils are low to moderately permeable and mildly alkaline. Groundwater flow direction is controlled by southwest-trending arroyos, and is to the southwest, following the Dillard Draw drainage system (see Figure 1-2). At Site SS-17 groundwater occurs at approximately 6 to 13 ft bgl and flows to the south-southeast, toward Dillard Draw.

The unconfined aquifer beneath the site, as well as the remainder of Holloman AFB, exceeds the New Mexico Human Health Standards for total dissolved solids and sulfate concentrations and has been designated as unfit for human consumption, based on NM WQCC 82-1, as amended through August 18, 1991, Parts 3-100 through 3-103. On the basis of the Guidelines for Groundwater Classification Under the EPA Groundwater Protection Strategy (EPA, 1986), the unconfined aquifer beneath Holloman AFB is classified as Class III B aquifer and is considered nonpotable.

Site History and Enforcement Activities

The site has been the location of the BX Service Station since the early 1950s. The site contains a service station, a convenience store, and a car wash. Four 10,000-gal. USTs and one 5000-gal. UST were located at the site.

Discrepancies of approximately 125,000 gal. in gasoline storage inventories prompted an investigation at Site SS-17 in 1981. During the investigation, the area around the USTs was excavated and the release of petroleum product was confirmed. Following the investigation, the corroded underground fuel lines that caused the release were replaced.

To determine the extent of the release, test borings and monitor wells were installed at the site in 1981. Product thicknesses of up to 4 ft were found in monitor wells. Two hydrocarbon recovery wells were installed and approximately 5500 gal. of liquid (later determined to be 95% water) were removed. Owing to the poor product recovery rates, recovery operations were discontinued in order to redesign the system.

To fully delineate the extent of contamination and better design the recovery system, an additional site investigation was conducted in 1984. The results of the investigation indicated that approximately 71,000 gal. of product remained at the site.

In 1987, the product recovery system was redesigned and operations were resumed using three recovery wells and two trenches. From January to December 1987, approximately 14,500 gal. were recovered from the site. Operations were then halted to reevaluate the site characteristics and evaluate the performance of the recovery system. In 1988, the existing recovery trenches were modified and two additional trenches were installed.
recovery system was not restarted until late 1989. In 1990, the system was again inspected and enhanced. From 1990 to 1991, approximately 16,800 gal. of product were removed, but from 1991 to 1992, only 99 gal. of product were recovered. Owing to the dramatic decrease in the product recovery rate and negligible product thicknesses, the system was turned off at this time. As of January 1992, the total amount of product removed was approximately 43,500 gal. The five USTs were removed in February 1992 and replaced with three aboveground storage tanks (6000 gal. each).

In 1991, a corrective action study recommended a soil vapor extraction (SVE) system to reduce the concentrations of petroleum hydrocarbons in the soil to the Base-specific cleanup level. A pilot study was initiated in 1991, and in 1996, a full-scale SVE system was installed and began operation.

A decision document was prepared in May 1993 indicating that the free product had been removed from the site and outlined the selection of SVE technology as the voluntary presumptive remedy to reduce the concentration of petroleum hydrocarbons in the soil.

Highlights of Community Participation

Copies of the following reports, which contain information pertaining to the site, are available to the public through the administrative record located at the Holloman AFB and Alamogordo libraries:

- Technical Report—Site 17: BX Service Station (Holloman AFB, November 1988);
- Final Corrective Action Plan—Site 17: BX Service Station (Holloman AFB, September 1992);
- Revised Final Decision Document—Site SS-17: BX Service Station (Holloman AFB, May 1993);
- A-E Sample Quality Control Summary Report—SS-17: BX Service (Holloman AFB, December 1993); and
- 100% Engineering Plans and Specifications for BX Service Station Remediation System (Holloman AFB, August 1995).

Public meetings are held semiannually by Holloman AFB to announce the availability of reports and present issues pertaining to the IRP sites on the Base. Representatives from Holloman AFB and the U.S. Army Corps of Engineers (Omaha District) are present at these meetings to address public comments. No comments were received regarding the site at these meetings.

This decision document presents the selected remedial action for the site as chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan.
Scope and Role of the Response Action

To prevent further degradation of groundwater beneath the site and to mitigate the potential explosive hazard posed by the free product, a product recovery system was installed. The system operated from 1981 until 1992, when only negligible free product remained. The recovery system did not address soil contamination exceeding the Base-specific cleanup level. SVE was selected as the voluntary remedial alternative to reduce TRPH concentrations to the cleanup level. In addition, by removing soil contamination, the SVE system will also remove the contaminant source to groundwater. A long-term groundwater monitoring program will be conducted at the site to ensure the effectiveness of the remedial action.

Summary of Site Characteristics

Test boring and wells installed in 1981 confirmed the release of petroleum product at the site. A product recovery system was installed in 1981, and operated until 1992. An additional investigation conducted in 1984 determined the extent of free product. A corrective action study was conducted in 1993 to determine the extent of soil contamination and the effectiveness of SVE at the site. A full-scale system was installed and began operation in 1996. A summary of the investigations is presented below.

In 1981, several test borings and monitor wells confirmed the presence of free product at the site. Product thicknesses of up to 4 ft were found in several monitor wells. In 1984, a site investigation determined the extent of free product using 15 monitor wells and 14 test holes. Product was detected at thickness levels ranging from trace amounts to 2.3 ft. The results of the report indicated that approximately 71,000 gal. of product remained at the site.

Forty soil borings were drilled and sampled in 1993 to delineate the area requiring soil remediation and to assess the effectiveness of the pilot-scale SVE system. Thirteen of the locations sampled had TRPH as gasoline concentrations equal to or greater than 1000 mg/kg. Figure 2-1 shows the estimated extent of soil contamination.

Summary of Site Risks

To prevent further degradation of groundwater beneath the site and to mitigate the potential explosive hazards associated with free product, a remedial action was initiated soon after the discovery of free product. No risk assessment was performed for the site; however, because the explosive hazards have been mitigated, the site should not pose an unacceptable threat to human health and the environment.

Description of the Selected Alternative

Free product was removed from Site SS-17 from 1981 to 1992. Operation of the free product recovery system ceased in 1992 because of low product recovery and negligible product thickness in the monitor wells. However, because TRPH-contaminated soil remained at the site, above the Base-specific TRPH cleanup level of 1000 mg/kg, Holloman AFB began a voluntary remedial action. To reduce the TRPH concentrations in the

September 1996
unsaturated soils to the cleanup level and to prevent further degradation of groundwater beneath the site, Holloman AFB selected SVE as the voluntary remedial alternative.

SVE is a process for enhancing the volatilization of contaminants in unsaturated soils by removing air from trenches and wells installed in contaminated soil. SVE systems have been implemented extensively and have been widely proved in remediation projects much larger and more complex than this site.

The selected alternative is expected to reduce the TRPH concentrations in the soil to at or below 1000 mg/kg, which is the cleanup level. This alternative should also prevent further degradation of the groundwater. The SVE process is irreversible and, therefore, the treatment is permanent.

The SVE alternative was selected during the corrective action study conducted in 1992. Holloman AFB conducted a pilot study in 1993, and the SVE system was installed in 1995 and is currently operating. The system consists of 16 small trenches with horizontal, slotted PVC extraction pipes buried in each one. The piping is manifolded to a positive displacement blower. Emissions from the blower are routed to a thermal oxidation unit for effluent vapor treatment. Twenty-four soil gas monitor probes were installed in the area to monitor the effectiveness of the SVE system. The selected remedy is presented in Figure 2-2.

Upon completion of the remedial activities, confirmation sampling for TRPH will be conducted to confirm that petroleum concentrations in the soil are at or below 1000 mg/kg. In addition, a long-term monitoring program will be initiated at the site to ensure that the remedy continues to be protective of human health and the environment. A long-term monitoring work plan will be submitted by Holloman AFB for approval by the NMED.

Responsiveness Summary

Restoration Advisory Board meetings were held semiannually to present information about the site to the public. Representatives from Holloman AFB and the U.S. Army Corps of Engineers (Omaha District) were present at these meetings to answer questions pertaining to the site. No comments were received during the meetings, therefore, no significant changes to the selected remedial action, as presented, were necessary.
Figure 2-2. Map of Selected Remedy for IRP Site SS-17
Holloman Air Force Base

IRP Site OT-24
Decision Document

Declaration

Statutory Preference for Treatment as a
Principal Element is not Applicable
and a Five-Year Review is not Required

Site Name and Location
IRP Site OT-24 (RCRA SWMU 134)
Former Equipment Maintenance Area
Holloman Air Force Base, New Mexico

Statement of Basis and Purpose
This decision document presents the selected remedial action for the referenced site chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan. This decision is based on the administrative record file for this site.

The State of New Mexico concurs on the selected remedy.

Description of the Selected Remedy: No Action
Information contained in the administrative record for Site OT-24 indicates that no action is necessary to protect human health and the environment.

Declaration Statement
The remedial investigation, risk assessment, and RCRA facility investigation conducted for the site indicated that conditions at the site do not require further action to ensure the protection of human health and the environment. Because no hazardous substances are present on site above health-based levels, a five-year review is not necessary.

If new evidence becomes available and suggests the need for further action, the site closeout decision may be reversed. Likewise, future changes in land use, environmental regulations, or environmental laws may reverse the closeout decision.

Mark Weidler, Cabinet Secretary
New Mexico Environment Department

Date

Dennis R. Larsen
Brigadier General, USAF Commander

Date

September 1996
Holloman Air Force Base

Decision Summary

Site Name, Location and Description

IRP Site OT-24, the former Equipment Maintenance Area, occupies approximately 14 acres south of the Kelly Road and Hale Drive intersection in the West Base area. Two drainage ditches run north-south along the east and west sides of the site. Hale Drive runs along the eastern ditch, and Buildings 920-924 are located along the western side of the road. A large earthen berm is located east of the ditch. The topography of the site slopes gently to the southwest. Site vegetation consists mainly of grasses and sagebrush. Figure 1-1 shows the location of Site OT-24 at Holloman AFB, and Figure 2-1 shows the layout.

Soils at the site consist of interbedded sands, silts, and clays. The soils are low to moderately permeable and mildly alkaline. Regional groundwater flow direction is controlled by southwest-trending arroyos and is to the southwest, following the Dillard Draw drainage system (see Figure 1-2). At Site OT-24, groundwater occurs at approximately 12 to 16.5 ft bgl and flows to the south, toward Lake Holloman.

The unconfined aquifer beneath the site, as well as the remainder of Holloman AFB, exceeds the New Mexico Human Health Standards for total dissolved solids and sulfate concentrations and has been designated as unfit for human consumption, based on NM WQCC 82-1, as amended through August 18, 1991, Parts 3-100 through 3-103. On the basis of Guidelines for Groundwater Classification Under the EPA Groundwater Protection Strategy (EPA, 1986), the unconfined aquifer beneath Holloman AFB is classified as a Class III B aquifer and is considered nonpotable.

Site History and Enforcement Activities

Maintenance operations were conducted in Buildings 920 through 924 at Site OT-24 from 1959 to 1970. Waste solvents, cleaners, and oils used during these operations were washed down drains and into septic tanks. Interviews and a site inspection conducted in 1991 indicated that wastes were not disposed of in the drainage ditches.

The site is also listed as SWMU 134 on the Hazardous and Solid Waste Amendments Permit issued to Holloman AFB by EPA Region VI. The SWMU was included in a RCRA facility assessment in 1987. The investigations and studies performed for the site met the requirements of both the IRP and the RCRA program.

Site OT-24 was identified as a potential contaminant source during an IRP records search conducted in 1983. As a result, the site was included in a Phase RI conducted in 1991. Results of the Phase I RI indicated that very low levels of BTEX were detected in two of the six monitor wells and that these levels do not pose a threat to human health or the environment. After reviewing the Phase I RI report, U.S. EPA Region VI requested additional groundwater monitoring to confirm the presence of BTEX. A Phase II RFI conducted in 1994 did not confirm the presence of BTEX in the groundwater.
Figure 2-1. Map of IRP Site OT-24
Highlights of Community Participation

Copies of the following reports, which contain information pertaining to the site, are available to the public through the administrative record located at the Holloman AFB and Alamogordo libraries:

- *Remedial Investigation Report—Investigation, Study and Recommendation for 29 Waste Sites* (Holloman AFB, October 1992);

- *Risk Assessment Report for the Remedial Investigation—Investigation, Study and Recommendation for 29 Waste Sites* (Holloman AFB, June 1992); and

- *Phase II RCRA Facility Investigation Report, Table 1 Solid Waste Management Units, Draft Final* (Holloman AFB, July 1995).

Public meetings are held semiannually by Holloman AFB to announce the availability of reports and present issues pertaining to the IRP sites on the Base. Representatives from Holloman AFB and the U.S. Army Corps of Engineers (Omaha District) are present at these meetings to address public comments. No comments were received regarding the site at these meetings.

This decision document presents the selected remedial action for the site as chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan.

Scope and Role of the Response Action

The Phase I RI, the risk assessment, and the Phase II RFI conducted for Site OT-24 indicate that no action is necessary to protect human health or the environment under CERCLA, as amended by SARA, and, to the extent practicable, the National Contingency Plan.

Summary of Site Characteristics

The IRP records search for the site indicated that groundwater contamination may be present as a result of past maintenance activities conducted at the site. During the Phase I RI, six monitor wells were installed and sampled for VOCs, total metals, anions, and total dissolved solids. Benzene was detected in the northernmost well (5.5 μg/L) and the southernmost well (16 μg/L). Both of these wells, which are located adjacent to surface water drainage ditches, contained detectable concentrations of other BTEX constituents.

During the Phase II RFI, groundwater samples were collected from 14 temporary standpipes installed with a direct push technology rig and recollected from the two monitor wells with previously detected BTEX concentrations. The samples from standpipes were screened for BTEX with a field gas chromatograph, and four samples were submitted to a certified laboratory for confirmation analysis. BTEX concentrations were not detected in the two monitor wells, but low levels of benzene (0.55 and 69 μg/L) were detected in two of the seven temporary standpipe locations in the northern portion of the site.
Summary of Site Risks

As part of the Phase I RI, a risk assessment was conducted to estimate the potential consequences to human health and the environment that could result if contamination at this site is not remediated. The risk assessment consisted of four basic steps: 1) data analysis and selection of chemicals of concern; 2) identification of exposure pathways and receptors (i.e., dermal contact, ingestion, or inhalation); 3) toxicity assessment of each contaminant; and 4) quantification of potential carcinogenic, noncarcinogenic, and ecological risks. A detailed description of the risk assessment is contained in the *Risk Assessment Report for the Remedial Investigation-Investigation, Study and Recommendation for 29 Waste Sites* (Holloman AFB, June 1992).

Human Health Risks

The human health risks evaluated for this site were based on the hypothetical exposure of off-Base residents to contaminated groundwater via an off-Base water well. This exposure does not exist because groundwater beneath Holloman AFB is Class III B (nonpotable) aquifer and, therefore, is not considered a potential exposure pathway. However, this hypothetical exposure was evaluated because the aquifer had not been fully characterized in 1991 when the risk assessment was conducted. Groundwater modeling indicated that the low levels of contaminants would not reach the hypothetical receptor location; therefore, the site does not pose an unacceptable risk to human health.

Ecological Risk

Ecological risk was evaluated using an ecological quotient, which estimates the potential ecological risks associated with contaminants of concern, primarily through uptake of contaminants by plants and ingestion of these plants by native biota. An ecological quotient of less than 1 indicates a low probability of adverse effects; a value between 1 and 10 indicates that there is a possibility of adverse ecological effects.

At Site OT-24, the total ecological quotient for black-tailed jack rabbits, selected as the indicator species, ingesting plants from the site was determined to be $3.2 \times 10^{-5}$. This value indicates that the site does not pose an unacceptable risk to the environment.

Description of Selected Alternative

The Phase I RI, risk assessment, and Phase II RFI conducted for the site indicate that no further action is necessary to protect human health and the environment.

Responsiveness Summary

Restoration Advisory Board meetings were held semiannually to present information about the site to the public. Representatives from Holloman AFB and the U.S. Army Corps of Engineers (Omaha District) were present at these meetings to answer questions pertaining to the site. No comments were received during the meetings; therefore, no significant changes to the selected remedial action, as presented, were necessary.
Declaration

Statutory Preference for Treatment as a Principal Element is not Applicable and a Five-Year Review is not Required

Site Name and Location
IRP Site SD-27 (SWMU 141)
Pad 9 Washrack Area
Holloman Air Force Base, New Mexico

Statement of Basis and Purpose
This decision document presents the selected remedial action for the referenced site, chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan. This decision is based on the administrative record file for this site.

The State of New Mexico concurs on the remedy.

Description of the Selected Remedy: No Action
Information contained in the administrative record for Site SD-27 indicates that no action is necessary to protect human health and the environment.

Declaration Statement
The remedial investigation and risk assessment conducted for the site indicate that conditions at the site do not require further action to ensure the protection of human health and the environment. Because no hazardous substances are present on site above health-based levels, a five-year review is not necessary.

If new evidence suggesting the need for further action becomes available, the site closeout decision may be changed. Likewise, future changes in land use, environmental regulations, or environmental laws may reverse the closeout decision.

Mark Weidler, Cabinet Secretary
New Mexico Environment Department

Dennis R. Larsen
Brigadier General, USAF Commander
Decision Summary

Site Name and Location

IRP Site SS-27, the Pad 9 Washrack Area, is located east of Taxiway F near Building 882 in the Main Base area. Site topography is relatively flat, and the area is sparsely vegetated. A moderate depression south of the pad marks the location of a former discharge pit. This former pit is overgrown with bushes and small trees and is surrounded by a slightly damaged wire-mesh fence. Figure 1-1 shows the location of Site SD-27 at Holloman AFB, and Figure 2-1 shows the site layout.

Soils at the site consist of interbedded sands, silts, and clays. The soils are low to moderately permeable and mildly alkaline. Approximately 8 to 10 ft of fill material overlies the soils within the former discharge pit. A hard caliche layer was encountered at 16 ft bgl. Regional groundwater flow direction is controlled by southwest-trending arroyos and flows to the southwest, following the Dillard Draw drainage system (see Figure 1-2). At Site SD-27, groundwater occurs approximately 8 ft bgl. Site-specific groundwater flow direction has not been determined.

The unconfined aquifer beneath the site, as well as the remainder of Holloman AFB, exceeds the New Mexico Human Health Standards for total dissolved solids and sulfate concentrations and has been designated as unfit for human consumption, based on NM WQCC 82-1, as amended through August 18, 1991, Parts 3-100 through 3-103. On the basis of the Guidelines for Groundwater Classification Under the EPA Groundwater Protection Strategy (EPA, 1986), the unconfined aquifer beneath Holloman AFB is classified as a Class III B aquifer and is considered nonpotable.

Site History and Enforcement Activities

The site was identified as a potential contaminant source during an IRP records search in 1983. Results of the records search indicated that the washrack was used to wash down drones and manned aircraft that had flown through clouds of nuclear blast materials in the late 1940s and early 1950s. Planes washed at the site were reportedly involved in a project studying fallout from nuclear explosions. The planes were equipped with air sampling devices and were flown through blast clouds to collect fallout samples. Following sampling activities, the planes were washed down with water. All runoff from the washrack drained into an unlined pit directly south of the pad area. The pit was approximately 12 ft deep. According to personnel interviews, the pad has not been used for aircraft maintenance since these activities ceased.

The site is also listed as SWMU 141 on the Hazardous and Solid Waste Amendments Permit issued to Holloman AFB by EPA Region VI. The SWMU was included in a RCRA facility assessment in 1987. The investigations and studies performed for the site met the requirements of both the IRP and the RCRA program.

In May 1976, soil samples were collected from the bottom of the pit and submitted for analysis. The analytical results indicated no radiation above normal background levels. The pit was backfilled after this soil sampling event.
Figure 2-1. Map of IRP Site SD-27
A site investigation was conducted in 1993 at the site. The investigation confirmed that radioactivity levels at the site did not exceed background levels. No evidence of petroleum contamination was detected above the water table; however, soil staining and petroleum constituents were detected in soils below the water table. The associated qualitative risk assessment concluded that the site did not pose an unacceptable risk to human health and the environment. After reviewing the investigation report, the NMED requested additional investigation to further delineate the vertical extent of contamination in the discharge pit. Additional sampling conducted in 1994 delineated the vertical extent of contamination.

Highlights of Community Participation

Copies of the following reports, which contain information pertaining to the site, are available to the public through the administrative record located at the Holloman AFB and Alamogordo libraries:

- *Preliminary Assessment and Site Investigation Report—Investigation of Four Waste Sites* (Holloman AFB, November 1993); and


Public meetings are held semiannually by Holloman AFB to announce the availability of reports and present issues pertaining to the IRP sites on the Base. Representatives from Holloman AFB and the U.S. Army Corps of Engineers (Omaha District) are present at these meetings to address public comments. No comments were received regarding the site at these meetings.

This decision document presents the selected remedial action for the site as chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan.

Scope and Role of the Response Action

Results from the site investigations and the qualitative risk assessment conducted indicate that no action is necessary to protect human health and the environment under CERCLA, as amended by SARA, and, to the extent practicable, the National Contingency Plan.

Summary of Site Characteristics

As a result of the IRP records search, a site investigation was conducted in 1993. The investigation detected petroleum contamination below the water table. Additional sampling conducted in 1994 delineated the vertical extent of contamination. A summary of these investigations is presented in the following subsections.
Soil
During the investigation in 1993, one boring was drilled near the former discharge pipe south of the washrack, two soil borings were drilled within the drainage pit, and one hand auger boring was drilled near the transformer.

Gross alpha and beta radioactivity levels measured in the samples were not greater than background. In addition, detected radioactivity levels were compared with *Waste Acceptance Criteria for Radioactive Solid Waste Disposal at SWSA-6* (Oak Ridge National Laboratory [ORNL], 1993). Solids with alpha activity exceeding 30 pCi/g are considered radioactive waste by ORNL. None of the samples at Site SD-27 exceeded these levels.

While drilling the soil boring in the discharge pit, stained soils with a fuel odor were noted beginning below the water table (approximately 8 ft bgl) and extending to a depth of 15 ft bgl. The soil above the water table was not stained (it is primarily fill used to cover the former discharge pit). Kerosene (430 µg/kg), ethylbenzene (680 µg/kg), toluene (51 µg/kg), and xylenes (2100 µg/kg) were detected in the sample collected from the stained interval.

In 1994, one soil boring was drilled within the discharge pit to a depth of 16 ft bgl. Visible staining and a petroleum odor were noted below the water table. Three soil samples were collected from intervals below the water table and analyzed by a certified laboratory for VOCs, SVOCs, and TRPH.

VOCs and SVOCs concentrations were detected in each of the three samples. Benzene concentrations ranged from 2.55 to 12.3 mg/kg. TRPH concentrations ranged from 150 to 6000 mg/kg. In general, the highest contaminant concentrations were detected in the sample taken below the water table from the 10- to 12-ft sample interval. TRPH concentrations above the Base-specific level of 1000 mg/kg were detected only in the 10- to 12-ft interval; therefore, the vertical extent of TRPH contamination has been delineated. Petroleum constituents were detected below 12 ft and visible staining was observed to a depth of 15.7 ft bgl, indicating that contamination does not extend below 16 ft. Samples could not be collected below 16 ft bgl because of formation resistance.

**Summary of Site Risks**

A qualitative risk assessment, conducted as part of the site investigation, identified potential receptors but concluded that the exposure pathways were incomplete and the contaminant concentrations were below health-based levels. Therefore, the site does not pose an unacceptable risk to human health or the environment.

**Description of the Selected Alternative**

The site investigations conducted for Site SD-27 indicate that no further action is necessary to protect human health or the environment.
Responsiveness Summary

Restoration Advisory Board meetings were held semiannually to present information about the site to the public. Representatives from Holloman AFB and the U.S. Army Corps of Engineers (Omaha District) were present at these meetings to answer questions pertaining to the site. No comments were received during the meetings; therefore, no significant changes to the selected remedial action, as presented, were necessary.
Declaration

Statutory Preference for Treatment as a Principal Element is not Applicable and a Five-Year Review is Required

Site Name and Location
IRP Site LF-29 (RCRA SWMU 104)
Former Army Landfill
Holloman Air Force Base, New Mexico

Statement of Basis and Purpose
This decision document presents the selected remedial action for the referenced site, chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan. This decision is based on the administrative record file for this site.

The State of New Mexico concurs on the remedy.

Description of the Selected Remedy: No Action
Information contained in the administrative record for Site LF-29 indicates that no action is necessary to protect human health and the environment. As part of the no action remedy, a long-term groundwater monitoring program will be initiated at the site to ensure the effectiveness of the remedy.

Declaration Statement
The site investigations and associated risk assessment conducted for the site indicate that conditions at the site do not require action to ensure the protection of human health and the environment. However, because waste may be present on site, a review will be conducted within five years to ensure that the remedy continues to provide adequate protection of human health and the environment.

If new evidence becomes available and suggests the need for further action, the site closeout decision may be reversed. Likewise, future changes in land use, environmental regulations, or environmental laws may reverse the closeout decision.

Mark Weidler, Cabinet Secretary
New Mexico Environment Department

Dennis R. Larsen
Brigadier General, USAF Commander

Date

September 1996
Decision Summary

Site Name and Location

IRP Site LF-29, the Former Army Landfill, occupies approximately 3 acres in the North Base area and is located approximately 300 ft north of Building 1001. The site is surrounded by a small (3 ft) earthen berm that extends 400 ft north-south and 350 ft east-west. The topography of the site slopes gently to the southwest. Site vegetation consists primarily of grasses, sagebrush, and other brushy vegetation. Figure 1-1 shows the location of Site LF-29 at Holloman AFB, and Figure 2-1 shows the site layout.

Soils at the site consist of interbedded sands, silts, and clays. The soils are low to moderately permeable and mildly alkaline. Groundwater flow direction is controlled by southwest-trending arroyos, and is to the northwest, following the Lost River drainage system (see Figure 1-2). At Site LF-29, groundwater occurs at approximately 19 to 24.5 ft bgl and flows to the west-northwest toward the Lost River drainage basin.

The unconfined aquifer beneath the site, as well as the remainder of Holloman AFB, exceeds the New Mexico Human Health Standards for total dissolved solids and sulfate concentrations and has been designated as unfit for human consumption, based on NM WQCC 82-1, as amended through August 18, 1991, Parts 3-100 through 3-103. On the basis of the Guidelines for Groundwater Classification Under the EPA Groundwater Protection Strategy (EPA, 1986), the unconfined aquifer beneath Holloman AFB is classified as Class III B aquifer and is considered nonpotable.

Site History and Enforcement Activities

The site was identified as a potential contaminant source during an IRP records search in 1983. Results of the records search indicated that the Army disposed of spent munitions and missiles at the site from the early 1950s to 1975. An earthen berm surrounds the site and warning signs are located outside the berm on each side of the landfill. Materials were also dumped outside the berm, roughly 200 ft south of the landfill. These materials are primarily construction debris.

The site is listed as SWMU 104 on the Hazardous and Solid Waste Amendments Permit issued to Holloman AFB by EPA Region VI. The SWMU was included in a RCRA facility assessment in 1987. The investigations and studies performed for the site met the requirements of the IRP and RCRA program.

A Phase I RI conducted in 1991 indicated that a release of contaminants may not have occurred at the site and that the site does not pose an unacceptable risk to human health or the environment. After reviewing the Phase I RI report, EPA Region VI and NMED requested the installation of additional monitor wells to provide adequate flow path coverage. In 1994, a Phase II RFI adequately characterized the groundwater beneath the site.
Figure 2-1. Map of IRP Site LF-29
Highlights of Community Participation

Copies of the following reports, which contain information pertaining to the site, are available to the public through the administrative record located at the Holloman AFB and Alamogordo libraries:

- *Remedial Investigation Report—Investigation, Study and Recommendation for 29 Waste Sites* (Holloman AFB, October 1992);
- *Risk Assessment Report for the Remedial Investigation—Investigation, Study and Recommendation for 29 Waste Sites* (Holloman AFB, June 1992); and
- *Phase II RCRA Facility Investigation Report, Table I Solid Waste Management Units, Draft Final* (Holloman AFB, July 1995).

Public meetings are held semiannually by Holloman AFB to announce the availability of reports and present issues pertaining to the IRP sites on the Base. Representatives from Holloman AFB and the U.S. Army Corps of Engineers (Omaha District) are present at these meetings to address public comments. No comments were received regarding the site at these meetings.

This decision document presents the selected remedial action for the site as chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan.

Scope and Role of the Response Action

The site investigations and risk assessment indicate that no action is necessary to protect human health and the environment under CERCLA, as amended by SARA, and to the extent practicable, the National Contingency Plan.

Summary of Site Characteristics

As a result of the IRP records, a Phase I RI was conducted in 1991 to determine the presence or absence of groundwater contamination beneath the site. Soil samples were not collected at the site because of the dangers associated with sampling in an area that may contain unexploded ordnance.

During the Phase I RI, four monitor wells were installed and sampled. The samples were analyzed by a certified laboratory for VOCs, total metals, organophosphorus pesticides, organochlorine pesticides, PCBs, explosives, chlorinated herbicides, anions, and TDS. The only VOC detected was chloroform (ranging from 5 to 22 µg/L) in two wells. 4,4'-DDD was detected at a concentration of 0.028 µg/L in one monitor well. Metals were not detected above background levels established for Holloman AFB.

During the Phase II RFI, three wells were installed downgradient of the site and one well was installed upgradient of the site to provide adequate flow path coverage. Groundwater samples were collected from the
four new wells and three existing wells and were analyzed by a certified laboratory for VOCs, metals, organochlorine pesticides, chlorinated herbicides, and explosives.

The highest concentrations of organic compounds (benzene, 3100 μg/L; 1,2-dichloroethene, 350 μg/L) were detected in the upgradient well. 1,3,5-trinitrobenzene (2.6 μg/L) and 2,4,6-trinitrotoluene (0.23 μg/L) were also detected in the upgradient well. Low levels of contaminants were detected in the downgradient wells; however, relative concentrations indicate that the contaminant source is upgradient of the landfill. An investigation to determine the upgradient source of contamination will be completed in 1996 as a newly identified source not related to Site LF-29.

Summary of Site Risks

As part of the Phase I RI, a risk assessment was conducted to estimate the potential consequences to human health and the environment posed by the site. The risk assessment consisted of four basic steps: 1) data analysis and selection of chemicals of concern; 2) identification of exposure pathways and receptors (i.e., dermal contact, ingestion, or inhalation); 3) toxicity assessment of each contaminant; and 4) quantification of potential carcinogenic, noncarcinogenic, and ecological risks. Results of the risk assessment are summarized below.

**Human Health Risks**

No potential human receptors were identified during the risk assessment. In addition, because groundwater beneath Holloman AFB is a Class III B (nonpotable) aquifer, it is not considered a resource for human consumption and, therefore, is not a potential exposure pathway.

**Ecological Risks**

Ecological risks were evaluated using an ecological quotient, which estimates the potential ecological risks associated with the contaminants of concern, primarily through the ingestion of soil and/or contaminated plants. An ecological quotient of less than 1 indicates a low probability of adverse effects, and ecological quotient between 1 and 10 indicates that there is a possibility of adverse ecological effects.

At Site LF-29, the ecological quotient for the White Sands Pupfish is 0 because groundwater modeling indicated that the contaminants will not reach the Lost River drainage system. The ecological quotient estimated for the black-tailed jackrabbit via ingestion of contaminated plants is $10^{-5}$, which suggests that the site does not pose an unacceptable risk to the environment.

**Description of the Selected Alternative**

The site investigations and associated risk assessment conducted for Site LF-29 indicate that no further action is necessary to protect human health and the environment.

As part of the no action remedy, a long-term monitoring program will be initiated to ensure that the remedy continues to provide adequate protection of human health and the environment. A long-term monitoring program will be submitted by Holloman AFB to NMED.
Responsiveness Summary

Restoration Advisory Board meetings were held semiannually to present information about the site to the public. Representatives from Holloman AFB and the U.S. Army Corps of Engineers (Omaha District) were present at these meetings to answer questions pertaining to the site. No comments were received during the meetings; therefore, no significant changes to the selected remedial action, as presented, were necessary.
Declaration

Statutory Preference for Treatment as a Principal Element is Applicable and a Five-Year Review is not Required

Site Name and Location
IRP Site SS-36 (RCRA SWMUs 129 and 178)
Unconventional Fuels Area Spill Site
Holloman Air Force Base, New Mexico

Statement of Basis and Purpose
This decision document presents the selected remedial action for the referenced site, chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan. This decision is based on the administrative record file for this site.

The State of New Mexico concurs on the remedy.

Description of the Selected Remedy: No Action
Information contained in the administrative record for Site SS-36 indicates that no action is necessary to protect human health and the environment. However, a voluntary remedial action was conducted to remove petroleum-contaminated soils exceeding the NMED-cleanup level for Holloman AFB.

Declaration Statement
The remedial investigation, associated risk assessment, RCRA facility investigation, and voluntary remedial action conducted for the site indicate that conditions at the site do not require action to ensure the protection of human health and the environment. Because no hazardous substances are present on site above health-based levels, a five-year review is not necessary.

If new evidence suggesting the need for further action becomes available, the site closeout decision may be changed. Likewise, future changes in land use, environmental regulations, or environmental laws may reverse the closeout decision.

Mark Weidler, Cabinet Secretary
New Mexico Environment Department

Dennis R. Larsen
Brigadier General, USAF Commander

September 1996
Holloman Air Force Base

IRP Site SS-36
Decision Document

Decision Summary

Site Name and Location

IRP Site SS-36, the Unconventional Fuels Area Spill Site, is located near former Buildings 1191 and 1192 at Holloman AFB, New Mexico. The first acid storage area and the former aniline storage area (former Building 1112) are also included in Site SS-36. The first acid storage area is located west of Building 1191 and the former aniline storage area is to the east. The site has been converted to the Base Equestrian Facility and fuels are no longer stored on site. The foundations for former Buildings 1191, 1192, and 1112 now serve as horse stables. Site topography is relatively flat, and the area is sparsely vegetated except in the horse corrals where the area is void of vegetation. Figure 1-1 shows the location of the site at Holloman AFB, and Figure 2-1 shows the site layout.

Soils at the site consist of interbedded sands, silts, and clays. The soils are low to moderately permeable and mildly alkaline. Groundwater flow direction is controlled by southwest-trending arroyos, and is to the northwest, following the Lost River drainage system (see Figure 1-2). Groundwater occurs at approximately 30 ft bgl at the site and flows to the west-northwest toward the Lost River drainage basin.

The unconfined aquifer beneath the site, as well as the remainder of Holloman AFB, exceeds the New Mexico Human Health Standards for total dissolved solids and sulfate concentrations and has been designated as unfit for human consumption, based on NM WQCC 82-1, as amended through August 18, 1991, Parts 3-100 through 3-103. On the basis of the Guidelines for Groundwater Classification Under the EPA Groundwater Protection Strategy (EPA, 1986), the unconfined aquifer beneath Holloman AFB is classified as Class III B aquifer and is considered nonpotable.

Site History and Enforcement Activities

Between 1952 and 1964, Site SS-36 served as an unconventional fuels storage area. Fuels stored at the site included unsymmetrical dimethylhydrazine, JP-4, inhibited red fuming nitric acid, inhibited white fuming nitric acid, and aniline. Buildings 1191 and 1192 had a total of four runoff pits that received all spilled fuels and floor washings from the concrete pad storage and mixing areas. Three runoff pits were located south of Building 1192 and one runoff pit was located south of Building 1191. The sumps are constructed of reinforced concrete with an approximated diameter of 6 ft and depth of 9 ft. The pits appear to have been filled with gravel and are open at the bottom. Building 1192 stored oxidizers, and Building 1191 stored propellants.

In 1983, Site SS-36 was identified as a potential contaminant source during an IRP records search. As a result, the site was included in a Phase I RI completed in 1992. Results of the Phase I RI indicated that petroleum contamination may be present in the groundwater beneath the site. Results of the Phase I RI indicated that groundwater beneath the site does pose an unacceptable risk to human health and the environment. However, because of insufficient soil data and an unanticipated groundwater flow direction, an additional investigation was recommended. After review of the Phase I RI report, the U.S. EPA concurred with the recommendations. A Phase II RFI was conducted in 1994. Results of the investigation indicated that the soil and groundwater beneath the site does not pose unacceptable risks, but that a small area of petroleum-contaminated soil above
Figure 2-1. Map of IRP Site SS-36
Holloman Air Force Base

IRP Site SS-36

Decision Document

the Base-specific cleanup level was present. Holloman AFB, during a voluntary remedial action in 1995, removed the TRPH-contaminated soil. Groundwater contamination was not detected during a Phase II RFI conducted in 1994.

The site is listed as SWMUs 129 and 178 on the Hazardous and Solid Waste Amendments Permit issued to Holloman AFB by U.S. EPA Region VI. These SWMUs were included in a RCRA facilities assessment in 1987. The investigation and studies performed for the site met the requirements of the IRP and RCRA program.

**Highlights of Community Participation**

Copies of the following reports, which contain information pertaining to the site, are available to the public through the administrative record located at the Holloman AFB and Alamogordo libraries:

- *Remedial Investigation Report—Investigation, Study and Recommendation for 29 Waste Sites* (Holloman AFB, October 1992);
- *Risk Assessment Report for the Remedial Investigation—Investigation, Study and Recommendation for 29 Waste Sites* (Holloman AFB, June 1992); and
- *Phase I RCRA Facility Investigation Report, Table 2 Solid Waste Management Units, Draft Final* (Holloman AFB, 1995).

Public meetings are held semiannually by Holloman AFB to announce the availability of reports and present issues pertaining to the IRP sites on the Base. Representatives from Holloman AFB and the U.S. Army Corps of Engineers (Omaha District) are present at these meetings to address public comments. No comments were received regarding the site at these meetings.

This decision document presents the selected remedial action for the site as chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan.

**Scope and Role of the Response Action**

The site investigations and risk assessment indicate that no action is necessary to protect human health and the environment under CERCLA, as amended by SARA, and to the extent practicable, the National Contingency Plan. However, because petroleum-contaminated soils exceeding the Base-specific cleanup level for TRPH were detected at the site, Holloman AFB conducted a voluntary remedial action (i.e., excavation) in 1995 to remove those soils.
Summary of Site Characteristics

The IRP records search conducted in 1983 indicated that contamination may be present at the site. The Phase I RI for Site SS-36 involved installation of a five-well groundwater monitoring network. Groundwater collected during this investigation was analyzed for VOCs, TRPH, total metals, total dissolved solids, and anions. No soil samples were collected during this investigation. Results from this investigation indicated that additional monitor wells should be installed because the original wells were not placed downgradient of potential source areas and no soil samples had been collected. Additional groundwater samples and soil samples were collected during the 1994 RFI. Four additional groundwater monitor wells were installed, and a total of 59 soil samples were collected. All RFI groundwater samples were collected for lead, nitrate-nitrite, TRPH, and SVOCs, and soil samples for TRPH, SVOCs, and lead. A summary of the analytical results are presented below.

Soil

Results from the Phase II RFI indicate that no visibly contaminated soil was observed. TRPH was detected in 19 samples; however, TRPH concentrations exceeded the cleanup level in surface samples from only two locations. No VOCs or SVOCs were detected at concentrations above RCRA action levels. The only VOCs detected above detection limits and not detected in the method blanks were toluene, acetone, and methyl ethyl ketone (the last two compounds being common lab contaminants).

Lead was detected at concentrations exceeding background levels established for Holloman AFB in seven samples, and exceeding trigger criteria in only one soil sample—a hand-auger sample collected from a drain at the former first acid storage area. Elevated levels of lead were detected in all four drain samples, which indicates that the metal drains themselves may be the possible sources of the lead. Soil pH levels in potentially contaminated samples ranged from 6.4 to 8.4, indicating that no releases of nitric acid have occurred at the site. Soil pH in background samples range from 7.26 to 7.74.

Groundwater

During the Phase I RI, five monitor wells were installed and sampled. The samples were analyzed by a certified laboratory for VOCs, TRPH, metals, anions, and total dissolved solids. With the exception of trichloroethene (24 μg/L) in one sample, VOCs were measured below analytical detection limits or were detected in the laboratory blank, making their presence in the normal sample uncertain. TRPH concentrations (ranging from 1380 to 2690 μg/L) were detected below risk-based levels. Nitrate/nitrite (ranging from 32 to 97 mg/L) was detected near, but below, the background concentration established for Holloman AFB. One sample contained lead above the background level.

During the Phase II RFI, four wells were installed and sampled. The samples were analyzed by a certified laboratory for TRPH, SVOCs, lead and nitrate/nitrite. No TRPH or SVOCs concentrations were detected in the groundwater. Lead (1.69 μg/L) and nitrate/nitrite (ranging from 0.0345 to 31.9 mg/L) were detected below background levels.
Summary of Site Risks

As part of the Phase I RI, a risk assessment was conducted to estimate the potential consequences to human health and the environment posed by the site. The risk assessment consisted of four basic steps: 1) data analysis and selection of chemicals of concern; 2) identification of exposure pathways and receptors (i.e., dermal contact, ingestion, or inhalation); 3) toxicity assessment of each contaminant; and 4) quantification of potential carcinogenic, noncarcinogenic, and ecological risks. A second risk assessment was conducted in conjunction with the Phase II RFI and incorporated the analytical results from the 1994 investigation. The same methodology was used in this risk assessment as in the 1992 one. The results of the risk assessment are presented below.

Human Health Risks
A total carcinogenic risk of less than $10^{-6}$ for each chemical contaminant is considered acceptable. This is equivalent to a one-in-a-million excess cancer risk from exposure to that chemical at the site. The combined carcinogenic risk from all chemical contaminants must be equal to or less than $10^{-4}$, a one-in-one-thousand excess cancer risk. Noncarcinogenic risk is assessed on the basis of a hazard index, which is the ratio of potential daily chemical intake to an acceptable dose. For a noncarcinogenic risk to be acceptable, the hazard index should not exceed a value of 1.0.

The Phase I RI risk assessment determined that there were no existing or potential human receptors for Site SS-36. Therefore, human health risks were not calculated. The risk assessment calculated risk values for all potential scenarios and found all to be acceptable. For the on-site worker scenario, carcinogenic risks ranged from $3 \times 10^{-7}$ to $4 \times 10^{-7}$. Present and future recreational carcinogenic risks are $2 \times 10^{-7}$ to $7 \times 10^{-7}$ for the average and reasonable maximum exposure scenarios, respectively. Potential future construction worker carcinogenic risks are $3 \times 10^{-10}$ and $5 \times 10^{-10}$ for average and reasonable maximum exposures, respectively.

The noncarcinogenic hazard index for this the site was not assessed because none of the contaminants had noncarcinogenic toxicity values.

Ecological Risks
Ecological risks were evaluated using an ecological quotient, which calculates the potential ecological risks associated with the contaminants of concern through the ingestion of soil and/or contaminated plants. Ecological quotients above a value of 1 represent the possibility of adverse environmental effects occurring from the intake of contaminants. No adverse ecological effects are expected to occur at sites with an ecological quotient of less than 1.

The ecological quotient from the 1992 risk assessment for aquatic organisms of $1 \times 10^{-4}$ was based on modeled surface water concentrations in Malone Draw. The ecological quotient was $1 \times 10^{-5}$ for the black-tailed jackrabbit. These results indicate a very low possibility of any adverse environmental effects from contaminants of potential concern at the site. An ecological quotient for the 1994 risk assessment was calculated for the site using the additional Phase II RFI data. An ecological quotient of 0.3 was determined for black-tailed jackrabbits. Therefore the risk assessment concluded that a low probability of any adverse environmental effects from contaminant levels at the site exist.
Description of the Selected Alternative

The site investigations and associated risk assessments conducted for the site indicated that no action is necessary to protect human health and the environment. However, a limited amount of petroleum-contaminated soil exceeding the Base-specific cleanup level was detected at the site. Holloman AFB conducted a voluntary remedial action (i.e., excavation) in 1995. The excavation was performed in accordance with the approved Base-Wide POL Remediation Plan (Holloman AFB, 1995). Less than 1 yd$^3$ of petroleum-contaminated soil was removed from the site.

Responsiveness Summary

Restoration Advisory Board meetings were held semiannually to present information about the site to the public. Representatives from Holloman AFB and the U.S. Army Corps of Engineers (Omaha District) were present at these meetings to answer questions pertaining to the site. No comments were received during the meetings; therefore, no significant changes to the selected remedial action, as presented, were necessary.
Holloman Air Force Base

Site Name and Location
IRP Site SS-39 (RCRA SWMUs 165, 177, 179, and 181)
Missile Fuel Spill Site
Holloman Air Force Base, New Mexico

Statement of Basis and Purpose
This decision document presents the selected remedial action for the referenced site, chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan. This decision is based on the administrative record file for this site.

The State of New Mexico concurs on the remedy.

Description of the Selected Remedy: No Action
Information contained in the administrative record for Site SS-39 indicates that no action is necessary to protect human health and the environment. As part of the no action remedy, a long-term monitoring program will be initiated at the site to ensure the effectiveness of the remedy.

Declaration Statement
The remedial investigation and associated risk assessments conducted for the site indicate that conditions at the site do not require action to ensure the protection of human health and the environment. Because no hazardous substances are present on site above health-based levels, a five-year review is not necessary.

If new evidence suggesting the need for further action becomes available, the site closeout decision may be changed. Likewise, future changes in land use, environmental regulations, or environmental laws may reverse the closeout decision.

Mark Weidler, Cabinet Secretary
New Mexico Environment Department

Dennis R. Larsen
Brigadier General, USAF Commander

Date

September 1996
Site Name and Location

IRP Site SS-39, the Fuel Missile Spill Area, is located approximately 3.5 miles northwest of the Main Base near Building 1176. The site consists of the two outfall areas from the oxidizer and propellant spill drain pipes, south of the Test Track and the drainage troughs and sumps located near Building 1176. Figure 1-1 shows the location of the site at Holloman AFB, and Figure 2-1 shows the site layout.

The site occupies an area of approximately 15 acres. Site topography is relatively flat, and the area is sparsely vegetated. Soils at the site consist of interbedded sands, silts, and clays. The soils are low to moderately permeable and mildly alkaline. Regional groundwater flow at Holloman AFB is to the southwest and is controlled by southwest-trending arroyos (see Figure 1-2). At Site SS-39, groundwater occurs approximately 20 ft bgl and flows to the south toward the Lost River drainage basin.

The unconfined aquifer beneath the site, as well as the remainder of Holloman AFB, exceeds the New Mexico Human Health Standards for total dissolved solids and sulfate concentrations and has been designated as unfit for human consumption, based on NM WQCC 82-1, as amended through August 18, 1991, Parts 3-100 through 3-103. On the basis of the Guidelines for Groundwater Classification Under the EPA Groundwater Protection Strategy (EPA, 1986), the unconfined aquifer beneath Holloman AFB is classified as a Class III B aquifer and is considered nonpotable.

Site History and Enforcement Activities

Facilities at Site SS-39 were involved in fueling, detanking, and routine maintenance of test sleds. Fueling activities for test sleds were completed on the track at the Alpha Pad before each sled launch. Before being removed from the track, sleds were emptied of fuels, and the fuels were then transferred to storage containers. The sleds were then taken to Building 1176, where any remaining fuel was purged from the engines. Fuels used at the test track consisted of unsymmetrical dimethyldradazine (UDMH), aniline, JP-4 (jet fuel), inhibited red fuming nitric acid (IRFNA), inhibited white fuming nitric acid (IWFNA), liquid oxygen (LOX), JPX (1:1 JP-4 and UDMH), dyes, solid rocket propellants, and possibly other compounds. Fuel spills were uncommon, owing to stringent safety precautions, though interviews with past employees have indicated that natural, topographic drainage trenches and drainage troughs could have received wastes. Solvents, such as trichloroethane, were commonly used in sled maintenance activities.

In 1983, Site SS-39 was identified as a potential contaminant source during an IRP records search. As a result, the site was included in a Phase I RI completed in 1992. Results of the Phase I RI indicated that cadmium in soil posed a potential risk to black-tailed jackrabbits and that groundwater downgradient of the site contained TCE. After reviewing the Phase I RI report, the U.S. EPA Region VI requested additional soil and groundwater data. A Phase II RFI was completed in 1994, which delineated soil and groundwater contamination.
Figure 2-1. Map of IRP Site SS-39
The site is listed as SWMUs 165, 177, 179, and 181 on the Hazardous and Solid Waste Amendment permit issued to Holloman AFB by U.S. EPA Region VI. These SWMUs were included in a RCRA facilities assessment in 1987. The investigations and studies performed for the site met the requirements of the IRP and RCRA program.

Highlights of Community Participation

Copies of the following reports, which contain information pertaining to the site, are available to the public through the administrative record located at the Holloman AFB and Alamogordo libraries:

- **Remedial Investigation Report—Investigation, Study and Recommendation for 29 Waste Sites** (Holloman AFB, October 1992);
- **Risk Assessment Report for the Remedial Investigation—Investigation, Study and Recommendation for 29 Waste Sites** (Holloman AFB, June 1992); and
- **Phase I RCRA Facility Investigation Report, Table 2 Solid Waste Management Units, Draft Final** (Holloman AFB, 1995).

Public meetings are held semiannually by Holloman AFB to announce the availability of reports and present issues pertaining to the IRP sites on the Base. Representatives from Holloman AFB and the U.S. Army Corps of Engineers (Omaha District) are present at these meetings to address public comments. No comments were received regarding the site at these meetings.

This decision document presents the selected remedial action for the site as chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan.

Scope and Role of the Response Action

The site investigations and the risk assessment conducted for Site SS-39 indicate that no action is necessary to protect human health and the environment under CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan.

Summary of Site Characteristics

The IRP records search, conducted in 1983, indicated that fuels, metals, and solvents may be present at the site. To determine the presence or absence of contamination at the site, Holloman AFB conducted a Phase I RI in 1991 and a Phase II RFI in 1994. A summary of the field investigations is presented below.

Soil

During the Phase I RI, five surface soil samples and two soil borings were collected at the site. The samples were analyzed by a certified laboratory for VOCs, total metals, and petroleum hydrocarbons. Results indicate
that in the area of the oxidizer and propellant drainpipe outfalls, arsenic, beryllium, and lead were detected above established background levels in several samples. The highest concentrations of these metals were 28 mg/kg, 0.58 mg/kg, and 1300 mg/kg, respectively. VOCs, predominantly chlorinated compounds (tetrachloroethene, 95 mg/kg), were detected in soils around the drainage sumps at Building 1176.

During the Phase II RFI, eight soil borings and five hand auger borings were drilled in drainage ditches downstream of the site. All borings were drilled to groundwater and samples were collected at 2-ft intervals. Samples were analyzed for SVOCs and metals. No SVOCs or metals were detected at concentrations above RCRA action levels.

**Groundwater**

Four groundwater monitor wells were installed during the Phase I RI in 1991. One round of samples was collected from these wells. Samples were analyzed by a certified laboratory for VOCs, metals, anions, and total dissolved solids. The highest concentrations of 1,1,1-trichloroethane (0.24 mg/L), carbon tetrachloride (0.0058 mg/L), and trichloroethene (0.059 mg/L) were detected in groundwater samples from wells near Building 1176 sumps, indicating that VOCs had migrated from the sumps to groundwater. Lead (0.019 mg/L) was detected above the established background level in one groundwater sample.

During the Phase II RFI in 1994, 15 temporary standpipes were installed downgradient of the sumps using a DPT rig. Groundwater samples were collected and analyzed for chlorinated VOCs using a field gas chromatograph. Eight of the samples were submitted to a certified laboratory for confirmation analysis. Groundwater samples were also collected from two existing downgradient monitor wells and analyzed for halogenated volatile organic compounds.

Several VOCs were detected at or below detection limits; however, many were not confirmed, so their presence is uncertain. 1,1,1-trichloroethane concentrations detected in the monitor wells (maximum, 0.418 mg/L) decreased dramatically 200 ft downgradient of the sumps (maximum, 0.038 mg/L).

**Summary of Site Risks**

As part of the Phase I RI, a risk assessment was conducted to estimate the potential consequences to human health and the environment posed by the site. The risk assessment consisted of four basic steps: 1) data analysis and selection of chemicals of concern; 2) identification of exposure pathways and receptors (i.e., dermal contact, ingestion, or inhalation); 3) toxicity assessment of each contaminant; and 4) quantification of potential carcinogenic, noncarcinogenic, and ecological risks. A detailed description of the risk assessment is contained in the *Risk Assessment Report for the Remedial Investigation—Investigation, Study and Recommendation for 29 Waste Sites* (Holloman AFB, June 1992).

**Human Health Risk**

The human health risks evaluated for the site were based on potential occupational exposure to site contaminants via inhalation.

Generally, a total carcinogenic risk of less than $10^{-6}$ for each chemical contaminant is considered acceptable. This is equivalent to a one-in-a-million excess cancer risk from exposure to that chemical at the site. In
addition, the combined carcinogenic risk from all chemical contaminants must be equal to or less than $10^{-4}$, a one-in-one-hundred-thousand excess cancer risk. Noncarcinogenic risk is assessed on the basis of a hazard index, which is the ratio of potential daily chemical intake to an acceptable dose. For a noncarcinogenic risk to be acceptable, the hazard index should not exceed a value of 1.0.

The carcinogenic risk estimated for the occupational exposure scenario was $10^{-7}$. This value indicates that adverse effects are unlikely.

**Ecological Risk**

Ecological risk was evaluated using an ecological quotient, which estimates the potential ecological risks associated with contaminants of concern, primarily through ingestion of soil and/or contaminated plants by native biota. An ecological quotient of less than 1 indicates a low probability of adverse effects; a value between 1 and 10 indicates that there is a possibility of adverse ecological effects.

The Phase I RI risk assessment determined that an ecological quotient of 7.1, which indicates a potential ecological risk, existed from the site. This conclusion was based on modeled uptake of lead and cadmium for soil and beryllium, lead, and zinc in the surface water of Lost River.

The risk assessment performed in conjunction with the Phase II RFI used collected plant, jackrabbit tissue, and surface water samples to remove the uncertainty associated with the uptake models. Comparison of plant and jackrabbit tissue samples with concentrations known to cause adverse effects indicated a low potential for adverse ecological effects to terrestrial organisms. An aquatic environment quotient of 0.3 indicated that no adverse effects are expected as a result of the site.

**Description of the Selected Alternative**

The remedial investigations and associated risk assessments conducted for the site indicated that no further action is necessary to protect human health and the environment.

As part of the no action remedy, a long-term monitoring program will be initiated to ensure that the remedy continues to provide adequate protection of human health and the environment. A long-term monitoring program will be submitted by Holloman AFB to NMED.

**Responsiveness Summary**

Restoration Advisory Board meetings were held semiannually to present information about the site to the public. Representatives from Holloman AFB and the U.S. Army Corps of Engineers (Omaha District) were present at these meetings to answer questions pertaining to the site. No comments were received during the meetings; therefore, no significant changes to the selected remedial action, as presented, were necessary.
Declaration

Statutory Preference for Treatment as a Principal Element is not Applicable and a Five-Year Review is not Required

Site Name and Location
IRP Site OT-45
Old AGE Refueling Station
Holloman Air Force Base, New Mexico

Statement of Basis and Purpose
This decision document presents the selected remedial action for the referenced site, chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan. This decision is based on the administrative record file for this site.

The State of New Mexico concurs on the remedy.

Description of the Selected Remedy: No Action
Information contained in the administrative record for Site OT-45 indicates that no action is necessary to protect human health and the environment.

Declaration Statement
The site investigations, associated risk assessment, and a remedial action conducted at the site indicate that conditions at the site do not require action to ensure the protection of human health and the environment. Because no hazardous substances are present on site above health-based levels, a five-year review is not necessary.

If new evidence suggesting the need for further action becomes available, the site closeout decision may be changed. Likewise, future changes in land use, environmental regulations, or environmental laws may reverse the closeout decision.

Mark Weidler, Cabinet Secretary
New Mexico Environment Department

[Signature]
Mark Weidler, Cabinet Secretary
New Mexico Environment Department

Date
9/30/96

Dennis R. Larsen
Brigadier General, USAF Commander

Date

September 1996
Decision Summary

Site Name and Location

IRP Site OT-45, the Old Aerospace Ground Equipment (AGE) Refueling Station, is located southeast of Building 296 (an office building) near the intersection of West Delaware Avenue and West Fourth Street in the Main Base area. The topography of the site is flat, and the site is covered with asphalt, concrete, or landscaping gravel. Figure 1-1 shows the location of the site at Holloman AFB, and Figure 2-1 shows the site layout.

Soils at the site consist of interbedded sands, silts, and clays. The soils are low to moderately permeable and mildly alkaline. Groundwater flow direction is controlled by southwest-trending arroyos, and is to the southwest, following the Dillard Draw drainage system (see Figure 1-2). Groundwater occurs at approximately 4.5 ft bgl at the site and flows to the southwest toward Dillard Draw.

The unconfined aquifer beneath the site, as well as the remainder of Holloman AFB, exceeds the New Mexico Human Health Standards for total dissolved solids and sulfate concentrations and has been designated as unfit for human consumption, based on NM WQCC 82-1, as amended through August 18, 1991, Parts 3-100 through 3-103. On the basis of the Guidelines for Groundwater Classification Under the EPA Groundwater Protection Strategy (EPA, 1986), the unconfined aquifer beneath Holloman AFB is classified as Class III B aquifer and is considered nonpotable.

Site History and Enforcement Activities

Site OT-45 was used for refueling activities and the storage of MOGAS, diesel fuel, and JP-4 jet fuel. Three underground storage tanks (two 12,500-gal. tanks and one 10,000-gal. tank), a pump island, and fuel station were located on the site. The underground storage tanks, pump island, and the fuel station were removed in the 1980s and replaced with a parking lot and landscaped areas.

The site was not identified as a potential contaminant source during an IRP records search in 1983. However, during an excavation for a utility trench, free product was discovered on the water table; the site was then added to the IRP. As a result, the site was included in a Phase I RI in 1985. Results of the investigation confirmed the presence of petroleum hydrocarbons and indicated that additional soil and groundwater samples were necessary to fully define the extent of contamination. A Phase II RI conducted in 1989 delineated the nature and extent of petroleum contamination. Because free product was encountered on the groundwater table, a remedial action (i.e., excavation) was conducted in 1991.

Upon completion of the remedial action, the site was recommended for closeout with Decision Document in 1992. However, the NMED requested additional soil investigation of the site to confirm that TRPH concentrations did not exceed 1000 mg/kg. Confirmation sampling was conducted in 1994 to address the NMED’s concern.
Figure 2-1. Map of IRP Site OT-45
Highlights of Community Participation

Copies of the following reports, which contain information pertaining to the site, are available to the public through the administrative record located at the Holloman AFB and Alamogordo libraries:

- *Installation Restoration Program—Remedial Investigation Report* (Holloman AFB, 1989);
- *Installation Restoration Program—Decision Document for Site 51* (Holloman AFB, 1992); and

Public meetings are held semiannually by Holloman AFB to announce the availability of reports and present issues pertaining to the IRP sites on the Base. Representatives from Holloman AFB and the U.S. Army Corps of Engineers (Omaha District) are present at these meetings to address public comments. No comments were received regarding the site at these meetings.

This decision document presents the selected remedial action for the site as chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan.

Scope and Role of the Response Action

The site investigations and risk assessment indicated that no further action was necessary to protect human health and the environment under CERCLA, as amended by SARA, and to the extent practicable, the National Contingency Plan. However, to prevent further degradation of groundwater beneath the site and to mitigate the potential explosive hazards posed by free product, a remedial action (i.e., excavation) was conducted in 1991 to remove petroleum-contaminated soils.

Summary of Site Characteristics

Site OT-45 was added to the IRP in 1983 when free product was discovered on the water table during the excavation of a utility trench at the site. The presence of soil and groundwater contamination was confirmed during a Phase I RI conducted in 1985. The extent of the petroleum contamination was delineated in 1989 during a Phase II RI. Petroleum-contaminated soils exceeding the Base-specific cleanup level for TRPH were excavated during a remedial action in 1991. The NMED requested additional sampling to confirm that TRPH concentrations did not exceed 1000 mg/kg; therefore, confirmation sampling was conducted in 1994. A summary of the investigations is presented below.

Soil

During the Phase I RI, two soil borings were drilled at the site. One of the borings was converted to a monitor well. Elevated concentrations of oil and grease, phenolics, total organic carbon, and total organic halogens were detected in the soil.
During the Phase II RI, eight soil borings were drilled; seven of the borings were converted to monitor wells. Low levels of petroleum constituents were detected in the soil. The greatest number and highest concentrations were detected in the center of the site, and free product was detected in several of the borings. Petroleum-contaminated soils were removed during a remedial action in 1991.

The confirmation sampling was conducted in 1995 after completion of the remedial action. During the confirmation sampling, a soil boring was drilled on each side of the rectangular-shaped former excavation, and soil samples were collected from the 1 to 2.5-ft sample interval and the interval above the water table (3 to 4.25 ft) in the four soil borings. However, owing to laboratory error, soil samples were recollected from the same depths with a hand auger near each of the four original soil borings. All samples were analyzed by a certified laboratory for gasoline range organics, including BTEX speciation and diesel range organics. With the exception of two borings located along the northern and northeastern sides of the former excavation, only low levels of gasoline range organics, diesel range organics, and BTEX were detected. Elevated gasoline range organics (ranging from 750 to 3400 mg/kg) and diesel range organics (ranging from 310 to 1200 mg/kg) were detected in the two northernmost borings.

To compare the analytical results with the Base-specific cleanup level, the concentrations of the gasoline range organic compounds and the diesel range organic compounds were summed and used as a conservative approximation of the TRPH concentration. Using this procedure, only the two northernmost borings exceeded the Base-specific cleanup level of 1000 mg/kg TRPH. Similar concentrations were not detected in the soil samples collected from the nearby hand auger borings. This difference within such a small area is likely caused by an extremely limited amount of residual TRPH contamination that may not have been removed during the excavation.

Groundwater
One well was installed at the site during the Phase I RI in 1985. Low levels of oil and grease, phenolics, total organic carbon, and total organic halogens were detected in the groundwater samples. During the Phase II RI in 1989, seven additional wells were installed. Six inches of free product (JP-4 with fuel oil #6) was measured in a well located in the center of the site. However, only low levels of petroleum constituents were detected in the other wells. The soils in center of the site were excavated during a voluntary remedial action in 1991 to remove the contaminant source and prevent the further degradation of groundwater beneath the site.

Summary of Site Risks
A quantitative risk assessment, conducted as part of the Phase II RI, concluded that the contaminants presented no significant threat to human health or the environment. The risk assessment also concluded that the free product at the site may present a potential explosive hazard.

The human health and ecological risks evaluated for this site were based on the hypothetical exposure to contaminated groundwater via an off-Base well. This exposure does not exist because groundwater beneath Holloman AFB is a Class III B (nonpotable) aquifer and, therefore, is not considered a potential exposure pathway. However, this hypothetical pathway was evaluated because the aquifer had not been fully characterized in 1989 when the risk assessment was conducted. Groundwater modeling indicated that the
contaminants would not reach the hypothetical receptor location at the Base boundary; therefore, the site does not pose an unacceptable risk to human health and the environment.

**Description of the Selected Alternative**

The site investigations and risk assessment conducted for the site indicate that no further action is necessary to protect human health and the environment. However, to prevent further degradation of groundwater beneath the site, Holloman AFB conducted a remedial action (i.e., excavation) in 1991. Petroleum contaminated soils were excavated from the area delineated during the Phase II RI. The excavation was then backfilled with soils from the Base borrow pit.

**Responsiveness Summary**

Restoration Advisory Board meetings were held semiannually to present information about the site to the public. Representatives from Holloman AFB and the U.S. Army Corps of Engineers (Omaha District) were present at these meetings to answer questions pertaining to the site. No comments were received during the meetings; therefore, no significant changes to the selected remedial action, as presented, were necessary.
Holloman Air Force Base

IRP Site SD-47

Decision Document

Declaration

Statutory Preference for Treatment as a Principal Element is Applicable and a Five-Year Review is not Required

Site Name and Location
IRP Site SD-47
POL Washrack Discharge Area
Holloman Air Force Base, New Mexico

Statement of Basis and Purpose
This decision document presents the selected remedial action for the referenced site, chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan. This decision is based on the administrative record file for this site.

The State of New Mexico concurs on the remedy.

Description of the Selected Remedy: Bioventing
The selected remedy will reduce the concentration of petroleum hydrocarbons in the soil to the NMED-cleanup level established for Holloman AFB. The remediation of petroleum hydrocarbons in the soil will limit further degradation of groundwater beneath the site. The major component of the selected remedy is the installation of a bioventing system.

Declaration Statement
The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practical and satisfies the statutory preferences for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because no hazardous substances are present on site above health-based levels, a five-year review of the site is not required.

Mark Weidler, Cabinet Secretary
New Mexico Environment Department

Date

Dennis R. Larsen
Brigadier General, USAF Commander

Date

September 1996
Site Name and Location

IRP Site SD-47, the POL Washrack Discharge Area, is located adjacent to a fence in the western portion of the POL Storage Yard. The POL Storage Yard is located east of the Main Base and approximately 900 ft west of the Base boundary. The washrack drains to two oil/water separators (SWMUs 21 and 22) located north and west of the washrack.

The site is sparsely vegetated, and topography of the site gently slopes from the northwest to the southwest. East of the site, the land surface dips rather steeply into a surface drainage feature. The drainage feature, Dillard Draw, is located adjacent to the eastern boundary of the Base. Figure 1-1 shows the location of Site SD-47 at Holloman AFB, and Figure 2-1 shows the site layout.

Soils at the site consist of interbedded sands, silts, and clays. The soils are low to moderately permeable and mildly alkaline. Regional groundwater flow is controlled by southwest-trending arroyos, and is to the southwest, following the Dillard Draw drainage system (see Figure 1-2). At Site SD-47, groundwater occurs at approximately 8 to 10 ft bgl and flows to the southeast, toward Dillard Draw.

The unconfined aquifer beneath the site, as well as the remainder of Holloman AFB, exceeds the New Mexico Human Health Standards for total dissolved solids and sulfate concentrations and has been designated as unfit for human consumption, based on NM WQCC 82-1, as amended through August 18, 1991, Parts 3-100 through 3-103. On the basis of the Guidelines for Groundwater Classification Under the EPA Groundwater Protection Strategy (EPA, 1986), the unconfined aquifer beneath Holloman AFB is classified as a Class III B aquifer and is considered nonpotable.

Site History and Enforcement Activities

The site was identified as a potential contaminant source during a IRP records search in 1983. Results of the records search indicated that the POL Washrack Area has been used for vehicle and equipment washing since 1953 and is still used for this purpose. From 1953 to 1980, washwater flowed from the washrack area directly to a drainage ditch located 100 ft west of fence. In 1980, oil/water separators were installed and the washwater was then routed to the oil/water separators and then discharged via underground piping to the drainage ditch.

In 1988 a RCRA facilities assessment found evidence of petroleum products in the drainage ditch. Malfunctions of the oil/water separators or an associated waste oil tank were suspected to be the origin of the contamination. The units were listed as SWMU 21 (Building 702 Oil/Water Separator), SWMU 22 (Building 704 Oil/Water Separator), and SWMU 122 (Building 704 Waste Oil Tank) in the Hazardous and Solid Waste Amendment permit issued to Holloman AFB by EPA Region VI.

All of the investigations and studies performed for the sites meet the requirements of the IRP and RCRA program. However, owing to the relative distance between the washrack discharge area (Site SD-47) and the SWMUs, the SWMUs have been investigated separately. Investigation results of the SWMUs are presented.
in the *Phase I RCRA Facility Investigation Report, Table 2 Solid Waste Management Units, Draft Final* (Holloman AFB, 1995).

Results of the Phase I RI indicated that petroleum contamination was present in the soil and groundwater beneath the site. Free product was detected at the site. To prevent the further degradation of groundwater beneath the site, a remedial action (i.e., excavation) was completed in September 1991. However, TRPH-contaminated soil exceeding the Base-specific cleanup level was left in place because it was adjacent and beneath the POL yard fence line.

The risk assessment conducted for the site indicated that the site does not present an unacceptable risk to human health and the environment. However, because TRPH concentrations in the soil exceeded the cleanup level, Holloman AFB conducted a voluntary remedial action in 1995 with the installation of a bioventing system at the site.

**Highlights of Community Participation**

Copies of the following reports, which contain information pertaining to the site, are available to the public through the administrative record located at the Holloman AFB and Alamogordo libraries:

- *Installation Restoration Program—Remedial Investigation Report* (Holloman AFB, 1989);
- *Installation Restoration Program—Baseline Risk Assessment Report* (Holloman AFB, 1993);
- *RI/RFI Investigation Report for Site SD-47* (Holloman AFB, 1994); and

Public meetings are held semiannually by Holloman AFB to announce the availability of reports and present issues pertaining to the IRP sites on the Base. Representatives from Holloman AFB and the U.S. Army Corps of Engineers (Omaha District) are present at these meetings to address public comments. No comments were received regarding the site at these meetings.

This decision document presents the selected remedial action for the site as chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan.

**Scope and Role of the Response Action**

To prevent the further degradation of groundwater beneath the site and to mitigate the potential explosive hazard posed by the free product, a remedial action (i.e., excavation) was completed in 1991. The action removed contaminated soil west of the POL yard fence line. However, contaminated soil exceeding the Base-specific cleanup level of 1000 mg/kg for TRPH was left in place adjacent to and beneath the POL fence.
The selected voluntary remedial action to reduce the TRPH concentrations to the cleanup level is a bioventing system. In addition, by removing the soil contamination, the bioventing system will also remove the contaminant source to groundwater. A long-term groundwater monitoring program will be conducted at the site to ensure the effectiveness of the remedial action.

Summary of Site Characteristics

The IRP records search, conducted in 1983, indicated that petroleum contamination may be present at the site as a result of past site activities. The presence and extent of petroleum hydrocarbons in the soil and groundwater beneath the site was determined during three investigations: the Phase I RI in 1989, a feasibility study in 1991, and the Phase II RI/RFI in 1993. A summary of these investigations are presented below.

Soil
During the Phase I RI in 1989, nine borings were drilled at the site to determine the presence of contamination. Soil samples were collected from the borings and then six of the borings were converted to monitor wells. Four sediment samples were collected from the discharge ditch. The soil samples were analyzed by a certified laboratory for VOCs, TRPH, and metals. Total BTEX concentrations (ranging from 0.02 to 79 mg/kg) and TRPH concentrations (ranging from 0.016 to 5300 mg/kg) were detected in the samples from the borings. The highest concentrations were detected near the groundwater table in the area of the washrack discharge line. No VOCs were detected in the sediment samples. Metals were detected below the background levels in all soil samples established for Holloman AFB.

A voluntary remedial action (i.e., excavation) was performed in 1991. However, because the contamination extended beneath the POL fence, all of the contaminated soil could not be removed during the excavation activities. Therefore, an RI/RFI investigation was conducted in 1993 to delineate the extent of residual petroleum contamination. During the investigation, a soil gas survey was conducted to define the extent of contamination and then two confirmation borings were drilled in the locations exhibiting the highest soil gas concentrations. TRPH concentrations, exceeding the Base-specific cleanup level of 1000 mg/kg, were detected within a narrow strip (approximately 15 by 35 ft) along the western side of the fence line and extending to the water table (8 to 10 ft bgl). Results of the investigation indicate that breaks in the discharge line are the likely source of contamination at the site.

Groundwater
During the Phase I RI in 1989, six borings were converted to monitor wells and then sampled to determine the presence of contamination. The samples were analyzed by a certified laboratory for VOCs, base/neutral/acid extractables (BNAs), and metals. Total BTEX concentrations (ranging from 841 to 19,500 µg/l) were detected in the wells. The highest concentrations were detected nearest and downgradient of the sump. Free product (27 in. thick) was measured in the well immediately downgradient of the discharge line.

To determine the extent of free product, a feasibility study was conducted in 1991. The six existing wells were resampled and analyzed for BTEX and TRPH. Total BTEX concentrations (ranging from 18 to 17,900 µg/l) were detected in the wells. TRPH (ranging from 5390 to 16,200 µg/l) and free product with thicknesses ranging from 1.85 to 2.9 ft were detected in the two wells nearest the sump.
During the RI/RFI in 1993, the extent of groundwater contamination was delineated. Groundwater samples were collected from 24 temporary standpipes installed with a direct push technology rig. On the basis of field screening, two additional monitor wells were installed outside the area of contamination. Groundwater samples were collected from the two new wells. The samples were analyzed for VOCs by a certified laboratory, and no VOCs were detected above analytical detection limits.

Summary of Site Risks

A risk assessment was conducted as part of the Phase II RI/RFI conducted in 1993. The risk assessment was conducted to estimate the potential consequences to human health and the environment posed by the site. The risk assessment consisted of four basic steps: 1) data analysis and selection of chemicals of concern; 2) identification of exposure pathways and receptors (i.e., dermal contact, ingestion, or inhalation); 3) toxicity assessment of each contaminant; and 4) quantification of potential carcinogenic, noncarcinogenic, and ecological risks. A summary of the risk assessment results are presented below.

Human Health Risks

The risk assessment evaluated three potential human exposure scenarios: the child trespasser, the on-site worker, and the hypothetical future construction workers.

Generally, a total carcinogenic risk of less than $10^{-6}$ for each chemical contaminant is considered acceptable. This is equivalent to a one-in-a-million excess cancer risk from exposure to that chemical at the site. A cumulative total (sum of risk from all chemicals) must be at or below $10^{-4}$ (or one-in-one-hundred-thousand excess cancer risk) to be considered an acceptable carcinogenic risk. At Site SD-47, the average and reasonable maximum carcinogenic risks estimated for the three potential exposure scenarios at Site SD-47 ranged from $10^{-10}$ to $10^{-7}$. These values were within the acceptable range, suggesting that carcinogenic effects are not likely to result from exposure at the site.

For a noncarcinogenic risk to be acceptable, the sum of the HI should not exceed a value of 1. The HI is the ratio of the daily chemical intake to a reference dose (the acceptable dose). At Site SD-47 the average and reasonable maximum noncarcinogenic risks estimated for the three potential exposure scenarios ranged from $10^0$ to $10^3$. These values did not exceed an HI of 1, suggesting systemic human health risks are not likely to result from exposure at the site.

Ecological Risks

No complete exposure pathways were identified during the risk assessment because soil contamination is limited to the subsurface and groundwater in the vicinity of the site does not discharge to the surface.

Description of the Selected Alternative

The site investigations and risk assessment conducted for the site indicate that no further action is necessary to protect human health and the environment. However, to prevent further degradation of groundwater beneath the site and to mitigate the potential explosive hazard posed by free product, a remedial action (i.e., excavation)
was completed in 1991. Approximately 9000 cubic yards of soil were excavated west of the POL yard fence line.

However, soil contamination extended beneath the west fence line of the POL Yard and was not removed during excavation activities. To reduce the TRPH concentrations to the Base-specific cleanup level in the unsaturated soils near the fence, Holloman AFB selected bioventing as the voluntary remedial action remedy.

Bioventing is a process for delivering oxygen to contaminated, unsaturated soils to stimulate biodegradation. This technology minimizes the volatilization of compounds and provides a low-cost, effective means of removing contaminants from subsurface soils. Bioventing systems have been implemented extensively and have been widely proved in remediation projects much larger and complex than the proposed site.

The selected remedy is expected to reduce the petroleum concentrations in the soil to at or below 1000 mg/kg, which is the cleanup level. Implementation of this in situ treatment should also prevent further degradation of the groundwater. The biodegradation process is irreversible and, therefore, the treatment is permanent.

To determine whether bioventing could be successfully implemented at Site SD-47, a pilot study was performed in 1995. As part of the pilot study, a soil gas survey was conducted to identify the optimum location for the wells and monitoring points. Using the results of the survey, one injection well, one background well, and five monitoring clusters were installed at the site. The results of the pilot study indicated that bioventing is an effective remedial technology at the site. The selected remedy is presented in Figure 2-2.

In addition to the selected corrective action, a long-term monitoring program will be initiated at the site to ensure that the remedy continues to be protective of human health and the environment. A long-term monitoring work plan will be submitted by Holloman AFB for approval by the NMED.

Responsiveness Summary

Restoration Advisory Board meetings were held semiannually to present information about the site to the public. Representatives from Holloman AFB and the U.S. Army Corps of Engineers (Omaha District) were present at these meetings to answer questions pertaining to the site. No comments were received during the meetings; therefore, no significant changes to the selected remedial action, as presented, were necessary.
Figure 2-2. Map of Selected Remedy for IRP Site SD-47
Figure 2-1. Map of IRP Site SD-47