MEMORANDUM FOR NM ENVIRONMENT DEPT
Hazardous & Radioactive Materials Bureau
Attn Ms Barbara Hoditschek
525 Camino de los Marquez
Santa Fe, NM 87502-6610

FROM: 49 CES/CEV
550 Tabosa Ave
Holloman AFB, NM 88330-8458

SUBJECT: Project Assessment Report for Holloman AFB Sewage Lagoons and Lakes (Atch 1).

1. The attached subject report (Atch 1) summarizes recent findings and provides excerpts from the administrative record for activities associated with the closure of the Holloman AFB lagoons and the investigation of Lake Holloman. The report concentrates on the period from August 1990 to present, although some discussion and information in the appendices pertains to earlier dates. This report is not intended to replace the previous Project Assessment Report published in August 1990.

2. This attached report is the only version of the document being distributed because the items discussed and the data presented are matters of record. However, minor corrections may be made by page substitutions.

3. Please direct comments and questions to Dr. Fred Fisher of the Environmental Flight, Commercial (505) 475-3931/5062 or DSN 867-3931/5062.


Attachments:
1. Project Assessment Report
2. Distribution List

Global Power for America
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Ms Stephanie Kruse
Mr Ron Kern
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Santa Fe, NM 87502-6610
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PROJECT ASSESSMENT REPORT

SEWAGE LAGOONS AND LAKES CLOSURE PROJECT
HOLLOMAN AIR FORCE BASE, NM

Prepared for:

49 CES/CEV
Holloman Air Force Base, NM

and

HQ ACC/CEVR
Langley Air Force Base, VA

Prepared by:

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

Radian Corporation
8501 North Mopac Blvd.
Austin, Texas 78720
512/454-4797

Under Contract No. DACW45-94-D-0003 with:

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

March 1995
PURPOSE OF DOCUMENT

A. This Project Assessment Report presents a history of regulatory and sampling activities that have occurred during the Holloman AFB sewage lagoons and lakes project, beginning with the year 1980. A previous Project Assessment Report prepared in August 1990 can be used to supplement this report. This document was prepared for, and in cooperation with the Base Environmental Office: 49 CES/CEV, 550 Tabosa Avenue, Holloman AFB, NM 88330-8458, phone 505/475-3931.

B. The primary objective of this report is to provide a historical review of events leading up to the closure of the sewage lagoons. This document can be used as a reference point to learn which documents can provide more detail on key issues or sampling events that have occurred during the sewage lagoons and lakes project.

C. This report contains a chronology of key events for the sewage lagoons and lakes project. It also provides an overview of key issues and sampling events. Examples of key issues are development of a closure plan, post-closure care permit application and determination of whether or not the sewage sludge is a listed hazardous waste. The appendices present a summary of analytical data from key sampling events, a list of documents prepared for the sewage lagoons and lakes project, and copies of pertinent correspondence.

March 1995
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2.2 Parties Involved

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Section 1
INTRODUCTION

Holloman Air Force Base (AFB), located near Alamogordo, New Mexico, operates seven sewage lagoons as part of a system to treat both industrial and domestic wastewater. The U.S. Environmental Protection Agency (EPA) Region 6, the New Mexico Environment Department (NMED), and Holloman AFB have been involved in bringing the sewage lagoon system into regulatory compliance since the early 1980s. Other federal agencies that have interests in the final closing of the sewage lagoons are the Department of Interior’s U.S. Fish and Wildlife Service (FWS) and the Bureau of Land Management (BLM). Due to the changes in the regulatory and technical environments over the course of this project, the approach to achieving compliance at the sewage lagoon system has varied.

The purpose of this document is to summarize the history of the regulatory status of the sewage lagoon system in order to present the relevant information for parties who are currently involved in the operation and regulation of the sewage lagoon system. This document presents a summary of the events and decisions made between 1984 and 1994 in addition to a discussion of the key issues and past investigations and studies.

Section 2 presents a brief chronological overview of the regulatory history of the Holloman AFB sewage lagoons and lakes project. Section 3 describes the site conditions including a description of the geology, hydrology and groundwater quality. Section 4 presents a general description of the key events and decisions made in regards to the Federal Facilities Compliance Agreement (FFCA) and the closure of the sewage lagoons. Section 5 describes the type of sampling and investigations for soil, water, and biota that have occurred during the course of this project. Section 6 presents a brief description of the key issues (i.e., regulatory status, listed waste determination, wetlands, and others) that have occurred during this project.

Appendix A presents a chronological summary of the sewage lagoons and lakes project. Appendix B provides a list of key people that have been involved on this project from the EPA, NMED, Base, USACE Omaha, HQ ACC, Radian, and other consultants. Appendix C presents the titles and dates of reports that have been prepared for this project. Appendix D provides summary tables of analytical results from past investigations of the sewage lagoons. Appendix E contains copies of pertinent correspondence (i.e., letters, memos, confirmation notices) related to the sewage lagoons and lakes project.
Section 2
BACKGROUND

This section presents a chronological overview of the regulatory history of the sewage lagoons, including a discussion of the various parties involved. A more detailed chronology of events is presented in Appendix A. Appendix B presents key personnel involved in the sewage lagoons and lakes project. Appendix C presents a summary of the documents that have been prepared concerning the sewage lagoons and lakes project.

2.1 Overview

Holloman AFB operates seven sewage lagoons as part of a system to treat both industrial and domestic wastewater. Table 2-1 presents an overview of regulatory activities for the sewage lagoons and lakes project.

In a March 1980 report to the State of New Mexico Environmental Improvement Division (NMEID), Holloman AFB cited problems at the wastewater treatment facility associated with inflow of unknown industrial wastes. A Part A permit application identifying hazardous wastes suspected to have been discharged to the sewage lagoons was submitted by the Base to EPA Region 6 in November 1980 under the requirements of the Resource Conservation and Recovery Act (RCRA). By virtue of this submission, the facility achieved interim status to operate as a hazardous waste management unit (HWMU).

From 1981 to 1985, EPA and NMED conducted annual inspections of Holloman AFB in accordance with RCRA and the New Mexico Hazardous Waste Act (NMHWA). As a result of these inspections, a Notice of Noncompliance (Docket Number RCRA VI-502-H) was issued on 23 August 1985. This notice alleged twelve separate and distinct violations of RCRA pertaining to the operation of the surface impoundments (i.e., sewage lagoons) as a hazardous waste treatment, storage, and disposal facility.

Under the assumption that the sewage lagoon system was operating as a HWMU, federal regulations required that Holloman AFB install a groundwater monitoring system to determine the impact of the sewage lagoon system on groundwater quality in the uppermost aquifer underlying the facility and a RCRA Part B operating permit application be submitted by 8 November 1985. The Base was unable to physically meet these requirements and an internal Holloman AFB memo (dated 21 November 1985) reflects the Base's understanding that the EPA would allow Holloman AFB to submit a closure plan by 23 November 1985 to perform an administrative (not physical) closure, and continue use of the impoundments for management of non-hazardous wastewater.

Holloman AFB submitted a closure plan on 22 November 1985 that was interpreted by EPA HQ in July 1986 as a delisting petition to exclude the waste stored in the sewage lagoons from regulation. The closure plan was therefore determined to be unsatisfactory. The EPA also determined that Holloman AFB had not yet submitted the required certification of compliance with groundwater monitoring and financial responsibility. These actions resulted in the issuance of a second Notice of Noncompliance (Docket Number RCRA VI-661-H) on 4 February 1987. In this notice, the Base was informed that the facility lost interim status authorization to
### Table 2-1

#### Overview of Project Activities

<table>
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<tr>
<th>Date of Activity</th>
<th>Activity Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 November 1980</td>
<td>HAFB submits Part A permit application to EPA Region 6 which authorizes operation of sewage lagoons as interim status HWMUs.</td>
</tr>
<tr>
<td>1981-1985</td>
<td>EPA/NMED inspections cite HAFB for failure to establish a groundwater monitoring program. HAFB contends that lagoons are not HWMUs; EPA rejects this position based on listing and mixture rule.</td>
</tr>
<tr>
<td>23 August 1985</td>
<td>EPA Region 6 issues a Notice of Noncompliance for failure to install groundwater monitoring wells. Notice states that monitoring program must be in place by 8 November 1985 to avoid losing interim status.</td>
</tr>
<tr>
<td>8 November 1985</td>
<td>Interim status units lacking groundwater monitoring program certification lose authorization to operate as HWMUs, triggering closure.</td>
</tr>
<tr>
<td>23 November 1985</td>
<td>HAFB submits an administrative closure plan for the lagoons.</td>
</tr>
<tr>
<td>11 July 1986</td>
<td>EPA Region 6 informs HAFB that the administrative closure plan was considered an intent to seek delisting and is therefore unsatisfactory.</td>
</tr>
<tr>
<td>29 August 1986</td>
<td>HAFB presents EPA with a preliminary delisting petition proposal.</td>
</tr>
<tr>
<td>4 February 1987</td>
<td>EPA Region 6 issues a second Notice of Noncompliance for failure to install a groundwater monitoring system. Notice revokes interim status and requires closure of lagoons.</td>
</tr>
<tr>
<td>6 February 1987</td>
<td>EPA HQ indicates that the delisting alternative does not appear feasible because of high concentrations of several waste constituents.</td>
</tr>
<tr>
<td>1981-1988</td>
<td>Five nonroutine sampling events conducted. PCBs are contaminant of concern.</td>
</tr>
<tr>
<td>20 December 1988</td>
<td>EPA Region 6, NMED, and HAFB sign Federal Facilities Compliance Agreement (FFCA) to resolve all issues in second Notice of Noncompliance. Major requirements of FFCA were to: 1) develop closure method and have it approved; and 2) develop a groundwater monitoring system and install it.</td>
</tr>
<tr>
<td>19 January 1988</td>
<td>HAFB submits closure plan to EPA Region 6 and NMED.</td>
</tr>
<tr>
<td>10 May 1989</td>
<td>EPA HQ closes HAFB's delisting petition file.</td>
</tr>
<tr>
<td>July 1989</td>
<td>Groundwater monitoring wells installed in the lagoon area. Sampling for the detection monitoring program begins the following month.</td>
</tr>
<tr>
<td>13 November 1989</td>
<td>HAFB and NMED discuss comments on the January 1989 closure plan and address concerns while continuing to operate lagoons for nonhazardous waste streams.</td>
</tr>
<tr>
<td>8 March 1990</td>
<td>Removal of 1316 tons of PCB-contaminated sludge from Pond B completed. Sludge and soil sampling conducted at Pond C.</td>
</tr>
<tr>
<td>14 June 1990</td>
<td>EPA Region 6 rejects lagoon closure plan; requires revised plan within 30 days.</td>
</tr>
<tr>
<td>Date of Activity</td>
<td>Activity Summary</td>
</tr>
<tr>
<td>-----------------</td>
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</tr>
<tr>
<td>18 July 1990</td>
<td>HAFB submits revised closure plan to EPA Region 6 and NMED.</td>
</tr>
<tr>
<td>19 July 1990</td>
<td>Removal of 2588 tons of PCB-contaminated sludge from Pond A completed.</td>
</tr>
<tr>
<td>October 1990</td>
<td>Surface water samples collected from sewage lagoons and lakes. An additional 75 tons of sludge was removed from Pond A after confirmation sampling.</td>
</tr>
<tr>
<td>8 May 1991</td>
<td>NMED informed HAFB that closure may be delayed in accordance with new regulations adopted by the state on 13 March 1991.</td>
</tr>
<tr>
<td>June 1991</td>
<td>Post-Closure Care Permit application and delay-of-closure plan were submitted to NMED.</td>
</tr>
<tr>
<td>July 1991</td>
<td>USFWS sampled migratory waterfowl and other indicator species at Lagoons A, B, G and Lake Holloman.</td>
</tr>
<tr>
<td>September 1991</td>
<td>First round groundwater assessment monitoring conducted.</td>
</tr>
<tr>
<td>February 1992</td>
<td>Second round groundwater assessment monitoring conducted.</td>
</tr>
<tr>
<td>February-March 1992</td>
<td>Sludge/soil sampling conducted—sewage lagoons and lakes.</td>
</tr>
<tr>
<td>May 1992</td>
<td>Two wells added to groundwater monitoring network upgradient from lagoons.</td>
</tr>
<tr>
<td>December 1992-April 1993</td>
<td>Phase 1 of Groundwater Assessment Monitoring Program conducted; 5 new wells installed.</td>
</tr>
<tr>
<td>February-March 1993</td>
<td>Background soil and groundwater samples collected.</td>
</tr>
<tr>
<td>March-April, July 1993</td>
<td>Collected biota samples from sewage lagoons and lakes.</td>
</tr>
<tr>
<td>October 1994</td>
<td>Performed additional sampling of sewage lagoons and lakes.</td>
</tr>
</tbody>
</table>
operate its surface impoundments on 8 November 1985.

After nearly two years of negotiations, EPA Region 6, Holloman AFB, and NMED signed a FFCA in December 1988. This agreement set forth a resolution of all issues raised in the Notices of Noncompliance, and set a schedule for achieving compliance with RCRA and reporting progress. In accordance with the FFCA schedule, Holloman AFB submitted a closure plan for the sewage lagoons to EPA Region 6 and NMED on 19 January 1989, and subsequently revised the closure plan in July 1990. For a period of almost two years, Holloman AFB, EPA, and NMED attempted to reach an agreement on the closure plan. The central issue of contention was the applicability of the RCRA "clean closure" requirements. Through a series of meetings with EPA, NMED, Holloman AFB, and Radian Corporation (Holloman AFB's contractor) during January 1991, it was agreed that the Base would pursue clean closure supported by a site-specific demonstration (i.e., risk assessment); however the closure plan has not yet been updated to reflect the site-specific demonstration.

Another requirement of the FFCA included the installation of a groundwater monitoring system encompassing the sewage lagoons. The system was installed in July 1989; the sampling and analysis for the detection monitoring system network commenced in August 1989 until May 1991 when assessment monitoring began.

In addition, Holloman AFB implemented a sludge removal project for the removal of PCB-contaminated sludge mounds within Ponds A and B of the sewage lagoons. Removal of PCBs to below the TSCA level of 25 ppm was completed in October 1990. This project was not considered part of closure activities; rather, it was considered a voluntary action by Holloman AFB.

In January 1991, Holloman AFB received a notice from EPA Region 6 that a statistically significant increase in total organic carbon had been detected in the groundwater monitoring and that a groundwater quality assessment plan would be required. The Base submitted the final groundwater quality assessment plan in June 1991 and received approval in September 1991. Phase 1 of the groundwater assessment monitoring was completed in 1993 and the report was submitted in December 1993 to NMED and EPA Region 6.

In June of 1991, Holloman AFB submitted a post-closure care permit (PCCP) application for the sewage lagoons. The purpose of the PCCP application was to allow Holloman AFB to continue to operate the sewage lagoons for nonhazardous waste under the "delay of closure" option. One condition for the review of the PCCP application, as stated in a letter from NMED dated 22 May 1991, was that a sampling and analysis program be conducted in all impoundments downstream of Pond C, including Lakes Holloman and Stinky. The PCCP application included the closure plan that was previously revised and submitted in July 1990. The PCCP application was declared administratively complete, but has never been technically reviewed by NMED for comments.

During preparation of the PCCP application, Holloman AFB received approval from HQ ACC to construct a new wastewater treatment plant and HQ ACC requested USACE Albuquerque District to hire a contractor to design the facility. The design is complete and the project is out for bid. Construction of the new wastewater treatment system will begin in March 1995. The new wastewater treatment system will completely replace the existing seven sewage lagoons.
In order to meet the requirement for additional investigation of the sewage lagoons, a preliminary investigation was conducted in October 1991 to determine water depths and sludge thicknesses. A strategy for investigation activities was prepared and negotiated through several conference calls. The investigation was conducted in the Spring of 1992 and the results were presented to the EPA Region 6 and NMED in August 1992. The investigation included the Phase 1 RCRA Facilities Investigation (RFI) for Lakes Holloman and Stinky. The data was used to update the risk assessment, and the updated risk assessment was presented in November 1993 to NMED. The Phase 2 RFI (groundwater sampling) for Lakes Holloman and Stinky was conducted in August 1993 and the results were presented to NMED and EPA Region 6 in December 1993.

In January 1994, Holloman AFB provided EPA and NMED with a conceptual plan for additional sampling at the sewage lagoons and lakes to address uncertainties noted in the risk assessment and to better define the extent of contamination. The data collected will be used to aid in determining closure options for the sewage lagoons and in clarifying the significance of previous detections. The field program began in October 1994, with slight modifications to the approach presented in the January 1994 conceptual plan. The activities performed in the field program will be summarized in the closure plan for the sewage lagoons.

### 2.2 Parties Involved

Although the main players in the regulation of the sewage lagoons at Holloman AFB are the Base, EPA Region 6, and NMED, many other parties have been involved in the program throughout the years and continue to provide support. A brief overview of the other organizations is outlined below. Appendix B provides a list of the individuals within each organization and their relationship to the project.

**Headquarters Air Combat Command (HQ ACC)**—Holloman AFB is part of the major command known as Air Combat Command. HQ ACC has an environmental office that is involved in environmental activities at ACC bases, including Holloman AFB. HQ ACC controls the funding for the Installation Restoration Program and other environmental programs throughout the command in addition to technical review and supervision of environmental programs at ACC bases. ACC was formerly Tactical Air Command (HQ TAC), prior to reorganization in 1992.

**US Army Corps of Engineers (USACE)**—Holloman AFB has used the USACE, Omaha District as a contract administrator for environmental projects relating to the sewage lagoons closure. USACE provides project administration and technical support for specific projects (delivery orders) for the sewage lagoon system as well as a mechanism to access environmental consultants and contractors. In general, all contractors working in support of the sewage lagoons closure project are contracted through the USACE.

USACE Albuquerque District is coordinating all construction of the wastewater treatment plant and will be involved with any construction occurring during closure of the sewage lagoons.

**Radian Corporation**—Radian Corporation has provided environmental consulting services to Holloman AFB through the USACE from 1986. Since June 1994, Radian Corporation has performed work under subcontract to Foster Wheeler Corporation.
Foster Wheeler Corporation—Foster Wheeler has the Total Environmental Restoration Contract (TERC) with the USACE, Omaha District and is the prime contractor for the sewage lagoons work conducted in 1994 and 1995.

US Department of the Interior (DOI)—The offices of the Fish and Wildlife Service (FWS), has an interest in the sewage lagoons because the DOI is the natural resources trustee for the migratory birds that use both the adjacent lands and the sewage lagoon system.

Previously, the Bureau of Land Management (BLM) had an interest in the closure of the sewage lagoons because they were the trustee who managed Lakes Holloman and Stinky and adjacent lands. BLM turned the land over to USAF in December 1994 and are no longer involved with decisions made for closure of the sewage lagoons.
Section 3
ENVIRONMENTAL SETTING

This section presents a summary of the environmental setting. The discussion is limited to information about the location, geology, hydrology, and groundwater quality at the Base, with particular emphasis on the sewage lagoons.

Further details concerning the geology and hydrogeology can be found in the following documents:

1) USGS, 1985, "Water Resources in Basin-filled Deposits in the Tularosa Basin, New Mexico." USGS Water Resources Investigation Report 85-4219; and


3.1 Location and Site Description
Holloman AFB is situated in south-central New Mexico in the northwest-central portion of Otero County as shown in Figure 3-1. The Base is located about 75 miles northeast of El Paso, Texas, and about 7 miles west of Alamogordo, New Mexico. Alamogordo is the largest city in Otero County and the biggest population center near Holloman AFB, with a population of approximately 31,000.

As illustrated in Figure 3-1, the sewage lagoons are located in the southwestern corner of the Base. Figure 3-2 is a land ownership map showing the recently transferred land from BLM to USAF.

The sewage lagoon system consists of seven aeration/evaporation lagoons. The first three sewage lagoons, Ponds A, B, and C, are aerated. Ponds A and B are generally operated in parallel fashion and occasionally operated in sequence to increase residence time. Afterward, the wastewater flows in series from Pond C through Ponds D, E, and G. Pond F is a sump that recirculates wastewater from Pond E back to the headworks of the system. Discharge from the last sewage lagoon (Pond G) flows via an open ditch to Lake Holloman.

Lake Holloman was formed by constructing a non-engineered dam to collect surface water drainage and wastewater discharge. The original dam was constructed in 1964 and upgraded to the present size in 1968. The 166-acre lake was intended to be the final impoundment for evaporation; however, due to seasonal low evaporation and increased wastewater generation from the Base activities, water from Lake Holloman occasionally overflows into Lake Stinky, a small salina. Any overflow into Lake Stinky eventually dissipates through evaporation.

3.2 Soils and Geology
The soils are either Holloman-Gypsum Land-Yesum, Complex, or Mead silty clay loam soil as shown in Figure 3-3. The Mead silty clay loam is found in low-lying areas, is less permeable, and sometimes is associated with wetlands (Soil Survey of Otero, New Mexico, 1981). The soil grades into the upper sand unit, which consists of 6 to 40 ft of sand, silt, or silty sand. Clay lenses are common in the upper sand unit. A discontinuous middle clay unit underlies the upper sand. The middle clay is reddish brown with abundant gypsum crystals and ranges from 10 to 40 ft thick where present. A lower sand unit consisting of interbedded sand, clay, and silt lies beneath the middle clay. This unit is
Figure 3-1. Location of the Sewage Lagoons at Holloman AFB
Figure 3-2. Land Ownership Patterns in the Immediate Project Area
Figure 3-3. Soils Map of Holloman AFB and Project Area
lithologically heterogeneous and ranges from 10 to 20 ft thick.

The subsurface conditions at the sewage lagoons were defined by direct sampling and observation of the drilling operations of soil and/or monitor well borings drilled between 1987 and 1993. Figures 3-4 and 3-5 illustrate and describe the general stratigraphy of the site.

The sediments consist of sand, silt, clay, and are subdivided into six very broadly definable units that appear to be continuous across the site (Figure 3-4). This interpretation is supported by available data; however, irregularities exist on a smaller scale because of the discontinuous nature of alluvial and lacustrine deposits.

3.3 Hydrology

3.3.1 Surface Water

Holloman AFB is located in the Tularosa Basin, which is a closed basin with no surface water drainage. Water is lost to evaporation, transpiration, and infiltration, or collects in Lake Lucero, the lowest point in the basin, approximately 20 miles southwest of Holloman AFB.

The Base is crossed by several southwest-trending arroyos that control surface drainage in the undeveloped part of the Base. All of the arroyos terminate in the gypsum dune fields located in the western portion of the Base with the exception of Lost River. Lost River continues into the larger dunes of White Sands National Monument before it terminates.

Most drainage from the main Base (developed portion) overflows through a drainage ditch that bypasses the sewage lagoons and flows to Lake Holloman. Because of the high water table, the ditch flows most of the year to Lake Holloman. Other Base drainage flows to Dillard Draw and to undrained depressions, some of which are jurisdictional wetlands.

Lake Holloman is a playa lake which is a "waters of the U.S." as defined in 40 CFR 122.2. Holloman AFB submitted an NPDES permit application in 1991 which is currently being revised to reflect the realignment of the Base in 1992 and the final design of the new wastewater treatment plant.

3.3.2 Wetlands

The USACE has identified the presence of 70 acres of jurisdictional wetlands near the sewage lagoons and location of the proposed wastewater treatment plant. These areas were identified in accordance with Section 404 of the Clean Water Act. The location of these wetlands are shown in Figure 3-6 and are located within the boundaries of Holloman AFB with the recent transfer of land from BLM.

Pond G comprises 40 of the 70 acres of jurisdictional wetlands and is currently exempt from regulation under Section 454 of the Clean Water Act because it is functioning as a part of the wastewater treatment system. However, if Pond G is disconnected from the wastewater treatment system, it would lose exemption and would be subject to Section 404 in order to excavate or fill the site. The FWS and Mesilla Valley Audubon Society have requested that Holloman AFB continue to supply water to Pond G to maintain wildlife habitat.

3.3.3 Groundwater

Groundwater occurs in unconfined conditions in the unconsolidated bolson deposits beneath Holloman AFB. The primary source of recharge for groundwater in the bolson aquifer is percolation of rainfall and stream runoff through the coarse, unconsolidated alluvial fan deposits located near the base of the mountains upgradient of Holloman AFB. Groundwater discharge
Figure 3-4. Stratigraphic Fence Diagram
### Site Stratigraphy

<table>
<thead>
<tr>
<th>Approximate Test BGL</th>
<th>General Stratigraphic Section</th>
<th>Unit</th>
<th>Average Thickness (feet)</th>
<th>Lithologic Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>UPPER SAND/SILT</td>
<td>12</td>
<td>SAND AND SILT – light tan to dark brown, poorly graded quartzose, minor gypsum crystals, dark accessory minerals, loose, dry to moist, rare green staining near base of unit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UPPER CLAY</td>
<td>6</td>
<td>CLAY – reddish-brown to greenish-gray, slightly silty, poorly graded, plastic, firm to friable, contains scattered pockets of small gypsum crystals, semi-continuous, becoming thinner in the north portion of site</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MIDDLE SAND/SILT</td>
<td>10</td>
<td>SAND AND SILT – reddish-brown to light gray, moderately to poorly graded, slightly clayey in zones, minor dark accessory minerals, loose, wet to saturated, minor gypsum crystals, rare pockets of carbon coated material</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MIDDLE CLAY</td>
<td>25</td>
<td>CLAY – reddish-brown to greenish-gray, poorly graded, becoming more greenish-gray westward, medium to high plasticity, slightly to moderately sandy, common pockets of medium to large gypsum crystals, moderately stiff to firm, wet to saturated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LOWER SAND/SILT</td>
<td>15</td>
<td>SAND AND SILT – brown to grayish-green, fine to medium grained, moderately to poorly graded, becoming more clayey near base, minor gypsum crystals, common dark accessory minerals, wet to saturated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LOWER CLAY</td>
<td>&gt;8</td>
<td>CLAY – grayish-green, silty, poorly graded moderate to high plasticity, thin interbedded layers of fine grained silty sand, minor gypsum crystals, wet to saturated</td>
</tr>
</tbody>
</table>

**Figure 3-5. Site Stratigraphy**
Figure 3-6. Wetlands Identified in the General Project Area
occurs either through evapotranspiration, springs or seeps along steep-sided arroyos, or into closed playa lakes such as Lake Lucero, the regional groundwater discharge area.

Regional groundwater flow is to Lake Lucero. Local groundwater flow is seasonally variable and is affected by the relationship between the water table elevation and the elevation of the bottom of the local arroyo channels. In the southeastern portion of the Base, regional groundwater flows southwest, following the Dillard Draw surficial drainage system. In the northern portion of the Base, groundwater flows to the west, following the Ritas Draw, Malone Draw, and Lost River drainages.

The groundwater elevation at the sewage lagoons was surveyed in March, April, and August 1993 to determine seasonal variation associated with precipitation and evaporation rates at Holloman AFB. As part of that survey, surface water elevations were measured in Ponds A, D, and G and in Lakes Holloman and Stinky to provide data necessary to characterize local relationships between surface water and groundwater. The *Phase I—Groundwater Assessment Monitoring Report* (Radian, December 1993) presents the results of this evaluation. A groundwater contour map is presented as Figure 3-7.

In the vicinity of the wastewater treatment facility, the depth to groundwater ranges from 2 ft below ground level (BGL) near the sewage lagoons to 13 ft BGL near Lakes Holloman and Stinky. Under an average hydraulic gradient of 0.3, the groundwater flows consistently from northeast to southwest. However, surface water in the unlined lakes cause groundwater mounding. Immediately to the east of Lakes Holloman and Stinky, groundwater flows toward the southeast if the elevation of Lake Holloman surface water is higher than the water table, which occurs most of the time.

### 3.4 Groundwater Quality

Groundwater quality in the Tularosa Basin is potable at the Boles and San Andres water well fields located at the foot of the Sacramento Mountains 14 miles southeast of Holloman AFB. Groundwater becomes progressively more mineralized as it flows downgradient toward the interior of the basin. This decrease in water quality can be attributed to slow groundwater migration from recharge to discharge areas and the presence of readily soluble minerals in the bolson sediments. Total dissolved solids exceed 100,000 mg/L in groundwater in some portions of the Tularosa Basin (USGS, 1985).

The groundwater beneath Holloman AFB is designated as unfit for human consumption based on New Mexico Water Quality Control Commission Regulations (NM WQCC 82-1, as amended through August 18, 1991 Parts 3-100 through 3-103) because it exceeds New Mexico Human Health Standards (HHSs) for total dissolved solids (TDS) and sulfate. Average values of other groundwater quality parameters measured at Holloman AFB (chloride, fluoride, and nitrate-nitrite) also exceed HHSs and, except for fluoride, also exceed federal primary and secondary drinking water maximum contaminant levels (MCLs; SMCLs). Water quality parameters reflect that the groundwater in this area is not potable under natural conditions.

Although EPA guidelines for groundwater classification are not recognized by the State of New Mexico, the EPA guidelines *Guidelines for Groundwater Classification Under the EPA Groundwater Protection Strategy* (EPA, 1986) classify the groundwater beneath Holloman AFB as a III B aquifer. Class III groundwater, characterized by having a TDS concentration greater than 10,000 mg/L, is not
Figure 3-7. Groundwater Contour Map
considered a source or a potential source of drinking water. Class III B groundwater is characterized by a low degree of interconnection to adjacent surface waters or groundwater of a higher class. The average measured TDS value of groundwater at Holloman AFB is greater than 10,000 mg/L (Radian, 1992). Because the Tularosa Basin is a closed basin, its groundwater does not discharge or connect to any adjacent aquifers. Adjacent surface waters include groundwater surfacing in Malone Draw and Lakes Holloman and Stinky. The TDS in Lake Holloman range from a winter low of 12,400 mg/L to a summer high of 17,000 mg/L (Cole, et al., 1981); therefore, groundwater at Holloman AFB is not interconnected with surface water of a higher class. In the investigation in 1993, TDS ranged from 11,000 to 12,000 mg/L in Lake Holloman and was 14,000 mg/L in Lake Stinky.
Section 4
KEY EVENTS/DECISIONS

This report supplements the previous Project Assessment Report (PAR) prepared in August 1990 and continues the project history of the sewage lagoons and lakes.

4.1 Federal Facilities Compliance Agreement

The Federal Facilities Compliance Agreement (FFCA) was signed by EPA Region 6, NMED, and Holloman AFB in December 1988 as a resolution to the Notices of Noncompliance. The compliance agreement required two main activities: 1) the installation of a groundwater monitoring system and commencement of compliance monitoring and 2) the submittal and implementation of a closure plan for the sewage lagoons.

4.1.1 Groundwater Monitoring System

An historical summary of the groundwater monitoring program is provided in Figure 4-1.

The groundwater monitoring system, consisting of eight new and two existing wells, was installed in July 1989; the sampling and analysis for the detection monitoring system network commenced in August 1989.

Subsequent quarterly and semi-annual sampling for Appendix III constituents and indicator parameters exhibited a statistically significant increase in TOC concentrations in five of the eight downgradient wells. EPA Region 6 first notified Holloman AFB of this situation at a meeting on 31 January 1991. Holloman AFB requested that EPA Region 6 provide the statistical evaluation of the data. On 3 May 1991, EPA Region 6 notified the Base in a letter that they had concluded that the first monthly results for TOC could not be used to calculate background levels for constituents and that the Base must use second, third, and fourth monthly events in addition to the first semi-annual event to calculate background.

In addition, EPA Region 6 restated their position that a statistical increase in TOC had occurred between upgradient well MW-1 and downgradient wells in the letter on 3 May 1991. This finding activated the need for a RCRA Assessment Monitoring Program. The Groundwater Assessment Monitoring Plan for the Sewage Treatment Lagoons at Holloman AFB was submitted in June 1991 and finalized in September 1991. The plan describes the procedures associated with the First Determination False Positive, Phase I, Phase II, and Phase III sampling.

The assessment monitoring activities occurred between September 1991 and February 1992. This sampling detected and confirmed (First Determination False Positive sampling) the presence of alpha-BHC in MW-05, and beta-BHC in MW-07. Aldrin and dieldrin were detected but not confirmed above their respective action levels based on ingestion of drinking water using the worst case exposure scenario (Subpart S action levels).

As a result of the First Determination False Positive activities, the Phase I Assessment Monitoring Program was executed in 1992 and 1993. Included in this activity was the installation of two additional background wells and five new downgradient wells. After installation, the new wells and the existing deep piezometers were sampled for Appendix IX constituents, and all wells were sampled for Method 8080 pesticides.
Detection Monitoring
(July 1989 through January 1991)

Groundwater Assessment Monitoring Plan
(September 1991)

First Determination False Positives: Appendix IX and Confirmation Sampling
(September 1991/February 1992)

Phase 1 Assessment Monitoring

FFCA requires Groundwater Monitoring System
Groundwater monitoring network consists of 10 wells
- (MW-01 through MW-08 installed in 1989)
- (MWS-02 and MWS-04 installed in 1987)
Quarterly and semiannual sampling of monitoring network for Appendix III constituents and indicator parameters
EPA Region VI determines statistically significant increase in TOC concentration in downgradient wells MW-02 through MW-06

Potential release activates RCRA Assessment Monitoring Program
Groundwater Assessment Monitoring Plan prepared
- Phase 1: Define nature and areal extent of contamination
- Phase 2: Identify contamination in second aquifer and determine vertical extent of contamination (if any)
- Phase 3: Identify preferential pathways for contamination migration (if any) and migration rates

First Determination False Positives includes 2 rounds of groundwater sampling (Appendix IX and confirmation sampling)
Round 1: Analyses include TOC and Appendix IX parameters
Agreement with NMED concludes that organochlorine pesticides are contaminants of concern
Round 2: Confirmation analyses include organochlorine pesticides by EPA Method SW8080
First Determination False Positives indicates:
- alpha-BHC in MW-05
- beta-BHC in MW-07
- Aldrin and Dieldrin above action levels in MW-03

Install two new background wells (MW-09, MW-10)
Install five new downgradient wells MW-11 through MW-15 and add existing MWS-05
Conduct two rounds of sampling
Round 1: Sample new wells & deep piezometers for Appendix IX constituents, and sample existing wells for SW8080 pesticides
Round 2: Confirmation sampling of new and existing shallow wells for SW8080 pesticides
Confirmation sampling indicates:
- Heptachlor epoxide in MW-03
- 4,4'-DDD in MW-04
- No pesticides confirmed in new downgradient wells
Nature and extent of SW8080 pesticides defined
Metals indicated potential release

Figure 4-1. Historical Summary of Groundwater Monitoring Program for the Sewage Lagoons
March 1995
Additional confirmation sampling indicated the presence of heptachlor epoxide in MW-03 and 4,4'-DDD in MW-04. Phase I sampling adequately defined the nature and extent of Method 8080 pesticides and indicated the potential release of metals. Results of the Phase I investigation are contained in the *Phase I Groundwater Assessment Monitoring Report* (Radian, 1993).

### 4.1.2 Closure Plan

Holloman AFB, NMED, and EPA Region 6 discussed the closure plan for a period of almost two years. The following presents an overview of these discussions:

- The initial closure plan was submitted to EPA and NMED in January 1989.

- NMED notified Holloman AFB on 26 January 1989 that because of work plan commitments and staffing priorities, the review of the closure plan would not occur within the following six months.

- On 13 July 1989, NMED provided a notice of Disapproval on the closure plan and provided a list of deficiencies with the comments. NMED requested that the additional technical information be submitted within 30 days. EPA notified Holloman AFB on 27 July 1989 that their comments on the closure plan were essentially the same as NMED's comments. Through various telephone calls, Holloman AFB was informed that NMED was taking the lead on the review of the closure plan.

- Holloman AFB provided the requested technical information as an attachment to the closure plan on 14 August 1989.

- On 9 November 1989, NMED provided comments to Holloman AFB on the revised closure plan submitted on 14 August 1989. A meeting was scheduled for 13 November 1989 to discuss the comments on the closure plan.

- Holloman AFB and NMED met on 13 November 1989 in Santa Fe to discuss the closure plan. The Base and NMED agreed that their were two acceptable courses of action for resolution, both of which were protective of human health and the environment and allow continued use of the sewage lagoons. These options were:

  1) a modified closure with a post-closure care plan and permit; or
  2) a delay of closure permit pursuant to the 14 August 1989 rule.

- NMED provided a memorandum to EPA Region 6 on 2 January 1990 that summarized the contamination in the sewage lagoons and NMED's position regarding what would be required for NMED to determine that Holloman AFB could continue the operation of the sewage lagoons. NMED proposed the two alternatives discussed in the meeting with the Base on 13 November 1989.

- On 26 January 1990, NMED notified EPA Region 6 that they did not have the time or the resources to pursue dispute resolution since the closure plan discussions were not resolving the disputes. Nor did NMED have the time to write a closure plan that would be acceptable to the state, especially if the rewritten plan would only trigger a dispute resolution.

- NMED requested that EPA Region 6 approve one of the two options originally proposed in the 2 January 1990 memo-
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Holloman Air Force Base

•  NMED provided a letter to EPA Region 6 regarding the state's understanding of the resolution of the closure plan. The letter stated that EPA Region 6 would require Holloman AFB to submit a closure plan that detailed exactly how the sewage lagoons would be excavated or capped and would remind the Base of the dispute resolution clause. The letter further stated that NMED had no further role to play until Holloman AFB responded to the EPA Region 6 letter.

•  On 14 June 1990, EPA Region 6 submitted a letter to Holloman AFB that stated the position referred to by NMED. EPA Region 6 stated that the closure plan must specify closure in accordance with 40 CFR Part 265 and must either be 1) clean closure (i.e., removal or decontamination of all waste residues, contaminated system components, and contaminated subsoils) or 2) closure in place (i.e., elimination of free-liquids and installation of a final cover. The EPA further stated that these options were not consistent with the current closure plan, which would allow for removal of some contaminated soils and continued use of some of the sewage lagoons. EPA Region 6 stated that the entire sewage lagoon system had been used to treat hazardous waste, and, therefore, the closure plan must address all of the sewage lagoons. EPA Region 6 required that a closure plan meeting these requirements be submitted within 30 days of receipt of the letter.

•  Holloman AFB responded to the EPA request with a letter on 18 July 1990 that submitted a closure plan that included revisions to address the comments that NMED had provided to Holloman AFB at the 13 November 1989 meeting in Santa Fe. The closure plan allowed for the continued use of the sewage lagoons. The letter further stated that the Base had previously been informed by EPA that NMED was taking the lead on the review of the closure plan and that the Base had met with NMED on 13 November 1989 to discuss their concerns about the closure plan and an agreement was reached. The Base further requested that, if the EPA disagreed with the approach to closure that had been agreed upon by NMED and the Base, a written response be provided to the Base that identified the portions of the closure plan that were deficient.

•  On 11 December 1990, the EPA responded to Holloman AFB's letter. The letter clarified that Federal Facilities Compliance Agreement had stated that EPA would process the closure plan to the point of approval and that NMED would approve it. However, when it became apparent that NMED did not have the resources to perform the review, NMED requested that EPA take the lead in the review.

The letter also discussed that the two options proposed in the letter were not available to Holloman AFB for the following reasons:
1) Delay of closure was not available because the sewage lagoons no longer had interim status to operate, which was a requirement for delay of closure; and

2) Modified closure would not comply with the closure requirements of 40 CFR Parts 265, Subparts G and K.

Again, the EPA required that Holloman AFB submit a closure plan that met the referenced requirements within 30 days.

- As a result of the EPA letter, Holloman AFB scheduled a meeting with the EPA on 4 January 1991 in Dallas, Texas. At this meeting, the Base discussed site-specific demonstration of clean closure as presented in the preamble of the final rule for Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities (52 Federal Register 8704, 8706, March 19, 1987). EPA stated that a site-specific demonstration of closure would have to be approved by NMED and suggested that Holloman AFB schedule a meeting between EPA Region 6, NMED, and the Base.

- A meeting was scheduled for 31 January 1991 in Santa Fe, New Mexico. EPA presented a draft Clean Closure Requirements Document dated January 1991. The document was considered guidance and discussed that 1) health-based closure levels are defined as the strictest standard, applying direct ingestion considerations and 2) health-based closure levels for carcinogens must be established for the risk level of $10^{-6}$. It was agreed that Holloman AFB would prepare a sampling and analysis plan to satisfy the requirements for a site-specific demonstration of clean closure for the sewage lagoons in accordance with the draft Clean Closure Requirements Document dated January 1991.

Subsequent to this meeting, discussions regarding delay of closure and a post-closure care permit application began (see Section 4.2). The closure plan was resubmitted with the Post-Closure Care Permit application in June 1991; no review or revisions have occurred since that time.

Currently, the FFCA is still incomplete because a closure plan has not been approved and implemented. The Air Force decided in 1993 to not use the existing sewage lagoons as part of the new wastewater treatment system that is currently being designed. This decision increased the flexibility in approaches to close the sewage lagoon system. Holloman AFB is currently in the process of revising the closure plan.

Since 1991, the FWS has been concerned with the effects that closure of the sewage lagoons will play on the wildlife supported by the sewage lagoon system. Investigations of the sewage lagoons and risk assessments have been performed to identify potential risks. Subsequent to these investigations, HAFB has narrowed the list of chemicals of potential concern from all Appendix IX constituents to Method 8080 pesticides and metals. Therefore in 1994, HAFB requested that NMED not review the closure plan and post closure care permit application as currently written since neither were an accurate statement of current events.

4.2 Approach to Closure

When discussions of closing the sewage lagoons began, EPA and NMED took the approach that the sewage lagoons must be closed in accordance with 40 CFR Part 265, Subparts G
and K, which presents two options for closure: "clean closure" or "closure in-place". Clean closure involves removal of all hazardous wastes and hazardous waste constituents whereas closure in-place involves leaving wastes and waste constituents in place and closing the facility as a landfill, including a permanent cap and a post-closure care permit.

Holloman AFB requested during January 1991 meetings with EPA Region 6 and NMED that the sewage lagoons be allowed to undergo clean closure supported by a site-specific demonstration (i.e., risk assessment). The basis for the request was the discussion of site-specific demonstration of clean closure in the preamble of the final rule for Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities (52 Federal Register 8704, 8706, March 19, 1987).

The agencies agreed in the January meetings that clean closure by site-specific demonstration would be an option for the closure of the sewage lagoons, assuming that any sewage lagoon that could not meet the site-specific health-based standard would undergo closure in-place.

4.3 Post-Closure Care Permit Application

The State of New Mexico adopted a final rule on delay of closure for certain HWMUs, including surface impoundments. This rule allowed a facility which had lost interim status to submit a closure/post-closure care permit (PCCP) application, which, if approved, would allow the facility to extend the final closure period of the HWMU to allow the unit to continue to accept nonhazardous wastes. EPA, NMED, and Holloman AFB agreed that this would be an opportunity to reach an equitable, legal, and environmentally sound solution for the sewage lagoons. The Base agreed in 1991 to submit a PCCP application and conduct a sampling program to determine whether the contamination in the sewage lagoons presented a threat to human health and the environment, and, therefore, would require an interim cleanup (prior to final closure).

NMED identified certain requirements for the PCCP application in a letter dated 22 May 1991, which included a closure plan, and post-closure plan, a sampling program for Ponds D, E, F, and G and Lakes Holloman and Stinky, a quarterly and semi-annual detection monitoring program for groundwater wells, and a contingency plan for increased monitoring and/or corrective action program in the event of a release. EPA also identified sampling requirements for the sewage lagoons in a letter dated 20 June 1991. Holloman AFB submitted the PCCP application in June 1991 and the closure plan that had been previously submitted in November 1989. The PCCP application presented a sampling program as requested in the letters from NMED and EPA Region 6.

In November 1991, Holloman AFB submitted a Conceptual Plan for Sludge and Soil Sampling that revised the sampling program presented in the PCCP application and requested by EPA Region 6 and NMED earlier in 1991. NMED approved the conceptual plan for sampling the sewage lagoons in an 18 November 1991 letter to Holloman AFB as an acceptable substitute to the sampling plan requested in a letter dated 22 May 1991. EPA Region 6 also approved the plan on 17 December 1991.

Holloman AFB paid a $28,000 permit fee in 1991 to NMED to review the PCCP application. Although the application was declared administratively complete, Holloman AFB never received technical comments on the application from the agencies.
Holloman AFB submitted the Site Characterization Report: Sewage Lagoon Investigation to NMED in September 1992, which addressed the requirements of the conceptual sampling plan. At the time the results were submitted, Holloman AFB requested that the review of the PCCP application be postponed so that the closure plan could be supplemented with a detailed feasibility study of closure alternatives and additional investigation, including: 1) surface water sampling, 2) a biota study, 3) a statistical study to assess the existing data, and 4) a detailed risk assessment. These activities were performed in 1993; however, the results of the risk assessment showed some uncertainties with the data and these are being addressed during a 1994 sampling event.

On 15 February 1994, Holloman AFB requested that the existing Closure Plan/Post-Closure Care Permit Application not be reviewed. The Base stated that the results from the 1992 investigation indicated that additional data would be required to determine the extent of contamination in the lower sewage lagoons.

4.4 Involvement of Department of the Interior

The Department of the Interior is the natural resources trustee for Lake Holloman and the lands surrounding the lake and for the migratory birds that utilize both the sewage lagoons and lakes. Two Department of the Interior agencies have been involved in the sewage lagoons closure issues at Holloman AFB: the BLM, and the FWS. In addition, BLM entered into a cooperative management agreement with the Mesilla Valley Chapter of the Audubon Society in 1987. Under the agreement, Audubon monitors the bird populations and provides management recommendations to improve their habitat.

In 1987, BLM requested that Holloman AFB provide BLM with copies of water quality reports since 1975 and any future reports related to the water quality at Lake Holloman. In 1989, BLM requested that the Base identify a point of contact within the Civil Engineering Squadron to update BLM staff on the status of activities at the sewage lagoons and lakes.

In January 1991, The FWS requested that a quantitative ecological risk assessment be performed for the sewage lagoons and provided Holloman AFB with a proposed scope. Holloman AFB contracted with FWS to perform an ecological assessment. Holloman received raw data from the study in June 1992 and has collected additional data during 1993.

In April 1993, Holloman AFB requested a species list and opened an informal consultation with FWS under Section 7 of the Endangered Species Act. The Base informed the FWS of plans to construct a new wastewater treatment plant to replace the sewage lagoon system, potentially eliminating the sewage lagoons and Lake Stinky as water bodies. The Mesilla Valley Audubon Society responded to this by requesting that Lake Stinky be preserved as shorebird habitat.

An ecological risk assessment was presented with the human health risk assessment presented to NMED in December 1993, Holloman Risk Assessments, Sewage Lagoons and Lakes Investigation. A biological assessment will be prepared and the ecological assessment will be updated with additional analytical data gathered by Holloman AFB during 1995.

In December 1994 BLM land, including Lake Holloman, was transferred to Holloman AFB. BLM is no longer involved with the sewage lagoons and lakes project.
Section 5
PAST INVESTIGATIONS/STUDIES AND RESULTS

A comprehensive review of sampling and analysis activities conducted over the past 15 years is provided in this section. Emphasis is placed on 1) the purpose of the sampling, 2) the scope of the sampling (i.e., the number of samples collected and types of analyses performed, and 3) the analytical results and conclusions. In addition, this section summarizes other studies or activities associated with the sewage lagoons.

A summary of analytical results for the various ponds and media are presented in Appendix D.

5.1 Soil and Sludge Investigations

5.1.1 1981 Water and Sludge Sampling—EP Toxicity
In November 1981, water and sludge samples were collected from the sewage lagoons and Lake Holloman for analysis by the EP toxicity procedure. This evaluation was conducted to determine whether the wastewater that the sewage lagoon received contained levels of heavy metals or other constituents that would cause the wastewater to be classified as hazardous waste. Samples of both the wastewater and sludge were collected and analyzed. Most of the constituents were below detectable levels and none exceeded the EP toxicity criteria defined in 40 CFR 261.24. The data was presented in the January 1982 Report, Evaluation for Hazardous Waste at Holloman AFB Sewage Treatment Plant. The following conclusions were made:

1. The wastewater and sludge samples appear not to be contaminated by the heavy metals arsenic, barium, cadmium, chromium, lead, mercury, selenium, or silver. (Detectable levels of arsenic, cadmium, chromium, and silver, were found in the wastewater, but at concentrations less than 10 percent of the regulatory limits. No contamination was detected in the sludge.) Chromium levels in the wastewater did fluctuate during a 24-hour period but were well within EPA's standards. (These fluctuations were associated with daily cleanup of industrial operations, but the exact source of chromium was not determined at that time.)

2. The sludge samples collected from the sewage lagoons did not exceed EPA's criteria for EP toxicity, corrosivity, or reactivity. (Since the sewage lagoons receive only wastewater, there is very little chance for ignitability problems).

5.1.2 1983 Water and Sludge Sampling—Chromium and Organics
In October 1983, sludge and wastewater samples were collected from Ponds A and B. This sampling event was primarily in response to a EPA letter issued 31 March 1983. Chromium was becoming an increasing concern of the EPA, and this sampling event was intended to substantiate the earlier findings of low concentrations of chromium in the wastewater. Organics (1,1,1-trichloroethane, trichloroethylene, and total organic halogens) and chromium were targeted for testing.

Analytical results were presented in the 22 December 1983 document Report to EPA Regarding Holloman Air Force Base Lagoons and T-38 Washrack Oil-Water Separator. The conclusions were essentially the same as the January 1982 report—although chromium was present in the wastewater stream, it was not
detected in the sludge contained in Ponds A or B. (Samples were analyzed by the EP toxicity method, which has a chromium detection limit of 50 µg/l.) Theoretical calculations were presented and indicated the following:

1. By means of a mass balance, the amount of chromium present in the wastewater was significantly below allowable amounts; and
2. Based on present operating conditions, hazardous levels of chromium in the sludge would not be reached until the year 2488, or approximately 500 years.

5.1.3 1984 Priority Pollutant Sampling

In response to a 15 August 1984 request by EPA Region 6, Holloman AFB proposed a protocol outlining sampling and analytical procedures for the list of 129 priority pollutants: Evaluation of Priority Pollutants in Sludges and Wastewater of the Holloman AFB Sewer Treatment Plant Oxidation Ponds (October 1984). The protocol was developed to test for the listed wastes that were suspected of being discharged to the sewage lagoons. In December 1984, a total of eleven sludge and wastewater samples were collected from Ponds A, B, and C and were analyzed for priority pollutants. The eight heavy metals and five pesticides were analyzed using EP toxicity and total extraction procedures. Analyses were conducted for purgeable organics (EPA Method 624), base/neutral and acid compounds (EPA Method 625), pesticides and PCBs (EPA Method 608), cyanides, and total phenols.

The analytical results of the December 1984 sampling were presented both in a meeting to EPA Region 6 in April 1985 and in a March 1986 report titled Evaluation for 129 Priority Pollutants, Holloman AFB Sewage Ponds. Of the eleven sludge and six water samples that were analyzed, one pollutant was found in concentrations that warranted some concern, polychlorinated biphenyls (PCBs). Sludge concentrations of PCB-1254 ranged from nondetect to 130 ppm. A bioassay study was recommended to investigate the possibility of PCBs accumulating in the indigenous biological organisms and transferring to larger animals via the food chain.

5.1.4 1987 Appendix IX Sampling in Support of Delisting Petition

In 1987, Holloman AFB contracted with Computrac, Inc. to prepare a preliminary delisting petition to delist the waste in the sewage lagoons. The purpose of the preliminary report was to determine if delisting was a feasible option, prior to conducting an extensive sampling plan. In support of the preparation of this preliminary delisting petition, a comprehensive sampling and analysis program on one sludge and one water sample from each sewage lagoon, Lake Holloman, and Lake Stinky was recommended, using EPA-approved protocols. The sampling effort was conducted in July 1987. The results of the analyses indicated that several metals (antimony, barium, cadmium, and mercury) were present in concentrations that could negatively impact the delisting petition. Furthermore, these concentrations were not limited to individual water bodies, but were found throughout the sewage lagoon system. None of the organic constituents identified as a potential problem by EPA in earlier samples (chloroform, PCB-1254, and benzo(a)pyrene) were detected in these new samples. Since only one sludge sample and one water sample were taken from each water body, no definitive conclusions were made from this sampling event. However, the delisting petition was abandoned.

Analytical results are presented in a 18 August 1987 report titled Analytical Summary of Holloman Air Force Base Delisting Assessment.
5.1.5 May 1988 Preliminary Investigation for Sludge Removal

HQ TAC (currently HQ ACC) began exploring the possibility of developing a revised closure scenario that would include the removal of the sludge mounds in Ponds A and B when the probability of a successful delisting was decreasing and costs were increasing. The removal of the sludge mounds required determining the height and areal extent of the mounds and the regions of PCB contamination. Radian Corporation contoured the mounds and collected a total of 18 depth-integrated samples (nine from each sludge mound) in May 1988. These were composited into six samples and submitted for laboratory analysis of PCBs and other organic and inorganic constituents. Results showed the PCB concentration in the sludge ranging from 24 to 63 ppm.

5.1.6 August 1988 Additional Investigation for Sludge Removal

The estimated size of the sludge mounds was approximately 10 times greater than originally estimated during the preliminary delisting petition. Consequently, a more extensive sampling plan was developed to better define the overall extent of contamination with respect to volatile and semivolatile organic constituents, PCBs, and metals. In August of 1988, a total of 45 locations in Pond A and 40 locations in Pond B were sampled. In addition, four points near the periphery of each sewage lagoon were sampled. Samples were again analyzed for PCBs and other organic and inorganic constituents. Results of the sampling effort were included in the Draft A-E Quality Control Summary Report (A-E QCSR) for Additional Sampling at Sewage Lagoons (Radian, December 1988).

Of the seven PCB species quantitated by Method 8080, only two were detected: PCB-1254 and PCB-1260. The total PCB concentrations (arithmetic sum of PCB-1254 and PCB-1260) ranged from 1.6 to 190 ppm. Concentrations of the two PCB compounds were added to present a worst-case scenario to evaluate the extent of contamination for sludge removal. No volatile organic compounds were detected in any sludge sample by Method 8240 analysis, which was consistent with previous sample results. Nineteen semivolatile compounds were detected at low concentrations by Method 8270. The majority of the compounds were polynuclear aromatic hydrocarbons. Although the analysis for total metals detected 12 metals in the sludge samples, no metals were detected above regulatory limits by the EP toxicity method for soils beneath the sludge mounds.

Based on these results, HQ TAC concluded that PCBs were the most significant contaminants of concern, and by removing the PCB-contaminated sludges, nearly all other known hazardous constituents would also be removed. A closure plan was developed to provide an 80 percent confidence level for removal of all sludge with a PCB concentration of 25 ppm or greater. Removal of 1316 tons of sludge from Pond B and 2663 tons from Pond A began in January 1990 and was completed in October 1990. Verification sampling was conducted from a 37-point sampling grid and samples were analyzed for PCBs. A sludge sample collected from a point outside the removal zone was found to contain 27 ppm PCBs; however, subsequent sampling of three points surrounding this location showed that the sludge contained less than 18 ppm PCBs. Western Technologies performed additional confirmation sampling from Pond A after the final sludge was removed and found concentrations no higher than 11 ppm.

5.1.7 1990 Surface Water Sampling

In October 1990 surface water samples were collected and analyzed from the sewage lagoons. The objective of this effort was to
obtain accurate surface water quality data for input to the risk assessment being prepared.

Two samples were collected from the wastewater treatment facility headworks, and five samples were collected from Ponds B, C, D, E, and G, and Lake Holloman. Sample locations were chosen to represent the areal distribution and variation of water quality within each impoundment.

Samples were analyzed for semivolatile organics, pesticides, PCBs, and metals. Only one sample reported a constituent above regulatory limits and this was iron. Organic lead was also detected at less than five times the reporting limit; however, these small concentrations have been a risk driver for Lake Holloman. There is some uncertainty with the results of the organic lead since the reported values are greater than the total lead concentrations reported and the equipment rinsate results also reported similar concentrations of organic lead. Holloman AFB personnel are not aware of any spills of aviation gasoline (leaded) to the sewage lagoon system that could have led to detecting the concentrations of organic lead reported. The uncertainty of organic lead will be addressed in the additional sampling of sludge and surface water performed in October to November 1994. The maximum levels of constituents detected in the surface water during the 1990 sampling event are summarized in Appendix D. Analytical results are presented in a December 1990 draft report titled Draft Quality Control Summary Report (A-E SQCSR) for Sewage Lagoon Surface Water Sampling.

5.1.9 1991 U.S. Fish and Wildlife Biota Sampling

During the summer of 1991 the U.S. Fish and Wildlife Service (FWS) conducted an investigation of the Holloman AFB sewage lagoon system and Lake Holloman to determine whether migratory birds were being exposed to organic and inorganic contamination present in these waters. Eleven sediment, one pond-water, and 35 biological samples were collected from several locations at the sewage lagoons and Lake Holloman. The samples were assayed for various metals, metalloids, and organic compounds.

Study results indicate that risks resulting from the presence of potentially toxic substances in aquatic systems were difficult to assess. Sediment samples revealed the potential for adverse biological effects; however, no analyses were performed to determine the bioavailability of the contaminants. Collected tissue samples contained generally low concentrations of these constituents. Analytical results of the investigation are reported in a draft survey report dated 14 January 1994, and entitled, "Preliminary Survey of Contaminants Present in Biota, Pore-Water, and Sediments at the Holloman AFB Waste
Water Treatment Facility." This report has not been finalized, but comments from the USACE and Holloman AFB were provided to FWS on 7 June 1994.

5.1.10 1992 Sewage Lagoon Investigation in Support of the PCCP Application

During February and March 1992, an investigation was conducted at the sewage lagoons to accomplish the following objectives:

- Support review of the PCCP application;
- Characterize the sewage lagoons and provide a preliminary estimate of the nature and extent of contamination and the resulting impact on final closure; and
- Provide a Phase I RFI Report for Lakes Holloman and Stinky as required by the Hazardous and Solid Waste Amendments (HSWA) permit.

Based on a preliminary investigation in October 1991 that measured the depth of sludge and water in each of the sewage lagoons, a sampling protocol was prepared and agreed upon by HAFB, NMED, EPA Region 6, USACE, and HQ ACC. This was documented in the Conceptual Plan for Sludge and Soil Sampling (Radian, Nov 1991). The sampling plan was accepted by NMED in a letter dated 18 November 1991 and by EPA Region 6 in a letter dated 17 December 1991.

The site was investigated by sampling and analyzing the sludge and underlying soil in the sewage lagoons, lakes, and ditch for Appendix IX constituents. The results of the investigation were documented in the Site Characterization Report (Radian, August 1992). This investigation indicated that the primary contaminants in the sludge samples from the sewage lagoons and lakes were metals and organochloride pesticides. Metals detected in the soil were below background levels and pesticides were significantly below action levels.

5.1.11 1993 Background Sampling

During February and March 1993 background soil and groundwater samples were collected. These samples represented background metal concentrations. To characterize background soil conditions, 10 sampling locations were selected from the Holloman-Gypsum Land-Yesum soil complex. Each sample location was carefully selected to avoid collecting samples affected by historical waste management practices. These background soil samples were representative of surface soil throughout the Base.

Four new monitor wells were installed in areas upgradient of potential contamination and in areas unaffected by past waste management practices. Samples were collected from these four wells and 10 existing background monitor wells. Samples were analyzed for total metals using unfiltered groundwater and for dissolved metals using 0.45 micron filtered groundwater. Analytical results from the background investigation are presented as an appendix in the December 1993 Draft Final Phase I-Groundwater Assessment Monitoring Report for the Sewage Lagoons and Lakes Investigation.

5.1.12 1993 Biota Sampling

Biota samples were collected to prepare a Biological Assessment Report in response to FWS's request per Section 7 of the Endangered Species Act. Biota samples were collected in all sewage lagoons and lakes, as well as in the ditch connecting Pond G and Lake Holloman. All biota sampling started downstream (Lake Stinky) and moved upstream, so that contaminants potentially stirred up during sampling activities would not interfere with analytical results from the samples collected.

Composite plankton samples were collected from Ponds A through G, and Lakes
Holloman and Stinky. Samples of fish (mosquito fish or *Gambusia affinis*) were collected from Pond G, the ditch, and Lake Holloman. Composite benthic samples were collected in Ponds A, E and the ditch. In addition near-surface sediment and surface water samples were collected. A duckling sample was also collected.

Biota samples were analyzed for chlorinated pesticides, PCBs, semivolatile organics, polychlorinated dioxins and furans, and some metals. Analytical results are currently being evaluated and will be reported in the biological assessment report scheduled for release in 1995.

5.1.13 October 1994 Sewage Lagoons and Lakes Additional Investigation

The purpose of the October 1994 sampling event was to further define the nature and extent of contamination within Ponds C, D, E, and G, the ditch from Pond G to Lake Holloman, and Lakes Holloman and Stinky; to answer uncertainties identified in the risk assessment for each pond; to provide analysis for developing cleanup standards and selecting appropriate remedial alternatives; and to define the volume of sludge potentially requiring remedial action in the ponds. Ponds A, B, or F are scheduled for remediation and therefore no samples were collected from these ponds. This sampling event is expected to be the final sampling event prior to conducting the corrective measures study and remedial design for closure.

A total of 122 sludge and soil samples were collected from the sewage lagoon and lake system. Sludge samples were collected from Ponds C, D, E, and G and Lake Holloman; surface soil samples were collected from Lake Stinky, and the ditch. Soil samples were collected in these later areas due to a lack of sludge.

As a result of the types of contaminants detected during previous sampling events, sludge and soil samples were analyzed for organochloride pesticides and metallic constituents (40 CFR, Part 264).

In addition to the sludge and soil samples, surface water samples were collected from Ponds C, D, E, G, Lake Holloman, and the Ditch. A total of 35 sample locations were selected from these areas. In order to reevaluate the results of previous samples collected for the 1991 risk assessment, all surface water samples were collected and analyzed for organolead and total lead.

Sample locations for the sludge, soil, and surface water samples were selected through probability kriging which is a geostatistical procedure. This procedure allows the use of nonparametric statistics to generate estimates of unknown concentrations. Nonparametric statistics are a group of "distribution-free" techniques that can be applied without prior information about the actual underlying statistical distribution of the concentrations of interest. A full description of the geostatistical procedures used to identify sample locations is presented in the January 1994 report titled *Conceptual Plan for Additional Sampling, Sewage Lagoons and Lakes Investigation* (Radian, 1994).

Analytical results are currently being reviewed and will be presented in a site characterization report during 1995.

5.2 Groundwater Investigations

5.2.1 August 1989-January 1991 Detection Monitoring Program

A groundwater detection monitoring system was installed as part of the FFCA requirement and for RCRA compliance since the sewage lagoons were determined to be HWMUs.
Background concentrations were developed on an accelerated schedule and collected during August, September, November and December 1989. Semiannual monitoring sampling continued in January and July 1990 (a resample was also collected in September 1990), and January 1991. Radian and IT Corporation performed the groundwater detection monitoring for Holloman AFB. The groundwater detection monitoring was performed in accordance with 40 CFR 265.92(d)(1) and (2) and the FFCA. The wells were monitored for the groundwater indicator parameters specified in 40 CFR 265.92(b)(3)-- pH, specific conductance, purgeable organic halides, and total organic carbon. Each time the wells were monitored water level, total well depth measurements were taken. Immiscible organic layers were also looked for, but were never found. The following wells were monitored: MW-1, S-2, MW-2, MW-3, MW-4, MW-5, MW-6, MW-7, MW-8, and S-4. See Figure 5-1 for locations.

Holloman AFB was notified by EPA Region 6 in January 1991 that a significant increase in total organic carbon (TOC) had occurred and that assessment monitoring would be triggered. EPA's evaluation of monthly and semiannual sampling events indicated a statistically significant increase in TOC between upgradient and downgradient wells. HAFB requested EPA's evaluation in writing in a 31 January 1991 meeting. The EPA provided this in a 3 May 1991 letter to Holloman AFB. The letter indicated that Holloman AFB's first monthly groundwater sampling report had levels of TOC in excess of the naturally occurring dissolved organic carbon for monitoring wells MW-1, 2, 3, 4, 5, 6, and 8, as noted in comparison to the results of EPA's split sample analyses. Therefore, EPA substituted their analytical results in place of Holloman AFB's analytical results for the first background sampling event to determine if significant increases had occurred in downgradient wells. An assessment monitoring plan was submitted in September 1991.

5.2.2 1991 and 1992 Groundwater Assessment Monitoring

The first step in assessment monitoring was to determine if the elevated downgradient TOC values were a result of a release of organic hazardous waste/waste constituents or a "false positive." Samples were collected in September 1991 from the monitor well network and analyzed for Appendix IX organic constituents and TOC. Results of this sampling indicated the presence of several waste-specific contaminants including volatile, semivolatile, and halogenated organics, and organochlorine pesticides. TOC and dissolved organic carbon (DOC) were also detected in several samples. Results showed no strong correlation between the presence of TOC/DOC and waste-specific organic contaminants. TOC can reasonably be present as a result of biological activity (e.g., decomposing organic matter) occurring in the domestic wastewater treatment system.

Subsequent discussion of the Appendix IX sampling results with NMED concluded that organochlorine pesticides were the only contaminants of concern, and that confirmation sampling should be conducted to confirm the presence of these constituents in the groundwater. The confirmation sampling was conducted in February 1992 for SW-846 Method 8080 compounds. Results of the confirmation sampling indicated that two organochlorine pesticides, alpha-BHC and delta-BHC, are present in the groundwater in monitor wells MW-5 and MW-7 respectively. In addition, the following organochlorine pesticides were detected during either the Appendix IX or confirmation sampling rounds: aldrin, dieldrin, beta-BHC, gamma-BHC, 4,4'-DDT, endosulfan I, endosulfan sulfate, endrin, heptachlor, and heptachlor epoxide. Aldrin and dieldrin were above the action levels. However, since these
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Project Assessment Report

Sewage Lagoons and Lakes Closure Project
Holloman Air Force Base

Figure 5-1. Location of Monitoring Wells
constituents were not present in both sampling rounds in comparable wells, their presence in the groundwater was not confirmed. Analytical results are presented in an April 1992 report titled *Results of Confirmation Sampling and Comparison to Appendix IX Sampling, Assessment Monitoring Program*.

A potential cause of elevated TOC levels is the location of monitor wells with respect to the sewage lagoons, and the impact of biological activity associated with wastewater treatment on water quality of the uppermost aquifer. The following recommendations for the groundwater monitoring program were made: 1) modified the RCRA groundwater monitoring network to include two upgradient monitors wells installed in February 1992 (MW-9 and MW-10) and abandon piezometer S-2, and 2) install additional wells southwest of Ponds A and C to determine if organochlorine pesticides have migrated beyond MW-5 and MW-7.

### 5.2.3 1992 Geoprobe and Piezometer Sampling

Groundwater samples were collected in December 1992 at 14 downgradient locations of Ponds A and D to determine lateral extent of groundwater contamination from organochlorine pesticides. The results were used to determine where additional permanent monitoring wells were to be installed and added to the groundwater monitoring network system. A Geoprobe Screen Point Groundwater Sampler or a piezometer were used to collect samples.

### 5.2.4 1993 Groundwater Assessment Monitoring - Phase 1

The primary objectives of the Phase 1 assessment monitoring were to define the lateral extent of Method 8080 pesticides in the uppermost aquifer and to make recommendations for future monitoring requirements. In addition, Appendix IX parameters were collected from newly installed monitor wells and deep piezometers to evaluate potential lateral and vertical migration of other constituents that may have gone undetected in previous sampling.

Three new monitor wells (MW-11 through MW-13) were installed downgradient of Pond A and two new monitor wells (MW-14 and MW-15) were installed and one existing piezometer (MWS-05) were added to the network downgradient of Pond D. Three deep piezometers (MWD-03 through MWD-05) were sampled to assess the potential for vertical migration of constituents.

Data evaluation criteria to ascertain the presence or absence of constituents was based on the First Determination False Positives.

The presence of Method 8080 pesticides was considered to be certain only in monitor wells MW-03 (heptachlor epoxide) and MW-04 (4,4'-DDD) immediately downgradient of the sewage lagoons. The presence of Method 8080 pesticides in other wells is considered either uncertain or unlikely. The lateral extent of pesticides has been defined downgradient of monitor wells MW-05 and MW-07 (Pond A) and MW-03 (Pond D). The extent of 4,4'-DDD in MW-04 (Pond G) is unknown because of the lack of monitor wells located further downgradient. However, based on results from monitor wells downgradient of Ponds A and D, it is anticipated that the presence of pesticides will be uncertain or unlikely further downgradient of MW-04.

The metals analyses indicate cadmium concentrations in the wells downgradient of Pond A to be higher than Base-wide background concentrations. MW-11, MW-12, and MW-13 monitoring wells detected higher average concentrations than background for mercury and tin, but all downgradient results were within the range of concentrations measured for background. For
MW-14, MW-15, and MWS-05, data for antimony, tin, and cadmium showed lower average concentrations than background, but some individual concentrations were above the upper tolerance limits.

Analytical results are presented in the December 1993 report titled *Phase I Groundwater Assessment Monitoring Report*.

### 5.2.5 1993 Phase 2 RFI for Lakes Holloman and Stinky

The objective of Phase 2 was to determine whether the uppermost aquifer hydraulically downgradient of Lakes Holloman and Stinky have been affected by constituents present in the sludge and soil in the lakes (Method 8080 pesticides and metals) as determined by the 1991 and 1992 sampling events.

Field activities occurred between February and April 1993. One round of groundwater samples was collected from five monitor wells and analyzed for Appendix IX constituents.

Method 8080 pesticides were detected in monitor wells MW-16, MW-17 and MW-18. The extent of Method 8080 pesticides in groundwater downgradient of Lakes Holloman and Stinky is unknown because of the lack of monitor wells located further downgradient. However, using the results of the groundwater monitoring conducted for the sewage lagoons, it is anticipated that concentrations of Method 8080 pesticides will decrease downgradient of the lakes.

No metals constituents have conclusively affected groundwater. The concentrations for antimony, cadmium, cobalt, mercury, and tin were above the upper tolerance limits for background in some monitor wells, but average concentrations downgradient of the lakes were not greater than average background concentrations. Analytical results are presented in a December 1993 report titled *Phase 2-RCRA Facility Investigation Report for Lakes Holloman and Stinky*.

### 5.3 Risk Assessment

#### 5.3.1 1991 Risk Assessment for Entire Sewage Lagoon System

A quantitative risk assessment was conducted for the sewage lagoon system at Holloman AFB to determine the health risk associated with exposure to existing contamination. The contaminants included in the risk assessment were those identified from environmental sampling conducted at the site, and for which toxicity data were available. Four potential exposure scenarios were identified: 1) occupational exposure to workers at the sewage lagoons, 2) exposure of children living on Base and playing at the sewage lagoons, 3) recreational exposure of birders at Lakes Holloman and Stinky, and 4) recreational exposure of hunters at the lakes.

The risk assessment considered both carcinogenic and noncarcinogenic effects. The carcinogenic risks estimated for all exposure scenarios were found to be well below one in one million (10^-6). The estimates of noncarcinogenic effects associated with occupational and recreational activities at the sewage lagoon system indicated little likelihood of adverse effects. Exposure for children playing at the sewage lagoons was found to be unacceptable, however, due primarily to the presence of organic lead in the surface water. Therefore, a fence was installed surrounding the sewage lagoons to prevent this exposure scenario from occurring. The presence of organic lead is suspect because it was detected at concentrations higher than those reported for total lead, and it was also found in the equipment rinsate samples.
5.3.2 1993 Risk Assessment for Each Sewage Lagoon, Ditch, and Lake

Separate risk assessments for each of the seven sewage lagoons (Ponds A, B, C, D, E, F, and G), the ditch from Pond G to Lake Holloman, and Lakes Holloman and Stinky were conducted to evaluate current and potential future impacts to human health and the environment, and to support closure of the sewage lagoons as hazardous waste management units. Recommendations for the sites included four general categories: 1) continued current operation; 2) continued current operation with access control; 3) additional sampling suggested; and 4) closure suggested.

The individual risk assessments present an assessment of the carcinogenic risks and noncancer hazards to human health and the environment associated with current and potential future activities at the sewage lagoons and lakes. At the request of NMED, a baseline risk assessment that assumed residential development and domestic water use over the entire contaminant source area (i.e., sewage lagoons) with little or no remedial activity, was conducted. Highly conservative worst-case exposure scenarios were evaluated as the baseline assessment. While these exposures are not likely to ever occur, they were used as a screening tool to determine whether risks/hazards are potentially present at the site. To ensure adequate characterization of the risk/hazard that may realistically be incurred at or near the sewage lagoons and lakes, site-specific risk assessments considered four populations in eight exposure scenarios: six chronic and two subchronic scenarios. Target risks were set at $10^{-6}$ for carcinogens and a hazard quotient of 1 for noncarcinogens. These benchmark values are designed to protect human health and are considered to be *de minimis* risks.

Numerous uncertainties are associated with the results of this risk assessment. Human health risks/hazards associated with Pond A and E, as well as the ditch were based primarily on a single sediment/soil sample in which heptachlor epoxide was detected. While the levels were high, they were not confirmed hits and do not necessarily represent site conditions. The organic lead results that drive the recreational and agricultural hazards at Lake Holloman were obtained during a surface water sampling investigation, and the origin of the organic lead is unknown and may not be related to past waste disposal practices at the sewage lagoons. As discussed previously, the concentrations of organic lead are suspect since their values are higher than the total lead concentrations reported, and organic lead was reported in the equipment rinsate. Additional samples were collected from the sewage lagoons and lakes in October 1994 to address these uncertainties and the risk assessments will be revised as the data becomes available.

The ecological risks were calculated using modeled data and may be overly conservative. Biota sample results were received after the ecological risk assessment was performed in 1993. The actual results from the biota samples collected will be substituted for the modeled information and the risks will be recalculated. The results will be presented to NMED along with the updated human health risk assessments.
Section 6
KEY ISSUES

6.1 Installation Restoration Program
The sewage lagoons are included in the Installation Restoration Program (IRP) being conducted at Holloman AFB. The sewage lagoons are referred to as IRP Site 49. The IRP was established to investigate past hazardous waste disposal sites at Department of Defense (DoD) installations. Implementation of the IRP generally follows the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the 1986 statutory amendments to CERCLA [the Superfund Amendments and Reauthorization Act (SARA) Section 9620], which made clear that the provisions of the National Contingency Plan apply to federal facilities.

As a DoD facility, Holloman AFB receives funding for the IRP from the Defense Environmental Restoration Account (DERA). Consequently, many of the activities for the investigation and remediation of the sewage lagoons must be coordinated through the IRP.

6.2 Corrective Action Program under HSWA
Holloman AFB operates a RCRA-permitted on-site storage facility for currently generated hazardous wastes, and, because of the facility operating permit, the Base is subject to the RCRA corrective action program. The Hazardous and Solid Waste Amendments (HSWA) portions of the permit were issued by EPA Region 6 (New Mexico does not have HSWA authorization at this time) and require Holloman AFB to investigate the solid waste management units (SWMUs) that were identified in the RCRA Facility Assessment (RFA). Two units, Lake Holloman (including the ditch that leads from Pond G to Lake Holloman) and Lake Stinky are listed on Table 1 of the permit as SWMUs 139 and 140, respectively.

The HSWA permit requires Holloman AFB to investigate these SWMUs under a RCRA Facilities Investigation (RFI). Holloman AFB submitted the equivalent of the Phase 1 RFI Report for Lakes Holloman and Stinky in August 1992 and Phase 2 in December 1993.

6.3 Status of Sewage Lagoons and Lakes as Regulated Units
The sewage lagoons (Ponds A through G) at Holloman are currently considered to be hazardous waste management units (HWMUs) under RCRA. This classification is based on EPA's and NMED's contention that the sewage lagoons allegedly received listed hazardous wastes after the applicable date of the substantive RCRA rules (19 November 1981). Further, under the federal and state RCRA rules, once a listed waste is introduced into a waste management unit, the entire mixture becomes a listed waste (and the initial downstream waste management unit becomes a HWMU), regardless of the concentration or volume of the hazardous waste initially discharged. See additional discussion in Section 6.4. The agencies have documented their position that the sewage lagoons are HWMUs in the FFCA (dated 20 December 1988) as well as in subsequent correspondence with Holloman AFB.

In response to a request by Holloman AFB, EPA and NMED clarified the regulatory status of Lake Holloman, Lake Stinky, and the drainage ditch that leads from the sewage lagoon system to Lake Holloman. The agencies determined that these three units would be regulated under the HSWA program as two SWMUs (the...
Ditch and Lake Holloman, and Lake Stinky), not as HWMUs. The key point to this determination was that no information exists to suggest that hazardous waste was ever handled in the ditch, Lake Holloman, or Lake Stinky. This position was presented in an EPA Region 6 letter to NMED dated 4 April 1994 from David Neleigh and a NMED letter to Holloman AFB dated 6 April 1994 from Barbara Hoditschek. This latter letter stated that Lake Holloman, Lake Stinky, and the ditch would be regulated by the EPA Region 6 under the HSWA corrective action program and the seven sewage lagoons would be regulated by NMED under the New Mexico Hazardous Waste Management Regulations (HWMR-7), Part V, 40 CFR 264. In addition, NMED confirmed that the sewage lagoons had lost interim status under RCRA.

6.4 Listed Waste Determination

In response to a RCRA Section 3007 request for information from the EPA in December 1984, Holloman AFB identified through undocumented interviews the hazardous wastes in Table 6-1 as having entered the sewage lagoons. In the Notice of Noncompliance from the EPA (Docket Number RCRA VI-661-H) in February 1987, the EPA restated the information from the 3007 request that these wastes were identified as having entered the sewage lagoon system. In November 1985, Holloman AFB submitted an administrative closure plan, which was later interpreted to be an intent to seek delisting (i.e., delisting petition), and included the information on the hazardous wastes that were suspected to have been discharged to the sewage lagoons (Table 6-1). In addition, the closure plan presented information that indicated that several of the listed wastes previously identified by Holloman AFB as having entered the sewage lagoons had been incorrectly identified as listed wastes. The wastes that Holloman AFB claimed to have incorrectly identified as hazardous wastes are noted on Table 6-1. No documentation exists to suggest that EPA responded to this information.

In addition, an EPA contractor conducted a RCRA Facility Assessment (RFA) as part of the RCRA corrective action program in 1987. The sewage lagoons were originally identified as SWMUs 148 through 154 and the wastes listed in Table 6-2 were identified as having been handled in the sewage lagoon system. The documentation behind this determination is not available. Several of the wastes were identified on both lists (Tables 6-1 and 6-2); however, several wastes are identified on either one list or the other, but not on both. This points to the fact that no one is certain which if any listed wastes were ever placed in the sewage lagoons.

In April of 1994, Holloman AFB requested a determination from NMED as to whether the sludge in the sewage lagoons is considered a listed waste due to the mixture rule [40 CFR 261.3(a)(2)(iv)]. Holloman AFB stated that the waste should not be considered listed hazardous waste because extensive investigation of surface water, sludge, and underlying soils in the sewage lagoons has, in most cases, failed to detect the constituents associated with the listed wastes presented in Table 6-1. Of those detected, the amounts found were well below the levels of concern according the Base. NMED agreed with this position in a conference call on 1 September 1994; however, in subsequent discussions, the NMED has indicated that they have not reached a decision on this issue. No written documentation has been provided.

6.5 Wetlands

When Holloman AFB decided to construct a new wastewater treatment facility to replace the sewage lagoon system, the closure of the sewage lagoons and the jurisdictional status of Pond G with respect to regulation as a wetland was discussed. The USACE determined that
### Table 6-1
Listed Wastes Allegedly Disposed of in Sewage Lagoons 1984
3007 Request and 1987 Notice of Noncompliance

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<th>EPA Waste Code</th>
<th>Description</th>
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<td>Halogenated degreasing solvents</td>
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</tr>
<tr>
<td>F003</td>
<td>Non-halogenated degreasing solvents</td>
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<tr>
<td>U228</td>
<td>Trichloroethene</td>
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<tr>
<td>U161</td>
<td>Methyl isobutyl ketone</td>
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<td>U227</td>
<td>1,1,2-trichloroethane</td>
<td></td>
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<td>U188</td>
<td>Phenol</td>
<td></td>
</tr>
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</tr>
</tbody>
</table>

* U233 [2-(2,4,5-trichlorophenoxy) propionic acid] was eliminated from 40 CFR 261.33 by USEPA in 1984 and replaced with a reference to F027 (relating to tri-, tetra-, and pentachlorophenol formulations).
### Table 6-2
Listed Wastes Allegedly Disposed of in Sewage Lagoons From RFA 1987

<table>
<thead>
<tr>
<th>EPA Waste Code</th>
<th>Description</th>
<th>Also Included in List from Request</th>
</tr>
</thead>
<tbody>
<tr>
<td>F001</td>
<td>Halogenated degreasing solvents</td>
<td>✓</td>
</tr>
<tr>
<td>F003</td>
<td>Nonhalogenated degreasing solvents</td>
<td>✓</td>
</tr>
<tr>
<td>F005</td>
<td>Nonhalogenated degreasing solvents</td>
<td></td>
</tr>
<tr>
<td>P012</td>
<td>Arsenic Oxide</td>
<td>✓</td>
</tr>
<tr>
<td>P035</td>
<td>??</td>
<td></td>
</tr>
<tr>
<td>P106</td>
<td>Sodium cyanide</td>
<td>✓</td>
</tr>
<tr>
<td>U002</td>
<td>Acetone</td>
<td>✓</td>
</tr>
<tr>
<td>U012</td>
<td>Aniline/Benzenamine</td>
<td></td>
</tr>
<tr>
<td>U036</td>
<td>Chlordane/alpha &amp; gamma isomers</td>
<td></td>
</tr>
<tr>
<td>U044</td>
<td>Chloroform</td>
<td></td>
</tr>
<tr>
<td>U167</td>
<td>1-naphthalenamine</td>
<td></td>
</tr>
<tr>
<td>U188</td>
<td>Phenol</td>
<td></td>
</tr>
<tr>
<td>U220</td>
<td>Toluene</td>
<td>✓</td>
</tr>
<tr>
<td>U159</td>
<td>2-butaneone (methyl ethyl ketone)</td>
<td></td>
</tr>
</tbody>
</table>
Pond G was currently exempt from regulation under Section 404 of the Clean Water Act because it was functioning as a part of the wastewater treatment system; however, if the sewage lagoon was disconnected from the wastewater treatment system, it would lose the exemption and would be subject to a Section 404 permit in order to excavate or fill the sewage lagoon.

6.6 Endangered Species/Wildlife

Until 1994, the Department of the Interior was the natural resources trustee for the lands adjacent to Holloman AFB receiving water discharges from the sewage lagoons, and for the migratory birds that use the adjacent lands, the lakes, and the sewage lagoons. The BLM administered the adjacent (public) lands for the Department of the Interior. In December 1994, the land occupied by Lake Holloman was transferred ownership to USAF.

However, during the time that BLM administered the lands, Lake Holloman was classified as a wildlife habitat area. Migratory waterfowl inhabit Lakes Holloman and Stinky and the sewage lagoons at various times during the year, particularly during the spring and fall migrations. Endangered species have also been sighted in the area. The FWS is charged with protecting migratory waterfowl (under the Migratory Bird Treaty Act) and endangered species (under the Endangered Species Act).

The BLM has expressed concern that past discharges from the sewage lagoons may have resulted in conditions that pose a threat to public health and safety on trust lands (DOI, 1990), the FWS is concerned about the potential bioaccumulation of hazardous constituents in lake organisms and subsequent endangerment of migratory waterfowl (FWS, 1991). NMED has expressed a strong preference that activities conducted to bring the sewage lagoons and lakes into compliance with RCRA also address the concerns of BLM and FWS (Anderson, 1991).

In April 1993, Holloman AFB requested a species list and opened an informal consultation with FWS under Section 7 of the Endangered Species Act. The Base informed the FWS of plans to construct a new wastewater treatment plant to replace the sewage lagoon system which would eliminate the sewage lagoons and Lake Stinky as water bodies. The Mesilla Valley Audubon Society responded to this by requesting that Lake Stinky be preserved as a shorebird habitat.

During 1991, the FWS conducted an investigation to assess whether harmful concentrations of contaminants could be present in water and biota at the sewage lagoon system or Lake Holloman. The objective of the study was to make an initial determination of the concentrations of organic and inorganic contaminants within biotic and abiotic components of the sewage lagoons and Lake Holloman aquatic ecosystems. Birds were collected from Ponds A, B, G, and Lake Holloman. A summary of the results was presented in a draft survey report dated 10 January 1994. This report has not been finalized. The results primarily indicated that risks resulting from the presence of potentially toxic substances in aquatic systems were difficult to assess. Some of the analytical results collected from sediment samples indicated that the concentrations could cause some adverse biological effects; however there were no analysis to determine if the constituents were bioavailable. Tissue samples collected contained generally low concentrations of these constituents.

Holloman AFB has collected biota samples from the sewage lagoons and lakes and will prepare a biological assessment report indicating the effects of closing Lagoon G and wetland and wetland...
Section 6—Key Issues
Project Assessment Report

6.7 Land Transfer from BLM to Holloman AFB

As part of designing the new wastewater treatment system, Holloman AFB requested that BLM provide right-of-way to construct evaporation ponds on BLM land adjacent to Lake Holloman. BLM no longer grants right-of-ways for disposal of wastewater as they had in the past when right-of-way was given for discharging effluent to Lake Holloman. However, BLM agreed to consider transferring the land, Lake Holloman, and portions of Lake Stinky to the USAF. Holloman AFB prepared an environmental assessment and requested Congress' approval of the land transfer in 1994. The land was transferred ownership to Holloman AFB in December 1994.

The land transfer legislation requires Holloman AFB to leave Lakes Holloman and Stinky open to the public. The Base will continue to manage the Lakes as wildlife habitat in accordance with the Clean Water Act which requires protection of existing uses. In addition, Holloman AFB must protect the rare and endangered species in accordance with the Migratory Waterfowl Treaty Act and the Endangered Species Act.
CHRONOLOGICAL HISTORY OF EVENTS RELATED TO THE SEWAGE LAGOON
HOLLOMAN AIR FORCE BASE

10 Mar 80  HAFB report to New Mexico Environmental Improvement Division (NMEID) cited sporadic problems at domestic wastewater treatment facility caused by inflow of unknown types of industrial wastes.

18 Mar 80  NMEID recommended HAFB identify industrial wastes being discharged into the system by type, amount, and time of discharge.

24 Mar 80  HQ TAC reviewed a 4 February 1980 proposal to develop Lake Holloman into a recreational facility. In discussions with USEPA, it was revealed that recreational use of Lake Holloman would cause the lake to be defined as navigable waters under the Clean Water Act of 1977, thus resulting in the need for a NPDES permit for the HAFB discharge. This permit would require the treatment system to upgrade to secondary treatment standards. The cost of this upgrade (approximately $350,000) was deemed unacceptable; therefore, the proposal was denied.

14 Nov 80  HAFB applied for a RCRA Part A permit for interim status to store hazardous wastes.

29 Apr 81  USEPA Region VI inspected HAFB and cited the Base for the following violations of RCRA involving the manifesting, storing, handling, and disposal of hazardous wastes:
- inadequate security at storage sites;
- leaking and corroding containers;
- poorly trained personnel improperly treating and disposing of toxic pesticides;
- lack of alarm system to signal emergencies;
- lack of written waste analysis plan; and
- use of the sewage treatment impoundments (lagoons) for the disposal of paint stripping effluent and other hazardous wastes.

8 Sep 81  USEPA Region VI issued a Notice of Violation (NOV) to HAFB. Several examples of danger to human health and the environment were cited.

30 Sep 81  USEPA Region VI officials met with Base officials to discuss the violations cited during the 29 April inspection. Both sides agreed that "indications" support that no hazardous waste was being placed into the lagoons.
HAFB letter to USEPA Region VI committed the Base to develop water testing procedures for monitoring the liquid influent and effluent from the lagoons, and to write a Hazardous Waste Management Plan.

HAFB conducted water and sludge sampling of sewage lagoons.

HAFB submitted a revised RCRA Part A permit application, deleting the sewage lagoons as a hazardous waste management unit. USEPA Region VI did not concur, however, and maintained the position that the lagoons were still subject to RCRA requirements.

HAFB informed USEPA that no hazardous waste was being discharged into the lagoons or had been placed in them. This contention was supported by the November 1981 sampling data documented in a report prepared by USAF Hospital Holloman: "Evaluation for Hazardous Waste at Holloman AFB Sewage Treatment Plant."

HAFB submitted Hazardous Waste Management Plan to USEPA.

USEPA informed HAFB that the 8 September 1981 violations were satisfactorily addressed and no further enforcement actions were necessary.

USEPA Region VI officially closed NOV on HAFB.

USEPA Region VI performed a follow-up inspection of HAFB focusing on what wastes had been discharged to the lagoons and whether any inspections of the lagoons had been made by the Base.

HAFB submitted annual waste management reports to USEPA.

HAFB submitted annual waste management reports to USEPA.

USEPA Region VI issued a Warning Letter to HAFB for lagoon violations. USEPA asked for a complete analysis of each sewage lagoon as previously committed to by HAFB in the Fall of 1981. In addition, USEPA threatened that unless a complete response was forthcoming from HAFB within 30 days, fines of up to $25,000 per day would be imposed for noncompliance. Holloman responded by letter indicating that the problem would be handled through the USAF Installation Restoration Program (IRP) and that USEPA would be informed of the testing results.

In a meeting between HAFB and USEPA Region VI, Holloman proposed to sample sludge in the lagoons and test the lagoons annually for hazardous wastes. Holloman also stated that it
did not have new testing procedures for analysis of the lagoon contents.

3 May 83
HAFB provided USEPA Region VI with water pollution inventory of sewage lagoon discharge.

9 Aug 83
HAFB informed USEPA that contrary to Holloman's earlier guarantee of 30 September 1981, discharge of paint stripping effluent to the lagoons had ceased on 1 July 1983. Base officials stated that no more paint stripping effluent would be discharged to the lagoons.

Aug 83
USEPA officials conducted a third inspection of HAFB.

29 Sep 83
USEPA met with HAFB officials and pointed out that the hazardous wastes listed in the two annual waste management reports were different from those in the original RCRA Part A application. USEPA asked for a description of the methodology used during the last sampling event. HAFB was also informed that if any chromium had been discharged to the lagoons, the lagoons would be considered a toxic waste treatment, storage, and disposal (TSD) facility since dilution was not acceptable. A corrosion control treatment of aircraft (suspected source of chromium in the wastewater stream) had been discontinued the previous June.

10 Oct 83
HAFB conducted water and sludge sampling of Ponds A and B. Samples were collected in accordance with the procedures in USEPA's SW-846a, "Test Methods for Evaluating Solid Waste--Physical/Chemical Methods." Organics (specifically 1,1,1-trichloroethane, trichloroethylene, and total organic halogens) and chromium were targeted for testing.

21 Nov 83
In a meeting between HAFB and USEPA it was agreed that if sampling showed low levels of chromium, then the lagoons would not be considered a TSD facility. At a pre-meeting for Air Force representatives, Holloman and AFRCE discussed potential discharges of chlorinated solvents from aircraft degreasing operations to the lagoons and concluded that the discharges were insignificant since no residue contamination was evident.

22 Dec 83
HAFB provided USEPA with the analysis of sludge samples collected from the bottom of the sewage lagoons in October 1983 ("Report to USEPA regarding Holloman Air Force Base Lagoons and T-38 Washrack Oil-Water Separator"). Analyses indicated that chromium and other heavy metals were discharged to the lagoons, but at levels that were not considered hazardous at that time.

22 Mar 84
USEPA Region VI requested additional data on other solvents that may have been discharged to the lagoons, and asked for
Holloman's assurance that none were being discharged at present.

1 May 84  
HAFB notified USEPA Region VI that based on analytical testing, the sludge should not be classified as hazardous waste and that the lagoons were therefore not a toxic disposal site subject to the requirements of RCRA.

24 Jul 84  
NMEID and USEPA officials conducted an inspection of HAFB site and paperwork. Twenty-two violations were noted.

8 Aug 84  
NMEID informed USEPA Region VI of 24 July 1984 inspection results: "...inspection indicates that [the sewage lagoons] have received and continue to receive daily, listed hazardous wastes." Of particular note was the Primate Research Institute (PRI), whose wastewater containing methanol and acetone was being discharged to the sewage lagoons.

15 Aug 84  
HAFB, in a meeting in Dallas, informed USEPA Region VI that paint stripping effluent would again be diverted into the lagoons since there was no clear decision whether the effluent contained hazardous constituents. USEPA, assured by Holloman on 20 January 1982 that no toxic materials were currently being discharged to the lagoons, requested sampling for all listed hazardous wastes that were suspected of being discharged to the lagoons, and indicated that the lagoons could now be considered a TSD facility and fully subject to the requirements of RCRA.

In closing the meeting, Holloman again assured USEPA that no additional hazardous wastes would be discharged to the lagoons, and they would request PRI to cease all discharges of hazardous wastes to the sewage treatment system.

15 Oct 84  
HAFB completed a proposal outlining the sampling protocol for 129 priority pollutants: "Evaluation of Priority Pollutants in Sludges and Wastewater of the Holloman AFB Sewer Treatment Plant Oxidation Ponds."

16 Nov 84  
HAFB sent a report to USEPA Region VI listing numerous hazardous materials suspected of being discharged to the lagoons from 1960 through August 1984. This list included trichloroethane, carbon tetrachloride, phenol, arsenic trioxide, sodium cyanide, naphthalene, toluene, xylenes, chlorinated fluorocarbons, methyl isobutyl ketone, methanol, acetone, formaldehyde.

Dec 84  
HAFB began collecting sludge and water samples from Ponds A, B, and C in accordance with the sampling protocol detailed in the 15 October 1984 report.
9 Jan 85  HAFB sent USEPA copies of its letters prohibiting hazardous waste generators from discharging their wastes to the lagoons.

15 Jan 85  USEPA letter informed HAFB that its lagoons were considered hazardous waste management units.

18 Mar 85  NMEID informed HAFB that under the 1984 Hazardous and Solid Waste Amendments to RCRA, a facility receiving hazardous materials had new standards imposed on it, irrespective of when the materials were placed in the facility.

Apr 85  Holloman personnel received hazardous waste management training from Computrac.

Apr 85  In a meeting between HAFB and USEPA Region VI in Dallas, Texas, USEPA indicated that the test results from December 1984 were acceptable; however, additional tests for organic compounds were requested. Also in this meeting, HAFB notified USEPA that it would pursue delisting of the lagoon contents.

1 Aug 85  Dynamac Corporation, under contract with the Tactical Air Command (TAC), began hazardous waste management training of HAFB personnel.

9 Aug 85  HAFB provided surface impoundment exposure information to USEPA Region VI and NMEID. This document included information on December 1984 testing results, security improvements, and the spill prevention and response plan.

23 Aug 85  USEPA Region VI issued a formal Notice of Noncompliance to HAFB for failure to install groundwater monitoring wells at the lagoons, and informed HAFB that the wastewater treatment system would lose its interim status and have to shut down on 8 November 1985 if groundwater monitoring wells were not installed. Holloman responded with the position that the lagoons were not TSD facilities since HAFB studies indicated that there were no hazardous constituents present in the lagoons. USEPA rejected this argument.

8 Oct 85  HAFB and USEPA Region VI met to discuss Notice of Noncompliance. Holloman insisted it could not install the required groundwater monitoring system before the 8 November deadline since the needed hydrogeologic studies and drilling of test wells would take approximately six months. HAFB proposed a compliance agreement in which the lagoons would continue to operate while completing a hydrogeologic study of the area. USEPA regional officials stated that they did not have the authority to enter into such an agreement; therefore, no agreement was made.

A-5
HAFB and USEPA Region VI representatives met again in hopes of reaching a compromise. Holloman requested an extension for submission of the delisting petition. USEPA denied this request.

HAFB was granted authority by HQ TAC to contract for the following A-E services:
- prepare a delisting petition;
- drill test wells; and
- conduct preliminary hydrogeologic studies of the lagoon areas.

Acting on the request of HAFB, the Assistant Secretary of the Air Force asked HQ USEPA to grant an extension for the delisting petition.

HQ USAF and SAF representatives met with HQ USEPA officials. As a result of this meeting, the USEPA agreed to allow the lagoons to operate beyond 8 November 1985 to treat nonhazardous wastes. USEPA officials also tentatively agreed to allow Holloman to submit a lagoon closure plan by 23 November 85 that did not require the lagoons to be drained.

USGS submitted hydrogeologic study ("Hydrologic Data on the Shallow Boson Fill near the Sewage Lagoons and Lake Holloman") to HAFB. The report included lithologic, water level, water quality, and aquifer test data collected from test drilling performed earlier in the month.

HAFB submitted administrative lagoon closure plan.

HAPB contracted Computrac to prepare a preliminary delisting proposal.

Wilson and Associates contract initiated to evaluate USGS data.

HAFB, HQ TAC/DEEV, and USAF/LEEV established testing procedures for the delisting petition.

HQ USAF, HQ USEPA, and Computrac representatives met in Washington, D.C. to discuss the delisting petition option. USEPA indicated that current sampling data (December 1984) of Ponds A, B, and C was not sufficient to prepare a delisting petition for the entire system. They recommended that a preliminary delisting petition be drafted based on currently available data. This first step would indicate whether or not delisting would be a feasible alternative. If the preliminary report showed delisting to be feasible, a more extensive sampling and analysis plan involving all seven lagoons and Lake Holloman would have to be developed and implemented for the...
formal delisting petition. Computrac representatives estimated May 1986 as the delivery date of the preliminary delisting petition.

25 Mar 86  
HAFB letter informed USEPA that all items from the 23 August 1985 Notice of Noncompliance were closed except for the lagoons issue.

27 Mar 86  
Meeting at HAFB with Computrac identified additional requirements to support delisting petition.

Mar 86  
USAF Bioenvironmental Engineering Services submitted to HAFB a report detailing results of sludge and water sampling conducted during December, 1984: "Evaluation for 129 Priority Pollutants, Holloman AFB Sewage Ponds".

Apr 86  
Wilson and Associates submitted the Hydrogeologic Investigation Report (based on USGS data) to HAFB.

11 Jul 86  
USEPA Region VI letter informed HAFB that the lagoon closure plan (23 November 1985) was not considered a closure plan, but rather an intent to seek delisting, and was therefore unsatisfactory. HAFB was instructed to resubmit a closure plan which adequately addressed the applicable requirements of 40 CFR Part 265, Subparts G and K. Furthermore, HAFB was requested to install an adequate groundwater monitoring system. Region VI also stated that they took "strong exception" to Holloman's intention to seek resolution through HQ USEPA: "Until [Region VI] delegates this action to the Headquarters Office of External Affairs, [HAFB] must deal with Region VI to resolve this action." Finally, HAFB was informed that their intention to pursue delisting in no way constrained USEPA Region VI from seeking full compliance with the Notice of Noncompliance issued on 23 August 1985.

Jul 86  
HQ TAC requested US Army Corp of Engineers (USACE), Omaha District to implement a RCRA Groundwater Monitoring Plan (GWMP) at the sewage lagoons.

Aug 86  
USACE requested Radian Corporation to provide a proposal for services to prepare the GWMP.

29 Aug 86  
HAFB presented HQ USEPA with the preliminary delisting petition proposal drafted by Computrac. Analytical results of sampling conducted in December 1984 were included in this proposal, as well as local economic and environmental factors.
USEPA Region VI and HAFB met to discuss all outstanding violations, negotiate a compliance schedule via the Compliance Agreement, and discuss the implementation of a GWMP design at the lagoons. It was agreed that Holloman would resubmit a new closure plan for the lagoons pending a response from HQ USEPA as to the feasibility of delisting. Finally, USEPA Region VI also indicated they were now receiving strong congressional pressure to resolve the situation.

USEPA Region VI and HAFB met in Dallas, Texas to discuss the possibility of treating the lagoons as a Superfund site subject to the Installation Restoration Program (IRP), versus RCRA. Since hazardous wastes were no longer being discharged to the lagoons, this option now warranted consideration.

USEPA Region VI and HAFB met in Dallas, Texas. USEPA rejected the IRP option discussed on 3 November and informed Holloman that the lagoons are regulated under RCRA, and requested a hydrogeologic study.

HAFB submitted the groundwater monitoring plan (GWMP) to USEPA Region VI for review and approval.

In a Notice of Noncompliance, USEPA Region VI revoked HAFB's permit to operate lagoons, resulting in a loss of interim status (LOIS), due to failure to provide groundwater monitoring.

HQ TAC and HQ USEPA met in Washington, D.C. to discuss the delisting petition and the proposed GWMP. HQ USEPA indicated that the delisting petition alternative did not appear feasible due to high concentrations of five constituents (antimony, chloroform, PCBs, selenium, and benzo(a)pyrene) and would probably be denied. However, it was noted that these high concentrations were generally confined to two specific areas or "hot spots," and that if these areas didn't exist, the delisting petition alternative would become more feasible. Having a better understanding of the delisting option, HAFB presented HQ USEPA with the following four questions:

- Will removal of the known "hot spots" prior to additional sampling have any impact on the delisting petition?

- Is it acceptable to have a sampling plan that is less dense than the 1 sample per 10,000 square feet which is normally required?

- Is it acceptable to test for Appendix IX constituents rather than Appendix VIII?
Can the lagoons be delisted separately?

HQ USEPA agreed to investigate these issues and inform HAFB of their decisions at a later date. Finally, USEPA stated that the Wilson and Associates Hydrogeologic Investigation (April 1986) was inconclusive to assess the geologic setting of the sewage lagoons, Lake Holloman, and Lake Stinky. USEPA requested HAFB to submit a Hydrogeologic Investigation Plan (HIP) to fully define the appropriate well locations for the GWMP.

Feb 87  USACE requested Radian to provide a proposal for services to prepare a closure plan for the sewage lagoons.

11 Mar 87  HAFB met with HQ TAC to develop a strategy suitable to successfully resolve the lagoon matter. A comprehensive analyses of one water and sludge sample from each lagoon, Lake Holloman, and Lake Stinky was recommended.

11 May 87  HQ TAC/DEEV, SAF/RIQ, and AF/LEE met in Washington, D.C. HQ TAC stated that since delisting was becoming more unfavorable in terms of costs and probability of success, they wanted to develop a revised closure scenario, including removal of the influent mounds ("hot spots") in Ponds A and B, installation of a groundwater detection monitoring system, and production of a closure plan that supported this approach.

12 May 87  HQ TAC, HAFB, USACE, Radian, USEPA Region VI, and USEPA Consultant Jacobs Engineering met at HAFB to discuss the proposed HIP and compliance agreement. USEPA was generally pleased with the HIP and had only minor comments and suggestions. Amendments to the compliance agreement were also negotiated. Specifically, time frames were increased, unilateral approval by USEPA was removed, and provisions were added for negotiations in the event of disagreements.

3 Jun 87  HAFB submitted GWMP to USEPA Region VI.

Jul 87  Computrac performed water and sludge sampling of Holloman lagoons and lakes. Only one water and one sludge sample were collected from each impoundment.

17 Jul 87  Bureau of Land Management (BLM) expressed concern to HAFB as to the water quality of Lake Holloman from the standpoint of public and wildlife safety, specifically, toxicity and disease transmission. This concern was a result of several inquiries relating to viral disease transmissions. BLM emphasized that the Air Force did not have exclusive use of Lake Holloman and requested copies of all water quality reports dating back to 1975, as well as all future reports.

A-9
USEPA Region VI formally approved HIP developed by Radian.

Installation of approved HIP piezometers began. As of 19 October 87, all piezometers were installed and development activities began, along with surveying the well locations.

USEPA Region VI informed HAFB of their decisions on several issues raised during the 6 February 1987 meeting. First, the delisting of portions of the lagoon system may be appropriate; therefore, HAFB could submit a delisting petition for individual lagoons. Second, the sampling requirements (1/10,000 sq ft) may be reduced; however, statisticians were still developing an appropriate sampling scheme. Third, the samples must still undergo a full Appendix VIII analysis since a complete history of the chemicals disposed in the area was not available. No decision was made on whether or not the removal of the "hot spots" would affect the delisting petition.

Computrac provided HAFB with water and sludge testing results from all seven lagoons, as well as Lakes Holloman and Stinky. Several metals (antimony, barium, cadmium, and mercury) were found in concentrations considered high enough to negatively impact the delisting petition. Furthermore, these high concentrations were not limited to individual water bodies, but were found throughout the system. These results were based on only one water and one sludge sample taken from each impoundment.

USEPA requested additional information on the delisting petition. HAFB responded.

USEPA, NMEID, and HAFB met to continue negotiation of the Compliance Agreement.

HQ USEPA informed HAFB of decision on how "hot spot" removal affected the delisting petition. First, it must be demonstrated prior to removal that the hot spot was an abnormality located in a homogeneous waste and explain how the abnormality formed. Upon removal, the remaining homogenous waste may be delisted; however, concentrated sampling in the vicinity of the hot spot removal was required.

Pump and slug tests were conducted on the piezometers.

NMEID, prompted by the environmental concerns of Mr. Robert J. Tafanelli (a private citizen), asked USEPA Region VI if Lake Holloman met the definition of waters of the United States, pursuant to 40 CFR 122.2.

NMEID officials inspected HAFB site.
In response to NMEID’s request (14 January 88), USEPA Region VI declined to classify Lake Holloman according to the definition of waters of the U.S., choosing to continue working through RCRA to resolve the situation.

Hydrogeologic Study Completed.

HQ TAC requested USACE to develop a design to remove contaminated sludge from the lagoons. USACE subsequently requested Radian to prepare plans and specifications for sludge removal. This design was based on a sampling scheme that identified PCBs as the primary hazardous waste constituent that had accumulated in the sewage sludge mounds in Ponds A and B.

USEPA Region VI declined to sign the Compliance Agreement primarily due to the agreement’s reference to Executive Order 12088 which pertains to dispute resolution authority.

NMEID issued a Notice of Violation to HAFB based on deficiencies in the Hazardous Waste Management Plan and no groundwater monitoring discovered during the 22 February 1988 inspection.

Radian conducted sampling and analysis to determine the level and extent of PCB contamination in the sludge mounds of Ponds A and B. Radian estimated that the actual size of the sludge mounds was approximately 10 times greater than the size previously reported by Computrac.

HQ TAC/DE received detailed sampling requirements for the delisting process from HQ USEPA. HQ TAC/DEEV began estimating the cost of the sampling plan required for the delisting petition.

A preliminary cost estimate prepared by HQ TAC to pursue delisting was in excess of $4 million, due primarily to the extensive sampling and analysis required. Furthermore, successful delisting was deemed questionable since some heavy metals and PCB concentrations were greater than the allowable 6.3 times the health based standards. Therefore, HAFB decided to pursue actual removal of contaminated sludges located in the mounds of Ponds A and B, combined with groundwater monitoring of the surrounding areas.

SAF/RQ cited Holloman’s progress under difficult and complex circumstances, and the Air Force’s commitment to complying with hazardous waste laws and regulations.

NMEID closed the 20 May 1988 NOV since Hazardous Waste Management Plan deficiencies were corrected and the issue of imple-
menting groundwater monitoring was being pursued by USEPA Region VI. NMEID reserved the right to enforce these requirements in the event USEPA could not resolve this issue.

22 Jul 88  HQ USEPA met with SAF/RQ, LEEV, and Holloman personnel to further discuss the Compliance Agreement. The meeting focused on revisions in the areas of Dispute Resolution, Funding, and Force Majeure. It was proposed that this agreement would serve as a model for the entire Air Force. HQ USEPA agreed to review the modifications and provide comments.

23 Jul 88  Design documents for the lagoon sewage sludge removal project were completed.

27 Jul 88  HAFB, HQ TAC, USACE, and Radian representatives met to discuss the sewage lagoon sludge removal design.

29 Jul 88  HQ USEPA provided comments to the Compliance Agreement modifications proposed on 22 Jul 88.

18 Aug 88  HAFB met with USEPA Region VI to discuss the revised Compliance Agreement, Hydrogeologic Investigation Plan, Groundwater Monitoring Plan, and the design documents for the sewage sludge removal. HAFB submitted the final HIP report to USEPA and NMEID and requested comments by 2 September 1988.

19 Aug 88  The Deputy Assistant Secretary of the Air Force submitted a revised Compliance Agreement to HQ USEPA, incorporating HQ USEPA's 29 July 1988 comments.

Aug 88  Radian conducted more extensive sampling and analysis of sludges in Ponds A and B to determine the areal extent of PCB and other organic and inorganic contamination that had been previously reported.

13 Sep 88  USEPA Region VI informed HAFB that approval for the sludge mound removal project was not necessary since the plan was neither part of a delisting petition nor a closure plan. USEPA welcomed the project as a positive step, but cautioned that it would not resolve the compliance issue.

Sep 88  A multi-million dollar construction contract was awarded to remove, transport, and incinerate the contaminated sludge mounds in Ponds A and B. Also, 2 years of funding was awarded for the groundwater monitoring program, pending approval of the GWMP and installation of the wells.

10 Nov 88  Radian submitted to HQ TAC/DEEV a removal scenario based on the August 1988 sampling results. The report detailed the statistical relationship between the limits of the sludge mounds.
removed and the confidence limit of removal (i.e., the probability that all sludge with PCB concentrations greater than 25 ppm would be removed).

16 Dec 88
HQ TAC requested that the construction project be modified to change the removal criteria to the 80 percent confidence contour for both lagoons. In other words, allow for a 20 percent risk that some PCB concentrations greater than 25 ppm would remain following removal of the sludge mounds, to be confirmed by additional sampling during construction.

20 Dec 88
Federal Facilities Compliance Agreement for HAFB was signed by USEPA Region VI, NMEID, and Air Force officials.

4 Jan 89
NMEID provided comments to USEPA Region VI on the GWMP with respect to the number and the location of proposed monitoring wells.

9 Jan 89
USEPA requested HAFB to provide clarification of the GWMP with respect to using some of the piezometers installed during the hydrogeologic study as monitoring wells.

10 Jan 89
Radian submitted a closure to HQ TAC and HAFB.

12 Jan 89
Congressional staff members conducted a site visit of HAFB.

18 Jan 89
HAFB letter to USEPA clarified the GWMP. Additional data, maps, and cross-sections of wells were provided.

18 Jan 89
NMEID sent comments to USEPA with respect to the draft Hydrogeologic Investigation Report.

19 Jan 89
HAFB submitted the Closure Plan to USEPA Region VI and NMEID.

26 Jan 89
NMEID informed HAFB that review of the closure plan was not possible for the next six months.

27 Jan 89
USEPA provided HAFB with technical comments on the proposed GWMP. HAFB forwarded these comments to Radian for incorporation into the final GWMP/HIP report.

9 Mar 89
HAFB submitted the Hydrogeologic Investigation Report to USEPA Region VI.

17 Apr 89
HAFB received the "Safety, Health and Emergency Response Plan (SHERP)" from International Technology (IT) Corporation for the Groundwater Detection Monitoring Program.
10 May 89  HQ USEPA officially closed HAFB's delisting petition file, requiring a new petition number for any subsequent delisting submissions.

2 Jun 89  USEPA Region VI approved proposed HAFB groundwater monitoring system. USEPA also informed HAFB that NMEID was currently reviewing the proposed sampling and analysis program and would provide a comprehensive response once the review was complete.

9 Jun 89  HAFB notified HQ TAC/DEEV that USEPA had approved the Groundwater Monitoring Plan, and requested that TAC notify USACE to proceed with the installation of proposed monitoring wells.

7 Jul 89  Radian provided HAFB with final submittal complete with review Comments/Responses of the Hydrogeological Investigation Report (HIR), Groundwater Monitoring Plan (GWMP), and the A-E Quality Control Plan/Sampling Plan (A-E QCP/SP).

13 Jul 89  NMEID rejected the closure plan received in January 1989. Due to the significant number of comments, NMEID recommended a revised closure plan be submitted.

18 Jul 89  NMEID informed HAFB that a complete review of the Quality Control Plan/Sampling Plan for groundwater monitoring would take an additional 40 days. Nonetheless, initial review comments were provided.

27 Jul 89  USEPA Region VI informed HAFB that their comments on the proposed closure plan were essentially the same as NMEID's comments issued 13 July 1989. Therefore, USEPA would not transmit its comments.

Jul 89  Groundwater monitoring wells were installed in the lagoon area.

14 Aug 89  HAFB responded to NMEID comments on the closure plan. HAFB also requested a meeting with the NMEID to discuss the issues related to the closure of the lagoons.

18 Aug 89  First round of groundwater sampling completed.

24 Aug 89  HAFB submitted the Groundwater Monitoring Well Installation Reports to USEPA Region VI and NMEID.

18 Sep 89  DEEV requested USACE MRD to initiate action to prepare a Project Assessment Report.

21 Sep 89  HAFB submitted to USEPA Region VI and NMEID the revised A-E QCP/SP with comments incorporated based on the NMEID preliminary review of the document.

A-14
28 Sep 89  Second round of groundwater sampling completed by IT Corporation.

11 Oct 89  US Department of the Interior (DOI) informed US Fish and Wildlife Service (FWS) of possible salamander die-off at Lake Holloman. The die off was initially reported by the Mesilla Valley Audubon Society and was not confirmed by DOI.

13 Oct 89  Radian submitted analytical results of the first round of groundwater sampling to USACE, HAFB, and HQ TAC.

16 Oct 89  HAFB personnel inspection of lagoon area found no indications of a salamander die off. HAFB consulted Mr. Herb Hammond who holds a Masters degree in Zoology. His thesis was a study of salamanders in the Las Cruces, New Mexico area. According to Mr. Hammond, salamanders hibernate in waters 2-3 feet deep during the time of year of the suspected die-off. It was also noted that salamanders will fake death when disturbed as a protection mechanism.


26 Oct 89  The Bureau of Land Management (BLM) and the Fish and Wildlife Service (FWS) performed inspection of the lagoon area. FWS subsequently requested NMEID to provide all records related to the lagoons, in particular the RCRA clean up action and wildlife studies. FWS also took the position on 30 November 1989 that Lake Holloman should be classified as "waters of the United States" and be subject to the Clean Water Act and NPDES permitting.

8 Nov 89  Third round of groundwater sampling completed by IT Corporation.

9 Nov 89  HAFB received a request from NMEID for clarifications to the existing closure plan in addition to HAFB's responses of 14 August 1989.

13 Nov 89  HQ TAC, NMEID, USACE, HAFB, and Radian representatives met in Santa Fe, New Mexico to discuss technical and administrative/legal issues related to the closure and post-closure plan.

13 Dec 89  Fourth round of groundwater sampling completed by IT Corporation.

8 Jan 90  HQ TAC directed USACE to develop and implement a sampling plan to further delineate contamination at the bottom of Ponds A and B to satisfy NMEID's request for soil borings. Also,
USACE was directed to modify the closure plan to reflect verification sampling.

18 Jan 90
First semi-annual groundwater sampling completed by IT Corporation.

22 Jan 90
Removal of contaminated sludge from Pond B began.

26 Jan 90
NMEID letter to USEPA Region VI indicated that NMEID did not have the time or resources to draft an acceptable closure plan for HAFB which would result in the triggering of dispute resolution. NMEID requested that an option be adopted that would allow the lagoon system to continue accepting nonhazardous wastes, thus avoiding dispute resolution procedures. NMEID also stated that "regulating military sewage lagoons which are identical to exempt POTWs is a questionable practice."

6 Feb 90
The Bureau of Land Management (BLM), Fish and Wildlife Service (FWS), and HAFB representatives met to discuss concerns regarding closure of the sewage treatment lagoons. As a result of this meeting, HAFB provided these agencies the results of the first round of groundwater sampling.

21 Feb 90
HAFB, USACE, Radian, Bradley Construction, Western Technologies, and Laramide Associates met at HAFB to discuss verification sampling and confirmation boring to be performed in Pond B following sludge removal completion.

8 Mar 90
Removal of contaminated sludge from Pond B was completed.

10 Mar 90
Western Technologies performed verification sampling of 37 points in Pond B. Analytical results indicated one sludge sample outside the removal zone above the 25 ppm PCB cleanup criteria. Radian was subsequently instructed to collect three sludge samples in and around this point, and submit a split sample to the USACE Missouri River Division (MRD) laboratory. These samples indicated the remaining sludge had PCB concentrations less than 18 ppm.

29 Mar 90
Radian completed confirmation boring in Pond B. This sampling effort consisted of six borings within the sludge removal zone and collecting samples of specified depths for detailed analyses.

30 Mar 90
Radian completed the abandonment of USGS groundwater monitoring wells adjacent to the sewage lagoons.

19 Apr 90
HAFB, Radian, and BLM representatives met in Las Cruces, New Mexico to discuss the potential for human and animal exposure
to contaminants in the HAFB sewage lagoons (including Lake Stinky and Lake Holloman). Holloman informed the BLM that these issues would be addressed in the Risk Assessment (RA) currently being prepared by Radian.

20 Apr 90  HAFB, Radian, and FWS representatives met to discuss the scope of the Risk Assessment. FWS requested that a wildlife study be performed focusing on the ducks which feed from the bottom of the lakes. HAFB representatives subsequently requested FWS to provide Holloman with a scope of work, including a cost estimate, for such a study.

7 May 90  Removal of contaminated sludge from Pond A began.

11 May 90  USACE and Radian representatives met in Austin, Texas to discuss outstanding issues related to the sewage lagoons, especially the PCB contamination of groundwater detected during the first round of groundwater sampling.

23 May 90  Radian resampled each of the 10 wells comprising the groundwater monitoring network. In addition, Radian collected five sediment samples from the drainage ditches that feed into the sewage lagoons and Lake Holloman.

Jun 90  Sludge dewatering filter press unit installed to reduce the water content of sludge removed from Pond A for off-site disposal.

14 Jun 90  USEPA Region VI letter to HAFB stated that the Closure Plan submitted to the NMEID on 19 January 1989 did not satisfy either of the USEPA accepted closure scenarios, i.e., "clean closure" or "closure in place." HAFB was subsequently requested to submit a closure plan consistent with one of these two scenarios within thirty (30) days.

18 Jul 90  HAFB submitted a revised closure plan to USEPA Region VI and NMEID, including a comment response package identifying previous NMEID comments and the corresponding closure plan response to each.

18 Jul 90  HAFB letter to USEPA Region VI requested a written response if additional deficiencies were noted in the revised closure plan.

19 Jul 90  Removal of contaminated sludge from Pond A was completed.
01-19 July 1990: The US Army Corps of Engineers' contractor for sludge removal at the sewage treatment lagoons pressed and hauled sludge from Pond A. The last load of sludge left Holloman 19 July. Verification sampling was conducted 20-23 July. On 30 July, results were received indicating there were several hot spots (i.e., sludge containing greater than 25 ppm). Additional samples were collected on 31 July. These results were received in five working days. Sampling indicated the area of the hot spots. The contract was extended to maintain site facilities and provide dewatering of Pond A. On 28 Sept, the US Corps of Engineers issued to the contractor a notice to proceed with the removal of an additional 75 tons of sludge from the lagoons.

05 July 1990: Holloman AFB submitted the sixth quarterly progress report to USEPA and the NMEID.


17-20 July 1990: International Technology (IT), Corp, Albuquerque Office, collected samples for a Semi-Annual Groundwater Sampling Round plus PCBs. Note: On 12-14 September 1990, because of a laboratory error, IT resampled for TOC. At that time, they also took well levels, pH, and specific conductivity.

18 July 1990: Holloman AFB submitted the Closure Plan which incorporates the NMEID comments provided to Holloman at a meeting in Santa Fe on 13-14 November 1989.

23 July 1990: The US Department of the Interior provided correspondence related to a scope of work for a contaminant study in Lake Holloman and Lake Stinky to assess potential impacts to migratory birds, and a scope of work which would address a potential threat to public health and safety on trust lands of the Department.

27 July 1990: Holloman AFB requested DERA funds from HQ TAC to conduct the contaminant study in Lake Holloman and Lake Stinky to assess potential impacts to migratory birds.

17 August 1990: Holloman AFB received the Project Assessment Report from Radian Corporation. This is a document providing the chronological history of events and a summary of all known activities related to the sewage treatment lagoons at Holloman AFB from March 1980 through July 1990.

20 August 1990: Holloman AFB received a copy of correspondence, from HQ TAC to the US Army Corps of Engineers, for modification of the construction contract for remedial action at Holloman AFB Sewage Lagoons to remove additional sludge from Pond A.
20 August 1990: Holloman AFB received a scope of work, from the US Department of the Interior, Bureau of Land Management, Las Cruces District Office, for sampling of Lakes Holloman and Stinky.

22 August 1990: Personnel from Holloman AFB, the US Army Corps of Engineers, Radian Corporation, and HQ TAC personnel met at Langley AFB to discuss lagoon closure, the preliminary results of the risk assessment, and other issues related to the sewage treatment lagoons at Holloman AFB. At this meeting it was decided additional sampling was necessary to better define contamination pathways. This sampling was scheduled for early October.

31 August 1990: Holloman AFB received a copy of correspondence from HQ TAC to the US Army Corps of Engineers providing funds for additional analytical work and preparation of reports documenting groundwater monitoring at the lagoons.

05 October 1990: Holloman AFB submitted the seventh quarterly progress report to USEPA and the NMEID.

09 October 1990: Western Technologies collected additional confirmation samples from Pond A. 11 ppm PCBs was highest concentration detected; confirms removal of PCBs.

26 November 1990: Holloman AFB received from the US Army Corps of Engineers the Groundwater Assessment Outline for the monitoring to be conducted at the sewage treatment lagoons.

30 November 1990: Holloman AFB received the Draft Risk Assessment for the Sewage Lagoon System, Holloman Air Force Base, NM.

06 December 1990: Holloman AFB received a cost estimate for several scenarios of closing and replacing the existing wastewater treatment system. This estimate was prepared by Radian Corporation.


17 December 1990: Holloman AFB received a letter from Mr. Ailyn M. Davis, USEPA Region VI, discussing two options of closure and requesting Holloman AFB to submit a closure plan, within thirty (30) days of receipt of subject letter, that calls for removal of all hazardous waste constituents from the seven lagoons or dewatering and capping of the seven lagoons.


04 January 1991: A meeting was held at EPA Region VI, Dallas, TX, to discuss the closure of the Holloman Sewage Treatment Lagoons. A copy of the minutes from this meeting is provided at Atch 2.
09 January 1991: HQ TAC requested HQ USAF/LEEV-CR (Mr. Ed Lopez) assist with arranging a meeting in Santa Fe, New Mexico, between the Air Force (Holloman AFB and HQ TAC) and the NMEID.

18 January 1991: Mr. Ed Lopez and Mr. Ronald Jahns, Department of the Air Force Regional Environmental Office, met with Dr. Bruce Swanton to discuss Mr. Davis' requirement for the Air Force to meet with the state and find out if they would allow for a clean closure based on a site specific risk assessment.

25 January 1991: Holloman AFB received a letter from the NMEID requesting all correspondence related to the FFCA be changed from Boyd Hamilton to Dr. Bruce Swanton.


31 January 1991: A meeting was held in Santa Fe, New Mexico, to discuss clean closure based on a site specific risk assessment as described in the preamble of the March 19, 1987, FR. A copy of the minutes from this meeting is provided at Atch 3.

14 February 1991: Holloman AFB was informed by HQ TAC that they may have the opportunity to put a sewage treatment plant in the FY 93 Military Construction Program. Through the Mobile (Alabama) District Army Corps of Engineers CH2M Hill was contacted to prepare Project Definitions (PD). The PD process is to develop the scope, technical approach, and cost for upgrading the Holloman AFB wastewater treatment system. Representatives from CH2M Hill visited Holloman AFB from 19-22 February to conduct a records/document review, visit the wastewater generation activities, tour the wastewater treatment facility, talk with Holloman AFB staff and collect site maps, utility and sewer maps, identify base design standards, etc. On 29 March 1991, the preliminary Project Definition was completed and provided to Holloman AFB.

28 February 1991: HQ TAC provided the USEPA and the NMEID an outline of Holloman's proposed sampling and analysis plan.


01 May 1991: Project Definition for a conceptual design of a new wastewater treatment plant was completed by the US Army Corps of Engineers.

03 May 1991: Holloman received a letter from Mr. Allyn M. Davis, Director Hazardous Waste Division, USEPA Reg VI, documenting a statistically significant increase in Total Organic Carbon (TOC) in the groundwater surrounding the sewage lagoons and lake system. This
letter required Holloman to submit a groundwater quality assessment plan within fifteen (15) days of receipt of Mr. Davis’ letter.

07 May 1991: Lt Col Robbins, Director, Environmental Programs HQ TAC communicated by letter with Mr. Davis stating the current senior leadership and members of the environmental teams at both Holloman and Cannon AFBs are eager to change EPA’s perception of TAC bases in New Mexico, desire to get on with clean-up of TAC bases, and maintain total environmental compliance. He requested EPA’s assistance in making our TAC bases leaders in the federal facilities environmental arena.

08 May 1991: Holloman AFB sent a copy via FAX of the Verification Samples/Lagoon B to Dr. Bruce Swanton (NMED Hazardous Waste Section).

08 May 1991: In a telecon between Dr. Bruce Swanton, NMED, Mr. Brent Johnson, HQ TAC/DEVVC, and Ms. Sharon Moore, HAFB, Dr. Swanton stated that due to a recent change in NM regulations affecting RCRA closure, Holloman AFB may submit a Post-Closure Care Permit application IAW the Final Rule for Delay of Closure Period for Hazardous Waste Management Facilities (FR, 14 August 1989) as adopted by NMED on 13 March 1991. Mr. Johnson explained that HAFB has programmed a new wastewater treatment facility for FY 93 and that justification of this new facility is contingent on obtaining an NPDES permit for HAFB’s effluent outfall.

13 May 1991: Holloman AFB received instructions from Elizabeth Gordon (NMED Hazardous Waste Section) on Post-Closure Permits.

15 May 1991: Holloman AFB received a letter from Armstrong Laboratory (AL/OEBE) scheduling a wastewater characterization survey to take place at Holloman AFB 12-23 August 1991.

15 May 1991: Holloman AFB sent a letter to Mr. Allyn Davis (Director, Hazardous Waste Management Division (6H) USEPA) requesting an extension for the submission of a groundwater quality assessment plan.

16 May 1991: There was a meeting at the Bureau of Land Management Office at Las Cruces, NM, to discuss real estate transaction/Lagoon Effluent Management.

16 May 1991: HAFB received an IN-TURN letter from Brent Johnson (HQ TAC/DEVVC) in which HAFB will proceed for option to delay closure by submitting an NPDES permit.

01 July 1991: NPDES permit application submitted to EPA Region 6 for new wastewater treatment plant.

05 July 1991: A compliance Agreement Quarterly Report for 1 April-30 June 1991 was submitted to USEPA Reg VI and the NMED.

17 July 1991: Received communication from US Fish & Wildlife Service regarding their biological study.

12-23 August 1991: Armstrong Laboratory, Brooks AFB, Texas, performed a wastewater characterization study. The waste water characterization was conducted for the FY93 WWTP design.

19 August 1991: HAFB received a FAX from Dr. Ellen Graber, USEPA Region VI, which provided EPA comments on HAFB Groundwater Assessment Monitoring Plan for the Sewage Treatment Lagoons.


26 August 1991: HAFB received a Field Report prepared by Armstrong Laboratory. The report was for the HAFB Wastewater Survey, 12-23 August. The findings indicated the waste water influent BOD is very weak and the chloride concentration is high. Groundwater infiltration is thought to be one of the major concerns of the weak waste.

27 August 1991: HAFB received an EPA letter summarizing their review and providing official comments of the Groundwater Assessment Plan for the Sewage Treatment Lagoons. Their letter further stated EPA was planning to split Appendix IX samples with HAFB.

28 August 1991: HAFB received a Revised Analytical Plan for Groundwater Assessment Monitoring from Radian Corporation. This plan was also provided to USEPA Reg VI and NMED, directly from Radian Corporation, at the request of Ms. Moore, HAFB.

03 September 1991: HAFB received copies of two briefings on the lagoons generated by HQ TAC to brief Brig Gen Newton, HAFB Installation Commander, and to SAF/MIQ. Briefings were to provide an overview to the lagoons and identify funding avenues for closure.

03-09 September 1991: Appendix IX groundwater samples were collected from the 10 wells at the sewage treatment lagoons.

06 September 1991: HAFB 833 CSG/DEV requested 833 AD/JA assistance on NPDES permit application and an evaluation of legal issues associated with WWTP effluent management.

09 September 1991: HAFB received a FAX copy from Radian Corporation of the USACE (Omaha District) Scope of Services for the Investigation of Hazardous Waste Sewage Lagoons (Sludge Sampling).
10 September 1991: HAFB received a courtesy copy of communication from the Fish & Wildlife Service to Ms. Ellen Caldwell, Permits Branch, USEPA Reg VI, regarding HAFB's NPDES application. FWS verbally informed that HAFB would submit revised NPDES application.

12 September 1991: At the request of Ms. Moore, Capt. Joe Castro, HQ TAC/DEV visited with Mr. Humke, USEPA Region VI, to discuss pretreatment and wastewater effluent permit limits for the proposed WWTP.

12 September 1991: HAFB provided a summary of all analytical reports completed to date to Mr. Bruce Swanton, NMED.

18 September 1991: HAFB submitted to USEPA and NMED the Final Groundwater Assessment Monitoring Plan for the HAFB Sewage Treatment Lagoons.

24 September 1991: HAFB requested HQ TAC obtain the services of contract personnel to assist the base in the processing of the NPDES Permit Application.

27 September 1991: HAFB received formal approval from USEPA Reg VI of the Analytical Plan for Groundwater Assessment Monitoring.

01-03 October 1991: Radian Corporation conducted preliminary sampling on Lagoons C, D, E, F, and G, and Lake Holloman to estimate water depth and sludge thickness in preparation for developing a sampling plan for sludge/soil.

04 October 1991: 11th quarterly Compliance Agreement Quarterly Report for 1 July-30 September 1991 was submitted to NMED and USEPA Region VI.

29 October 1991: Draft conceptual plan for sludge/soil sampling in lagoons is distributed to NMED, EPA, BLM, FWS, and others for comment.

30 October 1991: Pre-design conference for wastewater treatment plant held at Holloman AFB (HAFB).

05 November 1991: Draft sampling and quality control summary report for Appendix IX lagoon groundwater samples (including QA sample results from EPA subcontractor) is completed.

06 November 1991: Conference call to discuss sludge/soil sampling strategies. NMED, EPA, COE, Radian Corporation, HQ TAC, and HAFB participated. EPA and NMED request copies of groundwater draft sampling/quality control summary report.

07 November 1991: Notification received from NMED that sludge/soil conceptual plan is acceptable. NMED HRMB QA/QC requirements document is included.

07 November 1991: Groundwater sampling/quality control report sent to EPA/NMED.
11 November 1991: Revised conceptual plan for sludge/soil sampling, incorporating comments from
6 November conference call, is submitted.

15 November 1991: Notification received from EPA that a strict regulatory interpretation will
require groundwater resampling in response to low-level pesticide hits (method 8080), even
though there is little possibility of a pesticide plume in groundwater.

03 December 1991: Received courtesy copy of written notification from NMED approving
sludge/soil conceptual plan.

09 December 1991: Received draft wastewater characterization survey report from Armstrong
Laboratory.

16 December 1991: Received approval from US Fish and Wildlife Service for conceptual plan for
sludge/soil sampling.

16 December 1991: Request made to HQ TAC for funds to install two additional upgradient
groundwater monitoring wells.

18 December 1991: Notified that NMED will require groundwater resampling for methods 8080,
8240, and 8270.

18 December 1991: In a phone conversation between HAFB and NMED, it was determined that the
requirement to resample method 8270 was in error. Resampling of methods 8080 and 8240
will still be required.

20 December 1991: Received written notice of EPA approval of conceptual plan for sludge/soil
sampling.

23 December 1991: Conference call between NMED, EPA, COE, Radian Corporation, and HAFB
to discuss groundwater resampling schedule, method detection limits (MDL), NMED QA/QC
requirements, and possible revised presentation of Sep sampling data. Issues involving
resampling schedule and NMED QA/QC requirements are resolved.

23 December 1991: Received revised NMED Hazardous and Radioactive Materials Bureau
(HRMB) QA/QC requirements.

31 December 1991: Conference call between NMED, EPA, HQ TAC, COE, Radian Corporation,
and HAFB to discuss laboratory contamination, MDL's and resampling schedule. Comparison
of data from different methods and different labs shows that apparent method
8240 hits resulted from laboratory contamination. NMED states that method 8240
resampling will not be required, pending verification that Radian's subcontract lab did not
blank-correct data. Agreement is reached on MDL's. Groundwater resampling (method 8080
only) is scheduled for late January.
02 January 1992: 12th quarterly Compliance Agreement Quarterly Report for 1 October-31 December 1991 was submitted to NMED and USEPA Region VI.

22 January 1992: Meeting of informal Lake Holloman working group held at Holloman AFB (HAFB). Attending were representatives of US Fish and Wildlife Service (FWS), BLM-Santa Fe, BLM-Las Cruces, Geo-Marine Corp (Plano, TX), and HAFB. F. Fisher of HAFB briefed on recent (1989-present) and scheduled sample collections. L. Shomo of FWS briefed on their July 1991 sample collections of biota and sediments.

03 February 1992: Received drafts of "Chemical Data Acquisition Plan" and "Site Safety and Health Plan" from Radian Corporation for the sample collections scheduled to begin during the week of 10 February 1992.

03 February 1992: Received copy of memo from Radian Corporation to Dr. Bruce Swanton, NMED, regarding method detection limits (MDLs) and health based limits (HBLs). The memo addressed Radian's concerns about relatively high achievable MDLs for the HAFB lagoon samples that result from the difficult sample matrix. HBLs were also a source of concern for several reasons: (1) HBL values differ among various EPA literature sources, (2) HBLs may be lower than MDLs for some chemical constituents, and (3) HBLs do not exist for some constituents. Radian requested a conference call to resolve these issues.

06 February 1992: Conference call between Radian Corporation personnel and Dr. Bruce Swanton, NMED. A protocol for dealing with MDLs and HBLs was developed based upon reporting chemical constituents exceeding health based limits (HBSs) wherever possible. Calculated HBLs are to be used if they differ from published HBLs since the factors used for calculations come from frequently updated databases. Calculations are performed according to Appendix 4 of "Draft Preliminary Standards for RCRA Risk Assessment," EPA Region VI, February 1991 (equivalent to Appendix E of proposed "Corrective Action for SWMUs at Hazardous Waste Management Facilities," 27 July 1990, Fed Reg). Sources for reference doses and slope factors were identified. Only one constituent of concern, kepone, had no HBL. This was conservatively set at 0.5 the HBL for DDT. Where HBLs were lower than MDLs, the two values were very similar except in one case, benzo(a)pyrene, where the HBL was approximately an order of magnitude lower than the MDL.

11 February 1992: HQ TAC directed USACE to prepare a revised NPDES wastewater application for new wastewater treatment plant.

10-14 February 1992: Radian Corporation arrived and made preparations for drilling 2 new wells and sampling soil, sludge, and groundwater. Soil samples collected from two bore holes, one upgradient and one downgradient, by Southwest Engineering and Radian Corporation. Southwest Engineering and Radian Corporation installed two new upgradient monitoring wells to replace one disallowed by EPA.

25 February 1992: Received documentation from Mark Blakeslee of BLM concerning EPA's decision that a playa lake near Carlsbad is "waters of the United States" because of its value as wildlife habitat.

25 February 1992: Received reminder from NMED that annual groundwater report was due 1 March.

28 February 1992: Mailed annual groundwater report to NMED.

11 March 1992: Received wastewater survey from Armstrong Laboratory, Brookes AFB, TX, for use in design of the new wastewater treatment facility.

19 March 1992: Received NMED response to questions regarding operator certification required to run the new wastewater treatment facility.

24 March 1992: Request TAC HQ authorize funding for initial stage of lagoon RI/FS to support closure. Funding requested included a comparative ecological toxicology study, additional water sampling requested by BLM, data management using the Air Force IRP information management system, a geostatistical analysis of existing data to identify sampling densities necessary to support closure, and a feasibility study of lagoon closure alternatives.

03 April 1992: 13th quarterly Compliance Agreement Quarterly Report for 1 January - 31 March 1992 was submitted to NMED and USEPA Region VI.

14 April 1992: Received draft version of "Results for Confirmation Sampling, Groundwater Assessment Monitoring Program, Holloman AFB, NM," from Radian Corporation, Austin, reporting the results of monitoring well samples collected the week of 10 February 1992.


04 May 1992: Received final version of "A-E Sampling and Quality Control Summary Report for Appendix IX Groundwater Sampling - Assessment Monitoring Program, Holloman AFB, NM," from Radian Corporation, Austin. This report combines the results of two previous draft reports of Appendix IX sampling in September 1991 and confirmation sampling in February 1992.

13 May 1992: Submitted "A-E Sampling and Quality Control Summary Report for Appendix IX Groundwater Sampling - Assessment Monitoring Program, Holloman AFB, NM," to NMED, EPA, and BLM. The cover letter provides notification that low levels of pesticide contamination (< 0.5 ppb) are present in the wells. No pesticides were detected by the QA lab, the USACE Missouri River Division Laboratory, which had higher detection limits than
did the Radian Corporation lab. In view of the low level of contamination and the highly saline, nonpotable aquifer, it was recommended to return to detection monitoring.

15 May 1992: Received monitoring well installation report for 2 new upgradient wells, MW-9 and MW-10, from Radian Corporation, Austin.

01 June 1992: Sent monitoring well installation report to NMED, EPA, and BLM.

03 June 1992: Received from EPA Region VI a copy of a letter identifying Mr. Barry Feldman as the replacement for Mr. Courtland Fesmire as EPA point of contact for the FFCA.

16 June 1992: Mr. Gary Barnes of the Holloman AFB Entomology Shop was interviewed regarding current and past use of pesticides as part of HAFB's efforts to locate sources of pesticide contamination. Insecticides applied at housing units since about 1985 consist of Diazinon, Ficam, and currently, Ficam Plus. Records are maintained for each housing unit and records may be available back to 1985. (The shop is only required to maintain records for 3 years.) The insecticide currently used for fogging is Scourge. Malathion was most commonly used in the recent past. No pesticides are currently used for termite control nor have they been in the recent past. Equipment rinsate is disposed into a holding tank and does not enter the sanitary sewer system.

22 June 1992: Conference call with NMED, EPA, HQ ACC, HAFB, USACE, Radian Corporation, and BLM.

The proposed modifications to the lagoon monitoring well network (add MW-9, MW-10, remove S-2) were acceptable to NMED and USEPA.

HAFB's proposal to return to detection monitoring is premature because additional studies are necessary to define the extent of contamination. HAFB will submit a document to NMED that, based upon the September 1991 assessment monitoring plan and the new data from the September 1991 and February 1992 samplings, summarizes their proposed contamination assessment plan. This document will be submitted in time to allow its review by NMED before the 27 July meeting (see below).

Additional monitoring wells will be sited downgradient from wells showing pesticide contamination. Some of the siting factors to be considered are the presence of endangered and threatened species, the direction of groundwater flow, and the possibility of surface water contamination of the wells. HAFB will locate potential well sites in consultation with BLM and US Fish and Wildlife Service personnel.

A meeting will be held at 1300 MDT, 27 July 1992, to discuss the groundwater contamination assessment plan and sludge/soil data (if available).

23 June 1992: Siting considerations for lagoon downgradient monitoring wells located on land administered by Bureau of Land Management were discussed with Mr. Scott Ludwig of the Las Cruces office of the BLM. Mr. Ludwig indicated that BLM had determined that an
environmental assessment will be required because of the possible presence of a threatened or endangered species, the grama-grass cactus.


14 July 1992: Received Draft Site Characterization Report for soil and sludge in Lagoons C-G, Lakes Holloman and Stinky, and associated ditches.

27 July 1992: Meeting at Santa Fe with NMED HRMB, USACE-Omaha, Radian Corporation, and BLM Las Cruces regarding results of assessment monitoring and discuss closure issues.

29 July 1992: Meeting at Santa Fe with HAFB, USACE-Omaha, and Radian Corporation to review Site Characterization Report and plan work for next year.

30 July 1992: Meeting at HAFB with USACE Albuquerque, CH2M Hill, and HQ ACC CETSO to discuss feasibility study for new sewage treatment plant. The Plant design will consist of parallel oxidation ditches with secondary clarifiers and aerobic sludge digestors. Effluent will be discharged to Lake Holloman or to evaporative lagoons. An NPDES permit will be obtained to regulate discharge to Lake Holloman. The NPDES permit is behind schedule because of the bankruptcy of a contractor but this will be added into CH2M Hill's contract. It was tentatively decided to eliminate overflow from Lake Holloman into Lake Stinky. This would be achieved by using evaporation lagoons to be located on land currently administered by BLM. BLM stated that a land transfer between BLM and the Air Force was possible and that they had no problems with evaporation lagoons in these locations.

04 August 1992: FAXed proposed work for coming year to NMED and BLM for comment.

10 August 1992: Received response from BLM. Most comments suggested increased sampling in Lake Stinky. HAFB generally concurs and suggestions were incorporated into scope of work.

11 August 1992: Received oral responses from Stephanie Stoddard and Steve Alexander of NMED. NMED will require all new groundwater assessment monitoring wells to be sampled for the full Appendix IX list. The old wells will be sampled for method 8080 pesticides.

17 August 1992: Received final Site Characteristic Report and AE-SQCSR from Radian Corporation.


17 September 1992: Sent Site Characteristic Report and AE-SQCSR to Stephanie Stoddard. These documents report the results of a study of contamination of the sludge and sediments in Holloman AFB (HAFB) sewage lagoons C-G, Lakes Holloman and Stinky, and associated drainage ditches. Also included were data from Lagoon C collected previously during 1990-91 but not reported in the AE-SQCSR report of June 1991. These data were submitted to NMED to support the Post-Closure Care Permit (PCCP) application and to USEPA as part of the Phase I, RCRA Facility Investigation (RFI), of Solid Waste Management Units (SWMUs) identified on Table 1 of the HSWA portion of HAFB's RCRA Part B permit.

As originally planned, these data would complete the PCCP, which would now be ready for technical review during FY93. HAFB proposed to postpone technical review of the PCCP until FY94 in order to supplement the plan with a detailed feasibility study of closure alternatives. Several studies will provide information for the feasibility study, including: (1) collection of surface water samples analyzed for what is now recognized as the most significant contamination in the lagoons, organochlorine pesticides; (2) an analytical study of contamination of biota not previously characterized by the US Fish and Wildlife Service study, including benthic organisms, algae, and fish; (3) a statistical study to determine if the existing data adequately characterize the contamination; and (4) a detailed assessment of the health and environmental risk of the lagoons. These studies, as well as additional studies of Lake Stinky soils, will also supplement the HSWA RFI investigation.

Two items of the FFCA remain unresolved: (1) develop an approvable closure plan, and (2) assess groundwater contamination. The work described above will provide the information necessary to finalize the closure plan and resolve the first issue. The continuation of the groundwater assessment monitoring program (described in the 14th quarterly report) will provide the data necessary to resolve the second issue.

02 October 1992: Submitted 15th Quarterly Report

09 October 1992: Holloman AFB (HAFB) completed the layout of the groundwater sampling grid west of Lagoons A and D and land administered by Bureau of Land Management (BLM). Mr. Marty Tagg, HAFB archaeologist, completed a survey for historically significant sites.

26 October 1992: BLM and HAFB personnel performed a botanical survey to locate endangered species, in particular the grama-grass cactus. None were located and the habitat was generally unfavorable for that species.

06 November 1992: Mailed signed request for right-of-way (SF-299) to the groundwater sampling grid and to BLM - Las Cruces District.

16 November 1992: Sent supplemental information for right-of-way request to BLM in response to a verbal request.
16 November 1992: Received Draft Site Safety and Health Plan from Radian Corporation for 1993 work detailed in the fifteenth quarterly report.

20 November 1992: Radian and HAFB personnel located potential sites for 3 additional monitoring wells, two to be located west of Lake Holloman and one west of Lake Stinky. These, along with two existing piezometers, will be used in the RCRA Facilities Assessment of Lake Holloman and Lake Stinky, which are identified as Solid Waste Management Units in HAFB's HSWA Part B permit.

01 December 1992: Sent letter clarifying that HAFB was placing a new right-of-way request and was not seeking to amend a previous right-of-way granted to the US Army Corps of Engineers (USACE) in September 1987.

01 December 1992: Received Pre-Draft of the Chemical Data Acquisition Plant (CDAP) from Radian Corporation for 1993 work.

09 December 1992: Received right-of-way easement NMNM 86824 from BLM - Las Cruces District, allowing groundwater sampling activities west of Lagoons A and D to being.

08-17 December 1992: Radian Corporation, Petro Site Assessment, and Southwest Engineering collected groundwater samples from 24 grid locations west of Lagoons A and D. Site access was difficult because of snowy and muddy conditions. Three different methods were used to collect samples, depending upon site accessibility.

22 December 1992: HAFB met with Mesilla Valley Audubon Society members and BLM representative to discuss the new wastewater treatment plant. The discussion centered on effects of different effluent management strategies on the wildlife habitat value of Lakes Holloman and Stinky.

22 December 1992: Radian, BLM, Human Systems Research, and HAFB personnel performed surveys for natural and cultural resources on the proposed well sites west of Lakes Holloman and Stinky. Several grama-grass cacti were noted and access routes were adjusted to avoid them. No significant archaeological sites were noted.

30 December 1992: Received comments from the Conservation Committee of Mesilla Valley Audubon Society based on the 18 December meeting.

25 January 1993: Holloman AFB (HAFB) met with New Mexico Environment Department (NMED) personnel in Santa Fe. Several issues relevant to the lagoons were discussed, including procedures for handling investigation derived wastes, permitting requirements under the NM groundwater protection program for the lagoons and for investigation derived wastes, and whether EPA had ever determined if Lake Holloman was Waters of the U.S. It was determined that HAFB should file a Notice of Intent to discharge the investigation derived wastes. It was also determined that HAFB should file a discharge plan under the NM groundwater protection program as an interim measure until a determination is made regarding a NPDES permit for the new plant. At this point, EPA has not declared Lake
Holloman to be Waters of the U.S.

01 February 1993: Received request from U.S. Fish and Wildlife Service (FWS) for additional information on December meeting with Mesilla Valley Audubon Society and on known locations of grama-grass cactus.

23 February 1993: Informational meeting on status of HAFB natural resources program and natural resource issues related to lagoons. Attended by BLM, FWS, Radian, and Army Corps of Engineers-Omaha District.

02, 04 March 1993: BLM (Mr. Scott Ludwig) observed water sampling from Lake Stinky and well installation on BLM land.

05 March 1993: HAFB submitted to NMED Groundwater Bureau (Mr. David Morgan) Notice of Intent to discharge the investigation derived wastes.

05 March 1993: HAFB submitted to NMED Hazardous and Radioactive Materials Bureau (Mr. Steve Alexander) the Annual RCRA Groundwater Monitoring Report for the lagoon wells.

15-24 March 1993: First round of groundwater samples from all lagoon and Lake Holloman/Stinky wells were collected. Collection of benthic biota samples began.

17-18 March 1993: NMED (Mr. Steve Alexander) at Holloman AFB for RCRA Compliance Monitoring Evaluation - Splitting samples from new lagoon wells with Radian.

17 March 1993: BLM (Mr. Scott Ludwig, Mr. Mike Howard) at Holloman AFB to observe monitoring well sampling and document that groundwater monitoring wells were constructed as specified in right-of-way easement.

18 March 1993: BLM (Mr. Scott Ludwig, Mr. Tom Custer) at Holloman AFB to observe monitoring well sampling and document that groundwater monitoring wells were constructed as specified in right-of-way easement.

29 March-05 April 1993: Radian Corp. conducted field activities: (1) Second sampling of 17 lagoon wells for organochlorine pesticides. (Confirmation sampling is now done automatically because contracting lead time exceeds the 15-day RCRA requirement for confirmation sampling.) (2) A water level survey was conducted of all monitoring wells and lakes and lagoons with staff gauges (A, D, G, Lake Holloman, North Lake Stinky). (3) Biota sampling continued with collections of benthic organisms, aquatic insects, duck fecal matter and flying insects. (4) Geotechnical samples were collected from lake Stinky to determine the potential for mobilization of contaminants in wind-blown dust.

07 April 1993: Radian Corp. demobilization meeting to report on field sampling activities. Sampling generally went well without significant problems. Problems encountered included (1) sand in deep piezometers D-3 and D-5, which may make them unsuitable for long-term monitoring, and (2) many insects had not yet emerged. Mr. Scott Ludwig of the Bureau of Land Management (BLM) suggested that literature values of octanol/water coefficients and organic
carbon partition coefficients, which are required for an ecological risk assessment, may not be appropriate because of the high content of total dissolved solids and organic carbon in the lagoons and lakes. A problem with the US Fish and Wildlife Service (USFWS) waterfowl sampling was also discussed: Since adult birds were collected, contaminants could have been acquired in locations other than the lagoons and lakes. One way to deal with this is collect ducklings which have never been anywhere else. Mr. Clent Bailey of USFWS agreed to make the collections if Radian would process the samples.

30 April 1993: HAFB requested a species list and an informal Section 7 consultation from USFWS.

23 June 1993: Brief informal meeting with BLM Real Estate Officer and Caballo Resource Area Manager on land transfer issues relating to new sewage treatment plant. Scheduled a formal meeting on subject for 16 July 1993.

28 June 1993: Radian Corp. meets with USFWS in Albuquerque to discuss Section 7 Requirements. USFWS will submit an outline to the Base and also indicated the report on their 1991 waterfowl sample collection is nearing completion.

29 June 1993: HAFB, US Army Corps of Engineers - Omaha District, and Radian Corp. met with NMED in Santa Fe to review current progress, discuss work in the immediate future and discuss closure issues. NMED indicated that they will begin a determination of whether lagoon closure will occur under 40 CFR 265 or 40 CFR 264. The regulatory status of the lagoons is unclear since they lost interim status (40 CFR 265) in 1985 for failure to install monitoring wells. On the other hand, US EPA and NMED authorized delay of closure and are processing an application for a Post-Closure Care Permit (40 CFR 264).

13-16 July 1993: Mr. Rusty Mase representing Environmental Technical Services Company was at HAFB to prepare for additional biota sampling. The primary goal of the visit was to collect ducklings prior to fledging, which addressed concerns of the United States Fish and Wildlife Service (USFWS). Many samples of other biota were collected allowing for the evaluation of additional portions of the food web. Determination of the numbers and types of analyses to be performed on these samples will be made after review of the analytical results on the biota samples collected last winter. Consideration of analytical options could include further discussion with the USFWS. Mr. Sky Bristol, USFWS, Albuquerque Office, provided one day's assistance in the collection of ducklings.

16 July 1993: Formal meeting the Bureau of Land Management (BLM) Real Estate Officer and Caballo Resource Area Manager on land transfer issues relating to the new sewage treatment plant. Meeting was held at the BLM District Office in Las Cruces, NM.

29 July 1993: HAFB transmitted letter to New Mexico Environment Department (NMED) including a list of reports/information already in NMED files to be reviewed with the Closure Plan; a list of upcoming submittals and the schedule for their submission; and a request for review of the Closure Plan, the regulatory status of the lagoons, and guidance for the approach to closure.
04-06 August 1993: Radian Corporation personnel conducted sampling at HAFB for total organic carbon (TOC) and octane/water and soil/water partition coefficients (Kow and Koc). In addition to sampling, a synchronous water level survey was conducted and brass well identification tags were attached to the sewage lagoons and lakes' wells and piezometers. Overall, the field activities were a success with no significant problems encountered.

17-19 August 1993: Analytical Results meeting was held at Radian Corporation headquarters in Austin, Texas with representatives of HAFB, HQ ACC (Langley AFB, VA), United States Corps of Engineers (USCOE) and Radian Corporation. Several changes in project approach were discussed and agreed to and are summarized as follows: 1) the statistical modeling will be updated using the Spring, 1993 results for Lake Stinky and using additional contaminants of concern identified by the risk assessments (if any); 2) the revised statistical modeling results will form the basis of a conceptual plan to be prepared by Radian and submitted for regulatory review at approximately the same time as the risk assessments; 3) Proceed with Corrective Measures Studies (CMSs) for Ponds A, B, and F. CMSs for the remaining lagoons will be delayed until the additional sampling described in the Conceptual Plan is completed; 4) addition of a construction workers' exposure scenario due to the possibility that all lagoons will be taken out of service and backfilled; 5) the substantial impact on groundwater flow, due to the installation of new unlined evaporation ponds in the area, will need to be addressed.

30 August 1993: A conference call was held to discuss all issues covered at the Analytical Results meeting held at Radian Headquarters 17-19 August 1993. Conference call participants were HAFB, HQ ACC (Langley AFB, VA), USCOE and Radian personnel.

8-9 September 1993: Wastewater Treatment Plant (WWTP) Design meeting (35% stage) was held at HAFB. Radian Corporation personnel were in attendance the first day and presented in overview of the current status of the sewage lagoons and lakes, e.g., regulatory status and classification, Federal Facilities Compliance Act (FFCA), final closure objectives and options, interdependence of Closure Option and new WWTP Design, etc.

24 September 1993: Personnel from NMED Groundwater Bureau were at HAFB for open discussions on current and future discharge plans. With regard to the existing sewage lagoons, it was concluded that a discharge plan would not be necessary due mainly to all the on-going Resource Conservation and Recovery Act (RCRA) investigations.

01 October 1993: Holloman AFB (HAFB) submitted 19th Quarterly Report.

04 October 1993: Meeting held at HAFB with Bureau of Land Management (BLM) personnel from the Las Cruces, NM, District. Issues covered at the meeting were on land transfer relating to the new sewage treatment plant. Mr. Scott Ludwig, Mr. Tim Sanders, and Ms. Bernie Creager represented the BLM. Both BLM and HAFB continue to agree that legislation is the preferred method of effecting the necessary land transfer and that HAFB would take the lead in sponsoring the legislation.

06 October 1993: Received copies of the Draft Phase I Groundwater Assessment Monitoring Report
and the Draft Phase 2 RCRA Facility Investigation (RFI) Report regarding HAFB sewage lagoons and lakes investigation.

12-14 October 1993: Public Hearing for the New Mexico Water Quality Control Commission was held in Santa Fe, NM, for the purpose of reviewing the "Water Quality Standards for Interstate and Intrastate Streams in New Mexico." HAFB Personnel from the Environmental Flight attended and provided testimony concerning various issues that would have an impact on the new HAFB Wastewater Treatment Plant.

18 October 1993: Letter submitted to the Mesilla Valley Audobon Society from HAFB giving notification of the pending transfer of land from the Department of the Interior (BLM) to the Department of the Air Force and acknowledging the interest of the Audobon Society in the valuable wildlife habitat of Lakes Holloman and Stinky.

26 October 1993: Letter submitted to Dr. Gordon Ewing, Mesilla Valley Audobon Society, from HAFB granting permission for Dr. Ewing to access the HAFB sewage lagoons and lakes for a two (2) year period. This clearance would allow Dr. Ewing to provide volunteer assistance to HAFB with wildlife management of the sewage lagoons and lakes.

04 November 1993: Dr. Fred Fisher, HAFB, met with compliance personnel from HQ ACC andable Corporation personnel at HQ ACC Langly AFB, Virginia, to discuss the status of HAFB sewage lagoons closure and the Federal Facilities Compliance Agreement (FFCA).

15 November 1993: Received copies (Volumes I, II, & III) of the Draft Holloman Risk Assessments/Sewage Lagoons and Lakes Investigation.

16 November 1993: Copies received of the Draft conceptual Plan for Additional Sludge and Soil Sampling describing the proposed approach for additional investigation of the sewage lagoons and lakes.


14-15 December 1993: Meeting was held at Santa Fe, NM, with personnel from new Mexico Environment Department, HQ ACC, USACE, HAFB, Radian Corporation, US Fish and Wildlife Service and BLM. On 14 December 1993, Radian Corporation provided overviews, status reports, updates, etc., on the HAFB sewage lagoons and lakes investigation. Presentations included: 1) project history, objectives, and regulatory overview; 2) Phase I Groundwater Assessment Monitoring; 3) Phase 2 RCRA Facility Investigation Lakes Holloman and Stinky; 4) Risk Assessment Results and Conclusions; and 5) Summaries and future activities. A complete scoping meeting between personnel from HAFB, USACE, HQ ACC, and Radian Corporation was held on 15 December 1993.

07 January 1994: A conference call was held between HAFB, U.S. Army Corps of Engineers (USACE), and Radian Corporation to discuss various issues relating to the Draft Final Conceptual Plan for Additional Sampling - Sewage Lagoons and Lakes Investigation.

10 January 1994: Copies of the Draft Final Conceptual Plan for Additional Sludge and Soil Sampling - Sewage Lagoons and Lakes Investigations were submitted to New Mexico Environment Department (NMED) and U.S. Environmental Protection Agency (US EPA), Region VI.

11 January 1994: Received 4 copies of the Draft Final Sampling and Quality Control Summary Report (SQCSR) - Holloman AFB Sewage Lagoons and Lakes Investigation.

12 January 1994: Received draft copy of Scope of Services - Baseline Risk/Biological Assessment and related work for the lagoons and lakes investigation from USACE. Comments provided recommended the inclusion of any available data contained in the U.S. Fish and Wildlife Service (USFWS) forthcoming survey report on contaminants in biota, pore water, and sediment at the HAFB wastewater treatment system.

14 January 1994: HAFB received the final draft of the USFWS survey report on contaminants in biota, pore water, and sediment at the HAFB wastewater treatment system. A copy of this report was forwarded to Radian Corporation.

01 February 1994: Meeting with representatives from US EPA, Region VI, Radian Corporation and HAFB was held at Dallas, Texas, covering issues relating to the Phase 2 RCRA Facility Investigation, Lakes Holloman and Stinky. Key issues discussed were project background, objectives and scope, data interpretation, and conclusions and recommendations.

15 February 1994: HAFB submitted letter to NMED requesting that NMED not review the existing Closure Plan/Post Closure Care Permit Application at this time due to FY 1993 investigative results indicating the need for additional data to determine the extent of contamination in the lower lagoons.

22 February 1994: A conference call was held between HAFB, USACE, Radian Corporation, and NMED. Key issues discussed, pertaining to the lagoons and lakes investigation, were statutory (regulatory) status, closure concerns, future direction, and timeline/schedule.

25 February 1994: Mr. Daniel Malanchuk of the United States Corps of Engineers, El Paso Regulatory Office, conducted an on-site visit to the lagoon area. The prime issue involved was the jurisdictional wetlands status of Lagoon G.

01 March 1994: Annual 1993 RCRA Groundwater Monitoring Report for the Holloman lagoons was submitted to NMED.

Note: Substantial changes are currently taking place regarding project organization and scheduling due to changes in contracting mechanisms. Even though these changes have delayed project funding and implementation, they should actually reduce delays in the future.

07 April 1994: A copy of the tentative scheduling for upcoming project work on the HAFB sewage lagoons and lakes investigation was submitted to New Mexico Environment Department (NMED). The schedule was tentative because a contract had not been awarded yet.

11 April 1994: HAFB received a letter from NMED dated 6 April 1994 giving a determination of the regulatory status of the Holloman sewage lagoons and lakes. After discussing the matter of regulatory authority with the US Environmental Protection Agency (EPA), it was agreed:
1) Lake Holloman, Lake Stinky, and the ditch to Lake Holloman are HSWA units and will remain under the authority of EPA; 2) the seven sewage lagoons are RCRA regulated units and will be closed under the authority of the State of New Mexico in accordance with the New Mexico Hazardous Waste Management Regulations (HWMR-7), Part V, 40 CFR 264.

14 April 1994: HAFB submitted a letter to NMED requesting that a determination be made on the classification of lagoon sludge waste. The regulatory status of the sludge will determine the treatment technologies required to meet land disposal treatment standards for sludge treated ex situ and returned to the lagoons or disposed of off-site.

18 April 1994: A conference call was held with representatives from NMED, HAFB, HQ ACC, US Army Corps of Engineers (USACE), ENSERCH, and Radian to discuss the sewage lagoons and lakes closure project at HAFB. Agenda items included the project schedule, NMED review of the Conceptual Plan for Additional Sampling, discussion of the regulatory status, and closure issues.

09 May 1994: HAFB received a letter from NMED dated 04 May 1994 acknowledging HAFB's request for NMED to delay reviewing Closure Plan/Post Closure Care Permit Application and also confirming that it is appropriate for HAFB to demonstrate clean closure for sewage Lagoons A through G, based on 40 CFR 264, Appendix IX constituents.

18 May 1994: The Draft Final Holloman Risk Assessments/Sewage Lagoons and Lakes Investigation was submitted to US EPA, Region VI.

18 May 1994: A 65% design review meeting on the new Wastewater Treatment Plant (WWTP) was held at HAFB.

19 May 1994: A meeting was held in Las Cruces, NM, with representatives from the Bureau of Land management (BLM), HAFB, and HQ ACC to discuss the Environmental Assessment for the new WWTP and also the congressional land transfer pertaining to Lakes Holloman and Stinky and the surrounding area.

19 May 1994: HQ ACC personnel met in Dallas, Texas, with US EPA, Region VI NPDES permitting personnel to discuss issues pertaining to the proposed new WWTP at HAFB.

24 May 1994: HAFB, Dr. Fred Fisher, met with Mr. Brian Mueller of EPA Region 6 NPDES, Permit Division, to discuss issues raised in the 19 May 1994 meeting.
07 June 1994: Review comments on "Preliminary Survey of Contaminants Present in Biota, Pore-Water, and Sediments at the Holloman AFB Wastewater Treatment Facility" were submitted by the Army Corps of Engineers, Omaha District, and the Holloman Environmental Flight to the US Fish and Wildlife Service (USFWS). The contaminant study was done by the USFWS.

09 June 1994: HQ ACC directed USACE Albuquerque District to expand the NPDES permit application scope of work in accordance with the 11 February 1992 letter originally directing this task to be performed.

26 June 1994: HAFB received the draft Environmental Assessment on the new proposed Wastewater Treatment Plant.

28 June 1994: A letter from the Holloman AFB installation commander was sent to NM Secretary of the Environment Judith Espinosa and US Environmental Protection Agency (EPA) Region 6 Director of Water Management Myron K. Knudson expressing concern that the proposed wastewater treatment plant might have difficulty complying with the Clean Water Act because the existing water quality standards were under revision, and, in any case, were not readily applicable to the unusual conditions in Lake Holloman. The commander requested both agencies review project plans for the wastewater treatment plant in order to verify that the plant is capable of meeting all applicable water quality standards.

30 June 1994: A conference call was held with representatives from NMED, HAFB, ENSERCH, and Radian to discuss the sewage lagoons and lakes closure project at HAFB. Agenda items included an overview of past conference calls, general scheduling for field work, reporting, and NMED comments; and NMED review of sampling plan and closure plan. At present, there is still no contract for investigative work. Early July 1994 is projected for a contract to be on line.

12 July 1994: A meeting was held with U.S. Fish and Wildlife Service (Mr. Clent Bailey), HQ ACC Natural Resources Manager (Mr. Roy Barker), and Holloman AFB personnel (Dr. Hildy Reiser, Dr. Fred Fisher) concerning the impact of the proposed wastewater treatment plant on the western snowy plover and other wildlife. (The snowy plover is a C2 candidate species nesting on Lake Holloman and Lake Stinky sand flats.) Holloman AFB proposed to schedule construction around the snowy plover breeding season. Also discussed were a short-term constructed wetlands feasibility study specifically for the wastewater treatment plant, and a long-term wetlands management plan funded through the Department of Defense Legacy Program.

29 July 1994: Received a reply to 28 June 1994 letter from NM Secretary of the Environment Espinosa indicating the NM Water Quality Act limits the authority of New Mexico Environment Department (NMED) to setting standards, specifically excluding the setting of design criteria. Reference was made to 1992 correspondence between a contractor, CH2M Hill, EPA Region 6, and NMED, in which NMED indicated Lake Holloman would probably be considered a warm water fishery because of the presence of mosquitofish. (Mosquitofish are periodically introduced into the lagoons and storm drainage ditches for mosquito control.)
02 August 1994: A semi-annual partnering meeting with NMED and the three NM Air Force Bases was held at Holloman AFB (HAFB). One item on the agenda was water quality standards for Lake Holloman. Dr. Jim Piatt, Chief, NMED Surface Water Bureau reiterated that the standards most applicable to the plant were the warm water fishery standards because of the presence of the introduced mosquitofish.

04 August 1994: Received a letter from U.S. Fish and Wildlife Service (FWS) concerning 12 July 1994 meeting indicating that, while the proposed scheduling of construction to avoid the western snowly plover breeding season would protect that species, it might increase the impact on other migratory species. The letter recommended Holloman AFB take a more holistic approach to the wildlife impacts of the wastewater treatment plant project. In particular, the letter recommended restoration and use of existing wetlands, including lagoon G and adjacent areas instead of constructing evaporation ponds. FWS recommended that HAFB conduct a feasibility study to investigate the use of existing wetlands, as well as the possibility of constructing wetlands for wastewater treatment and/or effluent disposal.

09 August 1994: HAFB transferred funds to CoE-Albuquerque District to study the feasibility of constructing wetlands in place of some of the effluent disposal ponds in the proposed wastewater treatment plant.

21 September 1994: Received a courtesy copy of correspondence from NMED Surface Water Bureau to EPA Region 6 reiterating their position that the most applicable standards to Lake Holloman were those of a warm water fishery.

26 September 1994: Received copy of letter from New Mexico Audubon Council to the HAFB installation commander expressing concern over the size and design of the evaporation ponds for the proposed wastewater treatment plant. The letter requested the base look into restoring existing wetlands near Lagoon G or using constructed wetlands for effluent disposal.

29 September 1994: Provided review comments to HQ ACC on Draft Environmental Assessment for Holloman AFB Wastewater Treatment Plant.

03 October 1994: A conference call was held with representatives from Radian Corporation and the Omaha USACE to discuss issues and changes regarding the Holloman Quality Assurance Project Plan for the Lagoons and Lakes Closure Project. These issues and changes dealt with Method Detection Limit (MDL) studies being run on isodrin, heptachlor epoxide and organic lead.


20 October - 11 November 1994: Field work began on the Sewage Lagoons and Lakes Closure Project with a sampling and analytical program that will complement the 1992 sampling results and define more precisely the extent of contamination in Ponds C, D, E, and G, and in Lakes Holloman and Stinky. The results will be used to resolve and better define risks
associated with each lagoon and lake due to uncertainties found in previous investigations. The results of this investigation will also be used in conjunction with previous investigation results to drive the decisions for closure alternatives and requirements. The field work was continuous for approximately three weeks. Some additional work will be performed, possibly in early 1995, after various costs can be negotiated and agreed upon.

25 October 1994: Provided written notification to CoEA El Paso Regulatory Office in accordance with Section 404 of the Clean Water Act that construction of new wastewater plant will result in the discharge of dredge and fill material to Waters of US. Included a project description and detailed project drawings for the areas in question.

25 October 1994: Site visit by CoEA El Paso Regulatory Office wetlands biologist (Mr. Dan Malanchuk), GeoMarine Corporation wetlands biologist (Mr. Kyle Odum), Air Force Center for Environmental Excellence Project Manager (Mr. Frank Castaneda) and Holloman AFB Water Resources Manager (Dr. Fred Fisher). Purpose was to examine potential wetlands identified in air photos near the proposed evaporation ponds between the old sewage lagoons and Lake Holloman. 14.3 acres of jurisdictional wetlands were identified during this visit.

31 October - 4 November 1994: CoEA contractor CH2M Hill and Holloman AFB personnel conducted an inventory of industrial discharges to sanitary sewer. Goal was to supplement information from the hazardous waste management program for use in the NPDES permit application. Results indicated that no major industrial discharges exist at Holloman and that less that 1% of the total wastewater results from industrial operations. The most common industrial discharges are oil/water separators receiving runoff from washracks and floor washing, and silver recover units discharging from photography shops.

31 October 1994: A conference call was held with representatives from the NMED, Holloman AFB, USACE (Omaha District), Foster Wheeler Corporation and Radian Corporation to discuss the proposed long-term groundwater monitoring plan for Holloman AFB’s sewage lagoons and lakes. Pertinent decisions addressed in the conference call were: Holloman AFB is proposing a detection monitoring program based on risk-based levels; Holloman AFB is proposing a first determination/false positive approach to determine if further evaluation is necessary (consistent with 40 CFR, Part 265, Subpart F requirements already in place); NMED is reevaluating the decision to classify the sludge in the lagoons as listed hazardous wastes; a Project Assessment Report describing the history of the sewage lagoons and lakes projects will be submitted to NMED; and the Groundwater Monitoring Plan and the Closure Plan will also be submitted to NMED.

01 November 1994: A conference call was held between Holloman AFB, EPA Region VI, USACE (Omaha District), and Radian Corporation to discuss the status of the Phase II RCRA Facility Investigation Report for Lakes Holloman and Stinky. Mr. Lowell Seaton, EPA Region VI, fundamentally agreed with the conclusions and recommendations of the report: a release of Method 8080 pesticides and metals is probable, but the concentrations are so low that additional downgradient investigation should not be pursued.
10 November 1994: A conference call was held between Holloman AFB, EPA Region VI, USACE (Omaha District), and Radian Corporation to discuss the specific requirements and outline for long-term monitoring at Lakes Holloman and Stinky. Packaged materials were provided to Mr. Lowell Seaton, EPA Region VI for discussion purposes. Mr. Seaton agreed with the technical approach outlined in the package and did not anticipate any serious problems. It was agreed the lakes should not require as extensive a monitoring program as the lagoons since they are not regulated units. Mr. Seaton believed a 10 year period would be sufficient for the lakes as opposed to the 30 years most likely required for the sewage lagoons.

10 November 1994: Conference call with USEPA Region 6 industrial NPDES permit office (Mr. Brian Mueller), CoEA (Ms. Joan Coffing), CH2M Hill (Mr. Coy Webb), Holloman AFB (Ms. Debbie Hartell and Dr. Fred Fisher) to discuss preparation of the revised permit application. The most significant item discussed was the fact that the application needed to include the discharge from the existing wastewater lagoon system in addition to the discharge from the new plant.

16 November 1994: Received a Draft Constructed Wetlands Feasibility Study from CoEA.


21 November 1994: Sent a letter to NMED Surface Water Bureau indicating that Holloman AFB did not agree that Lake Holloman was a warm fishery because natural background water quality was unsuitable for most warm water fish and would naturally violate state water quality standards. Relevant data from previous studies was enclosed. The ability of mosquito fish to tolerate conditions unsuitable for other fish, such as those existing in rice paddies, was discussed. HOLLOMAN AFB indicated that, although it might physically be possible to create conditions suitable for the propagation of warm water fish by expanding the volume and flow in Lake Holloman, this would destroy significant wildlife habitat (Lake Holloman is managed as a wildlife refuge), and would conflict with efforts to reduce water use on base. The impacts on wildlife habitat would probably violate the Endangered Species Act, the Fish and Wildlife Coordination Act, and Executive Order 11990 (Protection of Wetlands).

28 November 1994: Received Draft NPDES Permit application and New Mexico Discharge Plan from CoEA contractor CH2M HILL.

01 December 1994: Received a facsimile inquiry from Senator Bingamon's office regarding HOLLOMAN AFB's response to 26 September 1994 letter from NM Audubon council.

06 December 1994: Sent a response to NM Audubon Council 26 September 1994 letter and 1 December 1994 inquiry from Senator Bingamon's office. The letter indicated the base was investigating alternatives to the proposed configuration of the evaporation ponds, including the possibility of constructing wetlands, and that USAF was fully committed to complying with laws and regulations protecting wetlands, including Section 404 of the Clean Water Act and Executive Order 11990. It was noted that the feasibility of some wetlands options might
be constrained by the need to minimize potential for collisions of birds with aircraft, and the requirements to investigate past contamination and close the old lagoons.

12 December 1994: Received five copies of the draft Long-term Monitoring Plan for the Sewage Lagoons and Lakes Holloman and Stinky.

17 December 1994: Received a response from Mesilla Valley Audubon Society through Senator Bingaman's office to 6 December 1994 letter. The letter suggested that the restoration of existing wetlands and creation of new ones would probably reduce potential for collisions of birds and aircraft because the wetland areas are farther from the runway that the existing sewage lagoons where birds often congregate at present.

19 December 1994: A conference call was held with representatives from NMED, Holloman AFB, USACE (Omaha District), Foster Wheeler Corporation and Radian Corporation to discuss the following issues: 1) Long-term Groundwater Monitoring Plan; 2) Project Assessment Report; 3) Closure Plan; 4) determination of listed waste; 5) schedule of upcoming conference calls and meetings; and 6) other related issues.

20 December 1994: Received phone call from Dr. Jim Piatt, Chief, NMED Surface Water Bureau concerning 21 November letter. Dr. Piatt indicated the Clean Water Act required the protection of the mosquito fish since it was already present in Lake Holloman. Alternatives to classifying Lake Holloman as a warm water fishery were discussed. The most promising approach, in view of the unusual physiology of the mosquito fish, and the unique chemistry of Lake Holloman, appears to be the development of site specific standards. Dr. Piatt indicated he would discuss this issue with USEPA Region 6 in the near future.

21 December 1994: Provided USACE Albuquerque District with comments on constructed wetlands feasibility study.

27 December 1994: Received two copies of the Remedial Action Options Analysis and Planning Document which explains the process of evaluating remedial options for sites at Holloman AFB.

28 December 1994: Received two copies of the draft Project Assessment Report (PAR) for Holloman AFB. This PAR presents a history of regulatory and sampling activities that have occurred during the Holloman AFB sewage lagoons and lakes project, beginning with the year 1980.

10 January 1995: Supplied comments on Draft NPDES Permit application and New Mexico discharge plan to USACE Albuquerque.

12 January 1995: Received verbal notification from HQ ACC that release of Draft Final EA for new waste water treatment plant would be delayed to allow for a water balance study to reduce the size of evaporation ponds.
APPENDIX B

Key Players on the Sewage Lagoons and Lakes Project
### Key Players on the Sewage Lagoons and Lakes Project

<table>
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<td>Jack Ellvinger</td>
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APPENDIX C

Documents Prepared for the Sewage Lagoons and Lakes Project
### List of Analytical Documents For Sewage Lagoons and Lakes Projects at Holloman AFB

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<tr>
<td>Evaluation for Hazardous Waste at Holloman AFB Sewage Treatment Plant</td>
<td>EP toxicity results of November 1981 water and sludge samples collected from the sewage lagoons and Lake Holloman</td>
<td>January 1982</td>
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<td>Sewage Lagoon Test Results</td>
<td>Analytical results of sludge and wastewater samples</td>
<td>UBTL/March 1985</td>
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<tr>
<td>Evaluation for 129 Priority Pollutants, Holloman AFB Sewage Ponds</td>
<td>During December 1984 HAFB collected sludge and wastewater samples from Ponds A, B, and C and analyzed for the 129 priority pollutants, heavy metals and pesticides and EP toxicity. Analytical methods used included EPA methods 624, 625, and 608, cyanides, and total phenols.</td>
<td>HAFB Bioenvironmental Engineering Services/March 1986</td>
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<td>Analytical Summary of Holloman Air Force Base Delisting Assessment, Holloman, New Mexico</td>
<td>Analytical results of December 1984 sampling event and a July 1987 sampling event that collected one sludge and one water sample from each sewage lagoon, Lake Holloman, and Lake Stinky. Appendix IX constituents were analyzed during the July 1987 event.</td>
<td>Wadsworth/ALERT Laboratories/August 18, 1987</td>
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<tr>
<td>Draft Quality Control Summary Report (A-E QCSR) for Additional Sampling Hazardous Waste Sewage Sludge Removal</td>
<td>Defines extent of PCB, organic constituents, and metals contamination in Ponds A (45 locations) and B (40 locations) and along the periphery of each lagoon (4 samples each). Analytical results of sewage sludge for metals, Methods 8240, 8270, 8080, cyanide, and EP toxicity. Samples were collected between August 22 and September 8, 1988.</td>
<td>Radian/January 1989</td>
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<tr>
<td>Hydrogeologic Investigation Report and Groundwater Monitoring Plan for the Sewage Treatment Lagoons</td>
<td>Results of hydrogeologic investigation and proposed monitoring system.</td>
<td>Radian/July 1989</td>
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<td>Data Quality Control Summary Report for Additional Groundwater Samples from the First Groundwater Sampling Round</td>
<td>Results of groundwater monitoring.</td>
<td>Radian/November 1989</td>
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<td>Letter to USACE summarizing sampling activities conducted in March 1990 for Ponds B and C</td>
<td>Analytical results of sludge and soil collected from Pond C.</td>
<td>Radian letter report April 1990</td>
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<td>Second, Third, and Fourth Monthly Groundwater Sampling Report</td>
<td>Results of groundwater monitoring from September 25-28; November 5-8; and December 10-14, 1989.</td>
<td>IT Corp./ May 1990</td>
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<td>First semiannual groundwater sampling report</td>
<td>Results of groundwater monitoring from January 15-17, 1990</td>
<td>IT Corp./ May 1990</td>
</tr>
<tr>
<td>Draft Quality Control Summary Report (A-E QCSR) for Sewage Lagoon Surface Water Sampling at Holloman Air Force Base, NM</td>
<td>Results of surface water samples collected from the sewage lagoons and lakes.</td>
<td>Radian/December 1990</td>
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<tr>
<td>Risk Assessment for the Sewage Lagoon System</td>
<td>Table 4-3 of the report contains maximum concentrations of constituents detected in previous investigations of the sewage lagoons.</td>
<td>Radian/February 1991</td>
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<tr>
<td>A-E Sampling and Quality Control Summary Report (A-E SQCSR) for Field Investigation to Support Sewage Lagoon Closure</td>
<td>Focuses on the quality of the soils underlying the sludge in Ponds A and B, and if any contaminants migrated to Pond C. Soil samples were collected from Ponds A, B, and C; sludge samples were collected from Ponds B and C; a groundwater sample was collected from Pond B. Four background soil samples were also collected. Samples were collected in March and November 1990. Samples were analyzed using SW methods 8240 (volatile organics), 8270 semivolatile organics), 8150 (chlorinated herbicides, 8080 (pesticides and PCBs), 9012 (cyanide), and 6010, 7060, 7471, and 7740 (metals).</td>
<td>Radian/June 1991</td>
</tr>
<tr>
<td>Quality Control Summary Report for Sewage Lagoon Surface Water Sampling</td>
<td>Results of surface water samples collected October 8-10, 1990 at Headworks, Ponds B, C, D, E, G, and Lake Holloman</td>
<td>Radian/June 1991</td>
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<td>Second Semi-annual Groundwater Sampling Report</td>
<td>Results of groundwater sampling performed July 17-20, 1990</td>
<td>IT Corp./June 1991</td>
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<td>Background Contamination Indicator Parameters Summary Statistics for Upgradient Wells and Comparison with Data for the Second Semi-annual Groundwater Sampling Episode, Sewage Treatment Lagoons Monitoring Wells</td>
<td>See title for description</td>
<td>IT Corp./June 1991</td>
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<td>Third Semi-annual Groundwater Sampling Report</td>
<td>Results of groundwater sampling performed January 14-17, 1991</td>
<td>IT Corp./June 1991</td>
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<td>Background Contamination Indicator Parameters Summary Statistics for Upgradient Wells and Comparison with Data for the Third Semi-annual Groundwater Sampling Episode, Sewage Treatment Lagoons Monitoring Wells</td>
<td>See title for description</td>
<td>IT Corp./June 1991</td>
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<td>Fourth semiannual groundwater sampling report</td>
<td>Results of groundwater sampling from July 15-19, 1991</td>
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<td>Background Contamination Indicator Parameters Summary Statistics for Upgradient Wells and Comparison with Data for the Fourth Semi-annual Groundwater Sampling Episode, Sewage Treatment Lagoons Monitoring Wells</td>
<td>See title for description</td>
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<tr>
<td>Groundwater Assessment Monitoring Plan for the Sewage Treatment Lagoons</td>
<td>Describes groundwater monitoring procedures for the Phase I Assessment</td>
<td>Radian/September 1991</td>
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<tr>
<td>Conceptual Plan for Sludge and Soil Sampling</td>
<td>Describes alternate plan for sampling each sewage lagoon to support the PCCP application.</td>
<td>Radian/November 1991</td>
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<tr>
<td>Results of Confirmation Sampling and Comparison to Appendix IX Sampling, Assessment Monitoring Program, Holloman AFB, NM</td>
<td>Results of confirmation sampling to determine the presence of organochlorine pesticides in the groundwater. Sampling was performed in February 1992.</td>
<td>Radian/April 1992</td>
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<td>Hazardous Waste Sewage Sludge Removal Lab Results</td>
<td>Results of sludge sampling on October 9, 1990</td>
<td>WT Environmental Consultants/ May 1992</td>
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<td>Sampling and Quality Control Summary Report (A-E SQCSR), Sewage Lagoon Investigation</td>
<td>Appendix IX analytical results of sludge and soil collected in the Ponds C, D, E, G, ditch, and Lakes Holloman and Stinky during the Spring of 1992. Sludge and soil samples were also analyzed for organophosphorus pesticides, chlorinated herbicides, PCBs, dioxins and furans.</td>
<td>Radian/August 1992</td>
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<tr>
<td>Site Characterization Report Sewage Lagoon Investigation</td>
<td>Presents sampling scheme for 1993 investigation. The appendix presents the results of the 8080 geoprobe analyses.</td>
<td>Radian/January 1993</td>
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<tr>
<td>Draft Final Chemical Data Acquisition Plan (CDAP)</td>
<td>Contains data evaluation criteria, conclusions and recommendations for groundwater monitoring results from wells downgradient of the Lakes.</td>
<td>Radian/December 1993</td>
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<tr>
<td>Draft Final Phase 2 - RCRA Facility Investigation Report for Lakes Holloman and Stinky</td>
<td>Analytical results for 8080 geoprobe water samples, and inorganic results for background soils and groundwater samples. Also inorganic analyses for soils, surface water, and groundwater; and organic analyses for soils, surface water and groundwater collected from the sewage lagoons and lakes. In addition results of biota samples collected from sewage lagoons and Lake Holloman.</td>
<td>Radian/October 1993</td>
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<td>Sampling and Quality Control Summary Report (A-E SQCSR) Sewage Lagoons and Lakes Investigation, Draft Final</td>
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<td>Radian/November 1993</td>
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<td>Holloman Risk Assessments for Sewage Lagoons and Lakes Investigation</td>
<td>Vol. II, Appendix B to this report presents the analytical data collected in previous investigations of the sewage lagoons. Appendix M describes the biota sampling event.</td>
<td>Radian/November 1993</td>
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<td>Draft Final Phase 1 - Groundwater Assessment Monitoring Report, Sewage Lagoons and Lakes Investigation</td>
<td>Defines lateral extent of Method 8080 pesticides in uppermost aquifer. Appendix IX constituents were collected in new wells that were installed. Document contains data evaluation criteria, conclusions and recommendations.</td>
<td>Radian/December 1993</td>
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<td>Preliminary Survey of Contaminants Present in Biota, Pore-Water, and Sediments at the Holloman Air Force Base Waste Water Treatment Facility</td>
<td>During the summer of 1991, USF&amp;WS collected eleven sediment, 1 pore-water, and 35 biological samples in the sewage lagoons and Lake Holloman. Samples were analyzed for heavy metals and metalloids, organochlorine pesticide and PCBs, polycyclic aromatic hydrocarbons, aliphatic hydrocarbons, and certain dioxin and furan compounds. Results and conclusions are presented in this report.</td>
<td>USF&amp;WS/January 1994</td>
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<td>Conceptual Plan for Additional Sampling Sewage Lagoons and Lakes Investigation</td>
<td>Describes proposed sampling procedures to identify extent of contamination in the sewage lagoons and lakes.</td>
<td>Radian/January 1994</td>
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APPENDIX D

Summary of Analytical Data
1990 Surface Water Sampling

Quality Control Summary Report (A-E QCSR)
For Sewage Lagoon Surface Water Sampling
Holloman AFB, New Mexico
June 1991
Figure 2-1. Location of Sewage Lagoon Surface Water Sampling Sites—Ponds B, C, D, E, and G
Figure 2-2. Location of Surface Water Sampling Sites--Lake Holloman
### TABLE 5-2. MAXIMUM LEVELS OF INORGANIC CONSTITUENTS

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<td>0.033 *</td>
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<td>&lt;0.024</td>
<td>&lt;0.024</td>
<td>&lt;0.024 *</td>
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<tr>
<td><strong>Antimony</strong></td>
<td>&lt;0.028</td>
<td>0.078 *</td>
<td>&lt;0.028</td>
<td>&lt;0.028</td>
<td>&lt;0.028</td>
<td>&lt;0.028</td>
<td>&lt;0.028 *</td>
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<tr>
<td><strong>Arsenic</strong></td>
<td>&lt;0.006</td>
<td>0.0038 *</td>
<td>0.004 *</td>
<td>0.0062 *</td>
<td>&lt;0.006</td>
<td>0.0072 *</td>
<td>0.0088 *</td>
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<tr>
<td><strong>Barium</strong></td>
<td>0.027 *</td>
<td>0.040</td>
<td>0.038 *</td>
<td>0.039 *</td>
<td>0.037 *</td>
<td>0.040 *</td>
<td>0.042 *</td>
</tr>
<tr>
<td><strong>Boron</strong></td>
<td>0.74</td>
<td>0.35 *</td>
<td>0.30 *</td>
<td>0.30 *</td>
<td>0.33 *</td>
<td>0.36 *</td>
<td>0.36 *</td>
</tr>
<tr>
<td><strong>Calcium</strong></td>
<td>340</td>
<td>410 *</td>
<td>350 *</td>
<td>340 *</td>
<td>350 *</td>
<td>440</td>
<td>870</td>
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<td><strong>Chromium (total)</strong></td>
<td>&lt;0.004</td>
<td>0.0046 *</td>
<td>&lt;0.004</td>
<td>&lt;0.004</td>
<td>&lt;0.004</td>
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<tr>
<td><strong>Chromium VI</strong></td>
<td>&lt;0.010</td>
<td>0.0004 *</td>
<td>0.014</td>
<td>&lt;0.010</td>
<td>&lt;0.010</td>
<td>&lt;0.0002</td>
<td>&lt;0.0002 *</td>
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<tr>
<td><strong>Copper</strong></td>
<td>0.0075 *</td>
<td>0.0052 *</td>
<td>&lt;0.005</td>
<td>&lt;0.005</td>
<td>&lt;0.005</td>
<td>&lt;0.005</td>
<td>&lt;0.005 *</td>
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<tr>
<td><strong>Iron</strong></td>
<td>0.19</td>
<td>0.11</td>
<td>0.076</td>
<td>0.054 *</td>
<td>0.035 *</td>
<td>&lt;0.013</td>
<td>1.7</td>
</tr>
<tr>
<td><strong>Lead</strong></td>
<td>0.0029 *</td>
<td>0.0074 *</td>
<td>0.0073 *</td>
<td>0.0054 *</td>
<td>0.0048 *</td>
<td>0.0032 *</td>
<td>0.0043 *</td>
</tr>
<tr>
<td><strong>Lead (Organic Flame)</strong></td>
<td>0.10 *</td>
<td>0.13</td>
<td>&lt;0.10</td>
<td>0.12 *</td>
<td>0.10</td>
<td>0.31 *</td>
<td>0.35 *</td>
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<tr>
<td><strong>Magnesium</strong></td>
<td>170</td>
<td>200</td>
<td>170</td>
<td>180</td>
<td>170</td>
<td>240</td>
<td>550</td>
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<td><strong>Manganese</strong></td>
<td>0.044</td>
<td>0.092</td>
<td>0.077</td>
<td>0.074</td>
<td>0.039 *</td>
<td>0.072</td>
<td>0.060</td>
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<td><strong>Mercury</strong></td>
<td>0.00051 *</td>
<td>0.00062 *</td>
<td>&lt;0.0002</td>
<td>0.00074 *</td>
<td>0.00062 *</td>
<td>0.00022 *</td>
<td>0.00033 *</td>
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<td><strong>Potassium</strong></td>
<td>10</td>
<td>13</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>17</td>
<td>36</td>
</tr>
<tr>
<td><strong>Selenium</strong></td>
<td>0.0027 *</td>
<td>0.0038 *</td>
<td>&lt;0.002</td>
<td>0.003 *</td>
<td>0.0055 *</td>
<td>&lt;0.004</td>
<td>&lt;0.004 *</td>
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<td><strong>Silicon</strong></td>
<td>12</td>
<td>17</td>
<td>16</td>
<td>17</td>
<td>15</td>
<td>16</td>
<td>15</td>
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<tr>
<td><strong>Silver</strong></td>
<td>0.026</td>
<td>&lt;0.003</td>
<td>&lt;0.003</td>
<td>&lt;0.003</td>
<td>&lt;0.003</td>
<td>&lt;0.003</td>
<td>&lt;0.003</td>
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<tr>
<td><strong>Sodium</strong></td>
<td>510</td>
<td>580</td>
<td>520</td>
<td>520</td>
<td>500</td>
<td>740</td>
<td>1800</td>
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<tr>
<td><strong>Vanadium</strong></td>
<td>0.011 *</td>
<td>0.010 *</td>
<td>0.0078 *</td>
<td>0.0063 *</td>
<td>&lt;0.0009</td>
<td>0.0047 *</td>
<td>0.0043 *</td>
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<tr>
<td><strong>Zinc</strong></td>
<td>0.033</td>
<td>0.025</td>
<td>0.013</td>
<td>0.0081 *</td>
<td>&lt;0.003</td>
<td>0.014 *</td>
<td>0.029 *</td>
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</tbody>
</table>

*Results are less than five times the method-specified detection limit.*
## TABLE 5-1. MAXIMUM LEVELS OF ORGANIC CONSTITUENTS

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Maximum Value (ug/L)</th>
<th>Detection Limit (ug/L)</th>
<th>Location of Maximum</th>
<th>Number of Occurrences</th>
</tr>
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<tbody>
<tr>
<td><strong>EPA Method 8270 - Semivolatile Organics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Phenol</td>
<td>7 J</td>
<td>10</td>
<td>D-4</td>
<td>1</td>
</tr>
<tr>
<td>Benzoic Acid</td>
<td>28 J</td>
<td>50</td>
<td>D-4</td>
<td>3</td>
</tr>
<tr>
<td>Diethyl Phthalate</td>
<td>14 J</td>
<td>20</td>
<td>H-3</td>
<td>2</td>
</tr>
<tr>
<td>Di-n-Butyl Phthalate</td>
<td>20 *</td>
<td>20</td>
<td>H-3</td>
<td>2</td>
</tr>
<tr>
<td>Butyl Benzyl Phthalate</td>
<td>42 *</td>
<td>20</td>
<td>H-3</td>
<td>2</td>
</tr>
<tr>
<td>Bis(2-ethylhexyl)phthalate</td>
<td>69 *B</td>
<td>20</td>
<td>H-3</td>
<td>26</td>
</tr>
<tr>
<td><strong>EPA Method 8080 - Pesticides/PCBs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alpha-BHC</td>
<td>0.2 J</td>
<td>0.5</td>
<td>G-3</td>
<td>2</td>
</tr>
<tr>
<td>Beta-BHC</td>
<td>0.6 J</td>
<td>1.5</td>
<td>G-3</td>
<td>2</td>
</tr>
<tr>
<td>Gamma-BHC/Lindane</td>
<td>0.01 J</td>
<td>1.5</td>
<td>B-4, B-5</td>
<td>2</td>
</tr>
<tr>
<td>Chlordane</td>
<td>0.2 J</td>
<td>7.0</td>
<td>B-1</td>
<td>3</td>
</tr>
<tr>
<td>Methoxychlor</td>
<td>0.02 J</td>
<td>10.0</td>
<td>D-5</td>
<td>1</td>
</tr>
<tr>
<td>Endrin Ketone</td>
<td>0.03 J</td>
<td>0.1</td>
<td>H-1</td>
<td>1</td>
</tr>
<tr>
<td>4,4'-DDE</td>
<td>0.4 J</td>
<td>1.5</td>
<td>B-1, E-1</td>
<td>2</td>
</tr>
</tbody>
</table>

* - Value is less than five times the method-specified detection limit.

J - Value is less than the method-specified detection limit.

B - Analyte was detected in the laboratory method blank. Value in uncorrected.
March 1990 Sludge and Soil Sampling

A-E Sampling and Quality Control Summary Report (A-E SQCSR) For Field Investigation to Support Sewage Lagoon Closure, Holloman AFB, NM

June 1991
### Table 6-1

**Analytical Results and Statistical Analyses for Background Samples**

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Units</th>
<th>BG-1 (soil)</th>
<th>BG-2 (soil)</th>
<th>BG-3 (soil)</th>
<th>BG-4 (soil)</th>
<th>Analytical Results</th>
<th>Statistical Analyses*&lt;sup&gt;a&lt;/sup&gt;</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Mean</td>
<td>Standard Deviation</td>
</tr>
<tr>
<td>Aluminum</td>
<td>(ppm)</td>
<td>8,600</td>
<td>16,000</td>
<td>1,200</td>
<td>1,400</td>
<td>6,800</td>
<td>7,033</td>
</tr>
<tr>
<td>Antimony</td>
<td>(ppm)</td>
<td>&lt;6.9</td>
<td>&lt;6.4</td>
<td>&lt;8.0</td>
<td>&lt;7.5</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Arsenic</td>
<td>(ppm)</td>
<td>3.1</td>
<td>3.0</td>
<td>1.9</td>
<td>3.2</td>
<td>2.8</td>
<td>0.6</td>
</tr>
<tr>
<td>Barium</td>
<td>(ppm)</td>
<td>68</td>
<td>72</td>
<td>19</td>
<td>17</td>
<td>44</td>
<td>30</td>
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<tr>
<td>Beryllium</td>
<td>(ppm)</td>
<td>0.37</td>
<td>0.67</td>
<td>&lt;0.29</td>
<td>&lt;0.27</td>
<td>0.62</td>
<td>0.07</td>
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<tr>
<td>Boron</td>
<td>(ppm)</td>
<td>&lt;27.0</td>
<td>&lt;25.0</td>
<td>&lt;32.0</td>
<td>&lt;30.0</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>Cadmium</td>
<td>(ppm)</td>
<td>&lt;0.99</td>
<td>&lt;0.91</td>
<td>&lt;1.1</td>
<td>&lt;1.1</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>Calcium</td>
<td>(ppm)</td>
<td>150,000</td>
<td>22,000</td>
<td>180,000</td>
<td>200,000</td>
<td>138,000</td>
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<td>Chromium</td>
<td>(ppm)</td>
<td>8.6</td>
<td>15.0</td>
<td>1.9</td>
<td>2.8</td>
<td>6.9</td>
<td>6.2</td>
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<tr>
<td>Cobalt</td>
<td>(ppm)</td>
<td>3.2</td>
<td>5.6</td>
<td>&lt;1.7</td>
<td>&lt;1.6</td>
<td>4.4</td>
<td>1.7</td>
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<tr>
<td>Copper</td>
<td>(ppm)</td>
<td>3.8</td>
<td>15.0</td>
<td>6.4</td>
<td>3.1</td>
<td>7.1</td>
<td>5.5</td>
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<tr>
<td>Cyanide</td>
<td>(ppm)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Iron</td>
<td>(ppm)</td>
<td>7,300</td>
<td>12,000</td>
<td>530</td>
<td>1,100</td>
<td>5,133</td>
<td>5,455</td>
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<tr>
<td>Lead</td>
<td>(ppm)</td>
<td>36.0</td>
<td>8.0</td>
<td>1.3</td>
<td>2.3</td>
<td>11.9</td>
<td>15.3</td>
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<tr>
<td>Magnesium</td>
<td>(ppm)</td>
<td>&lt;0.12</td>
<td>25,000</td>
<td>2,700</td>
<td>4,600</td>
<td>10,767</td>
<td>12,362</td>
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<tr>
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<td>(ppm)</td>
<td>170</td>
<td>300</td>
<td>13</td>
<td>28</td>
<td>127</td>
<td>135</td>
</tr>
<tr>
<td>Mercury</td>
<td>(ppm)</td>
<td>&lt;0.12</td>
<td>&lt;0.11</td>
<td>&lt;0.14</td>
<td>&lt;0.13</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>(ppm)</td>
<td>&lt;15.0</td>
<td>&lt;14.0</td>
<td>&lt;17.0</td>
<td>&lt;16.0</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Nickel</td>
<td>(ppm)</td>
<td>5.8</td>
<td>11.0</td>
<td>4</td>
<td>3</td>
<td>8.4</td>
<td>3.7</td>
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<tr>
<td>Potassium</td>
<td>(ppm)</td>
<td>2,300</td>
<td>4,400</td>
<td>220</td>
<td>180</td>
<td>1,775</td>
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<tr>
<td>Selenium</td>
<td>(ppm)</td>
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<td>0.59</td>
<td>&lt;0.57</td>
<td>&lt;0.54</td>
<td>0.55</td>
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<tr>
<td>Silicon</td>
<td>(ppm)</td>
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<td>180</td>
<td>180</td>
<td>220</td>
<td>170</td>
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<tr>
<td>Silver</td>
<td>(ppm)</td>
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<td>&lt;0.86</td>
<td>&lt;0.81</td>
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<td>N/A</td>
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<td>2,200</td>
<td>7,100</td>
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<td>Thallium</td>
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<td>&lt;26.0</td>
<td>&lt;32.0</td>
<td>&lt;30.0</td>
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<td>N/A</td>
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<tr>
<td>Vanadium</td>
<td>(ppm)</td>
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<td>26.0</td>
<td>4.8</td>
<td>9.9</td>
<td>13.7</td>
<td>9.0</td>
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<tr>
<td>Zinc</td>
<td>(ppm)</td>
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<td>27.0</td>
<td>5.3</td>
<td>21.0</td>
<td>20.1</td>
<td>10.3</td>
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</tbody>
</table>

*Statistical analyses based on detected concentrations only.

*N/A = Not available/not applicable
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<thead>
<tr>
<th>Analyte</th>
<th>Units</th>
<th>Location(s)</th>
<th>Maximum Value</th>
<th>Upper Tolerance Limit</th>
<th>Exceedances (percent)</th>
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<tbody>
<tr>
<td>Aluminum</td>
<td>(ppm)</td>
<td>A-5-A-0</td>
<td>130,000</td>
<td>51,602</td>
<td>2 (11%)</td>
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<tr>
<td>Antimony</td>
<td>(ppm)</td>
<td>N/A</td>
<td>ND</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>Arsenic</td>
<td>(ppm)</td>
<td>A-5-B-0</td>
<td>6.0</td>
<td>6.7</td>
<td>0</td>
</tr>
<tr>
<td>Barium</td>
<td>(ppm)</td>
<td>A-5-A-0</td>
<td>120</td>
<td>236</td>
<td>0</td>
</tr>
<tr>
<td>Beryllium</td>
<td>(ppm)</td>
<td>A-1-C-0</td>
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<td>3.29</td>
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</tr>
<tr>
<td>Boron</td>
<td>(ppm)</td>
<td>N/A</td>
<td>ND</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>Cadmium</td>
<td>(ppm)</td>
<td>N/A</td>
<td>ND</td>
<td>N/A</td>
<td>0</td>
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<tr>
<td>Calcium</td>
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<tr>
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<td>ND</td>
<td>N/A</td>
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<tr>
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<td>(ppm)</td>
<td>A-5-A-0</td>
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<td>39,980</td>
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<td>ND</td>
<td>N/A</td>
<td>0</td>
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<tr>
<td>Molybdenum</td>
<td>(ppm)</td>
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<td>ND</td>
<td>N/A</td>
<td>0</td>
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<td>Nickel</td>
<td>(ppm)</td>
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<td>147</td>
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<tr>
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<td>14,583</td>
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<tr>
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<td>(ppm)</td>
<td>A-2-A-0</td>
<td>1.3</td>
<td>8.4</td>
<td>0</td>
</tr>
<tr>
<td>Silicon</td>
<td>(ppm)</td>
<td>A-2-A-0</td>
<td>410</td>
<td>438</td>
<td>0</td>
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<tr>
<td>Silver</td>
<td>(ppm)</td>
<td>N/A</td>
<td>ND</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>Sodium</td>
<td>(ppm)</td>
<td>A-1-C-0</td>
<td>5,900</td>
<td>18,622</td>
<td>0</td>
</tr>
<tr>
<td>Thallium</td>
<td>(ppm)</td>
<td>A-6-A-0</td>
<td>94</td>
<td>N/A</td>
<td>13 (72%)</td>
</tr>
<tr>
<td>Vanadium</td>
<td>(ppm)</td>
<td>A-2-B-0</td>
<td>26.0</td>
<td>71.2</td>
<td>0</td>
</tr>
<tr>
<td>Zinc</td>
<td>(ppm)</td>
<td>A-5-A-0</td>
<td>44.0</td>
<td>85.4</td>
<td>0</td>
</tr>
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</table>

N/A = Not applicable/not available
ND = Not detected
Table 6-3
Comparison of Inorganic Analytical Results for Pond B and Background Soil Samples

<table>
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<th>Analyte</th>
<th>Units</th>
<th>Maximum Location(s)</th>
<th>Maximum Value</th>
<th>Upper Tolerance Limit</th>
<th>Exceedances (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum</td>
<td>(ppm)</td>
<td>B-4-B-0</td>
<td>20,000</td>
<td>51,602</td>
<td>0</td>
</tr>
<tr>
<td>Antimony</td>
<td>(ppm)</td>
<td>N/A</td>
<td>ND</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>Arsenic</td>
<td>(ppm)</td>
<td>B-2-C-0</td>
<td>10.0</td>
<td>6.7</td>
<td>1 (7%)</td>
</tr>
<tr>
<td>Barium</td>
<td>(ppm)</td>
<td>B-4-B-0</td>
<td>160</td>
<td>236</td>
<td>0</td>
</tr>
<tr>
<td>Beryllium</td>
<td>(ppm)</td>
<td>B-4-B-0</td>
<td>1.1</td>
<td>3.3</td>
<td>0</td>
</tr>
<tr>
<td>Boron</td>
<td>(ppm)</td>
<td>N/A</td>
<td>ND</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>Cadmium</td>
<td>(ppm)</td>
<td>N/A</td>
<td>ND</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>Calcium</td>
<td>(ppm)</td>
<td>B-5-B-0</td>
<td>200,000</td>
<td>647,706</td>
<td>0</td>
</tr>
<tr>
<td>Chromium</td>
<td>(ppm)</td>
<td>B-4-B-0</td>
<td>17.0</td>
<td>46.7</td>
<td>0</td>
</tr>
<tr>
<td>Cobalt</td>
<td>(ppm)</td>
<td>B-3-B-0</td>
<td>6.2</td>
<td>68.4</td>
<td>0</td>
</tr>
<tr>
<td>Copper</td>
<td>(ppm)</td>
<td>B-4-A-0</td>
<td>9.1</td>
<td>41.9</td>
<td>0</td>
</tr>
<tr>
<td>Cyanide</td>
<td>(ppm)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>Iron</td>
<td>(ppm)</td>
<td>B-4-B-0</td>
<td>14,000</td>
<td>39,980</td>
<td>0</td>
</tr>
<tr>
<td>Lead</td>
<td>(ppm)</td>
<td>B-4-A-0</td>
<td>7.4</td>
<td>116.0</td>
<td>0</td>
</tr>
<tr>
<td>Magnesium</td>
<td>(ppm)</td>
<td>B-4-B-0</td>
<td>49,000</td>
<td>133,358</td>
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<td>(ppm)</td>
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<td>(ppm)</td>
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<td>ND</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>(ppm)</td>
<td>N/A</td>
<td>ND</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>Nickel</td>
<td>(ppm)</td>
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<td>13.0</td>
<td>147.0</td>
<td>0</td>
</tr>
<tr>
<td>Potassium</td>
<td>(ppm)</td>
<td>B-4-A-0</td>
<td>5,200</td>
<td>14,583</td>
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<td>Selenium</td>
<td>(ppm)</td>
<td>N/A</td>
<td>ND</td>
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<td>0</td>
</tr>
<tr>
<td>Silicon</td>
<td>(ppm)</td>
<td>B-6-A-0</td>
<td>6,000</td>
<td>438</td>
<td>12 (84%)</td>
</tr>
<tr>
<td>Silver</td>
<td>(ppm)</td>
<td>N/A</td>
<td>ND</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>Sodium</td>
<td>(ppm)</td>
<td>B-2-C-0</td>
<td>4,300</td>
<td>18,622</td>
<td>0</td>
</tr>
<tr>
<td>Thallium</td>
<td>(ppm)</td>
<td>N/A</td>
<td>ND</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>Vanadium</td>
<td>(ppm)</td>
<td>B-4-B-0</td>
<td>39.0</td>
<td>71.2</td>
<td>0</td>
</tr>
<tr>
<td>Zinc</td>
<td>(ppm)</td>
<td>B-4-A-0</td>
<td>40.0</td>
<td>85.4</td>
<td>0</td>
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</table>

N/A = Not applicable/not available
ND = Not detected
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<th>Analyte</th>
<th>Units</th>
<th>Maximum Location(s)</th>
<th>Maximum Value</th>
<th>Upper Tolerance Limit</th>
<th>Exceedances (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum</td>
<td>ppm</td>
<td>C-3-A-0</td>
<td>13,000</td>
<td>51,602</td>
<td>0</td>
</tr>
<tr>
<td>Antimony</td>
<td>ppm</td>
<td>N/A</td>
<td>ND</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>Arsenic</td>
<td>ppm</td>
<td>C-2-A-0</td>
<td>1.5</td>
<td>6.7</td>
<td>0</td>
</tr>
<tr>
<td>Barium</td>
<td>ppm</td>
<td>C-5-A-0</td>
<td>100</td>
<td>236</td>
<td>0</td>
</tr>
<tr>
<td>Beryllium</td>
<td>ppm</td>
<td>C-1-A-0</td>
<td>0.46</td>
<td>3.29</td>
<td>0</td>
</tr>
<tr>
<td>Boron</td>
<td>ppm</td>
<td>N/A</td>
<td>ND</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>Cadmium</td>
<td>ppm</td>
<td>N/A</td>
<td>ND</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>Calcium</td>
<td>ppm</td>
<td>C-3-A-0</td>
<td>120,000</td>
<td>647,706</td>
<td>0</td>
</tr>
<tr>
<td>Chromium</td>
<td>ppm</td>
<td>C-1-A-0</td>
<td>34.0</td>
<td>46.7</td>
<td>0</td>
</tr>
<tr>
<td>Cobalt</td>
<td>ppm</td>
<td>C-3-A-0</td>
<td>4.2</td>
<td>68.4</td>
<td>0</td>
</tr>
<tr>
<td>Copper</td>
<td>ppm</td>
<td>C-5-A-0</td>
<td>44.0</td>
<td>41.9</td>
<td>1 (17%)</td>
</tr>
<tr>
<td>Cyanide</td>
<td>ppm</td>
<td>N/A</td>
<td>ND</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>Iron</td>
<td>ppm</td>
<td>C-3-A-0</td>
<td>9,000</td>
<td>39,980</td>
<td>0</td>
</tr>
<tr>
<td>Lead</td>
<td>ppm</td>
<td>C-3-A-0</td>
<td>17.0</td>
<td>116.0</td>
<td>0</td>
</tr>
<tr>
<td>Magnesium</td>
<td>ppm</td>
<td>C-1-A-0</td>
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<td>133,358</td>
<td>0</td>
</tr>
<tr>
<td>Manganese</td>
<td>ppm</td>
<td>C-1-A-0</td>
<td>210</td>
<td>990</td>
<td>0</td>
</tr>
<tr>
<td>Mercury</td>
<td>ppm</td>
<td>N/A</td>
<td>ND</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>ppm</td>
<td>N/A</td>
<td>ND</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>Nickel</td>
<td>ppm</td>
<td>C-3-A-0</td>
<td>9.1</td>
<td>147.0</td>
<td>0</td>
</tr>
<tr>
<td>Potassium</td>
<td>ppm</td>
<td>C-1-A-0</td>
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<td>14,583</td>
<td>0</td>
</tr>
<tr>
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<td>ppm</td>
<td>N/A</td>
<td>ND</td>
<td>8.4</td>
<td>0</td>
</tr>
<tr>
<td>Silicon</td>
<td>ppm</td>
<td>C-5-A-0</td>
<td>8,200</td>
<td>438</td>
<td>6 (100%)</td>
</tr>
<tr>
<td>Silver</td>
<td>ppm</td>
<td>C-1-A-0</td>
<td>4.9</td>
<td>N/A</td>
<td>2 (33%)</td>
</tr>
<tr>
<td>Sodium</td>
<td>ppm</td>
<td>C-5-A-0</td>
<td>2,300</td>
<td>18,622</td>
<td>0</td>
</tr>
<tr>
<td>Thallium</td>
<td>ppm</td>
<td>N/A</td>
<td>ND</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>Vanadium</td>
<td>ppm</td>
<td>C-3-A-0</td>
<td>28.0</td>
<td>71.2</td>
<td>0</td>
</tr>
<tr>
<td>Zinc</td>
<td>ppm</td>
<td>C-5-A-0</td>
<td>130.0</td>
<td>85.4</td>
<td>1 (17%)</td>
</tr>
</tbody>
</table>

N/A = Not applicable/not available
ND = Not detected
Table 6-5
Comparison of Inorganic Analytical Results for Pond C and Background Soil Samples

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Units</th>
<th>Maximum Location(s)</th>
<th>Maximum Value</th>
<th>Upper Tolerance Limit</th>
<th>Exceedances (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum</td>
<td>ppm</td>
<td>C-2-B-0</td>
<td>11,000</td>
<td>51,602</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C-3-B-0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>C-5-B-0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antimony</td>
<td>ppm</td>
<td>N/A</td>
<td>ND</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>Arsenic</td>
<td>ppm</td>
<td>C-1-B-0</td>
<td>1.7</td>
<td>6.7</td>
<td>0</td>
</tr>
<tr>
<td>Barium</td>
<td>ppm</td>
<td>C-3-B-0</td>
<td>160</td>
<td>236</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C-6-B-0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beryllium</td>
<td>ppm</td>
<td>C-3-B-0</td>
<td>0.44</td>
<td>3.29</td>
<td>0</td>
</tr>
<tr>
<td>Boron</td>
<td>ppm</td>
<td>N/A</td>
<td>ND</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>Cadmium</td>
<td>ppm</td>
<td>N/A</td>
<td>ND</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>Calcium</td>
<td>ppm</td>
<td>C-3-B-0</td>
<td>190,000</td>
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</tr>
<tr>
<td>Chromium</td>
<td>ppm</td>
<td>C-2-B-0</td>
<td>15.0</td>
<td>46.7</td>
<td>0</td>
</tr>
<tr>
<td>Cobalt</td>
<td>ppm</td>
<td>C-2-B-0</td>
<td>3.9</td>
<td>68.4</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C-3-B-0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copper</td>
<td>ppm</td>
<td>C-2-B-0</td>
<td>18.0</td>
<td>41.9</td>
<td>0</td>
</tr>
<tr>
<td>Cyanide</td>
<td>ppm</td>
<td>N/A</td>
<td>ND</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>Iron</td>
<td>ppm</td>
<td>C-2-B-0</td>
<td>8,200</td>
<td>39,980</td>
<td>0</td>
</tr>
<tr>
<td>Lead</td>
<td>ppm</td>
<td>C-2-B-0</td>
<td>5.3</td>
<td>116.0</td>
<td>0</td>
</tr>
<tr>
<td>Magnesium</td>
<td>ppm</td>
<td>C-5-B-0</td>
<td>25,000</td>
<td>133,358</td>
<td>0</td>
</tr>
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<td>Manganese</td>
<td>ppm</td>
<td>C-1-B-0</td>
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<tr>
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<td>ND</td>
<td>N/A</td>
<td>0</td>
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<td>ppm</td>
<td>C-2-B-0</td>
<td>12</td>
<td>N/A</td>
<td>1 (17%)</td>
</tr>
<tr>
<td>Nickel</td>
<td>ppm</td>
<td>C-2-B-0</td>
<td>8.3</td>
<td>147.0</td>
<td>0</td>
</tr>
<tr>
<td>Potassium</td>
<td>ppm</td>
<td>C-3-B-0</td>
<td>2,800</td>
<td>14,583</td>
<td>0</td>
</tr>
<tr>
<td>Selenium</td>
<td>ppm</td>
<td>N/A</td>
<td>ND</td>
<td>8.4</td>
<td>0</td>
</tr>
<tr>
<td>Silicon</td>
<td>ppm</td>
<td>C-4-B-0</td>
<td>4,000</td>
<td>438</td>
<td>6 (100%)</td>
</tr>
<tr>
<td>Silver</td>
<td>ppm</td>
<td>N/A</td>
<td>ND</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>Sodium</td>
<td>ppm</td>
<td>C-5-B-0</td>
<td>1,200</td>
<td>18,622</td>
<td>0</td>
</tr>
<tr>
<td>Thallium</td>
<td>ppm</td>
<td>N/A</td>
<td>ND</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
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<td>ppm</td>
<td>C-3-B-0</td>
<td>30</td>
<td>71</td>
<td>0</td>
</tr>
<tr>
<td>Zinc</td>
<td>ppm</td>
<td>C-2-B-0</td>
<td>210</td>
<td>85</td>
<td>1 (17%)</td>
</tr>
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</table>

N/A = Not applicable/not available
ND = Not detected
Table 6-6

Comparison Between Sludge and Soil Analytical Results for Semivolatile Organics for Ponds A and B

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Sludge Maximum (ppm)</th>
<th>Percent Detects (%)</th>
<th>Soil Maximum (ppm)</th>
<th>Percent Detects (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,2,4-trichlorobenzene</td>
<td>12.00</td>
<td>9.2</td>
<td>ND</td>
<td>0.0</td>
</tr>
<tr>
<td>1,2-dichlorobenzene</td>
<td>14.00</td>
<td>3.7</td>
<td>ND</td>
<td>0.0</td>
</tr>
<tr>
<td>2-methylnaphthalene</td>
<td>42.00 *</td>
<td>14.8</td>
<td>ND</td>
<td>0.0</td>
</tr>
<tr>
<td>4-chloroaniline</td>
<td>10.00 *</td>
<td>5.6</td>
<td>ND</td>
<td>0.0</td>
</tr>
<tr>
<td>Anthracene</td>
<td>7.40</td>
<td>7.4</td>
<td>ND</td>
<td>0.0</td>
</tr>
<tr>
<td>Benzo(a)anthracene</td>
<td>7.19 *</td>
<td>5.6</td>
<td>ND</td>
<td>0.0</td>
</tr>
<tr>
<td>Benzo(a)pyrene</td>
<td>7.80 *</td>
<td>18.5</td>
<td>ND</td>
<td>0.0</td>
</tr>
<tr>
<td>Benzo(b)fluoranthene</td>
<td>9.60 *</td>
<td>11.1</td>
<td>ND</td>
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</tr>
<tr>
<td>Bis(2-ethylhexyl)phthalate</td>
<td>100.00 B</td>
<td>79.6</td>
<td>1.10 *</td>
<td>46.9 c</td>
</tr>
<tr>
<td>Chrysene</td>
<td>8.30 *</td>
<td>20.4</td>
<td>ND</td>
<td>0.0</td>
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<tr>
<td>Di-n-butylphthalate</td>
<td>18.00 B</td>
<td>48.1</td>
<td>0.17 J</td>
<td>6.2 f</td>
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<td>Di-n-octylphthalate</td>
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<td>14.8</td>
<td>ND</td>
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<td>13.00</td>
<td>22.2</td>
<td>ND</td>
<td>0.0</td>
</tr>
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<td>0.80 *</td>
<td>1.8</td>
<td>ND</td>
<td>0.0</td>
</tr>
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<td>Indeno(1,2,3-cd)pyrene</td>
<td>1.89 *</td>
<td>1.8</td>
<td>ND</td>
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</tr>
<tr>
<td>Isophorone</td>
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<td>ND</td>
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</tr>
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<td>Phenanthrene</td>
<td>7.90 *</td>
<td>5.6</td>
<td>ND</td>
<td>0.0</td>
</tr>
<tr>
<td>Pyrene</td>
<td>10.00</td>
<td>24.1</td>
<td>ND</td>
<td>0.0</td>
</tr>
</tbody>
</table>

aBased on Radian sludge sampling of Ponds A and B in 1988.

bBased on 54 sludge samples submitted for semivolatile organic analyses.

cBased on Radian soil sampling of Ponds A and B in 1990.

dBased on 32 soil samples submitted for semivolatile organic analyses.

eOf the 15 detections, 14 were at concentrations below the detection limit.

fAll detections were at concentrations less than the detection limit.
### Table 6-7

Comparison Between Sludge and Soil Analytical Results for Pond C

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Location&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Sludge (ppb)</th>
<th>Soil (ppb)</th>
<th>Reduction&lt;sup&gt;b&lt;/sup&gt; (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semivolatiles</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bis(2-ethylhexyl)-phthalate</td>
<td>1</td>
<td>1,200 *</td>
<td>&lt;430</td>
<td>&gt;64</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>750 *</td>
<td>500 *</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>650 *</td>
<td>&lt;410</td>
<td>&gt;37</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>910 *</td>
<td>210 J</td>
<td>77</td>
</tr>
<tr>
<td>Dibenzofuran</td>
<td>1</td>
<td>310 *</td>
<td>&lt;170</td>
<td>&gt;45</td>
</tr>
<tr>
<td>Di-n-butylphthalate</td>
<td>4</td>
<td>&lt;250</td>
<td>260 *</td>
<td>&gt;4</td>
</tr>
<tr>
<td>2-Methylnaphthalene</td>
<td>1</td>
<td>1,100 *</td>
<td>&lt;350</td>
<td>&gt;68</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>14,000 *</td>
<td>&lt;350</td>
<td>&gt;97</td>
</tr>
<tr>
<td>Phenanthrene</td>
<td>1</td>
<td>1,800 *</td>
<td>&lt;470</td>
<td>&gt;74</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>11,000 *</td>
<td>&lt;470</td>
<td>&gt;96</td>
</tr>
<tr>
<td>Pyrene</td>
<td>6</td>
<td>200 *</td>
<td>120 J</td>
<td>40</td>
</tr>
<tr>
<td>Herbicides</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dichloropropr</td>
<td>2</td>
<td>&lt;78</td>
<td>153 C*</td>
<td>&gt;-96</td>
</tr>
<tr>
<td>Pesticides</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4,4'-DDD</td>
<td>1</td>
<td>6,000 C</td>
<td>160 CG</td>
<td>97</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>80 C*</td>
<td>180 C*</td>
<td>-125</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>1,900 C</td>
<td>160 CG</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>430 C</td>
<td>78 C</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>16,000 C</td>
<td>&lt;52</td>
<td>&gt;99</td>
</tr>
<tr>
<td>4,4'-DDE</td>
<td>1</td>
<td>240 C*</td>
<td>14 C*</td>
<td>94</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>&lt;69</td>
<td>240 C*</td>
<td>&gt;-248</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>400 XG</td>
<td>&lt;24</td>
<td>94</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>95 C*</td>
<td>21 C*</td>
<td>78</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>8,100 CG</td>
<td>&lt;52</td>
<td>99</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>57 C*</td>
<td>&lt;5.1</td>
<td>&gt;91</td>
</tr>
<tr>
<td>Endosulfan I</td>
<td>2</td>
<td>1,500 X</td>
<td>440 X</td>
<td>71</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>850 X</td>
<td>170 X</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>4,400 X</td>
<td>440 X</td>
<td>90</td>
</tr>
</tbody>
</table>

<sup>a</sup>Sample locations for Pond C are shown in Figure 2-3.

<sup>b</sup>Negative sign indicates percent increase from sludge to soil; greater than symbol (>) indicates percent change given is the minimum-actual change could be greater.
Table 6-8

Comparison of Leachate Analytical Results with Regulatory Levels

<table>
<thead>
<tr>
<th>Analyte</th>
<th>A-1-C-0 (mg/L)</th>
<th>A-5-A-0 (mg/L)</th>
<th>B-4-A-0 (mg/L)</th>
<th>B-5-A-0 (mg/L)</th>
<th>C-2-B-0 (mg/L)</th>
<th>C-6-B-0 (mg/L)</th>
<th>FCRA Limit (mg/L)</th>
<th>Drinking Water Standards (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum</td>
<td>N/A</td>
<td>&lt;0.046</td>
<td>&lt;0.20</td>
<td>N/A</td>
<td>&lt;0.20</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Antimony</td>
<td>N/A</td>
<td>0.032</td>
<td>&lt;0.20</td>
<td>N/A</td>
<td>&lt;0.20</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Arsenic</td>
<td>&lt;0.036</td>
<td>&lt;0.036</td>
<td>0.013</td>
<td>&lt;0.053</td>
<td>&lt;0.0050</td>
<td>&lt;0.053</td>
<td>5.0</td>
<td>0.03</td>
</tr>
<tr>
<td>Barium</td>
<td>0.14</td>
<td>0.19</td>
<td>0.21</td>
<td>0.13</td>
<td>0.15</td>
<td>0.16</td>
<td>100.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Beryllium</td>
<td>N/A</td>
<td>&lt;0.001</td>
<td>&lt;0.0020</td>
<td>N/A</td>
<td>&lt;0.0020</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Boron</td>
<td>N/A</td>
<td>0.71</td>
<td>&lt;0.60</td>
<td>N/A</td>
<td>&lt;0.60</td>
<td>N/A</td>
<td>N/A</td>
<td>1.0</td>
</tr>
<tr>
<td>Cadmium</td>
<td>&lt;0.005</td>
<td>&lt;0.005</td>
<td>&lt;0.0050</td>
<td>&lt;0.0040</td>
<td>&lt;0.0050</td>
<td>&lt;0.0040</td>
<td>1.0</td>
<td>0.01</td>
</tr>
<tr>
<td>Calcium</td>
<td>N/A</td>
<td>840</td>
<td>2.300</td>
<td>N/A</td>
<td>2.200</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Chromium</td>
<td>&lt;0.005</td>
<td>&lt;0.005</td>
<td>&lt;0.0010</td>
<td>&lt;0.0070</td>
<td>&lt;0.010</td>
<td>&lt;0.0070</td>
<td>5.0</td>
<td>0.05</td>
</tr>
<tr>
<td>Cobalt</td>
<td>N/A</td>
<td>&lt;0.006</td>
<td>&lt;0.010</td>
<td>N/A</td>
<td>&lt;0.010</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Copper</td>
<td>N/A</td>
<td>0.046</td>
<td>0.020</td>
<td>N/A</td>
<td>&lt;0.020</td>
<td>N/A</td>
<td>N/A</td>
<td>1.0</td>
</tr>
<tr>
<td>Iron</td>
<td>N/A</td>
<td>&lt;0.010</td>
<td>&lt;0.040</td>
<td>N/A</td>
<td>0.2</td>
<td>N/A</td>
<td>N/A</td>
<td>0.3</td>
</tr>
<tr>
<td>Lead</td>
<td>&lt;0.049</td>
<td>0.09</td>
<td>&lt;0.0030</td>
<td>&lt;0.042</td>
<td>&lt;0.0030</td>
<td>&lt;0.042</td>
<td>5.0</td>
<td>0.05</td>
</tr>
<tr>
<td>Magnesium</td>
<td>N/A</td>
<td>160</td>
<td>190</td>
<td>N/A</td>
<td>65</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Manganese</td>
<td>N/A</td>
<td>0.22</td>
<td>4</td>
<td>N/A</td>
<td>0.31</td>
<td>N/A</td>
<td>N/A</td>
<td>0.05</td>
</tr>
<tr>
<td>Mercury</td>
<td>&lt;0.0002</td>
<td>&lt;0.0002</td>
<td>N/A</td>
<td>&lt;0.0002</td>
<td>N/A</td>
<td>&lt;0.0002</td>
<td>0.2</td>
<td>0.002</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>N/A</td>
<td>0.021</td>
<td>&lt;0.050</td>
<td>N/A</td>
<td>0.12</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Nickel</td>
<td>N/A</td>
<td>&lt;0.020</td>
<td>0.044</td>
<td>N/A</td>
<td>&lt;0.020</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Potassium</td>
<td>N/A</td>
<td>17</td>
<td>5.6</td>
<td>N/A</td>
<td>&lt;3.0</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Selenium</td>
<td>&lt;0.049</td>
<td>&lt;0.049</td>
<td>&lt;0.0050</td>
<td>&lt;0.075</td>
<td>&lt;0.0050</td>
<td>&lt;0.075</td>
<td>1.0</td>
<td>0.01</td>
</tr>
<tr>
<td>Silicon</td>
<td>N/A</td>
<td>21</td>
<td>15</td>
<td>N/A</td>
<td>12</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Silver</td>
<td>&lt;0.005</td>
<td>&lt;0.005</td>
<td>&lt;0.010</td>
<td>&lt;0.0070</td>
<td>&lt;0.010</td>
<td>&lt;0.0070</td>
<td>5.0</td>
<td>0.05</td>
</tr>
<tr>
<td>Sodium</td>
<td>N/A</td>
<td>110</td>
<td>17</td>
<td>N/A</td>
<td>25</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Thallium</td>
<td>N/A</td>
<td>&lt;0.11</td>
<td>&lt;0.10</td>
<td>N/A</td>
<td>&lt;0.10</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Vanadium</td>
<td>N/A</td>
<td>&lt;0.055</td>
<td>&lt;0.020</td>
<td>N/A</td>
<td>&lt;0.020</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Zinc</td>
<td>N/A</td>
<td>0.33</td>
<td>0.020</td>
<td>N/A</td>
<td>&lt;0.020</td>
<td>N/A</td>
<td>N/A</td>
<td>5.0</td>
</tr>
</tbody>
</table>

*Toxicity limits given in 40 CFR Section 261.24, Table 1
**Table 6-9**

Comparison of Sludge Characteristics:
Ponds A and B versus Pond C

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Pond A and B Maximum&lt;sup&gt;a&lt;/sup&gt; (ppm)</th>
<th>Percent Detects&lt;sup&gt;b&lt;/sup&gt; (%)</th>
<th>Pond C Maximum&lt;sup&gt;c&lt;/sup&gt; (ppm)</th>
<th>Percent Detects&lt;sup&gt;d&lt;/sup&gt; (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,2,4-trichlorobenzene</td>
<td>12.00</td>
<td>9.2</td>
<td>ND</td>
<td>0.0</td>
</tr>
<tr>
<td>1,2-dichlorobenzene</td>
<td>14.00</td>
<td>3.7</td>
<td>ND</td>
<td>0.0</td>
</tr>
<tr>
<td>2-methylnaphthalene</td>
<td>42.00&lt;sup&gt;*&lt;/sup&gt;</td>
<td>14.8</td>
<td>ND</td>
<td>0.0</td>
</tr>
<tr>
<td>4-chloroaniline</td>
<td>10.00&lt;sup&gt;*&lt;/sup&gt;</td>
<td>5.6</td>
<td>ND</td>
<td>0.0</td>
</tr>
<tr>
<td>Anthracene</td>
<td>7.46</td>
<td>7.4</td>
<td>ND</td>
<td>0.0</td>
</tr>
<tr>
<td>Benzo(a)anthracene</td>
<td>7.19&lt;sup&gt;*&lt;/sup&gt;</td>
<td>5.6</td>
<td>ND</td>
<td>0.0</td>
</tr>
<tr>
<td>Benzo(a)pyrene</td>
<td>7.80&lt;sup&gt;*&lt;/sup&gt;</td>
<td>18.5</td>
<td>ND</td>
<td>0.0</td>
</tr>
<tr>
<td>Benzo(b)fluoranthene</td>
<td>9.60&lt;sup&gt;*&lt;/sup&gt;</td>
<td>11.1</td>
<td>ND</td>
<td>0.0</td>
</tr>
<tr>
<td>Bis(2-ethylhexyl)phthalate</td>
<td>100.00 B</td>
<td>79.6</td>
<td>6.20 J</td>
<td>83.3</td>
</tr>
<tr>
<td>Chrysene</td>
<td>8.30&lt;sup&gt;*&lt;/sup&gt;</td>
<td>20.4</td>
<td>ND</td>
<td>0.0</td>
</tr>
<tr>
<td>Dibenzofuran</td>
<td>ND</td>
<td>0.0</td>
<td>0.31&lt;sup&gt;*&lt;/sup&gt;</td>
<td>16.7</td>
</tr>
<tr>
<td>Di-n-butylphthalate</td>
<td>18.00 B</td>
<td>48.1</td>
<td>ND</td>
<td>0.0</td>
</tr>
<tr>
<td>Di-n-octyl phthalate</td>
<td>5.59&lt;sup&gt;*&lt;/sup&gt;</td>
<td>14.8</td>
<td>ND</td>
<td>0.0</td>
</tr>
<tr>
<td>Fluoranthene</td>
<td>13.00</td>
<td>22.2</td>
<td>ND</td>
<td>0.0</td>
</tr>
<tr>
<td>Fluorene</td>
<td>0.80&lt;sup&gt;*&lt;/sup&gt;</td>
<td>1.8</td>
<td>ND</td>
<td>0.0</td>
</tr>
<tr>
<td>Indeno(1,2,3-cd)pyrene</td>
<td>1.89&lt;sup&gt;*&lt;/sup&gt;</td>
<td>1.8</td>
<td>ND</td>
<td>0.0</td>
</tr>
<tr>
<td>Isophorone</td>
<td>4.50&lt;sup&gt;*&lt;/sup&gt;</td>
<td>3.7</td>
<td>ND</td>
<td>0.0</td>
</tr>
<tr>
<td>Phenanthrene</td>
<td>7.90&lt;sup&gt;*&lt;/sup&gt;</td>
<td>5.6</td>
<td>11.00&lt;sup&gt;*&lt;/sup&gt;</td>
<td>50.0</td>
</tr>
<tr>
<td>Phenol</td>
<td>ND</td>
<td>0.0</td>
<td>0.15 J</td>
<td>16.7</td>
</tr>
<tr>
<td>Pyrene</td>
<td>10.00</td>
<td>24.1</td>
<td>0.20&lt;sup&gt;*&lt;/sup&gt;</td>
<td>16.7</td>
</tr>
</tbody>
</table>

<sup>a</sup>Based on Radian sludge sampling of Ponds A and B in 1988.

<sup>b</sup>Based on 54 sludge samples submitted for semivolatile organic analyses.

<sup>c</sup>Based on Radian sludge sampling of Pond C in 1990.

<sup>d</sup>Based on six sludge samples submitted for semivolatile organic analyses.
1992 Sewage Lagoon Investigation in Support of the PCCP Application

Site Characterization Report
Sewage Lagoon Investigation
August 1992
Table 5-1

Maximum Concentrations and Frequency of Detection for Analytes in Sludge and Soil Samples from Pond C

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Sludge</th>
<th>0-2 ft</th>
<th>2-4 ft</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency of Detection</td>
<td>Maximum Concentration</td>
<td>Location</td>
</tr>
<tr>
<td>SW6010 - Metals (mg/kg)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barium</td>
<td>6/6</td>
<td>130</td>
<td>C-01</td>
</tr>
<tr>
<td>Cadmium</td>
<td>4/6</td>
<td>6</td>
<td>C-05</td>
</tr>
<tr>
<td>Chromium</td>
<td>6/6</td>
<td>120</td>
<td>C-01</td>
</tr>
<tr>
<td>Cobalt</td>
<td>1/6</td>
<td>4.3</td>
<td>C-06</td>
</tr>
<tr>
<td>Copper</td>
<td>6/6</td>
<td>260</td>
<td>C-05</td>
</tr>
<tr>
<td>Nickel</td>
<td>2/6</td>
<td>15</td>
<td>C-02</td>
</tr>
<tr>
<td>Silver</td>
<td>6/6</td>
<td>320</td>
<td>C-01</td>
</tr>
<tr>
<td>Vanadium</td>
<td>6/6</td>
<td>55</td>
<td>C-01</td>
</tr>
<tr>
<td>Zinc</td>
<td>6/6</td>
<td>330</td>
<td>C-01</td>
</tr>
<tr>
<td>SW7060 - Arsenic (mg/kg)</td>
<td>1/6</td>
<td>3.5</td>
<td>C-06</td>
</tr>
<tr>
<td>SW7421 - Lead (mg/kg)</td>
<td>6/6</td>
<td>64</td>
<td>C-05</td>
</tr>
<tr>
<td>SW7471 - Mercury (mg/kg)</td>
<td>6/6</td>
<td>1.6</td>
<td>C-01</td>
</tr>
<tr>
<td>SW7740 - Selenium (mg/kg)</td>
<td>4/6</td>
<td>6.3</td>
<td>C-05</td>
</tr>
<tr>
<td>SW8080 - Organochlorine Pesticides and PCBs (µg/kg)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4,4'-DDD</td>
<td>5/6</td>
<td>1600</td>
<td>C-06</td>
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<tr>
<td>4,4'-DDE</td>
<td>6/6</td>
<td>1300</td>
<td>C-06</td>
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<td>4,4'-DDT</td>
<td>5/6</td>
<td>360</td>
<td>C-05</td>
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Table 5-1
(Continued)

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<th>Intervals:</th>
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<th>2-4 h</th>
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<td>Location</td>
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<tr>
<td>Aldrin</td>
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<td>(13)</td>
<td>C</td>
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<tr>
<td>Endosulfan I</td>
<td>1/6</td>
<td>380 XCG</td>
<td>C-05</td>
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<tr>
<td>Endosulfan Sulfate</td>
<td>0/6</td>
<td>(65)</td>
<td>C</td>
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<td>Endrin Aldehyde</td>
<td>0/6</td>
<td>(26)</td>
<td>C</td>
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<tr>
<td>Heptachlor epoxide</td>
<td>0/6</td>
<td>(13)</td>
<td>C</td>
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<tr>
<td>alpha-Chlordane</td>
<td>1/6</td>
<td>66 JC</td>
<td>C-03</td>
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<td>beta-BHC</td>
<td>0/6</td>
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<td>C</td>
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<td>delta-BHC</td>
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<td>5000 X</td>
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<td>gamma-Chlordane</td>
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<td>210 CG</td>
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<td>SW8150 - Chlorinated Herbicides (µg/kg)</td>
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<td>2,4,5-T</td>
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<td>300 XCG</td>
<td>C-05</td>
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<td>SW8240 - Volatile Organic Compounds (µg/kg)</td>
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</tr>
<tr>
<td>Acetone</td>
<td>6/6</td>
<td>2300 @</td>
<td>C-03</td>
</tr>
<tr>
<td>Benzene</td>
<td>1/6</td>
<td>1 J</td>
<td>C-06</td>
</tr>
<tr>
<td>Carbon disulfide</td>
<td>3/6</td>
<td>110 @</td>
<td>C-05</td>
</tr>
<tr>
<td>Ethyl benzene</td>
<td>6/6</td>
<td>43 @</td>
<td>C-04</td>
</tr>
<tr>
<td>Methyl ethyl ketone</td>
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<td>310 J</td>
<td>C-05</td>
</tr>
<tr>
<td>Methylene chloride</td>
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<td>(6.5)</td>
<td>C</td>
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<tr>
<td>Tetrachloroethene</td>
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<td>0.81 J</td>
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Table 5-1
(Continued)

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<tr>
<th>Analyte</th>
<th>Frequency of Detection&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Maximum Concentration</th>
<th>Location&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Frequency of Detection&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Maximum Concentration</th>
<th>Location&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Frequency of Detection&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Maximum Concentration</th>
<th>Location&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
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<tbody>
<tr>
<td>Toluene</td>
<td>6/6</td>
<td>15 JB</td>
<td>C-06</td>
<td>5/6</td>
<td>2.3 JB</td>
<td>C-01</td>
<td>2/2</td>
<td>0.45 JB</td>
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<td>Xylenes</td>
<td>6/6</td>
<td>130 @</td>
<td>C-05</td>
<td>1/6</td>
<td>3.3 J</td>
<td>C-03</td>
<td>0/2</td>
<td>(6.4)</td>
<td>C</td>
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<tr>
<td>Acetophenone</td>
<td>2/6</td>
<td>3.2 J</td>
<td>C-04</td>
<td>0/6</td>
<td>(1.3)</td>
<td>C</td>
<td>0/2</td>
<td>(1.3)</td>
<td>C</td>
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<tr>
<td>Di-n-octylphthalate</td>
<td>0/6</td>
<td>(1.3)</td>
<td>C</td>
<td>1/6</td>
<td>0.22 J</td>
<td>C-02</td>
<td>0/2</td>
<td>(1.3)</td>
<td>C</td>
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<tr>
<td>Dibutylphthalate</td>
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<td>0.35 J</td>
<td>C-02</td>
<td>0/6</td>
<td>(1.3)</td>
<td>C</td>
<td>0/2</td>
<td>(1.3)</td>
<td>C</td>
</tr>
<tr>
<td>Fluoranethene</td>
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<td>0.34 J</td>
<td>C-02</td>
<td>0/6</td>
<td>(1.3)</td>
<td>C</td>
<td>0/2</td>
<td>(1.3)</td>
<td>C</td>
</tr>
<tr>
<td>Phenanthrene</td>
<td>6/6</td>
<td>1.3 J</td>
<td>C-06</td>
<td>0/6</td>
<td>(1.3)</td>
<td>C</td>
<td>0/2</td>
<td>(1.3)</td>
<td>C</td>
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<tr>
<td>Pyrene</td>
<td>2/6</td>
<td>0.57 J</td>
<td>C-02</td>
<td>0/6</td>
<td>(1.3)</td>
<td>C</td>
<td>0/2</td>
<td>(1.3)</td>
<td>C</td>
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<tr>
<td>bis(2-Ethylhexyl)phthalate</td>
<td>5/6</td>
<td>36 B@</td>
<td>C-02</td>
<td>5/6</td>
<td>7.9 B</td>
<td>C-06</td>
<td>2/2</td>
<td>0.38 JB</td>
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<tr>
<td>SW9012 - Total Cyanide (mg/kg)</td>
<td>2/6</td>
<td>330</td>
<td>C-01</td>
<td>3/6</td>
<td>0.75 @</td>
<td>C-03</td>
<td>1/2</td>
<td>1.2 @</td>
<td>C-03</td>
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<td>SW9030 - Sulfides (mg/kg)</td>
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<td>2800</td>
<td>C-01</td>
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<td>130 @</td>
<td>C-01</td>
<td>0/2</td>
<td>(31)</td>
<td>C</td>
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</table>

<sup>a</sup>Number of detections/total number of samples.
<sup>b</sup>Location of maximum concentration.

Note: Table presents only constituents detected in soil and/or sludge at this site.

( ) = Not detected result. Reporting limit in parenthesis.
X = Qualitative confirmation of analyte on both columns. Quantitation differed by a factor of two or more between columns. Value determined by the first column is reported.
@ = Measured result is less than five times the detection limit.
C = Presence and quantitation of analyte confirmed by second column analysis.
J = Detected below the detection limit.
B = Analyte detected in laboratory blank analysis, no blank subtraction performed.
Table 5-3

Maximum Concentrations and Frequency of Detection for Analytes in Sludge and Soil Samples from Pond D

<table>
<thead>
<tr>
<th>SW6010 - Metals (mg/kg)</th>
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<th></th>
<th></th>
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<tr>
<td>Analyte</td>
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<td>Maximum Concentration</td>
<td>Location</td>
<td>Frequency of Detection</td>
<td>Maximum Concentration</td>
<td>Location</td>
<td></td>
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<tr>
<td>Barium</td>
<td>6/6</td>
<td>82</td>
<td>D-06</td>
<td>3/3</td>
<td>64</td>
<td>D-03</td>
<td></td>
</tr>
<tr>
<td>Chromium</td>
<td>1/6</td>
<td>3.6 @</td>
<td>D-04</td>
<td>2/3</td>
<td>9.4 @</td>
<td>D-01</td>
<td></td>
</tr>
<tr>
<td>Nickel</td>
<td>0/6</td>
<td>(7.0)</td>
<td>D</td>
<td>1/3</td>
<td>9 @</td>
<td>D-01</td>
<td></td>
</tr>
<tr>
<td>Vanadium</td>
<td>2/6</td>
<td>11 @</td>
<td>D-06</td>
<td>2/3</td>
<td>26 @</td>
<td>D-01</td>
<td></td>
</tr>
<tr>
<td>Zinc</td>
<td>3/6</td>
<td>12 @</td>
<td>D-01</td>
<td>2/3</td>
<td>23 @</td>
<td>D-01</td>
<td></td>
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<tr>
<td>SW7060 - Arsenic (mg/kg)</td>
<td>6/6</td>
<td>2.1 @</td>
<td>D-06</td>
<td>3/3</td>
<td>2.9 @</td>
<td>D-01</td>
<td></td>
</tr>
<tr>
<td>SW7421 - Lead (mg/kg)</td>
<td>6/6</td>
<td>2.2</td>
<td>D-04</td>
<td>3/3</td>
<td>4.5</td>
<td>D-01</td>
<td></td>
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<tr>
<td>SW7740 - Selenium (mg/kg)</td>
<td>1/6</td>
<td>0.59 @</td>
<td>D-05</td>
<td>0/3</td>
<td>(0.53)</td>
<td>D</td>
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<table>
<thead>
<tr>
<th>SW8080 - Organochlorine Pesticides and PCBs (µg/kg)</th>
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<td>240 C</td>
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<td>(1.3)</td>
<td>D</td>
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<tr>
<td>4,4'-DDE</td>
<td>1/6</td>
<td>35 X@</td>
<td>D-04</td>
<td>0/3</td>
<td>(1.3)</td>
<td>D</td>
<td></td>
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<tr>
<td>4,4'-DDT</td>
<td>1/6</td>
<td>52 C@</td>
<td>D-04</td>
<td>2/3</td>
<td>5.2 X@</td>
<td>D-03</td>
<td></td>
</tr>
<tr>
<td>Endosulfan Sulfate</td>
<td>2/6</td>
<td>2.4JC</td>
<td>D-02</td>
<td>0/3</td>
<td>(1.3)</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>Heptachlor</td>
<td>0/6</td>
<td>(1.3)</td>
<td>D</td>
<td>1/3</td>
<td>1.8 X@</td>
<td>D-03</td>
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</tr>
<tr>
<td>alpha-Chlordane</td>
<td>0/6</td>
<td>(1.3)</td>
<td>D</td>
<td>1/3</td>
<td>1.5 X@</td>
<td>D-03</td>
<td></td>
</tr>
<tr>
<td>beta-BHC</td>
<td>1/6</td>
<td>8.1 C</td>
<td>D-05</td>
<td>2/3</td>
<td>26 X</td>
<td>D-03</td>
<td></td>
</tr>
<tr>
<td>delta-BHC</td>
<td>0/6</td>
<td>(1.3)</td>
<td>D</td>
<td>1/3</td>
<td>17 X</td>
<td>D-03</td>
<td></td>
</tr>
<tr>
<td>gamma-BHC</td>
<td>0/6</td>
<td>(1.3)</td>
<td>D</td>
<td>1/3</td>
<td>21 X</td>
<td>D-01</td>
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### Table 5-3

(Continued)

<table>
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<tr>
<th>Analyte</th>
<th>SW8240 - Volatile Organic Compounds (µg/kg)</th>
<th>SW8270 - Semivolatile Organic Compounds (µg/kg)</th>
<th>SW9030 - Sulfides (mg/kg)</th>
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<tbody>
<tr>
<td>Frequency of Detection^a</td>
<td>Frequency of Detection^a</td>
<td>Frequency of Detection^a</td>
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<tr>
<td>Maximum Concentration</td>
<td>Maximum Concentration</td>
<td>Maximum Concentration</td>
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<tr>
<td>Location^b</td>
<td>Location^b</td>
<td>Location^b</td>
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<td>Acetone</td>
<td>Acetone</td>
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</tr>
<tr>
<td>2/6</td>
<td>3/6</td>
<td>1/6</td>
<td></td>
</tr>
<tr>
<td>50 J</td>
<td>1.1 J</td>
<td>82 @</td>
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<tr>
<td>D-05</td>
<td>D-04</td>
<td>D-04</td>
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<td>0/3</td>
<td>0/3</td>
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<td>1/3</td>
<td>1/3</td>
<td>0/3</td>
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</tr>
<tr>
<td>22 J</td>
<td>1.3 B@</td>
<td>(30)</td>
<td></td>
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<tr>
<td>D-01</td>
<td>D-01</td>
<td>D</td>
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</tbody>
</table>

^a Number of detections/total number of samples.

^b Location of maximum concentration.

Note: Table presents only constituents detected in soil and/or sludge at this site.

( ) = Not Detected result. Reporting limit in parenthesis.

X = Qualitative confirmation of analyte on both columns. Quantitation differed by a factor of two or more between columns. Value determined by the first column is reported.

@ = Measured result is less than five times the detection limit.

C = Presence and quantitation of analyte confirmed by second column analysis.

I = Detected below the detection limit.

B = Analyte detected in laboratory blank analysis, no blank subtraction performed.
### Table 5-5

Maximum Concentrations and Frequency of Detection for Analytes in Sludge and Soil Samples from Pond E

<table>
<thead>
<tr>
<th>Intervals:</th>
<th>Sludge</th>
<th>0.2 ft</th>
<th>2.4 ft</th>
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<td><strong>Analyte</strong></td>
<td><strong>Frequency of Detection</strong></td>
<td><strong>Maximum Concentration</strong></td>
<td><strong>Location</strong></td>
</tr>
<tr>
<td>SW6010 - Metals (mg/kg)</td>
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<td></td>
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<tr>
<td>Barium</td>
<td>5/5</td>
<td>110</td>
<td>E-05</td>
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<td>Cadmium</td>
<td>1/5</td>
<td>2.9 @</td>
<td>E-01</td>
</tr>
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<td>Chromium</td>
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<td>28</td>
<td>E-01</td>
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<tr>
<td>Cobalt</td>
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<td>E-05</td>
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<td>Copper</td>
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<td>75</td>
<td>E-01</td>
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<td>Nickel</td>
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<td>12 @</td>
<td>E-01</td>
</tr>
<tr>
<td>Silver</td>
<td>5/5</td>
<td>39</td>
<td>E-01</td>
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<tr>
<td>Vanadium</td>
<td>5/5</td>
<td>34 @</td>
<td>E-01</td>
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<tr>
<td>Zinc</td>
<td>5/5</td>
<td>86</td>
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<td>SW7060 - Arsenic (mg/kg)</td>
<td>3/5</td>
<td>2.3 @</td>
<td>E-05</td>
</tr>
<tr>
<td>SW7421 - Lead (mg/kg)</td>
<td>5/5</td>
<td>13</td>
<td>E-01</td>
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<td>SW7471 - Mercury (mg/kg)</td>
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<td>0.44 @</td>
<td>E-04</td>
</tr>
<tr>
<td>SW7740 - Selenium (mg/kg)</td>
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<td>2.7 @</td>
<td>E-01</td>
</tr>
<tr>
<td>SW8080 - Organochlorine Pesticides and PCBs (µg/kg)</td>
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<td></td>
</tr>
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<td>4,4'-DDD</td>
<td>5/5</td>
<td>7300 CD</td>
<td>E-03</td>
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<td>4/5</td>
<td>1800 CD</td>
<td>E-03</td>
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<td>0/5</td>
<td>(26)</td>
<td>E</td>
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Table 5-5
(Continued)

<table>
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<tr>
<th>Intervals</th>
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<th>2-4 ft</th>
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<tbody>
<tr>
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<td>Frequency of Detection</td>
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<td>Location</td>
</tr>
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<td>77</td>
<td>E</td>
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<tr>
<td>Endosulfan Sulfate</td>
<td>0/5</td>
<td>130</td>
<td>E</td>
</tr>
<tr>
<td>Heptachlor</td>
<td>0/5</td>
<td>26</td>
<td>E</td>
</tr>
<tr>
<td>alpha-BHC</td>
<td>0/5</td>
<td>26</td>
<td>E</td>
</tr>
<tr>
<td>alpha-Chlordane</td>
<td>0/5</td>
<td>26</td>
<td>E</td>
</tr>
<tr>
<td>beta-BHC</td>
<td>0/5</td>
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<td>E</td>
</tr>
<tr>
<td>delta-BHC</td>
<td>0/5</td>
<td>26</td>
<td>E</td>
</tr>
<tr>
<td>gamma-BHC</td>
<td>2/5</td>
<td>110 C@</td>
<td>E-01</td>
</tr>
<tr>
<td>gamma-Chlordane</td>
<td>2/5</td>
<td>230 X</td>
<td>E-03</td>
</tr>
</tbody>
</table>

**SW8240 - Volatile Organic Compounds (µg/kg)**

| Acetone | 0/5 | 5200 | E | 1/5 | 62 JF | E-04 | 0/4 | (130) | E |
| Carbon disulfide | 0/5 | 250 | E | 2/5 | 14 | E-03 | 1/4 | 11 @ | E-03 |
| Methylene chloride | 0/5 | 250 | E | 1/5 | 2.4 J | E-04 | 0/4 | (6.3) | E |
| Toluene | 1/5 | 74 J | E-03 | 3/5 | 1.3 J | E-04 | 0/4 | (6.3) | F |
| Xylenes | 1/5 | 250 J | E-01 | 0/5 | (6.6) | E | 0/4 | (6.3) | E |

**SW8270 - Semivolatile Organic Compounds (µg/g)**

<p>| Dibutylphthalate | 1/5 | 0.23 J | E-03 | 0/5 | (1.3) | E | 0/4 | (1.3) | E |
| Phenanthrene | 3/5 | 0.81 J | E-01 | 0/5 | (1.3) | E | 0/4 | (1.3) | E |
| bis(2-Ethylhexyl)phthalate | 5/5 | 12 @ | E-05 | 1/5 | 0.51 | E-03 | 2/4 | 5.4 @ | E-02 |</p>
<table>
<thead>
<tr>
<th>Intervals</th>
<th>Sludge</th>
<th>0-2 ft</th>
<th>2-4 ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analyte</td>
<td>Frequency of Detection</td>
<td>Maximum Concentration</td>
<td>Location</td>
</tr>
<tr>
<td>SW9012 - Total Cyanide (mg/kg)</td>
<td>4/5</td>
<td>180</td>
<td>E-01</td>
</tr>
<tr>
<td>SW9030 - Sulfides (mg/kg)</td>
<td>3/5</td>
<td>850</td>
<td>E-05</td>
</tr>
</tbody>
</table>

*Number of detections/total number of samples.

bLocation of maximum concentration.

Note: Table presents only constituents detected in soil and/or sludge at this site.

( ) = Not detected result. Reporting limit in parenthesis.

X = Qualitative confirmation of analyte on both columns. Quantitation differed by a factor of two or more between columns. Value determined by the first column is reported.

@ = Measured result is less than five times the detection limit.

C = Presence and quantitation of analyte confirmed by second column analysis.

D = Secondary dilution required for this analyte.

J = Detected below the detection limit.

B = Analyte detected in laboratory blank analysis, no blank subtraction performed.
### Table 5-7

**Maximum Concentrations and Frequency of Detection for Analytes in Sludge and Soil Samples from Pond F**

<table>
<thead>
<tr>
<th>Intake</th>
<th>Sludge</th>
<th>SO-2 ft</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency of Detection</td>
<td>Maximum Concentration</td>
</tr>
<tr>
<td>SW6010 - Metals (mg/kg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barium</td>
<td>2/2</td>
<td>59</td>
</tr>
<tr>
<td>Chromium</td>
<td>2/2</td>
<td>33</td>
</tr>
<tr>
<td>Copper</td>
<td>2/2</td>
<td>75</td>
</tr>
<tr>
<td>Nickel</td>
<td>1/2</td>
<td>13 @</td>
</tr>
<tr>
<td>Silver</td>
<td>2/2</td>
<td>59</td>
</tr>
<tr>
<td>Vanadium</td>
<td>2/2</td>
<td>36 @</td>
</tr>
<tr>
<td>Zinc</td>
<td>2/2</td>
<td>98</td>
</tr>
<tr>
<td>SW7060 - Arsenic (mg/kg)</td>
<td>2/2</td>
<td>4 @</td>
</tr>
<tr>
<td>SW7421 - Lead (mg/kg)</td>
<td>2/2</td>
<td>17</td>
</tr>
<tr>
<td>SW7471 - Mercury (mg/kg)</td>
<td>2/2</td>
<td>0.43 @</td>
</tr>
<tr>
<td>SW7740 - Selenium (mg/kg)</td>
<td>1/2</td>
<td>2.5 @</td>
</tr>
<tr>
<td>SW8080 - Organochlorine Pesticides and PCBs (µg/kg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4,4'-DDD</td>
<td>2/2</td>
<td>11000 C</td>
</tr>
<tr>
<td>4,4'-DDE</td>
<td>2/2</td>
<td>1900 C</td>
</tr>
<tr>
<td>4,4'-DDT</td>
<td>2/2</td>
<td>160 C @</td>
</tr>
<tr>
<td>Heptachlor</td>
<td>1/2</td>
<td>50 JC</td>
</tr>
<tr>
<td>alpha-Chlordane</td>
<td>1/2</td>
<td>250 X @</td>
</tr>
<tr>
<td>delta-BHC</td>
<td>2/2</td>
<td>5000 X</td>
</tr>
<tr>
<td>gamma-BHC</td>
<td>1/2</td>
<td>76 C @</td>
</tr>
<tr>
<td>gamma-Chlordane</td>
<td>2/2</td>
<td>64.1 X</td>
</tr>
<tr>
<td>SW8240 - Volatile Organic Compounds (µg/kg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acetone</td>
<td>2/2</td>
<td>1400 @</td>
</tr>
<tr>
<td>Carbon disulfide</td>
<td>2/2</td>
<td>38 @</td>
</tr>
</tbody>
</table>
Table 5-7
(Continued)

<table>
<thead>
<tr>
<th>Intervals</th>
<th>Sludge</th>
<th>0-2 ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analyte</td>
<td>Frequency of Detection&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Maximum Concentration</td>
</tr>
<tr>
<td>Ethyl benzene</td>
<td>1/2</td>
<td>12 J</td>
</tr>
<tr>
<td>Methyl ethyl ketone</td>
<td>2/2</td>
<td>220 J</td>
</tr>
<tr>
<td>Toluene</td>
<td>2/2</td>
<td>10 JB</td>
</tr>
<tr>
<td>Xylenes</td>
<td>2/2</td>
<td>38 @</td>
</tr>
</tbody>
</table>

**SW8270 - Semivolatile Organic Compounds (µg/kg):**

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Frequency of Detection&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Maximum Concentration</th>
<th>Location&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Frequency of Detection&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Maximum Concentration</th>
<th>Location&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dibenzofuran</td>
<td>1/2</td>
<td>0.86 J</td>
<td>F-01</td>
<td>0/1</td>
<td>(1.4)</td>
<td>F</td>
</tr>
<tr>
<td>Fluorene</td>
<td>1/2</td>
<td>0.82 J</td>
<td>F-01</td>
<td>0/1</td>
<td>(1.4)</td>
<td>F</td>
</tr>
<tr>
<td>Phenanthrene</td>
<td>2/2</td>
<td>4.6 J</td>
<td>F-01</td>
<td>0/1</td>
<td>(1.4)</td>
<td>F</td>
</tr>
<tr>
<td>bis(2-Ethylhexyl)phthalate</td>
<td>2/2</td>
<td>5.4 JB</td>
<td>F-01</td>
<td>0/1</td>
<td>(1.4)</td>
<td>F</td>
</tr>
</tbody>
</table>

**SW9030 - Sulfides (mg/kg):**

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Frequency of Detection&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Maximum Concentration</th>
<th>Location&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Frequency of Detection&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Maximum Concentration</th>
<th>Location&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2/2</td>
<td>1800</td>
<td>F-01</td>
<td>1/1</td>
<td>60 @</td>
<td>F-01</td>
</tr>
</tbody>
</table>

<sup>a</sup>Number of detections/total number of samples.

<sup>b</sup>Location of maximum concentration.

Note: Table presents only constituents detected in soil and/or sludge at this site.

( ) = Not detected result. Reporting limit in parenthesis.

X = Qualitative confirmation of analyte on both columns. Quantitation differed by a factor of two or more between columns. Value determined by the first column is reported.

@ = Measured result is less than five times the detection limit.

C = Presence and quantitation of analyte confirmed by second column analysis.

J = Detected below the detection limit.

B = Analyte detected in laboratory blank analysis, no blank subtraction performed.
Table 5-9
Maximum Concentrations and Frequency of Detection for Analytes in Sludge and Soil Samples from Pond G

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Intersect</th>
<th>Sludge</th>
<th>0-2 ft</th>
<th>2-4 ft</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency of</td>
<td>Maximum</td>
<td>Frequency of</td>
<td>Maximum</td>
</tr>
<tr>
<td></td>
<td>Location[^b]</td>
<td></td>
<td>Location[^b]</td>
<td></td>
</tr>
<tr>
<td>SW6010 - Metals (mg/kg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barium</td>
<td>6/6</td>
<td>120</td>
<td>6/6</td>
<td>180</td>
</tr>
<tr>
<td>Beryllium</td>
<td>1/6</td>
<td>0.68 @</td>
<td>0/6</td>
<td>(0.80)</td>
</tr>
<tr>
<td>Chromium</td>
<td>6/6</td>
<td>18</td>
<td>6/6</td>
<td>14</td>
</tr>
<tr>
<td>Cobalt</td>
<td>4/6</td>
<td>5.4 @</td>
<td>1/6</td>
<td>4.4 @</td>
</tr>
<tr>
<td>Copper</td>
<td>5/6</td>
<td>24 @</td>
<td>0/6</td>
<td>(8.0)</td>
</tr>
<tr>
<td>Nickel</td>
<td>4/6</td>
<td>12 @</td>
<td>2/6</td>
<td>9.7 @</td>
</tr>
<tr>
<td>Vanadium</td>
<td>6/6</td>
<td>30</td>
<td>6/6</td>
<td>29 @</td>
</tr>
<tr>
<td>Zinc</td>
<td>6/6</td>
<td>66</td>
<td>6/6</td>
<td>44</td>
</tr>
<tr>
<td>SW7000 - Arsenic (mg/kg)</td>
<td>6/6</td>
<td>2.4 @</td>
<td>6/6</td>
<td>3.1 @</td>
</tr>
<tr>
<td>SW7421 - Lead (mg/kg)</td>
<td>6/6</td>
<td>38</td>
<td>6/6</td>
<td>120</td>
</tr>
<tr>
<td>SW7471 - Mercury (mg/kg)</td>
<td>2/6</td>
<td>0.18 @</td>
<td>0/6</td>
<td>(0.060)</td>
</tr>
<tr>
<td>SW7740 - Selenium (µg/kg)</td>
<td>1/6</td>
<td>1.3 @</td>
<td>0/6</td>
<td>(0.48)</td>
</tr>
<tr>
<td>SW8080 - Organochlorine Pesticides and PCBs (µg/kg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4,4'-DDD</td>
<td>5/6</td>
<td>3100 C</td>
<td>4/6</td>
<td>7.5 C</td>
</tr>
<tr>
<td>4,4'-DDE</td>
<td>5/6</td>
<td>450 X</td>
<td>2/6</td>
<td>3.1 X @</td>
</tr>
<tr>
<td>4,4'-DDT</td>
<td>2/6</td>
<td>120 C @</td>
<td>0/6</td>
<td>(2.6)</td>
</tr>
<tr>
<td>Endosulfan Sulfate</td>
<td>0/6</td>
<td>(7.9)</td>
<td>6/6</td>
<td>1.2 JC</td>
</tr>
</tbody>
</table>
Table 5-9
(Continued)

<table>
<thead>
<tr>
<th>Intervals:</th>
<th>Sludge</th>
<th>0-2 ft</th>
<th>2-4 ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analyte</td>
<td>Frequency of Detection</td>
<td>Maximum Concentration</td>
<td>Location</td>
</tr>
<tr>
<td>Heptachlor</td>
<td>0/6</td>
<td>(1.6)</td>
<td>G</td>
</tr>
<tr>
<td>Isodrin</td>
<td>0/6</td>
<td>(1.6)</td>
<td>G</td>
</tr>
<tr>
<td>Kepone</td>
<td>1/6</td>
<td>1.7 X@</td>
<td>G-01</td>
</tr>
<tr>
<td>alpha-BHC</td>
<td>2/6</td>
<td>79 C@</td>
<td>G-03</td>
</tr>
<tr>
<td>alpha-Chlordane</td>
<td>3/6</td>
<td>110 X@</td>
<td>G-02</td>
</tr>
<tr>
<td>beta-BHC</td>
<td>0/6</td>
<td>(1.6)</td>
<td>G</td>
</tr>
<tr>
<td>gamma-BHC</td>
<td>0/6</td>
<td>(1.6)</td>
<td>G</td>
</tr>
<tr>
<td>gamma-Chlordane</td>
<td>3/6</td>
<td>310 X</td>
<td>G-02</td>
</tr>
</tbody>
</table>

SW8240 - Volatile Organic Compounds (µg/kg)

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Frequency of Detection</th>
<th>Maximum Concentration</th>
<th>Location</th>
<th>Frequency of Detection</th>
<th>Maximum Concentration</th>
<th>Location</th>
<th>Frequency of Detection</th>
<th>Maximum Concentration</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetone</td>
<td>1/6</td>
<td>87 J</td>
<td>G-01</td>
<td>3/6</td>
<td>140 J</td>
<td>G-01</td>
<td>1/2</td>
<td>63 J</td>
<td>G-05</td>
</tr>
<tr>
<td>Carbon disulfide</td>
<td>1/6</td>
<td>37 C@</td>
<td>G-01</td>
<td>4/6</td>
<td>14 C@</td>
<td>G-02</td>
<td>0/2</td>
<td>(7.2)</td>
<td>G</td>
</tr>
<tr>
<td>Methylene chloride</td>
<td>0/6</td>
<td>(7.9)</td>
<td>G</td>
<td>5/6</td>
<td>32 C@</td>
<td>G-02</td>
<td>1/2</td>
<td>37 C@</td>
<td>G-02</td>
</tr>
<tr>
<td>Toluene</td>
<td>0/6</td>
<td>(7.9)</td>
<td>G</td>
<td>4/6</td>
<td>4.4 J</td>
<td>G-03</td>
<td>1/2</td>
<td>0.58 J</td>
<td>G-05</td>
</tr>
</tbody>
</table>

SW8270 - Semivolatile Organic Compounds (µg/g)

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Frequency of Detection</th>
<th>Maximum Concentration</th>
<th>Location</th>
<th>Frequency of Detection</th>
<th>Maximum Concentration</th>
<th>Location</th>
<th>Frequency of Detection</th>
<th>Maximum Concentration</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetophenone</td>
<td>1/6</td>
<td>0.85 J</td>
<td>G-02</td>
<td>0/6</td>
<td>(1.3)</td>
<td>G</td>
<td>0/2</td>
<td>(1.4)</td>
<td>G</td>
</tr>
<tr>
<td>Butylbenzylphthalate</td>
<td>0/6</td>
<td>(1.6)</td>
<td>G</td>
<td>0/6</td>
<td>(1.3)</td>
<td>G</td>
<td>1/2</td>
<td>0.88 J</td>
<td>G-02</td>
</tr>
<tr>
<td>Di-n-octylphthalate</td>
<td>0/6</td>
<td>(1.6)</td>
<td>G</td>
<td>0/6</td>
<td>(1.3)</td>
<td>G</td>
<td>1/2</td>
<td>0.23 J</td>
<td>G-02</td>
</tr>
<tr>
<td>bis(2-Ethylhexyl)phthalate</td>
<td>6/6</td>
<td>3.9 C@</td>
<td>G-04</td>
<td>5/6</td>
<td>3.6 C@</td>
<td>G-03</td>
<td>0/2</td>
<td>(1.4)</td>
<td>G</td>
</tr>
</tbody>
</table>
Table 5-9
(Continued)

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Sludge</th>
<th>0-2 ft</th>
<th>2-4 ft</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency of Detection</td>
<td>Maximum Concentration</td>
<td>Location</td>
</tr>
<tr>
<td>SW8280 - Dioxins and Furans (ng/g)</td>
<td>0/6</td>
<td>(0.0082)</td>
<td>G</td>
</tr>
<tr>
<td>TCDFs (total)</td>
<td>2/6</td>
<td>5.6 @</td>
<td>G-06</td>
</tr>
<tr>
<td>SW9012 - Total Cyanide (mg/kg)</td>
<td>5/6</td>
<td>2000</td>
<td>G-04</td>
</tr>
<tr>
<td>SW9030 - Sulfides (mg/kg)</td>
<td>2/6</td>
<td>100 @</td>
<td>G-04</td>
</tr>
</tbody>
</table>

*Number of detections/total number of samples.

Location of maximum concentration.

Note:
- Table presents only constituents detected in soil and/or sludge at this site.
- ( ) = Not detected result. Reporting limit in parenthesis.
- X = Qualitative confirmation of analyte on both columns. Quantitation differed by a factor of two or more between columns. Value determined by the first column is reported.
- @ = Measured result is less than five times the detection limit.
- C = Presence and quantitation of analyte confirmed by second column analysis.
- J = Detected below the detection limit.
## Table 5-11

Maximum Concentrations and Frequency of Detection for Analytes in Sludge and Soil Samples from Lake Holloman

<table>
<thead>
<tr>
<th>Analyte</th>
<th>SW6010 - Metals (mg/kg)</th>
<th>SW7060 - Arsenic (mg/kg)</th>
<th>SW7421 - Lead (mg/kg)</th>
<th>SW7471 - Mercury (mg/kg)</th>
<th>SW7740 - Selenium (mg/kg)</th>
<th>SW8080 - Organochlorine Pesticides and PCBs (µg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Barium</td>
<td>7/7</td>
<td>210</td>
<td>7/7</td>
<td>110</td>
<td>2/2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LH-03</td>
<td></td>
<td></td>
<td>LH-05</td>
</tr>
<tr>
<td></td>
<td>Chromium</td>
<td>5/7</td>
<td>25 @</td>
<td>4/7</td>
<td>8.3 @</td>
<td>2/2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LH-03</td>
<td></td>
<td></td>
<td>LH-05</td>
</tr>
<tr>
<td></td>
<td>Cobalt</td>
<td>2/7</td>
<td>4.9 @</td>
<td>2/7</td>
<td>5.7 @</td>
<td>0/1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LH-04</td>
<td></td>
<td></td>
<td>LH-07</td>
</tr>
<tr>
<td></td>
<td>Copper</td>
<td>4/7</td>
<td>38 @</td>
<td>0/7</td>
<td>(7.5)</td>
<td>0/2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LH-03</td>
<td></td>
<td></td>
<td>LH</td>
</tr>
<tr>
<td></td>
<td>Nickel</td>
<td>2/7</td>
<td>11 @</td>
<td>0/7</td>
<td>(7.5)</td>
<td>0/2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LH-04</td>
<td></td>
<td></td>
<td>LH</td>
</tr>
<tr>
<td></td>
<td>Vanadium</td>
<td>6/7</td>
<td>47 @</td>
<td>5/7</td>
<td>19 @</td>
<td>2/2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LH-03</td>
<td></td>
<td></td>
<td>LH-05</td>
</tr>
<tr>
<td></td>
<td>Zinc</td>
<td>7/7</td>
<td>78 @</td>
<td>7/7</td>
<td>29 @</td>
<td>2/2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LH-03</td>
<td></td>
<td></td>
<td>LH-05</td>
</tr>
<tr>
<td></td>
<td>SW7060 - Arsenic (mg/kg)</td>
<td>6/7</td>
<td>5.9 @</td>
<td>7/7</td>
<td>4 @</td>
<td>2/2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LH-05</td>
<td></td>
<td></td>
<td>LH-06</td>
</tr>
<tr>
<td></td>
<td>SW7421 - Lead (mg/kg)</td>
<td>7/7</td>
<td>37</td>
<td>7/7</td>
<td>3.8</td>
<td>2/2</td>
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<td>LH-04</td>
<td></td>
<td></td>
<td>LH-06</td>
</tr>
<tr>
<td></td>
<td>SW7471 - Mercury (mg/kg)</td>
<td>0/7</td>
<td>(0.067)</td>
<td>2/7</td>
<td>0.53</td>
<td>0/2</td>
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<td>LH</td>
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<td>LH-06</td>
</tr>
<tr>
<td></td>
<td>SW7740 - Selenium (mg/kg)</td>
<td>1/7</td>
<td>1.7 @</td>
<td>3/7</td>
<td>1.2 @</td>
<td>0/2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LH-03</td>
<td></td>
<td></td>
<td>LH-03</td>
</tr>
<tr>
<td></td>
<td>4,4'-DDD</td>
<td>1/7</td>
<td>600 C</td>
<td>0/7</td>
<td>(1.4)</td>
<td>0/2</td>
</tr>
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<td></td>
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<td>LH-04</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>4,4'-DDE</td>
<td>4/7</td>
<td>45 C</td>
<td>1/7</td>
<td>1.7 X @</td>
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<td>LH-04</td>
<td></td>
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<td>LH-04</td>
</tr>
<tr>
<td></td>
<td>4,4'-DDT</td>
<td>1/7</td>
<td>1.2 X @</td>
<td>0/7</td>
<td>(2.7)</td>
<td>0/2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LH-04</td>
<td></td>
<td></td>
<td>LH</td>
</tr>
<tr>
<td></td>
<td>Dieldrin</td>
<td>5/7</td>
<td>110 X</td>
<td>0/7</td>
<td>(1.3)</td>
<td>0/2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LH-02</td>
<td></td>
<td></td>
<td>LH</td>
</tr>
<tr>
<td></td>
<td>Endrin Aldehyde</td>
<td>0/7</td>
<td>(2.5)</td>
<td>0/7</td>
<td>(2.7)</td>
<td>1/2</td>
</tr>
<tr>
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<td></td>
<td></td>
<td>LH</td>
<td></td>
<td></td>
<td>LH-02</td>
</tr>
<tr>
<td></td>
<td>Heptachlor</td>
<td>1/7</td>
<td>1.2 X @</td>
<td>1/7</td>
<td>2.2 X @</td>
<td>0/2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LH-04</td>
<td></td>
<td></td>
<td>LH-05</td>
</tr>
<tr>
<td></td>
<td>Isodrin</td>
<td>2/7</td>
<td>9900 X</td>
<td>1/7</td>
<td>42 X @</td>
<td>0/2</td>
</tr>
<tr>
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<td></td>
<td>LH-06</td>
<td></td>
<td></td>
<td>LH-07</td>
</tr>
<tr>
<td></td>
<td>alpha-BHC</td>
<td>1/7</td>
<td>7.9 @</td>
<td>2/7</td>
<td>1.5 X @</td>
<td>0/2</td>
</tr>
<tr>
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<td></td>
<td></td>
<td>LH-02</td>
<td></td>
<td></td>
<td>LH-05</td>
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<tr>
<td></td>
<td>alpha-Chlordane</td>
<td>1/7</td>
<td>5.9 C</td>
<td>0/7</td>
<td>(1.3)</td>
<td>0/2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LH-04</td>
<td></td>
<td></td>
<td>LH</td>
</tr>
<tr>
<td></td>
<td>delta-BHC</td>
<td>3/7</td>
<td>7000 CD</td>
<td>5/7</td>
<td>4200 XD</td>
<td>0/2</td>
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<td>LH-07</td>
<td></td>
<td></td>
<td>LH-07</td>
</tr>
<tr>
<td></td>
<td>gamma-BHC</td>
<td>2/7</td>
<td>14 X @</td>
<td>7/7</td>
<td>25 X @</td>
<td>1/2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LH-02</td>
<td></td>
<td></td>
<td>LH-07</td>
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Table 5-11
(Continued)

<table>
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<th>Interval</th>
<th>Analyte</th>
<th>Frequency of Detection</th>
<th>Maximum Concentration</th>
<th>Location</th>
<th>Frequency of Detection</th>
<th>Maximum Concentration</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>gamma-Chlordane</td>
<td>6/7</td>
<td>75 C</td>
<td>LH-04</td>
<td>0/7</td>
<td>(1.3)</td>
<td>LH</td>
</tr>
<tr>
<td>SW8240</td>
<td>Volatile Organic Compounds (µg/kg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acetone</td>
<td>2/7</td>
<td>220 J</td>
<td>LH-04</td>
<td>5/7</td>
<td>170 @</td>
<td>LH-07</td>
</tr>
<tr>
<td></td>
<td>Carbon disulfide</td>
<td>2/7</td>
<td>35 @</td>
<td>LH-04</td>
<td>1/7</td>
<td>16 @</td>
<td>LH-04</td>
</tr>
<tr>
<td></td>
<td>Methyl ethyl ketone</td>
<td>1/7</td>
<td>34 J</td>
<td>LH-04</td>
<td>1/7</td>
<td>19 J</td>
<td>LH-07</td>
</tr>
<tr>
<td></td>
<td>Methylene chloride</td>
<td>1/7</td>
<td>3.4 J</td>
<td>LH-04</td>
<td>7/7</td>
<td>33 @</td>
<td>LH-07</td>
</tr>
<tr>
<td></td>
<td>Toluene</td>
<td>0/7</td>
<td>(6.3)</td>
<td>LH</td>
<td>6/7</td>
<td>3.5 J</td>
<td>LH-02</td>
</tr>
<tr>
<td>SW8270</td>
<td>Semivolatile Organic Compounds (µg/l)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>bis(2-Ethylhexyl)phthalate</td>
<td>3/7</td>
<td>28 @</td>
<td>LH-05</td>
<td>3/7</td>
<td>0.74 J</td>
<td>LH-06</td>
</tr>
<tr>
<td></td>
<td>SW9012 - Total Cyanide (mg/kg)</td>
<td>6/7</td>
<td>120</td>
<td>LH-02</td>
<td>6/7</td>
<td>11</td>
<td>LH-05</td>
</tr>
<tr>
<td></td>
<td>SW9030 - Sulfides (mg/kg)</td>
<td>7/7</td>
<td>2700</td>
<td>LH-05</td>
<td>6/7</td>
<td>360</td>
<td>LH-07</td>
</tr>
</tbody>
</table>

Note: Table presents only constituents detected in soil and/or sludge at this site.

( ) = Not detected result. Reporting limit in parenthesis.
X = Qualitative confirmation of analyte on both columns. Quantitation differed by a factor of two or more between columns. Value determined by the first column is reported.
@ = Measured result is less than five times the detection limit.
C = Presence and quantitation of analyte confirmed by second column analysis.
D = Secondary dilution required for this analyte.
J = Detected below the detection limit.
Table 5-14

Maximum Concentrations and Frequency of Detection for Analytes in Sludge and Soil Samples from Lake Stinky

<table>
<thead>
<tr>
<th>Interval</th>
<th>0-2 ft</th>
<th>2-4 ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW6010 - Metals (mg/kg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barium</td>
<td>3/3</td>
<td>95</td>
</tr>
<tr>
<td>Chromium</td>
<td>2/3</td>
<td>10 (4)</td>
</tr>
<tr>
<td>Cobalt</td>
<td>0/3</td>
<td>1.8</td>
</tr>
<tr>
<td>Vanadium</td>
<td>3/3</td>
<td>20 (4)</td>
</tr>
<tr>
<td>Zinc</td>
<td>3/3</td>
<td>34 (4)</td>
</tr>
<tr>
<td>SW7060 - Arsenic (mg/kg)</td>
<td>3/3</td>
<td>5.7 (4)</td>
</tr>
<tr>
<td>SW7421 - Lead (mg/kg)</td>
<td>3/3</td>
<td>6.1</td>
</tr>
<tr>
<td>SW8080 - Organochlorine Pesticides and PCBs (µg/kg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endrin Aldehyde</td>
<td>0/3</td>
<td>(3.4)</td>
</tr>
<tr>
<td>Isodrin</td>
<td>1/3</td>
<td>12 (10)</td>
</tr>
<tr>
<td>alpha-BHC</td>
<td>0/3</td>
<td>(1.7)</td>
</tr>
<tr>
<td>delta-BHC</td>
<td>3/3</td>
<td>3400 (5)</td>
</tr>
<tr>
<td>gamma-BHC</td>
<td>3/3</td>
<td>35 (4)</td>
</tr>
<tr>
<td>SW8140 - Organophosphorus Pesticides (µg/kg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethyl parathion</td>
<td>1/3</td>
<td>64 (10)</td>
</tr>
<tr>
<td>SW8150 - Chlorinated Herbicides (µg/kg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,4,5-T</td>
<td>1/3</td>
<td>2 (10)</td>
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</tbody>
</table>
Table 5-14

(Continued)

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Frequency of Detectiona</th>
<th>Maximum Concentration</th>
<th>Locationb</th>
<th>Frequency of Detectiona</th>
<th>Maximum Concentration</th>
<th>Locationb</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW8240 - Volatile Organic Compounds (µg/kg)</td>
<td>1/3</td>
<td>420 @</td>
<td>LS-03</td>
<td>1/3</td>
<td>80 J</td>
<td>LS-01</td>
</tr>
<tr>
<td>Acetone</td>
<td>1/3</td>
<td>14 @</td>
<td>LS-03</td>
<td>0/3</td>
<td>(6.9)</td>
<td>LS-01</td>
</tr>
<tr>
<td>Carbon disulfide</td>
<td>1/3</td>
<td>33 J</td>
<td>LS-03</td>
<td>1/3</td>
<td>13 J</td>
<td>LS-01</td>
</tr>
<tr>
<td>Methyl ethyl ketone</td>
<td>0/3</td>
<td>(8.1)</td>
<td>LS</td>
<td>3/3</td>
<td>9.2 @</td>
<td>LS-03</td>
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<tr>
<td>Toluene</td>
<td>1/3</td>
<td>0.39 J</td>
<td>LS-03</td>
<td>3/3</td>
<td>1.5</td>
<td>LS-03</td>
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<tr>
<td>SW8270 - Semivolatile Organic Compounds (µg/kg)</td>
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<td></td>
</tr>
<tr>
<td>bis(2-Ethylhexyl)phthalate</td>
<td>2/3</td>
<td>3.9 @</td>
<td>LS-01</td>
<td>2/3</td>
<td>0.078 J</td>
<td>LS-01</td>
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<tr>
<td>SW8280 - Dioxins and Furans (ng/g)</td>
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<td></td>
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</tr>
<tr>
<td>TCDFs (total)</td>
<td>1/3</td>
<td>0.1</td>
<td>LS-03</td>
<td>1/3</td>
<td>0.095</td>
<td>LS-03</td>
</tr>
<tr>
<td>SW9012 - Total Cyanide (mg/kg)</td>
<td>2/3</td>
<td>8.3</td>
<td>LS-02</td>
<td>3/3</td>
<td>11</td>
<td>LS-02</td>
</tr>
<tr>
<td>SW9030 - Sulfides (mg/kg)</td>
<td>3/3</td>
<td>540</td>
<td>LS-03</td>
<td>0/3</td>
<td>(32)</td>
<td>LS</td>
</tr>
</tbody>
</table>

aNumber of detections/total number of samples.
bLocation of maximum concentration.

Note: Table presents only constituents detected in soil and/or sludge at this site.

( ) = Not detected result. Reporting limit in parenthesis.
X = Qualitative confirmation of analyte on both columns. Quantitation differed by a factor of two or more between columns. Value determined by the first column is reported.
@ = Measured result is less than five times the detection limit.
C = Presence and quantitation of analyte confirmed by second column analysis.
D = Secondary dilution required for this analyte.
J = Detected below the detection limit.
Table 6-1
Summary of Constituents With Concentrations Above Action Levels

<table>
<thead>
<tr>
<th>Site</th>
<th>Constituent</th>
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<tbody>
<tr>
<td>Pond C</td>
<td>--</td>
</tr>
<tr>
<td>Pond D</td>
<td>--</td>
</tr>
<tr>
<td>Pond E</td>
<td>4,4'-DDD</td>
</tr>
<tr>
<td>Pond F</td>
<td>4,4'-DDD</td>
</tr>
<tr>
<td>Pond G</td>
<td>Beryllium, 4,4'-DDD</td>
</tr>
<tr>
<td>Lake Holloman</td>
<td>Dieldrin, Isodrin</td>
</tr>
<tr>
<td>Ditch from Pond G to Lake Holloman</td>
<td>Beryllium</td>
</tr>
<tr>
<td>Lake Stinky</td>
<td>--</td>
</tr>
<tr>
<td>Other Ditch Samples</td>
<td>Isodrin</td>
</tr>
<tr>
<td>Boreholes</td>
<td>--</td>
</tr>
</tbody>
</table>

= No constituent exceeds action level.
1991 and 1992 Groundwater Assessment Monitoring

Assessment Monitoring Results: Appendix IX and Confirmation Sampling—Detection and Compliance Monitoring Program

April 1992
Table 4-1
Summary of Analytical Results

<table>
<thead>
<tr>
<th>Analyte</th>
<th>MW-1</th>
<th>S-2</th>
<th>S-2 Duplicate</th>
<th>MW-2</th>
<th>MW-3</th>
<th>MW-4</th>
<th>MW-5</th>
<th>MW-6</th>
<th>MW-7</th>
<th>MW-8</th>
<th>MW-9</th>
<th>S-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Halogenated Volatile Organics - SW 8670 (µg/L)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Bromochloromethane</td>
<td>&lt;0.130</td>
<td>&lt;0.130</td>
<td>7.1 (0.130)</td>
<td>&lt;0.130</td>
<td>&lt;0.130</td>
<td>&lt;0.130</td>
<td>&lt;0.130</td>
<td>&lt;0.130</td>
<td>&lt;0.130</td>
<td>&lt;0.130</td>
<td>&lt;0.130</td>
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<tr>
<td>Chloroform</td>
<td>&lt;0.100</td>
<td>&lt;0.100</td>
<td>17.4 (0.100)</td>
<td>&lt;0.100</td>
<td>&lt;0.100</td>
<td>&lt;0.100</td>
<td>&lt;0.100</td>
<td>&lt;0.100</td>
<td>&lt;0.100</td>
<td>&lt;0.100</td>
<td>&lt;0.100</td>
<td>&lt;0.100</td>
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<tr>
<td>Dichloromethane</td>
<td>&lt;0.200</td>
<td>&lt;0.200</td>
<td>32.2 (0.200)</td>
<td>&lt;0.200</td>
<td>&lt;0.200</td>
<td>&lt;0.200</td>
<td>&lt;0.200</td>
<td>&lt;0.200</td>
<td>&lt;0.200</td>
<td>&lt;0.200</td>
<td>&lt;0.200</td>
<td>&lt;0.200</td>
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</tbody>
</table>

Organochlorine Pesticides and PCBs - SW 8360 (µg/L)

<table>
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<tr>
<th>Analyte</th>
<th>MW-1</th>
<th>S-2</th>
<th>S-2 Duplicate</th>
<th>MW-2</th>
<th>MW-3</th>
<th>MW-4</th>
<th>MW-5</th>
<th>MW-6</th>
<th>MW-7</th>
<th>MW-8</th>
<th>MW-9</th>
<th>S-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aldrin</td>
<td>&lt;0.0098</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>0.0095 (0.0095)</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
</tr>
<tr>
<td>#HCPO</td>
<td>&lt;0.0098</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>0.0095 (0.0095)</td>
<td>3.9 (0.0095)</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
</tr>
<tr>
<td>Endosulfan</td>
<td>&lt;0.0098</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>0.041 (0.0098)</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
</tr>
<tr>
<td>Heptachlor</td>
<td>&lt;0.0098</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>0.022 (0.0098)</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
</tr>
<tr>
<td>Heptachlor epoxide</td>
<td>&lt;0.0098</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>0.26 (0.0095)</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
<td>&lt;0.0095</td>
</tr>
</tbody>
</table>

Volatile Organic - SW 8240 (µg/L)

<table>
<thead>
<tr>
<th>Analyte</th>
<th>MW-1</th>
<th>S-2</th>
<th>S-2 Duplicate</th>
<th>MW-2</th>
<th>MW-3</th>
<th>MW-4</th>
<th>MW-5</th>
<th>MW-6</th>
<th>MW-7</th>
<th>MW-8</th>
<th>MW-9</th>
<th>S-4</th>
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<td>&lt;5.0</td>
<td>&lt;5.0</td>
<td>&lt;5.0</td>
<td>&lt;5.0</td>
<td>&lt;5.0</td>
<td>&lt;5.0</td>
<td>&lt;5.0</td>
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<td>&lt;5.0</td>
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<td>&lt;5.0</td>
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<td>&lt;5.0</td>
<td>&lt;5.0</td>
<td>&lt;5.0</td>
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<td>&lt;5.0</td>
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<td>DIO2-Styrene/Phthalates</td>
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<td>&lt;9.5</td>
<td>12.9 (9.5)</td>
<td>&lt;9.5</td>
<td>24.8 (9.5)</td>
<td>19 (5.5)</td>
<td>51 (9.5)</td>
<td>43 (5.5)</td>
<td>43 (5.5)</td>
<td>18 (5.5)</td>
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<tr>
<td>Total Organic Carbon - 415.2 (µg/L)</td>
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<td>&lt;1.0</td>
<td>1.0</td>
<td>8.6 (1.0)</td>
<td>&lt;1.0</td>
<td>1.0</td>
<td>1.8 (1.0)</td>
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<td>3.0 (1.0)</td>
<td>1.8 (1.0)</td>
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<td>Dissolved Organic Carbon (0.45 µm filter)</td>
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<td>&lt;1.0</td>
<td>&lt;1.0</td>
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<td>&lt;1.0</td>
<td>&lt;1.0</td>
<td>&lt;1.0</td>
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</tbody>
</table>

* Table lists only those constituents present above the method detection limit.  
( ) Detection limits shown adjacent to quantified results.  
@ Established result less than 5 times detection limit.  
A Inorganic CLP result is less than Contract Required Detection Limit (CRDL), but greater than the instrument Detection Limit (IDL)  
B Inorganic CLP result is less than CRDL but greater than the instrument Detection Limit (IDL).  
C Confirmed on second column or by GC/MS.  
X Presence of the analyte was not confirmed after analyses on a second column.  

D-41
Table 4-1

Confirmation Sampling Results for EPA Method 8080

<table>
<thead>
<tr>
<th>Analysis</th>
<th>MW-1 Result (DL)</th>
<th>S-2 Result (DL)</th>
<th>MW-3 Result (DL)</th>
<th>MW-3 Result (DL)</th>
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<tbody>
<tr>
<td>Aldrin</td>
<td>ND (0.0095)</td>
<td>ND (0.0095)</td>
<td>0.015 X (0.010)</td>
<td>0.097 C (0.010)</td>
</tr>
<tr>
<td>alpha-BHC</td>
<td>ND (0.0095)</td>
<td>ND (0.0095)</td>
<td>ND (0.010)</td>
<td>ND (0.010)</td>
</tr>
<tr>
<td>beta-BHC</td>
<td>ND (0.0095)</td>
<td>ND (0.0095)</td>
<td>ND (0.010)</td>
<td>ND (0.010)</td>
</tr>
<tr>
<td>delta-BHC</td>
<td>ND (0.0095)</td>
<td>ND (0.0095)</td>
<td>0.030 C (0.010)</td>
<td>0.032 C (0.010)</td>
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<tr>
<td>gamma-BHC</td>
<td>ND (0.0095)</td>
<td>ND (0.0095)</td>
<td>ND (0.010)</td>
<td>0.15 C (0.010)</td>
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<tr>
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<td>ND (0.020)</td>
<td>0.24 C (0.020)</td>
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<td>ND (0.0095)</td>
<td>ND (0.010)</td>
<td>0.25 C (0.010)</td>
</tr>
<tr>
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<td>ND (0.048)</td>
<td>0.0054 X (0.048)</td>
<td>0.0051 X (0.050)</td>
<td>ND (0.050)</td>
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<tr>
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<td>ND (0.010)</td>
<td>0.28 C (0.010)</td>
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<td>ND (0.0095)</td>
<td>ND (0.010)</td>
<td>0.082 C (0.010)</td>
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<td>MW-1 Result (DL)</td>
<td>MW-2 Result (DL)</td>
<td>MW-2 Result (DL)</td>
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<td>SW8080 - Organochlorine Pesticides and PCBs (µg/L)</td>
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<td>ND (0.0095)</td>
<td>ND (0.0095)</td>
<td>ND (0.0095)</td>
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<td>ND (0.0095)</td>
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<tr>
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<td>ND (0.0095)</td>
<td>ND (0.0095)</td>
<td>ND (0.0095)</td>
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<td>ND (0.0095)</td>
<td>ND (0.0095)</td>
<td>ND (0.0095)</td>
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<tr>
<td>gamma-BHC</td>
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<td>ND (0.0095)</td>
<td>ND (0.0095)</td>
<td>ND (0.0095)</td>
</tr>
<tr>
<td>4,4'-DDT</td>
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<td>ND (0.019)</td>
<td>ND (0.019)</td>
<td>ND (0.019)</td>
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<td>ND (0.0095)</td>
<td>ND (0.0095)</td>
<td>ND (0.0095)</td>
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<tr>
<td>Endosulfan Sulfate</td>
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<td>ND (0.048)</td>
<td>ND (0.048)</td>
<td>0.0073 JX (0.048)</td>
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<td>ND (0.0095)</td>
<td>ND (0.0095)</td>
<td>ND (0.0095)</td>
</tr>
<tr>
<td>Heptachlor</td>
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<td>ND (0.0095)</td>
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Table 4-1
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<td>(0.010)</td>
</tr>
<tr>
<td>alpha-BHC</td>
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<td>(0.010)</td>
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<tr>
<td>beta-BHC</td>
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<tr>
<td>gamma-BHC</td>
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<td>(0.010)</td>
</tr>
<tr>
<td>4,4'-DDT</td>
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<td>(0.020)</td>
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<tr>
<td>Dieldrin</td>
<td>ND</td>
<td>(0.010)</td>
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<tr>
<td>Endosulfan Sulfate</td>
<td>ND</td>
<td>(0.050)</td>
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<td>Endrin</td>
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<tr>
<td>Heptachlor</td>
<td>ND</td>
<td>(0.010)</td>
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*Table lists only those constituents present above the method detection limit.
DL = Detection limits.
ND = Not detected.
@ = Established result less than 5 times detection limit.
C = Confirmed on second column.
J = Result less than sample quantitation limit. Indicates an estimated value.
X = The presence of the analyte was not confirmed after analysis on a second column.
### Table 4-2

Appendix IX and Confirmation Sampling Results for EPA Method 8080

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<th>MW-1 Appendix IX Sampling</th>
<th>Confirmation Sampling</th>
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<th>Confirmation Sampling</th>
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<td>Result (DL)</td>
<td>Result (DL)</td>
<td>Result (DL)</td>
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<tr>
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<td>ND (0.0098)</td>
<td>ND (0.0095)</td>
<td>ND (0.0095)</td>
<td>ND (0.0095)</td>
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<tr>
<td>alpha-BHC</td>
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<td>ND (0.0095)</td>
<td>ND (0.0095)</td>
<td>ND (0.0095)</td>
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<tr>
<td>beta-BHC</td>
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<td>ND (0.0095)</td>
<td>ND (0.0095)</td>
</tr>
<tr>
<td>delta-BHC</td>
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<td>ND (0.0095)</td>
<td>0.049 C (0.0095)</td>
<td>ND (0.0095)</td>
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<td>gamma-BHC</td>
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<td>ND (0.0095)</td>
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<td>ND (0.0095)</td>
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<td>ND (0.0095)</td>
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<td>ND (0.0095)</td>
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<tr>
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<td>ND (0.048)</td>
<td>ND (0.048)</td>
<td>0.0054 JX (0.048)</td>
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<td>ND (0.0095)</td>
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**SW8080 - Organochlorine Pesticides and PCBs (µg/L)**

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<td>Result (DL)</td>
<td>Result (DL)</td>
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<td>ND (0.0095)</td>
<td>ND (0.0095)</td>
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<tr>
<td>delta-BHC</td>
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<td>ND (0.0095)</td>
<td>0.049 C (0.0095)</td>
<td>ND (0.0095)</td>
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<tr>
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<td>ND (0.0095)</td>
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<tr>
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<td>ND (0.048)</td>
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Table 4-2

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<td>(0.010)</td>
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<tr>
<td>beta-BHC</td>
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<td>ND</td>
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## Table 4-2
(Continued)

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<td>(0.0095)</td>
<td>ND</td>
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<tr>
<td>beta-BHC</td>
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Table 4-2
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SW8080 - Organochlorine Pesticides and PCBs (µg/L)
Table 4-2

(Continued)

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* Table lists only those constituents present above the method detection limit.
DL Detection limits.
ND Not detected.
@ Established result less than 5 times detection limit.
C Confirmed on second column.
J Result less than sample quantitation limit. Indicates an estimated value.
X The presence of the analyte was not confirmed after analysis on a second column.
1993 Background Sampling

Appendix to Draft Final Phase I—Groundwater Assessment
Monitoring Report for the Sewage Lagoons and Lakes Investigation
December 1993
Table 2-1
Summary Statistics for Soil

| Analyte     | Method | Minimum | Maximum | Mean    | Standard Deviation | Median | Skewness | | | | | |
|-------------|--------|---------|---------|---------|--------------------|--------|----------|----------------------|----------------------|----------------------|----------------------|
| Aluminum    | SW6010 | 260.000 | 6200.000| 3106.667| 1666.6548          | 2800.000| -0.6710 | 3.9327               | -0.2114               | 4855.6696          | 8764.4972          |
| Antimony    | SW6010 | -9.2980 | 7.8410  | -0.6770 | 3.9327             | -0.2114|          |                      |                      | 2.6865              | 7.2844              |
| Antimony    | SW7041 | -0.0490 | 0.1400  | 0.0874  | 0.0613             | 0.0640 |          |                      |                      | 0.1249              | 0.2533              |
| Arsenic     | SW6010 | -9.2120 | 8.2380  | 0.1165  | 3.3548             | 0.1520 |          |                      |                      | 2.9842              | 5.8833              |
| Barium      | SW6010 | 14.0000 | 65.0000 | 35.7778 | 16.0295            | 30.0000|          |                      |                      | 50.7970             | 84.3632             |
| Beryllium   | SW6010 | -0.0410 | 0.4000  | 0.1323  | 0.1152             | 0.1100 |          |                      |                      | 0.1500              | 0.4000              |
| Boron       | SW6010 | 5.2000  | 11.0000 | 8.4444  | 2.0348             | 8.5000 |          |                      |                      | 10.7510             | 15.0118             |
| Cadmium     | SW6010 | -0.3762 | 0.5600  | 0.1832  | 0.0929             | 0.0036 |          |                      |                      | 0.2538              | 1.0359              |
| Calcium     | SW6010 | 160000.000 | 250000.000 | 223333.333 | 25495.0976          | 230000.000 | 7412.8984 | 240000.000 | 250000.000 |
| Chromium    | SW6010 | -0.3600 | 4.8000  | 2.3400  | 1.4071             | 2.2000 |          |                      |                      | 3.6584              | 6.6049              |
| Cobalt      | SW6010 | -0.2600 | 1.7000  | 0.9156  | 0.5179             | 0.7600 |          |                      |                      | 1.4008              | 2.4852              |
| Copper      | SW6010 | 1.8000  | 3.8000  | 2.9222  | 0.6340             | 3.1000 |          |                      |                      | 3.5163              | 4.8438              |
| Iron        | SW6010 | 180.0000 | 4500.000 | 2275.5556 | 1348.1015          | 2000.000 | 7538.6887 | 6361.6513 |
| Lithium     | SW6010 | 2.6000  | 15.0000 | 7.7778  | 3.3063             | 7.2000 |          |                      |                      | 10.8757             | 17.7993             |
| Magnesium   | SW6010 | 1700.000 | 1200.000 | 5411.111 | 3050.1821          | 4500.000 | 8269.0458 | 14656.2132 |
| Manganese   | SW6010 | 7.5000  | 120.0000 | 46.1667 | 33.2378            | 37.0000 |          |                      |                      | 77.3095             | 146.9104            |
| Mercury     | SW7471 | -0.0640 | -0.0080 | -0.0270 | 0.0123             | -0.0250 | 0.0164 | 0.0006              |
| Molybdenum  | SW6010 | 0.2500  | 4.2000  | 1.7289  | 1.2197             | 1.7000 |          |                      |                      | 2.8717              | 5.4258              |
Table 2-1
(Continued)

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<th>Analyte</th>
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<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Median</th>
<th>Pseudosigma</th>
<th>Warning Limit</th>
<th>Upper Tolerance Limit</th>
<th>Basis</th>
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Field = statistics based on field samples only.
Combine = statistics based on combination field and blank data.
Table 2-2
Summary Statistics for Dissolved Metals in Groundwater

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<th>Maximum</th>
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Field = statistics based on field samples only.
Combine = statistics based on combination field and blank data.
1993 Phase I Groundwater Assessment Monitoring

Draft Final Phase I—Groundwater Assessment Monitoring Report
Sewage Lagoons and Lakes Investigation
December 1993
Table 4-1

Presence Uncertain, Method 8080 Pesticides (µg/L)

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MDL  Method Detection Limit is defined in SW-846 as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.

a  Protocol Required Detection Limits (PRDLs) are provided for analytes that have no method specified detection limits. PRDLs are the highest common detection limits for an analyte on multiple instruments and are based on detection limit requirements in 40 CFR Part 136.

Round 1 result/Round 2 result
B Analyte was also detected in the associated laboratory method blank (Organic Methods).
J Estimated value because the analyte was detected at a concentration less than the reporting limit (Organic Methods).
G Analyte was not confirmed. Analyte was detected using both primary and secondary columns; however, the concentrations differ by more than a factor of two (Method SW8080).
X Analyte was not confirmed. Analyte was detected using primary column only (Method SW8080).
ND Not Detected.
### Table 4-2

**Presence Unlikely, Method 8080 Pesticides (μg/L)**

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<td>ND/0.004X</td>
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<td>Endosulfan I</td>
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<td></td>
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<td>ND/0.013X</td>
<td>ND/0.0052B</td>
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<td>ND/0.013X</td>
<td>ND/0.0052B</td>
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<td>Heptachlor</td>
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<td>0.00431X/ND</td>
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<td>ND/0.015X</td>
<td></td>
<td></td>
<td>ND/0.0041</td>
<td></td>
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<tr>
<td>Heptachlor epoxide</td>
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<td>0.0051X/ND</td>
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<td>ND/0.0055X</td>
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<td>ND/0.0064X</td>
<td>ND/0.0081</td>
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<td>ND/0.0042X/ND</td>
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<td>ND/0.003X</td>
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<td>Methoxychlor</td>
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</tbody>
</table>

ND: Not detected
Table 4-2

(Continued)

MDL  Method Detection Limit is defined in SW-846 as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.

* Protocol Required Detection Limits (PRDLs) are provided for analytes that have no method specified detection limits. PRDLs are the highest common detection limits for an analyte on multiple instruments and are based on detection limit requirements in 40 CFR Part 136.

Round 1 result/Round 2 result

B  Analyte was also detected in the associated laboratory method blank (Organic Methods).

J  Estimated value because the analyte was detected at a concentration less than the reporting limit (Organic Methods).

G  Analyte was not confirmed. Analyte was detected using both primary and secondary columns; however, the concentrations differ by more than a factor of two (Method SW8080).

X  Analyte was not confirmed. Analyte was detected using primary column only (Method SW8080).

ND  Not Detected.
### Table 4-4

**Method 8080 Pesticides, Deep Piezometers (µg/L)**

<table>
<thead>
<tr>
<th>Analyte</th>
<th>MDL</th>
<th>MWD-03</th>
<th>MWD-04</th>
<th>MWD-05</th>
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<tbody>
<tr>
<td>alpha-Chlordane</td>
<td>0.02</td>
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<td></td>
<td>0.0055JX</td>
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<tr>
<td>delta-BHC</td>
<td>0.01</td>
<td>0.013X</td>
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<tr>
<td>Endosulfan sulfate</td>
<td>0.05</td>
<td></td>
<td>0.013JB</td>
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<tr>
<td>Endrin</td>
<td>0.01</td>
<td>0.0022JX</td>
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<tr>
<td>gamma-BHC</td>
<td>0.01</td>
<td>0.015X</td>
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<tr>
<td>gamma-Chlordane</td>
<td>0.01</td>
<td></td>
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<td>0.0016JX</td>
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<td>0.065X</td>
<td>0.0081JX</td>
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<td>Isodrin</td>
<td>0.01</td>
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<td>0.0092JX</td>
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</table>

* Protocol Required Detection Limits (PRDLs) are provided for analytes that have no method specified detection limits. PRDLs are the highest common detection limits for an analyte on multiple instruments and are based on detection limit requirements in 40 CFR Part 136.

B Analyte was also detected in associated laboratory method blank.

J Estimated value because the analyte was detected at a concentration less than the reporting limit (Organic Methods).

X Analyte was not confirmed. Analyte was detected using primary column only (Method SW8080).
Table 4-5

Presence Certain and Uncertain for Method 8080 Pesticides (µg/L),

<table>
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<th>Analyte</th>
<th>MW-02</th>
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<th>MW-05</th>
<th>MW-07</th>
<th>MW-02</th>
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<td>alpha-BHC</td>
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<td>0.034C/0.023C</td>
<td>ND/0.022C</td>
<td>0.049C/ND</td>
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<td>delta-BHC</td>
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<td>ND/0.032C</td>
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<tr>
<td>gamma-BHC</td>
<td>ND/0.15C</td>
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<td>4,4'-DDT</td>
<td>ND/0.24C</td>
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<td>Dieldrin</td>
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<td>ND/0.082C</td>
<td>0.022C/ND</td>
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</table>

September 1991/March 1992

C = Presence and concentration of Method 8080 pesticide confirmed on both primary and secondary columns of gas chromatogram.

X = The presence of the analyte was not confirmed on a second column.

ND = Not Detected
1993 Phase 2 RFI for Lakes Holloman and Stinky

Draft Final Phase 2
RCRA Facility Investigation Report for Lakes Holloman and Stinky
Sewage Lagoon and Lakes Investigation
December 1993
### Table 4-1

**Presence Certain, Method 8080 Pesticides**

<table>
<thead>
<tr>
<th>Analyte</th>
<th>MW-16</th>
<th>MW-17</th>
<th>MW-18</th>
<th>MWS-09</th>
<th>MWS-16</th>
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<tbody>
<tr>
<td>Aldrin</td>
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<td>0.014</td>
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<tr>
<td>4,4'-DDE</td>
<td>0.015</td>
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**NOTE:** Presence certain indicates that the pesticide was detected on both the primary and secondary columns of the gas chromatogram.

**J** = Estimated value because the analyte was detected at a concentration less than the reporting limit.
Table 4-2

Presence Unlikely, Method 8080 Pesticides

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<th>MWS-16</th>
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<td>0.012X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>delta-BHC</td>
<td>0.049G</td>
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<tr>
<td>4,4'-DDD</td>
<td>0.022X</td>
<td>0.016X</td>
<td>0.014X</td>
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</tr>
<tr>
<td>4,4'-DDE</td>
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<td>0.013G</td>
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<td>0.0044JX</td>
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<td>0.023X</td>
<td>0.015X</td>
<td>0.1X</td>
<td>0.0057JX</td>
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<td>0.018X</td>
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NOTE: Presence questionable indicates pesticide was either less than the reporting limit or the concentration was not confirmed on the second column of the gas chromatogram.

J = Estimated value because the analyte was detected at a concentration less than the reporting limit.
G = Analyte was not confirmed. Analyte was detected using both primary and secondary columns; however, the concentrations differ by more than a factor of two.
X = Analyte was not confirmed. Analyte was detected using primary column only.
APPENDIX E

Correspondence
### SUMMARY OF PERTINENT CORRESPONDENCE

<table>
<thead>
<tr>
<th>Description</th>
<th>Date</th>
<th>From</th>
<th>To</th>
</tr>
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<tbody>
<tr>
<td><strong>Hazard Waste Determination Issues:</strong></td>
<td></td>
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<tr>
<td>Hazard Determination</td>
<td>Oct 14, 1987</td>
<td>EPA HQ</td>
<td>HQ TAC/DE</td>
</tr>
<tr>
<td>Request for redetermination</td>
<td>July 15, 1988</td>
<td>Deputy Assistant Secretary of the Air Force</td>
<td>Jeff Bingaman, United States Senate</td>
</tr>
<tr>
<td>Request from NMED for determination</td>
<td>April 15, 1994</td>
<td>HAFB</td>
<td>NMED</td>
</tr>
<tr>
<td>Preliminary verbal decision by EPA</td>
<td>Conference Call Notice No. 1 October 29, 1994</td>
<td>Foster Wheeler and Radian</td>
<td>USACE and Distribution</td>
</tr>
<tr>
<td>No final decision made, NMED will need more time to make decision</td>
<td>Conference Call Notice No. 2 November 18, 1994</td>
<td>Foster Wheeler and Radian</td>
<td>USACE and Distribution</td>
</tr>
<tr>
<td><strong>Closure Issues</strong></td>
<td></td>
<td></td>
<td></td>
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<td>Hybrid Closure (FR 19 March 1987)</td>
<td>July 19, 1987</td>
<td>EPA Region 6</td>
<td>HAFB</td>
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<tr>
<td>Hot spot removal</td>
<td>September 18, 1988</td>
<td>EPA Region 6</td>
<td>HAFB</td>
</tr>
<tr>
<td>Closure plan deficiencies and Health based clean closure</td>
<td>July 13, 1989</td>
<td>NMEID</td>
<td>HAFB</td>
</tr>
<tr>
<td>Delay of closure/post closure care permit</td>
<td>January 26, 1990</td>
<td>NMEID</td>
<td>EPA Region 6</td>
</tr>
<tr>
<td>BLM involvement</td>
<td>Feb 14, 1990</td>
<td>HAFB</td>
<td>BLM</td>
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<td>NMEID turnover to EPA</td>
<td>May 7, 1990</td>
<td>NMEID</td>
<td>EPA Region 6</td>
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<td>EPA disapproval of 1990 closure plan</td>
<td>Dec 11, 1990</td>
<td>EPA Region 6</td>
<td>HAFB</td>
</tr>
<tr>
<td>EPA suggests having NMEID agree to clean closure/risk based concept</td>
<td>Meeting notes of January 4, 1991 meeting with EPA</td>
<td>HAFB</td>
<td>EPA Region 6</td>
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## CORRESPONDENCE SUMMARY

(Continued)

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<th>Description</th>
<th>Date</th>
<th>From</th>
<th>To</th>
</tr>
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<tbody>
<tr>
<td>Delay of closure adopted by NMEID</td>
<td>April 18, 1991</td>
<td>EPA Region 6</td>
<td>NMEID</td>
</tr>
<tr>
<td>Sampling requirements for sewage lagoons as part of permit application for delay of closure</td>
<td>May 22, 1991</td>
<td>NMED</td>
<td>HAFB</td>
</tr>
<tr>
<td>Issues of January 31, 1991 meeting in NMED addressed</td>
<td>May 28, 1991</td>
<td>EPA Region 6</td>
<td>HQ TAC</td>
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<tr>
<td>Submittal of Post Closure Care Permit Application</td>
<td>June 7, 1991</td>
<td>HAFB</td>
<td>NMED</td>
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<tr>
<td>Sampling and analysis</td>
<td>June 20, 1991</td>
<td>EPA Region 6</td>
<td>HAFB</td>
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<tr>
<td>Supersede May 22, 1991 sampling requirements</td>
<td>November 18, 1991</td>
<td>NMED</td>
<td>HAFB</td>
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<td>Sampling plan approval</td>
<td>December 17, 1991</td>
<td>EPA Region 6</td>
<td>HAFB</td>
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<tr>
<td>Clean closure demonstrations</td>
<td>August 17, 1992</td>
<td>NMED</td>
<td>HAFB</td>
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<tr>
<td>Request to delay review of PCCP to FY94</td>
<td>September 17, 1992</td>
<td>HAFB</td>
<td>NMED</td>
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<tr>
<td>Request to delay review of closure plan and PCCP</td>
<td>February 15, 1994</td>
<td>HAFB</td>
<td>NMED</td>
</tr>
<tr>
<td>Closure authority for 7 sewage lagoons under NMED and 40 CFR Part 264</td>
<td>April 6, 1994</td>
<td>NMED</td>
<td>HAFB</td>
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<tr>
<td>Clean closure can be demonstrated using Appendix IX constituents rather than Appendix VIII</td>
<td>May 4, 1994</td>
<td>NMED</td>
<td>HAFB</td>
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<tr>
<td><strong>Groundwater Monitoring Issues</strong></td>
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<td>Appendix IX constituents</td>
<td>June 2, 1989</td>
<td>EPA Region 6</td>
<td>HAFB</td>
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<td>Significant difference noted by EPA</td>
<td>May 3, 1991</td>
<td>EPA Region 6</td>
<td>HAFB</td>
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<tr>
<td>Additional sampling requested</td>
<td>December 17, 1991</td>
<td>NMED</td>
<td>HAFB</td>
</tr>
<tr>
<td>Agreed methylene chloride and acetone were laboratory contaminants</td>
<td>Memo for Record of December 31, 1991 conference call with NMED</td>
<td>HAFB</td>
<td>HAFB</td>
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<tr>
<td>Suggested detection monitoring to delete TOC and add Method 8080</td>
<td>April 13, 1992</td>
<td>Radian</td>
<td>USACE-Omaha</td>
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<tr>
<td>BLM involved in siting additional wells on BLM land</td>
<td>Memo of Record HAFB</td>
<td>HAFB</td>
<td>HAFB</td>
</tr>
<tr>
<td>Analytical requests</td>
<td>Confirmation Notice No. 5 July 31, 1992</td>
<td>Radian</td>
<td>USACE</td>
</tr>
<tr>
<td>NMED's comments on Groundwater Assessment Monitoring</td>
<td>August 12, 1992</td>
<td>NMED</td>
<td>NMED</td>
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<tr>
<td>Appendix IX constituents not required for routine monitoring</td>
<td>Memo for Record HAFB</td>
<td>HAFB</td>
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<tr>
<td><strong>Natural Resources and Other Issues</strong></td>
<td></td>
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<tr>
<td>Notice of Noncompliance</td>
<td>February 4, 1987</td>
<td>EPA</td>
<td>HAFB</td>
</tr>
<tr>
<td>Federal Facilities Compliance Agreement</td>
<td>December 29, 1988</td>
<td>EPA</td>
<td>USAF</td>
</tr>
<tr>
<td>Lake Holloman a waters of the U.S.</td>
<td>Memo for Record HAFB</td>
<td>HAFB</td>
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<th>Description</th>
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<tbody>
<tr>
<td>Lake Stinky support of shore birds</td>
<td>August 16, 1993</td>
<td>Audubon Society</td>
<td>US F&amp;WS</td>
</tr>
<tr>
<td>Section 7 Endangered Species Act</td>
<td>April 30, 1993</td>
<td>HAFB</td>
<td>US F&amp;WS</td>
</tr>
<tr>
<td>Pond G not under jurisdiction of Section 404 as long as part of wastewater system. If not part of a wastewater system the shallow parts of Pond G would be considered a wetlands and filling or excavation would be regulated under Section 404</td>
<td>July 19, 1994</td>
<td>USACE - Albuquerque</td>
<td>HAFB</td>
</tr>
</tbody>
</table>
Information Submission Under 3007 RCRA, 42 U.S.C. 6927

U.S. EPA
Hazardous Waste Management Division
Attn: Mr. William Rhee (GH-HQ)
Interfirst II Building - 25th Floor
Dallas, TX 75270

1. The following information is provided pursuant to your request for information under 3007 of the Resource Conservation and Recovery Act, 42 U.S.C. 6927. The responses submitted follow the paragraph letter designation of Enclosure 2, Section 4, supplied to Holloman AFB by your office.

FACILITY: Holloman Air Force Base
MAILING ADDRESS: 835 CGS/CC
Holloman AFB, NM 88330-3900
LOCATION: U.S. Highway 70, Otero County,
New Mexico
EPA NUMBER: NM 672124422

Responses to paragraph 4:

a. There has been no hazardous waste discharged to the Holloman AFB sewer lagoons during the year prior to November 8, 1985.

b. The Holloman AFB sewage lagoons ceased receiving hazardous waste in October 1984.

c. Domestic sewage is placed in the Holloman AFB sewage lagoons daily.

d. e. and f. See attached description of sewage lagoon process.

2. If you have any questions contact Mr. Robert J. Andreoli, (505) 698-3450.

MEMO FOR RECORD:
RONALD F. BAKER, Colonel, USAF
Commander

DEE

1 Attn

Sewage Lagoon Process

cc: Mr. Peter Pacho
Hazardous Waste Section
WEID
P.O. Box 963
Santa Fe, NM 87504-0963
SEWAGE LAGOON PROCESS

The sewage treatment facility consists of two aerated, parallel, and four nonaerated, series, lagoons receiving approximately 1.5 million gallons per day of comminuted raw sewage. The discharge from the last lagoon goes to a salina, Lake Holloman, for eventual evaporation. There is no discharge from Lake Holloman to a navigable water as defined by the United States Environmental Protection Agency. Therefore, a National Pollutant Discharge Elimination System (NPDES) permit under Public Law 92-500 is not required.

1. Collection System

Influent wastewater arrives at the collection headworks from three pipes by both gravity and pumped flow. Measurements of chlorides and total dissolved solids in the influent wastewater are higher than similar measurements on the supplied potable water or values based on typical domestic sewage as shown in Table P1. Human excreta typically increases chlorides in sewage about 15 mg/l and TDS in sewage from 400 to 500 mg/l above that of the potable water. Since the groundwater table is within ten feet of the surface, the source of the concentrated dissolved material is likely infiltration of the groundwater which contains up to 20,000 mg/l total dissolved solids.
TABLE P1

Comparison of Chlorides and Total Dissolved Solids Concentration in Holloman Wastewater to Expected and Typical Wastewater Concentrations

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Holloman AFB Potable Water</th>
<th>Holloman AFB Wastewater Expected</th>
<th>Holloman AFB Wastewater Measured</th>
<th>Typical Untreated Wastewater</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorides</td>
<td>30-230</td>
<td>45-245</td>
<td>900-2000</td>
<td>50-200</td>
</tr>
<tr>
<td>Total Dissolved Solids</td>
<td>600-1100</td>
<td>1000-1500</td>
<td>2000-2800</td>
<td>500-800</td>
</tr>
</tbody>
</table>
2. Headworks

Influent wastewater to the headworks can be directed into one of two comminutor channels or into a third bar screen channel to reduce or remove large material. Each channel has a manually-operated gate valve; normally, only one is open at any given time.

After comminution or screening, the wastewater flow is directed to one of two grit chambers to allow heavy particles to settle out. The unused chamber contains drying, settled grit. According to plant personnel, this material usually requires several weeks of drying to permit removal.

The wastewater flow is metered by a Parshall flume. Flow reaching the flume throat is turbulent as a result of the drop from the grit chamber.

The metered wastewater is pumped from the wet well by four pumps, all of which are controlled by a single float with multiple contacts. In the event of power failure, there is a bypass line from the wet well to a collection box next to a splitter box leading to the lagoons.

Wastewater pumped into the wet well is directed to a collection box. A recirculation line from the end of the plant (i.e., sump pond) is also directed into the collection box. The splitter box discharges to two pipes, one for each of two parallel lagoons, A and B. The collection box is retained because the wet well bypass and sump recirculation lines are connected to it.

3. Primary Lagoons

The two parallel Lagoons, A and B, receive the raw comminuted wastewater. These lagoons included: fifteen, 5 hp, floating, propeller aerators, the lagoon banks to a slope of 1:2-1/2, and rubber lining for bank protection. The surface area of the primary lagoons is 21 acres.

4. Secondary Lagoons

Lagoons C, D, E, and the sump receive, in series, the wastewater from Lagoons A and B. Lagoon C contains one, 5 hp, floating, propeller aerator placed at the influent point of Lagoon C, the banks to a slope of 1:2-1/2, and riprap two feet above and below the waterline. There is a recirculation line from the sump to the collection box. The purpose of this line is to supply oxygenated water for mixing with incoming raw sewage to decrease the anaerobic nature of the influent. The recirculated wastewater also decreases the retention time in the primary lagoons.

Overflow to Lagoon G is through a corrugated metal pipe from the southeast corner of Lagoon E. Lagoon G has dissolved oxygen levels normally exceeding 8 mg/l and supports an abundant algae growth. The depth of Lagoon G varies from several inches at its north and east end to a maximum of six feet at the south end. The discharge from the lagoon is through an 18-inch diameter corrugated metal pipe into a drainage ditch leading to Lake Holloman. The discharge is usually pea soup green because of the suspended algae.
Colonel William W. Koelm, USAF
Deputy Commander
833 CSG/DEEV
Holloman AFB, New Mexico 88330-5000

Re: Notice of Noncompliance
RCRA Docket No. VI-502-H

Dear Colonel Koelm:

This letter is in response to your letter dated March 25, 1986, and to various conversations between Mr. Robert Andreoli of your staff and Mr. Will Focht of my staff.

The Environmental Protection Agency (EPA) is anxious to resolve all issues raised in our Notice of Noncompliance. We agree that a great deal of work is necessary to achieve compliance with requirements applicable to the surface impoundments. However, in our October and November 1985 meetings we provided comments to you which required the revision of the various documents in order to achieve full compliance. We would like to pursue a formal resolution of these issues in order to narrow the scope of the remaining controversy.

With regard to the surface impoundments: Region VI takes strong exception to your intention to seek resolution through EPA Headquarters. Until we delegate this action to the Headquarters Office of External Affairs (in accordance with the procedures outlined in the Federal Facilities Compliance Program), you must deal with Region VI to resolve this action. At this time, EPA Headquarters' role is limited to processing of a delisting petition. (To date, Holloman AFB has not submitted a petition for EPA review.)

The Region has reviewed Holloman's surface impoundment closure plan and finds it unsatisfactory. This document is not a closure plan but rather an intent to seek delisting. You must resubmit a closure plan which adequately addresses the applicable requirements of 40 CFR Part 265, Subparts G and K.

We have also learned that 40 CFR Part 265, Subpart F groundwater monitoring system is not in place -- or even proposed. Be assured that the installation and operation of an adequate groundwater monitoring system is specifically required [see also RCRA §3005(i)].
Finally, you should understand that your intention to pursue delisting in no way stays or otherwise constrains EPA in seeking full compliance with our Notice. The EPA Headquarters delisting program office has no authority to enter into agreements which preclude the necessity for compliance with applicable regulations.

It is hoped that this letter clarifies our position. We suggest that Holloman AFB promptly submit for review and approval the various documents and plans referenced above.

If you have any questions, please contact Mr. Will Focht at (214) 767-9984.

Sincerely yours,

Allyn M. Davis
Director
Hazardous Waste Management Division

cc: Ms. Denise Fort, Director
    Environmental Improvement Division
    New Mexico Health and Environment Department
COOPERATIVE MANAGEMENT AGREEMENT
BETWEEN
MESILLA VALLEY AUDUBON SOCIETY
AND
BUREAU OF LAND MANAGEMENT
LAS CRUCES DISTRICT

INTRODUCTION

The Mesilla Valley Audubon Society, hereafter identified as Audubon, and the Bureau of Land Management, Las Cruces District, hereafter identified as BLM, enter into an agreement for cooperative management of the public land at Lake Holloman for the purpose of improving wildlife habitat management at the lake. Audubon and BLM recognize Lake Holloman as a highly important wildlife habitat for resident and migratory game and non-game birds, including state and federal endangered species.

OBJECTIVES

The objectives of this agreement are to directly involve Audubon, a primary user group, in management of Lake Holloman, and to inventory bird use at Lake Holloman over a period of several years in support of a proposed Habitat Management Plan (HMP).

PLANNED ACTIONS

The following actions will be initiated to meet the above objectives:

1. Audubon will seasonally monitor bird species and relative bird abundance as a pre-HMP inventory, with particular attention to endangered species. An annual report will be submitted to BLM following the fourth and eighth seasons of monitoring.

2. Audubon will formulate and submit management objectives and planned actions for the development of an HMP, as it deems appropriate, to be considered with those from BLM, New Mexico Department of Game and Fish (NMDGF), and the U. S. Fish and Wildlife Service (FWS), and other involved agencies as part of the annual monitoring report.

3. Audubon will have an active role in the discussion of its proposals in meeting with NMDGF, FWS, and BLM addressing the Lake Holloman HMP.

4. Audubon will assist in the implementation of the HMP by providing manpower for small projects to be identified in the HMP.
5. BLM will select recommendations from Audubon and other agencies it deems appropriate and prepare the Lake Holloman HMP. HMP preparation will occur when BLM project scheduling and funding processes permit, and may not fall within the term of this agreement.

TENURE, TRANSFER, AND TERMINATION
Audubon recognizes that BLM retains authority to regulate uses of the public land. This agreement does not exempt BLM from implementing existing or future laws and regulations pertaining to the use of the public land.

This Cooperative Management Agreement shall be effective when signed by the parties hereto and shall remain in effect for a period of 8 full seasons (approximately 2 years) from the date of final approval and concurrence. The seasons are here defined as:

- Winter - December, January, February
- Spring - March, April, May
- Summer - June, July
- Fall - August, September, October, November

This agreement shall be reviewed by all interested parties at the time of expiration to determine the desirability of reapproval for a subsequent term. This agreement may be terminated by mutual agreement, or by either party upon thirty days notice in writing to the other of its intention to terminate upon a date indicated.

CONSULTATION AND COORDINATION
Initial coordination with Audubon for this Agreement was conducted during September 1985 as a result of the Audubon Society's Adopt-A-Refuge Program. Audubon formally requested to enter into this Agreement in a letter dated April 4, 1986. NMDGF, FWS, White Sands National Monument (WSNM), Corp of Engineers/Holloman Air Force Base (COE/HAFB), and BLM New Mexico State Office (NMSO) were provided with a description of the proposal and asked to comment on it. NMSO, NMDGF, and FWS supported the proposal. COE/HAFB had no objections to the proposal, and WSNM did not reply. In addition, the proposal was submitted to the Las Cruces District Advisory Council at the April 1986 meeting. No comments were received. Additional coordination included Wes Walker, grazing allottee (allotment 7068). The White Sands Resource Management Plan calls for elimination of grazing on the Lake Holloman portion of allotment 7068. Mrs. Walker indicated that they had no serious objections to this CMA.

EVALUATION
Evaluation of this agreement will be conducted following the first annual report and following submission of the second annual report and expiration of this agreement.
APPROVAL AND CONCURRENCE

The undersigned agree to the terms and conditions of this cooperative management agreement.

Sanford D Schemma
President, Mesilla Valley Audubon Society  
August 6, 1986

District Manager, Las Cruces District
Bureau of Land Management  
August 6, 1986

The undersigned concur, in principle, with the objectives and planned actions of this cooperative agreement.

Joel Chinn
Director, New Mexico Department of Game and Fish  
August 12, 1986

Regional Director, Region 2
US Fish and Wildlife Service  
10/7/86
Proposed Groundwater Monitoring Plan (Your Letter, 13 Nov 86)

Radian Corporation
ATTN: Nelson H. Lund
P.O. Box 9948
Austin, TX 78766-0948

1. HQ TAC/DESV and our office have reviewed the Groundwater Monitoring Plan and see no errors in its preparation. However, on 26 November 1986, Capt Kimbrell hand-delivered two copies of the plan to EPA Region VI, and they had several questions that he could not answer.

2. We request that you contact EPA Region VI to establish a technical telephone dialogue, and answer their questions. The point of contact at Region VI is Mr. Will Focht, (214) 757-9884. Request that we be kept current on dialogue affecting this project.

3. The 26 November EPA meeting determined that the sewage lagoons would stay under RCRA versus CERCLA regulations. The EPA/USAF Compliance Agreement, drafted on 9 October 1986, was held up, pending the decision of the 26 November meeting. We expect the compliance agreement to be ready for signature within 30 days. We will send you a copy once it has been signed by all parties.

4. We are proposing a modification of our contract with Computrac Inc to delist our sewage lagoons. Computrac will be requested to prepare a sampling protocol for the expanded sampling your company will perform. They will also use the data collected from your groundwater monitoring and expanded sampling to prepare a complete delisting petition.

5. Point of contact is Capt Joe Kimbrell, 833 CSG/DESV, (505) 479-3496.

SIGNED
ROBERT J. BITZNER, Lt Col, USAF
Base Civil Engineer

cc: HQ TAC/DESV

Computrac Inc
P.O. Box 19854
Raleigh, NC 27619-0000
UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION VI
DALLAS, TEXAS

IN THE MATTER OF:

HOLLOMAN AIR FORCE BASE
HOLLOMAN AFB, NEW MEXICO
EPA I.D. NUMBER NM6572124422

DOCKET NUMBER RCRA VI-661-H
NOTICE OF NONCOMPLIANCE, COMPLIANCE SCHEDULE, NECESSITY FOR CONFERENCE

This NOTICE OF NONCOMPLIANCE, COMPLIANCE SCHEDULE, AND NOTICE OF NECESSITY FOR CONFERENCE hereinafter referred to as "Notice", is issued pursuant to Section 3008 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, (as amended), 42 U.S.C. §6928, ("RCRA"), and further amended by the Hazardous and Solid Waste Amendments of 1984 [Public Law 98-616] ("HSWA"). The authority to issue this Notice has been delegated to the Regional Administrator, Environmental Protection Agency ("EPA"), Region VI, and redelegated to the Director, Hazardous Waste Management Division ("Complainant").

Pursuant to Section 3008(a)(2) of RCRA, the EPA may, after providing notice to the State, enforce the requirements of Subtitle C of RCRA in a State which has received final authorization to carry out a hazardous waste management program under Section 3006(b) of RCRA, 42 U.S.C. §6926(b). The State of New Mexico received final authorization to carry out the RCRA hazardous waste program as published in 50 Fed.Reg. 1515 (January 11, 1985). The State of New Mexico has not been authorized to enforce the provisions of HSWA. This Complaint sets forth violations of Subtitle C of RCRA in accordance with HSWA and applicable laws and regulations established under the New Mexico hazardous waste management program.
Pursuant to Section 3008(a)(2) of RCRA, notice of this action was given to the State of New Mexico. This Notice of Noncompliance is issued consistent with the Federal Facilities Compliance Program and Executive Order 12088, Federal Compliance With Pollution Control Standards.


PRELIMINARY STATEMENT

1. Respondent is a "person" as defined in Section 1004(15) of RCRA, 42 U.S.C. §6903(15), 40 CFR §260.10, and as defined in HWMR-2 §102(A)(70).

2. On or about November 19, 1980, Respondent was operating a tactical air command base at its facility at 833 CSG/DEEV, Holloman Air Force Base, Holloman Air Force Base, New Mexico. Respondent has been continuously operating at this present location prior to and since November 19, 1980.

3. Respondent is a "generator" and an "owner" and "operator" of a "hazardous waste management facility" in accordance with the definitions of those terms under Section 1004 of RCRA and 40 CFR §260.10, and HWMR-2 §102.A.
4. Respondent is a Federal agency as that term is defined in 40 CFR §260.10 and HWMR-2 §102.A.

5. Pursuant to Sections 6001 and 6004 of RCRA, 42 U.S.C. §§6961 and 6964, each department, agency, and instrumentality of the executive, legislative, and judicial branches of the Federal Government (1) having jurisdiction over any solid waste management facility or disposal site, or (2) engaged in any activity resulting, or which may result, in the disposal or management of solid waste shall be subject to, and comply with, all Federal, State, interstate, and local requirements, both substantive and procedural (including any requirement for permits or reporting or any provisions for injunctive relief and such sanctions as may be imposed by a court to enforce such relief), respecting control and abatement of solid or hazardous waste disposal in the same manner, and to the same extent, as any person is subject to such requirements.

6. Respondent's location is a "facility" which "stores", "treats", or "disposes" of hazardous waste in accordance with the definitions of these terms under 40 CFR §§260.10 and 261.3, and HWMR-2 §§102.A and 201.A.1.d.

7. Respondent has been in continuous operation since November 19, 1980, treating, storing and/or disposing of hazardous waste at its present location.

8. Section 3010(a) of RCRA, 42 U.S.C. §6930(a), and HWMR-2 6202 requires any person generating or transporting any substance identified as a hazardous waste subject to this Subtitle, or owning or operating a facility for treatment, storage, or disposal of such substance to file with EPA and
the New Mexico Environmental Improvement Division (NMEI) a notification stating the location and general description of such activity and the identified or listed hazardous waste handled by such person. No identified or listed hazardous waste subject to this Subtitle may be transported, treated, stored or disposed of unless notification has been given pursuant to Section 3010 of RCRA as explained in 45 Fed.Reg. 12746-12754 (February 26, 1980). The notification must be filed within ninety (90) days of promulgation of regulations identifying or listing hazardous wastes. 40 CFR Part 261, which identifies and lists, among others, the hazardous wastes generated, treated, stored and/or disposed of by Respondent, was promulgated at 45 Fed.Reg. 33084, 33119 (May 19, 1980). Therefore, Respondent was required to notify as a generator and treater, storer and/or disposer of hazardous waste not later than August 18, 1980.

9. Pursuant to Section 3010 of RCRA and HWMR-2 §202, Respondent notified EPA on or about August 15, 1980, of hazardous waste that was generated and treated, stored, and/or disposed of at its facility located at Holloman Air Force Base, New Mexico.

10. Respondent submitted its Part A permit application to treat, store, and/or dispose of hazardous waste at its facility on or about November 14, 1980. Respondent amended or revised its Part A permit application on January 20, 1982, June 25, 1982, April 27, 1984, December 12, 1985, and January 29, 1986. In its January 29, 1986, revised Part A permit application, Respondent identified itself as a generator, transporter, and treater, storer, and/or disposer of the following hazardous wastes:
A. Hazardous Wastes from non-specific sources identified at 40 CFR §261.31 and HWMR-2 §201.C.2;

   F001, F002, F003, F004, F005, F007 and F008.

B. Discarded commercial chemical products, manufacturing chemical intermediates, or off-specification commercial chemical products identified at 40 CFR §261.33 and HWMR-2 §201.C.4;

   U002, U022, U075, U098, U151, U159, U228, U211, U220, U226, U239, U232, U240, P001, P006 and P008.

C. Ignitable characteristic hazardous waste identified at 40 CFR §261.21 and HWMR-2 §201.B.2;

   D001.

D. Corrosive characteristic hazardous waste identified at 40 CFR §261.22 and HWMR-2 §201.B.3

   D002.

E. Toxic characteristic hazardous waste identified at 40 CFR §261.24 and HWMR-2 §201.B.5;

   D004, D005, D006, D007 and D008.

11. By virtue of the notification and the submission of its Part A permit application, Respondent's facility was accorded "interim status" authorization to operate under §3005(e)(1) of RCRA, 42 U.S.C. §6925(e)(1).


13. During the inspection it was noted that Respondent operated "surface impoundments" at its facility which were used to treat, store, and/or dispose of "hazardous waste" as these terms are defined at 40 CFR §§261.3 and 261.10, and HWMR-2 §§102(87) and 201.
14. In response to a RCRA Section 3007 request for information, Respondent, by letter dated December 17, 1984, submitted to EPA a listing of hazardous wastes that have entered the surface impoundments (sewage lagoon/sewage system). This survey indicated that the following listed hazardous wastes entered the surface impoundments:

A. Hazardous wastes from non-specific sources given in 40 CFR §261.31 and HWMR-2 §201.C.2;
   F001 and F003.

B. Discarded commercial chemical products, off-specification species, or manufacturing chemical intermediates given at 40 CFR §261.33 and HWMR-2 §201.C.4;
   U228, U161, U227, U188, U154, U002, U122, U165, U220, U239, U003, U233, P095, P012 and P106.

15. In accordance with 40 CFR §§265.90 and 265.91, and HWMR-2 §§206.C.1.a.1. and 206.C.1.b.1., the owner or operator of a surface impoundment, landfill, or land treatment facility which is used to manage hazardous waste must have implemented, on or before November 19, 1981, a groundwater monitoring program capable of determining the facility's impact on the quality of groundwater in the uppermost aquifer underlying the facility except as HWMR-2 §§206.A. and 206.C.1.a.3. and 5. provide otherwise. Also, a groundwater monitoring system must be capable of yielding groundwater samples for analysis and must consist of:

A. Monitoring wells (at least one) installed hydraulically upgradient (i.e., in the direction of increasing static head) from the limit of the waste management area. Their number, locations, and depths must be sufficient to yield groundwater samples that are:
   (1) Representative of background groundwater quality in the uppermost aquifer near the facility; and
   (2) Not affected by the facility.
B. Monitoring wells (at least three) installed hydraulically downgradient (i.e., in the direction of decreasing static head) at the limit of the waste management area. Their number, locations, and depths must ensure that they immediately detect any statistically significant amounts of hazardous waste constituents that migrate from the waste management area to the uppermost aquifer (40 CFR §265.91).

16. Respondent has not installed a groundwater monitoring system at the surface impoundments (sewage lagoons) as required by 40 CFR §§265.91 and 265.91 and 40 CFR §206.C.1.a.1 and 206.C.1.b.1. Therefore, Respondent is not now, nor has it ever been, in physical compliance with the groundwater monitoring requirements of 40 CFR Part 265.

17. Respondent's facility is a land disposal facility which has been granted "interim Status" under §3005(e)(1) of RCRA, before November 8, 1984.

18. According to Section 3005(e)(2) of RCRA, 42 U.S.C. §6925(e)(2), in the case of each land disposal facility which has been granted interim status under that subsection before November 8, 1984, interim status shall terminate on November 8, 1985, unless the owner or operator of such facility:

A. Applies for a final determination regarding the issuance of a permit under subsection (c) for such facility; and

B. Certifies that such facility is in compliance with all applicable groundwater monitoring and financial responsibility requirements.

19. Respondent did not submit the required certification of compliance with groundwater monitoring and financial responsibility requirements on or before November 8, 1985; nor could it have so certified because a
prerequisite to said certification is physical compliance with all applicable groundwater monitoring requirements 50 Fed.Reg. 38948 (September 25, 1985).


COUNT - FAILURE TO SUBMIT A CLOSURE PLAN


22. According to HWMR-2 §206.C.2.c(3), 40 CFR §265.112(c)(1) and 50 Fed.Reg. 38946-38949 (September 25, 1985), the owner or operator of a hazardous waste management facility must submit a closure plan no later than fifteen (15) days after loss of interim status. In this case that deadline would be November 23, 1985.

23. Respondent submitted what was purported to be a closure plan on November 22, 1985. Complainant has determined that this document is not a closure plan. Instead the document is a notice of intent to petition Complainant to amend 40 CFR Part 261 to exclude from regulation the wastes stored in Respondent's surface impoundments.

24. Therefore, Respondent has violated HWMR-2 §206.C.2.c(3) and 40 CFR §265.112(d), by failing to submit a closure plan within fifteen (15) days after loss of interim status.
COMPLIANCE SCHEDULE

Pursuant to Sections 3005(e)(2), 3008(a), 6001, and 6004 of RCRA, 42 U.S.C. §§6925(e)(2), 6928, 6961, and 6964, 50 Fed.Reg. 38946-38949 (September 25, 1985), and Executive Orders 12088 and 12146, Respondent is hereby requested to take the following actions:

1. Submit a closure plan for its hazardous waste surface impoundments which meets the requirements of HWRM-R-2 §§206.C.2 and 206.C.6.f (40 CFR §§265.112(b) and 265.228) not later than fifteen (15) days after receipt of this Order. The closure plan shall be submitted to NMEID and EPA.

2. Complete closure of its hazardous waste surface impoundments according to the approved closure plan not later than 180 days after the date of closure plan approval by NMEID.

3. Submit a certification of closure in accordance with HWRM-R-2 §206.C.2.f and 40 CFR §265.115 upon completion of closure to NMEID and EPA.

In addition, Respondent shall submit documentation to EPA indicating the specific action Respondent has taken to comply with the provisions of this COMPLIANCE SCHEDULE within thirty (30) days from the date of the meeting which is to be held in ten (10) days from the receipt of this NOTICE. If corrective measures are not properly taken, the problems identified in this NOTICE will be reported to your parent agency for appropriate action or, if necessary, will be presented to the Office of Management and Budget for resolution.
NECESSITY FOR CONFERENCE

Pursuant to the United States Environmental Protection Agency's Federal Facilities Compliance Program, dated January 4, 1984, and Executive Order 12088, when a Federal facility is found to be out of compliance with substantive pollution control requirements, EPA informs the facility immediately. The facility is notified in writing of the finding of noncompliance and copies of the notification are forwarded to the regional office of the parent agency and to the appropriate State and local pollution control agencies. Each notification defines the noncompliance situation, requests that the facility acknowledge the situation, and requests a meeting within ten (10) days to discuss the problem. The notification also advises the facility that a remedial plan will have to be submitted to the EPA regional office for approval within 30 days after the meeting.

YOU ARE HEREBY REQUESTED TO CONTACT EPA FOR THE PURPOSE OF SETTING A MEETING DATE TO ADDRESS THIS NOTICE OF NONCOMPLIANCE. SAID MEETING IS TO BE CONDUCTED WITHIN TEN (10) DAYS FROM RECEIPT OF THIS NOTICE. To arrange for this meeting you may contact either Will Focht at (214) 767-9884 or Robert K. Reges at (214) 767-2799.

Allyn Davis
Hazardous Waste Management Division
U.S. Environmental Protection Agency
Region VI

Dated this 4th day of February 1987, at Dallas, Texas.
MEMORANDUM

SUBJECT: Holloman Air Force Base Proposal to Delist

FROM: Allyn M. Davis, Director
Hazardous Waste Management Division (6H)

TO: Marcia E. Williams, Director
Office of Solid Waste (WH-562)

The Regional Administrator, Mr. Robert Layton, has asked me to look into questions raised during his recent meeting with General Goodwin of the Air Force's Tactical Air Command. During their meeting, the General asked about the status of the proposal to delist filed by Holloman Air Force Base, New Mexico (HAFB) with your office.

As you may know, HAFB has seven surface impoundments which are part of the sewage treatment plant. The last of which discharges into playa lakes, Lake Holloman and Lake Stinky. In the past, these impoundments received listed hazardous waste which, due to the mixture rule, rendered the entire system subject to RCRA regulation. These discharges stopped in 1984. In August of 1985, Region VI issued a complaint against HAFB for eleven violations of RCRA including the absence of groundwater monitoring and the lack of a closure plan. A LOIS complaint was issued against HAFB in February of 1987. Several meetings have been held with the concerned parties, the result being that HAFB has decided to pursue delisting as an alternative to closure.

The enforcement action by Region VI against HAFB is currently at an impasse. While a compliance agreement has been negotiated, it is unlikely that the Air Force will sign the agreement until the delisting issue is resolved. If the compliance issue at HAFB is elevated in accordance with the Federal Facilities Compliance Strategy, the best solution for the protection of the environment may not be reached. Elevation is likely if the delisting issues are not resolved in the near future.

In the meeting between General Goodwin and Mr. Layton, the General indicated that in November 1986 the Air Force had discussions with Mr. Myles Morse of your staff to try to resolve issues on the proposal to delist. The most pressing of these is whether HAFB must undertake the massive sampling effort heretofore required by your staff. That sludge sampling program would require one composite sludge sample every 10,000
square feet of impoundment. As the area in question is 270 acres (11,761,200 square feet), this program would require a minimum of 1176 sludge samples. An equally illustrative but less resource intensive program may be sufficient to generate the data required.

General Goodwin also reported that your staff committed to replying to the issues raised last November by January 1987. To date, no reply from your office has been received by the Air Force. Based on our past experiences in dealing with owner/operators, we suggest that your staff confirm in writing any agreements reached in meetings. In any event, and even though HAFB has not submitted a formal delisting petition, the Air Force requests a formal reply from you on the issues raised last November.

Mr. Layton is personally committed to this matter. Please respond directly either to him or to General Goodwin. If you respond directly to General Goodwin, please provide a copy to Mr. Layton.
July 10, 1987

Colonel William W. Koelm, USAF
Commander
833 Combat Support Group
Holloman Air Force Base, New Mexico 88330-5000

Dear Colonel Koelm:

During my recent meeting with General Goodwin of the Tactical Air Command, he raised the question of possibly using the proposed Resource Conservation and Recovery Act (RCRA) hybrid closure rule (52 Fed. Reg., March 19, 1987) for the closure of the surface impoundments in use at Holloman Air Force Base (HAFB).

First, let me point out that this is a proposed rule and not a final rule. Due to the intricacies of the rule-making process, EPA Headquarters does not anticipate final action on this rule for at least one year from the proposal date. Further, the proposed standards would not be immediately effective in a state such as New Mexico, which has a Federally-authorized hazardous waste management program. The standards would not be applicable until New Mexico adopts equivalent standards and those standards are approved by EPA. Realistically, these standards may not be applicable in New Mexico until the end of 1988. Also, as with any proposed rule, the final rule may differ significantly from that proposed, due to input from the affected community and the public-at-large.

Currently, there are two options available for the closure of a hazardous waste surface impoundment: (1) Closure in place; or (2) closure by removal. The closure-in-place option requires dewatering of the impoundment and stabilization of the waste. Then, the impoundment must be covered with an impervious cap. The owner/operator must provide 30 years of monitoring at the site. If all contaminated material is removed, post-closure care may not be necessary.

The proposed hybrid closure rule would combine the capping and removal options. The majority of contaminated materials would still have to be removed; however, the cover and post-closure care could be designed based on the exposure pathway of concern. These pathways are: Surface water; direct contact; groundwater; and atmospheric releases. This approach gives the EPA Regional Administrator, or the authorized State, broad guidelines under which to evaluate a proposed hybrid closure. These guidelines consist of a number of factors which must be considered when a design for a
hybrid system is submitted. The guidelines are designed to ensure that wastes or waste residues will not pose a threat to human health or the environment.

The factors to be considered in a hybrid closure plan include, at a minimum:

1. Potential adverse effects on groundwater;
2. Potential adverse effects on surface water;
3. Potential adverse effects of direct contact;
4. Potential adverse effects caused by a release to the atmosphere; and
5. The engineered characteristics of the closure.

EPA expects to limit the use of this mechanism to situations where residual hazardous constituents are present in low concentrations or of low toxicity and have low mobilities, where migration of the waste residuals to any medium is unlikely, and where long-term monitoring is guaranteed. To obtain approval for a hybrid closure plan, the owner or operator of a facility will be required to submit site-specific data which will address these concerns. Further, EPA will require monitoring to verify the data used to design the hybrid closure plan.

General Goodwin also discussed the proposal to delist that HAFB submitted to EPA's Headquarters. My staff sent Marcia Williams, the Director of the Office of Solid Waste, a letter asking her to personally attend to this matter. I expect her to reply either directly to General Goodwin or myself, in which case I will pass along her comments.

A member of my RCRA enforcement staff will be calling you soon to discuss the continuing enforcement action and possible resolution of the case.
General Roy Goodwin  
Director, Engineering Services  
HQ TAC/DE  
Langley AFB, Virginia 23665-5001

Dear General Goodwin:

In response to your inquiries on the status of the petition by Holloman Air Force Base (HAFB) to exclude the wastes contained in seven on-site surface impoundments and two lakes from regulation as hazardous wastes, a chronology of the progress of the petition (#0660) has been compiled. The chronology summarizes the meetings between HAFB and EPA representatives and outlines the progress that has been made concerning the major outstanding issues that were discussed at these meetings.

EPA and Air Force representatives have met three times to discuss delisting options and issues for their treatment train system. The impoundment train, which was established to treat the base's domestic sewage, also received hazardous wastes. Therefore, under the "mixture rule" [40 C.F.R. 261.3(b)(2)], the waste contained in the seven impoundments, Lake Holloman, and Lake Stinky is considered to be hazardous.

At the first meeting on August 29, 1986, Air Force officials submitted background information and preliminary sampling data. EPA and Air Force representatives met again in November 1986 to discuss the results of the EPA evaluation of the information that was submitted at the August meeting. The meeting focused on the additional data that would be needed to complete the delisting petition. Three major issues were discussed at this meeting: sampling requirements, analytical requirements, and ground water monitoring needs.

**Sampling**

Air Force officials were informed that to properly characterize the waste and evaluate its uniformity and variability, previously established delisting policy on sampling would require the collection and analysis of over 1,600 composite samples (439 of impoundment sludge, 439 of impoundment liquid, and 723 of lake water and soils).
In addition, they were informed that, generally, delisting decisions are based on the maximum detected concentrations of hazardous constituents for which the waste is analyzed. However, a mean concentration value may be used if a sufficient number of samples is collected, but this approach would greatly increase the number of samples required for characterization.

Analysis --

Air Force officials were informed that they would have to analyze each composite for all Appendix VIII constituents in order to fully characterize the waste as required under the Hazardous and Solid Waste Amendments of 1984. Petitioners can deviate from this requirement only if they can demonstrate through historical records and/or raw material input information that certain Appendix VIII constituents cannot be present in the waste. Air Force officials were concerned that their records could not support such a deviation from the requirements.

Groundwater --

Air Force officials were informed that a complete delisting petition should include four quarters of groundwater monitoring data from a system that had been inspected and approved by EPA Region VI authorities.

The meeting concluded with the understanding that Air Force officials would evaluate this information and decide whether to pursue a delisting.

The third meeting between EPA and Air Force representatives on February 6, 1987 focused on Air Force requests for possible allowances to delisting sampling and analytical requirements due to the large volume of waste involved. EPA agreed to re-evaluate the issue.

We understand that in June, based on telephone communications with Agency staff, Will Focht (formerly of EPA's Region VI office) informed Air Force officials that the EPA was still evaluating the remaining outstanding issues regarding delisting a portion of the treatment train, removal of "hot spots," and more lenient sampling and testing requirements. The present status of each of these issues is as follows.
Delisting Portions of Treatment Trains --

At the February meeting, Air Force officials were informed that only the entire treatment train, not portions of it, could be subject to delisting. The Air Force believes that contamination of one impoundment in a series (or "treatment train") does not imply contamination of all impoundments in that train. Thus, even though two of the impoundments are showing PCB contamination, they believe that the remaining five impoundments and two lakes should be delisted if they meet all of our delisting criteria.

In a recent Agency meeting, it was determined that we may consider a petitioner's request to delist portions of a treatment train. This policy change would therefore, allow Holloman AFB to submit a petition for separate units of their treatment train if they so choose.

Hot Spot Removal --

The Air Force has requested that the Agency consider its petition after the removal of areas of highly localized contamination (or "hot spots") from the two contaminated impoundments. Thus, we would eliminate from consideration the failing samples that were collected from these areas. Holloman officials believe that if these samples are not considered, that all seven impoundments will meet delisting standards.

We agree that in some cases, hot-spot removal is an acceptable method for removing localized contamination from a generally homogeneous waste. We also agree that removal of hot spots can, assuming that the remaining waste meets delisting standards, yield a waste that can be delisted under 40 C.F.R. §260.22. In such cases, we will require that the petitioner demonstrate, prior to removal, that the hot spot(s) represents a localized compositional abnormality in a homogeneous waste and explain how the abnormality formed. After removal, the petitioner must demonstrate that the waste is uniformly non-hazardous (by delisting standards) throughout the unit. This demonstration will include more concentrated sampling in the vicinity of the hot spot removal.
Sampling and Analytical Requirements

EPA has re-evaluated the Air Force's request to reduce the number of samples to be taken for analysis and agrees that the large size of the impoundments and lakes in question may warrant a departure from standard procedure. A statistically valid characterization of these impoundment wastes may be achieved with a fewer number of samples. We are developing guidelines for a sampling approach that would be appropriate for the Holloman situation and hope to reduce the number of samples required.

We will continue to require a full Appendix VIII analysis of all samples since a complete history of the chemicals disposed in the area is not available. As noted previously, this complete analysis will be required to ensure that all hazardous constituents that have been disposed in the impoundments are properly characterized. The background information and preliminary sampling data illustrate several inconsistencies in the Air Force's disposal records; for example, there is no mention of transformer oil disposal in the impoundments, however, the waste is contaminated with PCBs and 1,2,4-trichlorobenzene, two constituents commonly found in transformer oils.

I hope that this chronology has satisfied your request and clarifies the Agency's position on the major issues involved with the delisting of the impoundment train at HAFB.

If you have any questions, please do not hesitate to contact me at (202) 362-4788.

Sincerely,

Myles E. Morse, Chief
Variances Section

cc: Robert J. Andreoli, HAFB
Lt. Col. Warren Hull, DOD Liaison to EPA
Kevin Palmer, SAIC
Robert J. Tafanelli
3937 Westview Avenue
Las Cruces, NM 88005

December 11, 1987

Mr. Glen Saums
New Mexico Environmental Improvement Division
P.O. Box 968
Runnels Building
Santa Fe, NM 87504-0968

Dear Mr. Saums:

I have been interested in Holoman Lake in Otero County for several years. As you know, it is a highly eutrophic lake with sharp oxygen fluctuations as well as an oasis in the desert for birds, especially shore birds.

In discussing the situation with several people, we have reason to believe that the Industrial Biomedical Complex is releasing effluent containing heavy metals as well as other contaminants into the lake. We would appreciate it very much if you could investigate this matter. I would also appreciate knowing your findings.

Thank you for your assistance in this matter.

Sincerely,

Robert J. Tafanelli
RJT:cjs
January 14, 1988

Mr. Myron Knudson, Director
U. S. Environmental Protection Agency (EPA)
Water Management Division
Allied Bank Tower, 12th Floor
1445 Ross Avenue
Dallas, Texas 75202-2733

Re: Holloman Lake in Otero County, New Mexico

Dear Mr. Knudson:

The New Mexico Environmental Improvement Division-Surface Water Quality Bureau requests that EPA make a determination to see if Holloman Lake meets the definition of waters of the United States, pursuant to 40 CFR 122.2.

The New Mexico Environmental Improvement Division-Surface Water Section (EID-SWS) received a letter from Mr. Robert J. Tafanelli dated December 11, 1987 (attachment enclosed). Mr. Tafanelli had concerns that an Industrial Biomedical Complex was releasing effluent that contained heavy metals as well as other contaminants into Holloman Lake in Otero County, New Mexico. According to Mr. Tafanelli this lake is highly eutrophic and serves as a oasis in the desert for birds, especially shoreline birds. Investigation by our office indicated that Holloman Lake is located adjacent to the Holloman Air Force Base (HAFB), also in Otero County. Glenn Saums, EID-SWS, contacted Mr. Ron Schotter (505) 479-3496, of the Civil Engineering Group at HAFB and discussed the situation. Mr. Schotter explained that Holloman Lake is a natural playa lake (map enclosed) which receives discharge from lagoon G, part of the wastewater system at HAFB. Holloman Lake also receives stormwater runoff from HAFB and since the ground water level is high in the area, the base has a series of ground water drains which discharge to the lake. Mr. Schotter indicated that the New Mexico State University does private research at the HAFB. This may be the aforementioned Biomedical Complex that Mr. Tafanelli was referring to. Lake Holloman is apparently artificially perennial because of effluent and ground water drainage received from the base.

If Holloman does meet the definition as a watercourse of the U.S., will EPA need to pursue an NPDES permit? We would appreciate your response to this situation, as soon as possible, so that this problem can be resolved. We thank you for your time and assistance. If you have any questions please contact Glenn Saums at (505) 827-2795.
Sincerely,

Kathleen M. Sisneros  
Bureau Chief  
Surface Water Quality Bureau

MS/ms

Enclosures

xc: Greg Lewis, Ground Water Bureau  
Kirk Jones, NMEID Directors Office  
Robert Tafanelli  
Ron Schotter, HAFB  
NMEID Alamogordo Field Office
Ms. Kathy Sisneros, Chief
Surface Water Quality Bureau
New Mexico Environmental Improvement Division
P.O. Box 968
Santa Fe, New Mexico 87504-0968

Dear Ms. Sisneros:

This letter is in response to your request that EPA make a determination on whether Holloman Lake in Otero County, New Mexico, meets the definition of "waters of the United States," pursuant to 40 CFR 122.2. I understand that you received a letter from a citizen, Mr. Tafanelli, who is concerned about the discharge of effluent from Holloman Air Force Base into a series of impoundments which ultimately empty into Holloman Lake. Mr. Tafanelli is apparently concerned about the impact potential contamination may be having on shoreline birds which visit the lake.

I would like to assure you that the situation at Holloman Lake is currently being addressed through the Resource Conservation and Recovery Act (RCRA). Pursuant to a draft compliance agreement recently negotiated with the Air Force base, actions are being taken to determine the presence or extent of contaminants in the lake and adjacent impoundments. Research completed to date consists of a hydrogeologic investigation of the area. Once the agreement is final, additional research will include water and sludge sampling of Holloman Lake and the series of impoundments, as well as the development of a groundwater monitoring system.

It would be possible to make a determination regarding the status of Holloman Lake pursuant to 40 CFR 122.2. However, it is doubtful that selecting this alternate regulatory avenue at this time would expedite the identification of environmental problems associated with the lake. I feel it would be more beneficial to continue working through RCRA, at least for now, than proceed on a separate and possibly duplicative track. If you feel
the situation is not being addressed adequately through this ongoing effort, please feel free to contact me and we can discuss this further.

Sincerely yours,

/S/ Myron O. Knudson

Myron O. Knudson, P.E.
Director
Water Management Division (6W)

cc: Kirkland Jones, NHEIS
    Directors' Office
    Glenn Sauts, NHEIS
    Surface Water Quality Bureau
    Greg Lewis, NHEIS-Ground Water Bureau
    NHEIS Alamogordo Field Office
    Terry Boone, HAFB
July 15, 1988

The Honorable Jeff Bingaman
United States Senate
Washington, D.C. 20510-0001

Dear Senator Bingaman:

I have reviewed the June 3, 1988, Memorandum prepared by the Subcommittee on Oversight and Investigations, Committee on Energy and Commerce, House of Representatives, on Department of Defense (DoD) and Department of Energy (DOE) compliance with hazardous waste laws. Please accept my perspective on the findings and conclusions for the three Air Force installations included in the Memorandum: Holloman Air Force Base, New Mexico, Reese Air Force Base, Texas, and McClellan Air Force Base, California. Before getting into the specifics, let me state that the Air Force is committed to compliance with hazardous waste laws and regulations. We are working this complex and demanding program aggressively. This organization has devoted over one-half billion dollars to date finding and fixing contaminated sites caused by past activities. We are also emphasizing current operations compliance and have several initiatives underway in hazardous waste minimization. I believe many of our activities are at the very forefront of this important national effort. We still have work ahead of us, and we are constantly encountering new requirements, but our commitment and efforts are strong and comprehensive.

The attached fact sheets provide specific details of the situation at each of the aforementioned installations. I believe these installations have aggressively worked their RCRA programs. This work has been extensively coordinated with state environmental offices and the EPA. The bases have, however, often had to act in absence of EPA input in order to progress with needed corrective actions. Each installation has solved or is moving toward resolution of the problems identified by EPA. These actions have been taken and will continue to be taken whether or not a compliance agreement is in effect. These actions include such things as well installation, groundwater monitoring, surface and sediment characterization, design and remediation projects. The Air Force has never viewed agreements as being a necessary prerequisite for action.

Letter also sent to Senator Domenici and Representative Skeen
We do not hesitate to apply resources to environmental problems. We have expended over four million dollars at Holloman, Reese and McClellan Air Force Bases directly related to the RCRA compliance issues. However, we are concerned about expending our increasingly scarce resources to address problems resulting from an unnecessarily restrictive application of the RCRA "mixture rule". At Holloman Air Force Base, for example, we have high volumes of sanitary wastewater containing extremely low concentrations of hazardous constituents introduced into the lagoon system as a result of small spills and releases of hazardous materials prior to 1984. The area groundwater quality is poor due to naturally occurring dissolved salts, and the closest down gradient potable water well is over 14 miles away. Large expenditures to remove sludges with extremely small concentrations of hazardous materials in order to achieve "complete closure" will not appreciably improve environmental quality. We believe such massive efforts may be ill-advised and not what Congress envisioned when RCRA was enacted.

Groundwater monitoring wells for the facilities in question exist at each of the three bases. Monitoring at Reese and Holloman have failed to show significant contamination. The facilities at these bases are sanitary sewage treatment units and received only small amounts of hazardous waste as a result of past practices. Our analytical results substantiate this condition and groundwater impacts from these lagoons are comparable to that of similar municipal sewage ponds. The monitoring program at the McClellan facility is inconclusive since it cannot distinguish if the groundwater contamination is from the RCRA regulated surface units or underlying CERCLA/SARA disposal sites. In recognition of the difficulty in conducting a groundwater monitoring program at McClellan, the state requested and received concurrence from EPA to defer current RCRA groundwater monitoring and postclosure requirements to the Installation Restoration Program investigative efforts. We have spent over 11 million dollars at McClellan to monitor and investigate groundwater problems--over 25 million dollars have been spent on actual cleanup measures. We have focussed on assuring that proper investigation and cleanup of groundwater is occurring, and less on whether the contamination was caused by a "RCRA facility" or a "CERCLA site". This focus on environmental enhancement may have inadvertently led to misinterpretations of administrative requirements associated with enforcement of regulations intended for simpler situations. In any event, however, I believe our focus is the correct one--for both the environment and the taxpayer.
In summary, Holloman, Reese and McClellan Air Force Bases have made outstanding progress in the face of unusually complex and difficult regulatory and administrative issues. I appreciate this opportunity to share my thoughts on the RCRA Significant Non-compliance Report and your support for Air Force environmental programs.

Sincerely,

GARY D. VEST
Deputy Assistant Secretary of the Air Force (Environment, Safety and Occupational Health)

Attachments
SEP 18 1988

Colonel William Koelm, USAF
Commander
333 Combat Support Group
Holloman Air Force Base, New Mexico 88330

Dear Colonel Koelm:

At the August 18, 1988, meeting between HAFB and EPA, you presented, for Region VI's consideration, a plan to remove sludge from sewage treatment lagoons A and B. As we understand it, this plan is neither part of a delisting petition nor a closure plan. We do not believe that there is a regulatory requirement for HAFB to seek agency approval for removal of the waste or for EPA to grant or deny such approval, provided that the removal of wastes does not constitute closure. Moreover, as you are aware, EPA Region VI has no authority to approve closure plans in the State of New Mexico.

EPA generally encourages activities at facilities that tend to protect the environment and reduce the potential for migration of hazardous waste. The hot spot removal project appears to have merit in this regard. However, EPA cannot grant HAFB a release from future environmental responsibilities based on this project. Please be aware that completion of this project could not be considered closure as that term is defined in the Resource Conservation and Recovery Act (RCRA) and HAFB would still be subject to the RCRA closure requirements for these lagoons. Further, EPA or NMEID may require additional remedial work on these units. Finally, if HAFB should ever be considered for inclusion of the Superfund National Priorities List, the Agency will consider the historical maximum extent of contamination in evaluating the potential hazards presented by the site.

If you have any additional questions please call me or have your staff call Court Fesmire at (214) 655-6775.

Sincerely yours,

Allyn M. Davis
Director
Hazardous Waste Management Division (6-H)
IN THE MATTER OF:
HOLLOMAN AIR FORCE BASE
HOLLOMAN AFB, NEW MEXICO
EPA I. D. No. NM6572124422

DOCKET NUMBER
RCRA VI-502-H and VI-661-H

FEDERAL FACILITIES
COMPLIANCE AGREEMENT

PRELIMINARY STATEMENT

Complainant, the Director of the Hazardous Waste Management Division (formerly the Air and Waste Management Division), EPA, Region VI, on behalf of the Administrator of the United States Environmental Protection Agency (EPA), filed two (2) Notices of Noncompliance, Compliance Schedules and Notices of Necessity for Conference (Notices) against Holloman Air Force Base, Department of the Air Force (Holloman or Respondent), in which Complainant alleged violations of the Resource Conservation and Recovery Act of 1976 (RCRA or The Act) (as amended), 42 U.S.C. §§6921 - 6991 and the New Mexico Hazardous Waste Act, N.M. Stat. Ann. §§74-4-1 thru 74-4-12 (1978). Those Notices, filed August 23, 1985 and February 4, 1987, and docketed as RCRA VI-502-H and RCRA VI-661-H, respectively, are appended to and made part of this Agreement (Appendix A). Complainant, as duly authorized delegatee of the Administrator of the EPA, the New Mexico Environmental Improvement Division (NMEID) and Respondent, as duly authorized delegatee of the United States Department of the Air Force, hereby consent to entry of
this Agreement, without trial or hearing, in resolution of all the issues raised by the aforementioned Notices. All provisions, conditions and terms of the corrective measures to be taken, the schedule for achieving compliance and the requirements for reporting progress are integrated in this Agreement and its attachments, and documented herein. Any parol agreements not incorporated herein are null and void.

NOW THEREFORE, it is ORDERED, ADJUDGED and AGREED as follows:

I. ENFORCEABILITY

For purposes of this Agreement and all consequent proceedings, Holloman admits the jurisdictional allegations of the Notices. Holloman neither admits nor denies specific factual allegations contained in those Notices.

Holloman recognizes its obligations to comply with RCRA as set forth in Section 6001 of RCRA.

The provisions of this Agreement, including those related to statutory requirements, regulations, permits, closure plans, or corrective action, including recordkeeping, reporting and schedules of compliance, shall be enforceable under citizen suits by the State and its agencies. Holloman agrees that the State and its agencies are a "person" within the meaning of Section 7002(a) of RCRA.

In the event of any action filed under Section 7002(a) of RCRA alleging any violation of any such requirement of this Agreement, it shall be presumed that the provisions of this Agreement, including those provisions which address recordkeeping, reporting, and schedules of compliance, are related to statutory requirements, regulations, permits, closure plans, or corrective action, and are thus enforceable under Section 7002(a) of RCRA.
II. COMPUTATION OF TIME

Unless otherwise specified in this document, all time periods delineated are to be computed from the date this Agreement is signed by Complainant. All time periods are to be calculated as calendar days, not working days, unless otherwise specified.

III. BINDING EFFECT

This Agreement shall apply to and be binding upon the Complainant, the Respondent, the United States Environmental Protection Agency, the State of New Mexico, the United States Department of the Air Force and all officers, directors, agents, trustees, servants, employees, successors or assigns of the named parties as well as upon all persons, firms and other legally cognizable entities in active concert or participation with the named parties.

IV. OBJECTIVES

All plans, studies, construction, maintenance and monitoring programs and other obligations created directly or indirectly by this Agreement shall be implemented in a manner calculated to bring the Respondent into compliance with Subtitle C of the Resource Conservation and Recovery Act as well as provisions of other applicable Federal and State permits, laws and regulations.

V. DEFINITIONS

As used in this Agreement:


"Binding" means to be legally enforceable upon. Those entities bound by this Agreement are constrained and compelled to act in accord with the terms herein contained.
"Reviewers" means the following persons or their designees:
1) For Complainant: Section Chief, ALONM Section, RCRA Enforcement Branch, and Counsel.
2) For NMEID: Program Manager, Hazardous Waste Section, Groundwater and Hazardous Waste Bureau, and Counsel.
3) For Respondent: Commander, 833 Combat Support Group, Holloman Air Force Base, New Mexico, and Counsel.

"Submit" means to mail, certified, return-receipt requested, the specified number of copies of the applicable documentation to the following individuals or their successors in interest:

Mr. Courtland Fesmire, Environmental Engineer
U. S. Environmental Protection Agency, Region VI, 6H-CS
First Interstate Bank Tower
1445 Ross Avenue
Dallas, Texas 75202-2733
[Two (2) copies]

Mr. Mark Peycke, Assistant Regional Counsel
U. S. Environmental Protection Agency, Region VI, 6C-H
First Interstate Bank Tower
1445 Ross Avenue
Dallas, Texas 75202-2733
[One (1) copy]

Mr. Boyd Hamilton, Program Manager
Hazardous Waste Bureau
Environmental Improvement Division
New Mexico Health and Environment Department
P. O. Box 968
Santa Fe, New Mexico 87504
[One (1) copy]

VI. CORRECTIVE MEASURES

A. Identification of Alleged Violations

RCRA Notice VI-502-H alleges twelve (12) separate and distinct violations of the Act, which may be summarized as follows:

1. Failing to submit proper notification of hazardous waste activity,
2. Operating surface impoundments without a permit,
3. Failing to submit a complete Federal Part A Permit Application,
4. Maintaining an inadequate inspection log,
5. Providing inadequate personnel training,

6. Maintaining leaking containers of hazardous wastes,

7. Maintaining open containers in which hazardous wastes were stored,

8. Improperly handling containers of hazardous wastes,

9. Failing to install a groundwater monitoring system,

10. Failing to submit for approval an adequate closure plan for hazardous waste surface impoundments,

11. Failing to draft and implement an adequate Waste Analysis Plan, and

12. Providing inadequate security in hazardous waste disposal and treatment areas.

The full text of these allegations and the specific regulatory requirements violated are set out in the appended, incorporated Notice numbered RCRA VI-502-H.

RCRA Notice VI-661-H alleges that Respondent's facility lost interim status authorization to operate its surface impoundments on November 8, 1985, and realleges Respondent's failure to submit an adequate closure plan for hazardous waste surface impoundments. The full text of these allegations is set out in the appended, incorporated Notice numbered RCRA VI-661-H.

B. Resolution of Alleged Violations Numbered 1, 2, 3, 4, 5, 6, 7, 8, 11 and 12.

Without waiving their right to proceed against future violations of any nature, Complainant and the Director of the NMEID hereby acknowledge that Holloman has addressed and resolved those past violations cited in the Notice VI-502-H as:

1. Failing to submit proper notification of hazardous waste activity,

2. Operating surface impoundments without a permit,

3. Failing to submit a complete Federal Part A Permit Application,
4. Maintaining an inadequate inspection log,
5. Providing inadequate personnel training,
6. Maintaining leaking containers of hazardous wastes,
7. Maintaining open containers in which hazardous wastes were stored,
8. Improperly handling containers of hazardous wastes,
11. Failing to draft and implement an adequate Waste Analysis Plan, and
12. Providing inadequate security in hazardous waste disposal and treatment areas.

The Respondent agrees to continue implementation of those corrective measures heretofore commenced in rectification of those violations reiterated in this paragraph. Upon signing of this Compliance Agreement and Final Order by all signatories, violations 1 - 8, 11 and 12 shall be deemed settled, satisfied and closed.

C. Resolution of Alleged Violation Number 9 and of Notice VI-661-H.

In resolution of alleged violation number nine (9) of Notice VI-502-H — failing to install a ground water monitoring system — and also in resolution of that portion of Notice VI-661-H not pertaining to closure plans, Respondent agrees to comply with 40 CFR Part 265, Subpart F, by either installing and operating a ground water monitoring system at its hazardous waste surface impoundments or by obtaining a waiver under 40 CFR §265.90(c). If a system is installed it will comply with the regulatory requirements of Title 40, Part 265, Subpart F of the Code of Federal Regulations and will be designed, constructed and operated pursuant to the following conditions and schedule:

2. Within sixty (60) days of signing this agreement, Respondent shall submit the findings and a proposal to install a ground
water monitoring system. Said proposal shall contain an implementation schedule and, if installation of a ground water monitoring system is proposed, the proposed system shall conform with the Technical Enforcement Guidance Document and the proposal shall include a Groundwater Sampling and Analysis Plan. Reviewers shall approve or shall provide their comments on the report and demands for modification, if any, to Respondent within thirty (30) days of receipt of the findings of the Hydrogeologic Investigation and Proposed Groundwater Monitoring Plan. Should further investigation be proposed by Respondent or demanded by Reviewer, Respondent shall submit a modified proposal, including an implementation schedule, for conducting the secondary investigation within sixty (60) days of submitting the original findings or receipt of the demands. Reviewers shall review said proposal, modify it as necessary to ensure that the investigation will provide information requisite to effective application of Subpart F, Part 265, Title 40 of the Code of Federal Regulations and approve same, as modified.

3. Within thirty (30) days of approval of the secondary investigation, if any is required, Respondent shall commence same and shall proceed in accord with the design and schedules it contains.

4. Within sixty (60) days of completion of the secondary investigation, if any, Respondent shall submit the findings and a proposal to install a ground water monitoring system.

5. Reviewers and Respondent shall review the proposed ground water monitoring system in light of the findings of the HIP and any secondary investigations. They shall, via negotiations, derive and approve a ground water monitoring system plan. If no approvable plan is consensually derived, an approved ground water monitoring system plan will be achieved via Dispute Resolution procedures.

6. Within thirty (30) days of approval of a proposed ground water monitoring system, Respondent shall commence installation of same. Installation shall proceed in accord with approved schedules.

7. Within thirty (30) days of completion of installation Respondent shall submit a ground water monitoring installation report prepared and certified by a Registered Professional Engineer. Said report must contain, at a minimum, comparisons of as-built details with proposed construction details and boring logs demonstrating that the system was constructed as designed.

8. The ground water monitoring installation report shall be reviewed by Reviewers who shall determine whether the system constructed conforms to the approved design. If the constructed system differs from the approved design the Reviewers may
demand modification of the system as constructed. Reviewers will provide their comments on the report and demands for modification, if any, to Respondent within forty-five (45) days of receipt of the ground water monitoring installation report. Within forty-five (45) days of receipt of the demands, if any, Respondent shall modify the system as demanded.

9. Notwithstanding pending modifications that the Reviewers require, if any, Respondent shall commence ground water sampling in conformance with the Ground Water Sampling and Analysis Plan developed and approved pursuant to Condition 2. Said sampling shall be repeated monthly over five (5) consecutive months, the first four (4) samplings to be used in establishing initial background concentrations of parameters specified in 40 CFR §265.92(b)(1986) and the fifth sampling as detection monitoring. Thereafter detection monitoring shall proceed at the frequencies prescribed in 40 CFR §265.92(d)(1986).

10. Within fifteen (15) days of receipt of laboratory analyses for each of the four sampling replicates, Respondents shall submit a copy of said results.

11. Subsequent to the second sampling replicate but prior to submittal of the analysis of the fifth sampling replicate, Respondent shall submit to Complainant and NMEID a Ground Water Assessment Monitoring Outline that complies with 40 CFR §265.93.

12. Within thirty (30) days of receipt of analysis of the fifth sampling replicate, Respondent shall submit a report summarizing the ground water monitoring results theretofore acquired. Said report shall statistically interpret the data in accordance with the techniques approved in the Ground Water Sampling and Analysis Plan.

13. The report submitted pursuant to Condition Twelve (12) shall be reviewed by Respondent and Reviewers and from that review a determination of the facility's impact on the uppermost aquifer shall be derived.

If the impact warrants institution of Assessment Monitoring, Respondent shall, within fifteen (15) days, submit a Ground Water Quality Assessment Plan drafted in accord with the dictates of 40 CFR §265.93(d)(3)(1986) and the Assessment Monitoring Outline prepared pursuant to Condition Eleven (11).

If the Reviewers agree that the findings then known do not warrant institution of Assessment Monitoring at that time, Respondent shall continue ground water monitoring in accord with its Sampling and Analysis Plan and 40 CFR §265.92 (1986).

14. When a final determination of the facility's impact on the uppermost aquifer is achieved, and after a ground water mon-
itoring assessment plan has been approved and implemented, if warranted, alleged violation number nine (9) of Notice VI-502-H and that portion of Notice VI-661-H not pertaining to closure plans shall be deemed settled, satisfied and closed. Complainant shall then notify Respondent that it has fulfilled its obligations in resolution of those allegations.

D. Resolution of Alleged Violation Number 10 and of Notice VI-661-H.

1. Within thirty (30) days Respondent shall submit a closure plan, based upon information then available, that accords Title 40, Part 265, Subparts G and K, Code of Federal Regulations (1986) closure plan requirements for hazardous waste surface impoundments.

2. The closure plan will be reviewed by NMEID in accordance with 40 CFR 265.112 and New Mexico Hazardous Waste Management Regulations Section Part 6. During this review period NMEID and Respondent may discuss the closure plan. After its review, NMEID shall submit the closure plan with its comments to Complainant. Complainant shall then process the closure plan to the approachable stage.

3. Upon notice to Respondent, by Complainant, that the closure plan is approachable, further resolution of alleged violation number ten (10) and that portion of Notice VI-661-H pertaining to closure plans shall be subject to the provisions of part VI.E. of this Agreement.

4. Upon approval of the closure plan by Complainant, Respondent shall close in accord with the plan and all applicable federal and state regulations, but if Respondent contests the terms of the approved closure plan, Complainant and Respondent shall resolve that contest via the dispute resolution provisions contained in paragraph XI of the Agreement.

5. Once the closure plan has been approved and finalized by Complainant, NMEID shall have the option of either monitoring the implementation of the closure plan itself, or referring implementation of the closure plan to Complainant. Implementation of the closure plan shall be according to applicable state and federal regulations. Any disputes regarding implementation of the closure plan shall be resolved between Complainant and Respondent, in accordance with the Dispute Resolution provision contained herein.

6. Respondent shall certify completion of closure to either Complainant or NMEID (whichever agency is monitoring implementation of the closure plan). Once closure certification has been formally accepted by either Complainant or NMEID, Complainant shall notify Respondent within forty-five (45) days that it has fulfilled its obligations in resolution of alleged violation number ten (10) of Notice VI-502-H and of those portions of Notice VI-661-H pertaining to closure plans and that those charges are deemed settled, satisfied and closed.
E. Covenant to Delay Compliance With Corrective Measure VI. D. Pending EPA Headquarter's Final Decision on Respondent's Petition to Delist Its Hazardous Wastes.

Acknowledgments and Caveats

1. Complainant and NMEID acknowledge that Respondent has filed with the Headquarters of the United States Environmental Protection Agency (HQ), preliminary data and a proposal for delisting the hazardous waste received by, or generated in, the Respondent's hazardous waste surface impoundments. That proposal did not contain all the information requisite to a delisting petition and was merely a step toward development of such a petition.

2. This covenant to delay is conditioned upon Respondent's good faith development and pursuit of a delisting petition.

For purposes of this covenant, "good faith" is defined as compliance with final, agreed courses of action developed pursuant to paragraph VI. E. 5. of this Covenant.

Should Complainant come to believe that Respondent has deviated from good faith compliance with any final agreed course of action to be taken pursuant to this Covenant, Complainant shall notify Respondent of the basis for its belief. Thereafter Respondent shall, within thirty (30) days, respond to Complainant's concerns. If, after consideration of Respondent's response, Complainant continues to believe that Respondent has deviated from good faith, Complainant shall proceed with approval of Respondent's closure plan in accord with then applicable regulations, and further resolution of alleged violation number ten (10) and that portion of Notice VI-661-H pertaining to closure plans shall thereafter proceed in accord with Conditions VI. D. 4, 5 and 6 of this Agreement.

3. If Respondent withdraws its proposal or its petition from consideration, Respondent shall immediately notify Complainant of this decision. Complainant shall then proceed with approval of Respondent's closure plan in accord with then applicable regulations and further resolution of alleged violation number ten (10) and that portion of Notice VI-661-H pertaining to closure plans shall thereafter proceed in accordance with Conditions VI. D. 4, 5 and 6 of this Agreement.

4. In a meeting at HQ, held February 6, 1987 and attended by representatives of Complainant, Respondent and HQ, Respondent was informed by HQ that additional information would have to be submitted before the proposal for delisting would be considered a petition. HQ informed Respondent that formal written comments on the proposal and calls for revision of the proposal would be formulated and forwarded by HQ to Respondent.
Actions

5. Within fifteen (15) days of receipt of comments, Respondent shall request a meeting with HQ to resolve issues raised by the comments. Said meeting will take place within fifteen (15) days of the request unless HQ dictates otherwise. At the meeting, all parties shall attempt to set a schedule of what must be done and when it will be done. If no agreed schedules are developed at the meeting, they will be developed via Dispute Resolution procedures. When an agreed schedule is developed it shall be documented by a party designated to do.

6. Immediately upon development of the final, agreed course of action, Respondent shall commence the approved activities.

7. If, subsequent to completion of the final, agreed course of action, HQ again finds that the petition is not complete HQ shall provide Respondent with additional comments that explicitly delineate the deficiencies in Respondent's petition and the parties shall repeat step five (5). The process shall be repeated until Respondent withdraws its petition from consideration or until the petition is judged complete by HQ.

8. If Respondent's petition is granted by HQ, Complainant shall notify Respondent that it has fulfilled its obligations in resolution of alleged violation number ten (10) and that portion of Notice VI-661-H pertaining to closure plans.

If Respondent's petition is denied by HQ, the Complainant shall proceed with approval of Respondent's closure plan and further actions in resolution of alleged violation number ten (10) and that portion of Notice VI-661-H pertaining to closure plans shall thereafter proceed in accordance with Conditions VI. D. 4, 5 and 6 of this Agreement.

VII. PROHIBITION

Respondent is proscribed from adding or discharging hazardous wastes to its surface impoundments unless in accordance with a RCRA permit.

VIII. FUNDING

Respondent shall request, through the Department of the Air Force and the Department of Defense, all funds and/or authorizations necessary to meet the conditions of this Agreement. With regard to funding, the timetables, schedules and courses of action reached in implementation of this Agreement are fixed and definite except to the extent that the Congress of the United States may fail to approve authorizations and/or appropriations requests.
necessary to execute them. [Although failure to obtain approval of adequate authorization and/or appropriations from Congress may alter the established timetable and schedules in accordance with paragraph IX, Force Majeure, it does not release Holloman from its obligations of compliance with the Resource Conservation and Recovery Act, as amended, 42 U.S.C. 6901 et seq. If sufficient funds are not appropriated by the Congress as requested and existing funds are not available to achieve compliance with the schedules provided in this agreement, and the Respondent reports the lack of funds in accordance with Section X, Reporting Requirements and Extensions, then pursuant to Section X, the compliance schedule shall be revised as necessary.]

IX. FORCE MAJEURE

A Force Majeure shall mean any event arising from causes beyond the control of Holloman AFB which causes a delay in or prevents the performance of any obligation under this Agreement. Force Majeure includes but is not limited to, acts of God; fire; war; insurrection; civil disturbance; explosion; adverse weather conditions that could not be reasonably anticipated; unusual delays in transportation, beyond the control of Holloman AFB; restraint by court order or order of public authority; inability to obtain, at reasonable cost and after exercise of reasonable diligence, any necessary authorizations, approvals, permits, or licenses due to action or inaction of any governmental agency or authority other than the Air Force; delays caused by compliance with applicable statutes or regulations governing contracting, procurement or acquisition procedures, despite the exercise of reasonable diligence; and failure to obtain approval of adequate authorizations and/or appropriations from Congress, if Holloman shall have made timely request for such funds as part of the budgetary process as set forth in Part VIII (Funding) of this
Agreement. A Force Majeure shall also include any strike or other labor dispute, whether or not within the control of the Parties affected hereby. Force Majeure shall not include increased costs of activities covered by this Agreement, whether or not anticipated at the time such activities were initiated.

X. REPORTING AND EXTENSIONS

Commencing at the end of the first full quarter after Complainant signs this Agreement, Respondent shall submit a quarterly progress report by the fifth (5th) working day of each fourth month. Progress reports shall summarize the efforts undertaken pursuant to this Agreement during the previous quarter.

In addition to regularly scheduled progress reports, Respondent shall immediately submit notification to the Complainant and the MEID whenever any delay is anticipated in meeting any scheduled compliance date (e.g., an event of Force Majeure). The notification shall describe in detail the anticipated length of delay, the precise cause or causes of the delay, when and how Respondent became aware of the causes of the delay, the measures taken and to be taken to prevent or minimize the delay (or similar, future delays) and the alternative timetable by which the measures shall be implemented. Within five (5) days of receiving such notification, Complainant shall make a determination whether the compliance schedule shall be revised. If Respondent disagrees with the Complainant's determination, Dispute Resolution procedures described herein shall control. If Complainant does not respond within fourteen (14) days to Respondent's notification, Respondent's alternative timetables shall be deemed approved.
XI. EMPOWERMENT TO AMEND

In the event that there is an amendment of the RCRA, or the NMHWA, or the regulations promulgated under those statutes, or in the event that any portion of Respondent's system of surface impoundments is declared Waters of the United States, or in the event that amendments to this Agreement are dictated by dispute resolvers pursuant to section XI of this Agreement, the effected provisions of this Agreement will be renegotiated as necessary. Disagreements in renegotiation shall be resolved pursuant to the Dispute Resolution provision of this Agreement. During the pendency of any request for renegotiation, this Compliance Agreement, to the extent it is not specifically abrogated by Complainant, shall remain in effect.

XII. DISPUTE RESOLUTION

Except as specifically set forth elsewhere in this Agreement, if a dispute arises under this Agreement, the procedures of this Part shall apply. In addition, during the pendency of any dispute, Holloman agrees that it shall continue to implement those portions of this Agreement which are not in dispute and which U. S. EPA and New Mexico determine can be reasonably implemented pending final resolution of the issue(s) in dispute. If U.S. EPA and New Mexico determine that all or part of those portions of work which are affected by the dispute should stop during the pendency of the dispute, Holloman shall discontinue implementing those portions of the work.

All Parties to this Agreement shall make reasonable efforts to informally resolve disputes at the Project Manager or immediate supervisor level. If resolution cannot be achieved informally, the procedures of this Part shall be implemented to resolve a dispute.

A. Within thirty (30) days of the date of any action by U.S. EPA or New Mexico which leads to or generates a dispute, Holloman shall submit to
the Dispute Resolution Committee (DRC) a Written Statement of Dispute setting forth the nature of the dispute, Holloman's position with respect to the dispute and the information that Holloman is relying upon to support its position. If Holloman does not provide such written statement to the DRC with this thirty (30) day period, Holloman shall be deemed to have agreed with the action taken by U.S. EPA or New Mexico which led to or generated the dispute.

B. Where U.S. EPA or New Mexico issues a written Notice of Position, any other Party which disagrees with the Written Notice of Position may submit to the DRC a written statement of dispute setting forth the nature of the dispute, its position with respect to the dispute and the information it is relying upon to support its position. If no other Party provides such a written statement of dispute to the DRC within thirty (30) days of receipt of the Written Notice of Position, the Parties shall be deemed to have agreed with the Written Notice of Position.

C. Prior to any Party's issuance of a written statement of dispute, the disputing Party shall engage the other Party in informal dispute resolution among the Project Managers and/or their immediate supervisors. During this informal dispute resolution period the Parties shall meet as many times as are necessary to discuss and attempt resolution of the dispute.

D. The DRC will serve as a forum for resolution of disputes for which agreement has not been reached through informal dispute resolution. The parties shall each designate one individual and an alternate to serve on the DRC. The individuals designated to serve on the DRC shall be employed at the policy level (SES or equivalent) or be delegated to authority to participate on the DRC for the purposes of dispute resolution under this Agreement. The U.S. EPA representative on the DRC is the Hazardous Waste Management Division
Director of U.S. EPA Region VI. New Mexico's designated member is the Chief, Hazardous Waste Bureau, NMEID. Holloman's designated member is the Director, Engineering and Environmental Planning, Headquarters Tactical Air Command. Notice of any delegation of authority from a Party's designated representative on the DRC shall be immediately provided to all other Parties.

E. Following elevation of a dispute to the DRC, the DRC shall have twenty-one (21) days to unanimously resolve the dispute and issue a written decision. If the DRC is unable to unanimously resolve the dispute within this twenty-one (21) day period, the written statement of dispute shall be forwarded to the Senior Executive Committee (SEC) for resolution within seven (7) days after the close of the twenty-one (21) day resolution period.

F. The SEC will serve as the forum for resolution of disputes for which agreement has not been reached by the DRC. The U.S. EPA representative on the SEC is the Regional Administrator of U.S. EPA's Region VI. New Mexico's designated member is the Director, Environmental Improvement Division. The Air Force's designated member is the Deputy Assistant Secretary of the Air Force for Environment, Safety, and Occupational Health. The SEC members shall, as appropriate, confer, meet and exert their best efforts to resolve the dispute and issue a written decision. If unanimous resolution of the dispute is not reached within twenty-one (21) days, U.S. EPA's Regional Administrator's issue a written position on the dispute. The Air Force may, within fourteen (14) days of the Regional Administrator's issuance of U.S. EPA's position, issue a written notice elevating the dispute to the Administrator of U.S. EPA for resolution in accordance with all applicable laws, directives and procedures. In the event that the Air Force elects not to elevate the dispute to the Administrator within the designated fourteen (14) day escalation period, the Air Force shall be deemed to have agreed with
the Regional Administrator's written position with respect to the dispute.

G. Upon escalation of a dispute to the Administrator of U.S. EPA pursuant to Subpart F, the Administrator will review and resolve the dispute within twenty-one (21) days. Upon request, and prior to resolving the dispute, the U.S. EPA Administrator shall meet and confer with both the NMEID Director and the Air Force's Secretariat Representative to discuss the issue(s) under dispute. Upon resolution, the Administrator shall provide NMEID and the Air Force with a written final decision setting forth resolution of the dispute. The duties of the Administrator set forth in this Part shall not be delegated.

H. The pendency of any dispute under this Part shall not affect the Air Force's responsibility for timely performance of the work required by this Agreement, except that the time period for completion of work affected by such a dispute shall be extended for a period of time usually not to exceed the actual time taken to resolve any good faith dispute in accordance with the dispute procedures specified herein. All elements of the work required by this Agreement which are not affected by the dispute shall continue and be completed in accordance with the applicable schedule.

I. When dispute resolution is in progress, work affected by the dispute will immediately be discontinued if the Hazardous Waste Division Director for U.S. EPA's Region VI requests, in writing, that work related to the dispute be stopped because, in U.S. EPA's opinion, such work is inadequate or defective, and such inadequacy or defect is likely to yield an adverse effect on human health or the environment, or is likely to have a substantial adverse effect on the implementation process. To the extent possible, U.S. EPA shall consult with the Air Force and NMEID prior to initiating a work stoppage request. After stoppage of work, if the Air Force believes that the work stoppage is inappropriate or may have potential significant adverse impacts, the Air Force
may meet with the Division Director and NMEID to discuss the work stoppage. Following this meeting, and further consideration of the issues, the Division Director will issue, in writing, a final decision with respect to the work stoppage. The final written decision of the Division Director may immediately be subjected to formal dispute resolution or such dispute may be brought directly to either the DRC or the SEC, at the discretion of the Air Force.

J. Within twenty-one (21) days of resolution of a dispute pursuant to the procedures specified in this Part, the Air Force shall incorporate the resolution and final determination into the appropriate plan, schedule or procedures and proceed to implement this Agreement according to the amended plan, schedule or procedures.

K. Resolution of a dispute pursuant to this Part of the Agreement constitutes a final resolution of any dispute arising under this Agreement. All applicable laws, directives, and procedures apply to resolution of disputes under this Part. All Parties shall abide by all terms and conditions of any final resolution of dispute obtained pursuant to this Part of this Agreement.

This Agreement shall become effective immediately.

Robert E. Layton Jr., P.E.
Regional Administrator
U.S. Environmental Protection Agency
Region VI

Dated this 20th day of December 1988, at Dallas Texas.
AGREED:

Dated: 20 Dec 1993

By:

Commander
83rd Combat Support Group
Respondent

Dated: 12/20/88

Allyn M. Davis, Director
Hazardous Waste Management Division
U.S. Environmental Protection Agency
Region VI
Complainant

Dated: 12/13/88

Richard Hitzeman, Director
New Mexico Environmental Improvement Division
January 26, 1989

Howard E. Moffitt  
Headquarters 8330 Combat Support Group  
Holloman Air Force Base, NM 88330-5000

Dear Mr. Moffitt:

The Environmental Improvement Division has received your closure plan as submitted pursuant to the Compliance Agreement. Due to current workplan commitments and staffing priorities a review of this document is not expected to occur within the next six months.

Should you have any questions, please feel free to contact me.

Sincerely,

Boyd Hamilton  
Program Manager  
Hazardous Waste Section  

BH/pv

cc: Court Fesmire - EPA
General Roy Goodwin  
Director, Engineering Services  
HQ TAC/DE  
Langley AFB, Virginia 23665-5001

Dear General Goodwin:

I am writing in regard to your draft delisting petition (#D0660) for wastes contained in seven on-site surface impoundments, a drainage ditch, and two lakes at Holloman Air Force Base, New Mexico. On June 20, 1988, we sent you a letter noting the results of our review of your sampling and analytical plan and addressing the outstanding issues for your draft petition. As of today, we have not received any further correspondence in regard to this draft petition.

Since we have not had any notice of your intentions to pursue a delisting in over a year and we do not want to keep inactive petitions in the review system, we are closing your draft petition file. You may submit a formal petition or a revised draft petition for your wastes in the future. Any submission will be assigned a new petition number and reviewed in chronological order along with all new petitions.

If you have any questions regarding this correspondence, or need any guidance for submitting a formal petition or a revised draft petition, please do not hesitate to contact Mr. Terry Grist of my staff at (202) 382-4782.

Sincerely,

Robert Kayser, Acting Chief
Variances Section

cc: Terry Grist, EPA HQ  
Jim Kent, EPA HQ  
Guy Tidmore, EPA Region VI  
Rena McClurg, EPA Region VI  
Henry Huppert, SAIC  
Terry Boone, HAFB  
Lt. Col. Warren Hull, DOD Liaison to EPA
June 2, 1989

CERTIFIED MAIL: RETURN RECEIPT REQUESTED

Colonel William Koelm, USAF
Commander
833 Combat Support Group
Holloman Air Force Base, New Mexico 88330

Dear Colonel Koelm:

In accordance with Section VI.C.5. of the Federal Facilities Compliance Agreement (FFCA) between the Environmental Protection Agency (EPA) and Holloman Air Force Base (HAFB), this letter will serve as approval of the proposed groundwater monitoring system for the HAFB sewage/hazardous waste lagoons. The system, as proposed in the final "Hydrogeologic Investigation Report and Proposed Groundwater Monitoring Plan" dated March, 1989, with the exceptions noted in paragraphs two and three below, is the approved system.

Upon further review of the revised proposed plan, the New Mexico Environmental Improvement Division (NMEID) believes that Lagoons A and B are the most likely potential sources for release of hazardous constituents. Accordingly, NMEID will require the installation of two additional monitoring wells in order to detect any release from the lagoons. One well will be required north-northeast of the proposed location of MW5 and the other well will be located southeast of MW5. Additional siting criteria will be that criteria already explained in EPA's letter to HAFB of January 27, 1989.

NMEID will require that the filter packs used on all new wells be 40/60 mesh. They agree with the proposed 0.010 well screen slot size and with the proposal to use surge blocks and bailers in well development. Further, they agree with the decision not to develop the wells with air. However, more aggressive methods may be needed to adequately develop wells screened opposite low permeability zones.

NMEID is currently reviewing the proposed sampling and analysis program and will provide a comprehensive response once that review is complete. NMEID has made the following preliminary comments which are provided for your information and action as necessary.

1) NMEID may consider a reduced sampling schedule for groundwater monitoring wells S4, MW6 and MW4 if evaluations made during the first year of sampling do not indicate that the hazardous waste unit has impacted the groundwater at these wells.
2) HAFB should submit results of an Appendix IX GC/MS scan (HWMR-5, Part V Section 264) of both sludge and solution samples from Lagoons A, B, and C. Metals analyses for both solution and sludge samples must be for total metals. If such analyses have not been made, EID will require HAFB to do so. If this information already exists NMEID should be provided a copy as soon as possible.

3) HAFB must initially sample all of its RCRA groundwater monitoring wells for Appendix IX parameters.

Installation of the approved system shall commence within thirty days of receipt of this letter as stated in Section VI.C.6 of the FFCA. This letter serves as approval from both reviewer agencies. If you have any questions, please have your staff call Court Fesmire at (214) 655-6775.

Sincerely,

[Signature]

Harriet Tregoning, Chief
ALONM Section (6H-CS)
RCRA Enforcement Branch

cc: Boyd Hamilton
    NMEID

    Bryan Stewart
    U.S. Army Corp of Engineers
Groundwater Monitoring Plan/EPA Comments

HQ TAC/DEEV (Vicki Hodges)

1. On 6 June 1989 Holloman Air Force Base (HAFB) received a letter of approval (copy attached) from the United States Environmental Protection Agency (EPA) Region 6 of our proposed groundwater monitoring system for the sewage lagoons, provided the base installs two additional wells. One well will be required north-northeast of the proposed location of MWS and the other well will be located southeast of MWS. Additional siting criteria was explained in EPA’s letter to HAFB of January 27, 1989. The NM EID will require the filter packs used on all new wells be 40/60 mesh.

2. The base concurs with the recommendations of the EPA and requests the Corp of Engineers proceed immediately with the installation of the monitoring wells. Per requirement of the Federal Facilities Compliance Agreement between the EPA and HAFB, this work must be initiated within 30 days and completed within 60 days of the date Holloman received this approval, i.e., 6 June 1989.

3. Request the Corp of Engineers provide weekly progress reports to the Environmental Planning Branch (833 CSG/DEV, Attn: Sharon Moore) until the installation is complete. This information is critical for the quarterly progress report which must be provided to the EPA by HAFB.

4. If you have any questions or comments please contact Sharon Moore at AV 867-3931.

SIGNED
HOWARD E. MOFFITT
Deputy Base Civil Engineer

1 Atch
EPA Letter, 2 June 1989

cc: W/o Atch
Brian Stewart
US Army Corp of Engrs
Omaha District, NE

Courtland Fesmire
EPA Region 6
Dallas, TX 75202

Boyd Hamilton
NM EID
Santa Fe, NM 87503
July 13 1989

Colonel William Koelm
Base Commander
Holloman Air Force Base
833 Combat Support Group
Holloman Air Force Base, NM 88330

RE: NOTICE OF DISAPPROVAL
NM6572124422

Dear Colonel Koelm:

The Hazardous Waste Program of the New Mexico Environmental Improvement Division (EID) has reviewed the Closure Plan for the Sewage Treatment Lagoons at Holloman Air Force Base (HAFB), dated 19 January, 1989, prepared by the Department of the Army Corps of Engineers, Omaha District for HQ, 833 CSG/DEEV. The closure plan is determined to be incomplete in accordance with the New Mexico Hazardous Waste Regulations (HWMR-5, as amended), Part VI, 40 CFR Section 265, Subpart G. This review indicates that further information on the clean closure procedures will be needed before final approval of the closure plan can be granted. The remainder of this letter addresses these areas of concern.

The regulations pertaining to closure of hazardous waste facilities specify performance standards which must be met rather than specific procedures for compliance.

The deficiencies in HAFB's closure plan are as follows:

1. HAFB has failed to provide an adequate description of how the facility will be closed to meet the performance standards set forth in HWMR-5, Part VI, 40 CFR Section 265.111 as required by Section 265.112(b)(1). Cleanup levels have been specified only for PCB's. The stated cleanup target level of 25 ppm PCB's is not consistent with
the EPA guidance regarding clean closure for surface impoundments stated in the March 19, 1987, Federal Register, page 8704. Standards for acceptable residual contamination are to be based on Agency-approved health-based limits. See the "Superfund Public Health Evaluation Manual", EPA publication 540/1-86/060 for a discussion of the procedures involved. Questions regarding the EPA guidance can be directed to Mr. James F. Michael of the Office of Solid Waste and Emergency Response at (202) 382-2231. EID has calculated the acceptable residual PCB soil concentration after clean closure to be 250 ppb using the above guidelines. HAFB must set target goals for all hazardous constituents based on these guidelines.

2. HAFB has failed to provide an estimate of the maximum extent of the operation which will be unclosed during the active life of the facility as required by HWMR-5, Part VI, 40 CFR Section 265.112(b)(2).

a. The detection limits for the SW846 method 8240 volatile organic compounds are not listed in HAFB's submitted closure plan. EID has located this data in the HAFB's earlier submittal, "Hazardous Waste Sewage Sludge Removal" (Radian Document No. 269-001-22). The method 8240 detection limits reported for the Computrac data are unacceptably high. EID considers the question of volatile organic compound contamination in the HAFB sewage lagoons to be unresolved at this time.

b. The detection limits for SW846 method 8270 as indicated on table 4-8 in the closure plan are unacceptably high. EID considers the question of semivolatile organic compound contamination in the HAFB sewage lagoons to be unresolved at this time.

c. Extraction procedure-toxicity (EP-tox) values are not relevant to the health-based guidelines used in the clean closure of surface impoundments. Total metal concentrations should be used to determine the depth to which the sludge/soil must be removed to satisfy the requirements of HWMR-5, Part VI, 40 CFR Section 265.111 with respect to heavy metal residues.

d. No analytical data have been presented to EID characterizing any hazardous constituents in lagoons D, E, G or in sump F.
e. HAFB must include a coring program for each lagoon to be closed in order to determine the total estimated depth of contamination. The closure plan must include a detailed description of the sampling and analysis program that will be used to determine the extent of contamination. The sampling program should detail the location of soil and background samples taken to establish the presence and areal extent of contamination, the specific sampling methods, the type of sample containers and sample preservation methods which will be used, field quality control procedures, and chain-of-custody procedures. The analytical program should detail the analytical parameters, analytical methods, laboratory quality control procedures, and must include the method detection limits as stated by the laboratory to be used. HAFB must provide EID with a reasonable estimate of the total volume of contaminated soil and sludge which will be removed to satisfy the closure performance standards of HWMR-5, Part VI, 40 CFR Section 265.111.

f. A testing program to determine that the standard for decontamination has been met at the completion of cleanup activities must be established. The program should include a description of sampling procedures, test parameters and specific analytical methods. The basis for designating a level of waste residue cleanup as adequate should be fully justified based on human health guidelines described in item A.1, above.

3. HAFB has failed to comply with additional requirements of HWMR-5, Part VI, 40 CFR Section 265.112(b)(3). HAFB has not adequately described: the steps involved in removing the hazardous waste, the methods of transporting the hazardous waste, how the hazardous waste will be stored prior to transportation, or the ultimate means of treating the hazardous waste. HAFB has failed to identify the off site treatment facility which will treat the hazardous waste. HAFB must include a description of the treatment or disposal methods, the operating status of the disposal facility and the facility's EPA I.D. number.

4. HAFB has failed to comply with HWMR-5, Part VI, 40 CFR Section 265.112(b)(4). The decontamination procedures used for all equipment and structures contaminated prior to or during closure should be identified. Cleaning agents or solvents should be specified. Washing protocols, procedures used to collect and dispose of contaminated residues and a
description of the testing and analytical methods used to ensure successful decontamination must be described. A description of the steps needed to dispose of contaminated residues generated from the decontamination of equipment and structures must be included. Indicate how and where contaminated residues will be disposed.

5. HAFB has failed to comply with HWMR-5, Part VI, 40 CFR Section 265.112(b)(5). EID cannot provide its complete comments on HAFB's groundwater monitoring plan at this time, but three areas of concern directly affect the closure process.

a. HAFB must sample its background wells (MW-1 and SW-2) for the parameters listed in HWMR-5, Part V, 40 CFR Section 264, Appendix IX. The presence of hazardous constituents would indicate that the groundwater yielded by the well was not unaffected by the facility as required by Section 265.91(a)(1)(ii) and therefore could not serve as the background well.

b. Any Section 264 Appendix IX constituent identified in any of HAFB's downgradient wells must be included as a parameter in all subsequent sample analyses. Any hazardous constituent which has been released into HAFB's sewage lagoons and which is determined to be in any of HAFB's downgradient wells must also be included in all subsequent analyses.

c. The correct indicator parameter for organic halogens is TOX as per HWMR-5, Part VI, 40 CFR Section 265.92(b)(3).

6. HAFB's closure plan does not include a detailed implementation schedule as required by HWMR-5, Part VI, 40 CFR Section 265.112(b)(6). The implementation schedule must assign a specific time interval over which each closure activity will be initiated and completed, including alternate scheduling which would be implemented based on data to be acquired at a later date.

7. HAFB's closure plan does not include provision for its amendment as per HWMR-5, Part VI, Section 265.112(c)(3). The closure plan should state that HAFB will submit a revised closure plan to the Director of EID no later than 30 days after any unexpected event that occurs during closure proceedings which affects the closure plan.
8. HAFB's closure plan does not specify the procedures to be followed in obtaining a certification of closure as per HWMR-5, 40 CFR Section 265.115. The certification of closure must be submitted to the EID within 60 days of the completion of the closure activities and the closure schedule should state this. The certification of closure must be signed by an independent registered professional engineer rather than one employed by HAFB or any of its operators.

9. The closure plan should state that upon completion of the closure activities, HAFB shall submit a Final Closure Report to EID. The report should document the final closure and contain, at a minimum, the following:
   
a. The certification described in item 8, above.
   
b. Any variance from the approved closure activities and the reason for the variance.
   
c. A tabular summary of all sampling results, if applicable, showing:
      
      1) The datum and associated detection limits reported,
      2) Identification of analytical procedure, and
      3) Identification of analytical laboratory.
   
d. The location of the file of supporting documentation:
      
      1) Field log books,
      2) Laboratory sample analysis reports,
      3) The QA/QC documentation, and
      4) Chain of custody records.
   
e. Disposal location of all waste residues.
   
f. A certification of accuracy of the report.

Please submit the information requested above in as much detail as possible. Due to the extensive amount of discussion needed, a revised closure plan is recommended.
By EID and EPA program requirements, the closure plan review process must be complete by the end of this fiscal year (September 30, 1989). Accordingly, this request will be the last exchange of technical information on the plan. EID will need to receive this information within 30 days in order to complete the review of the closure plan as set forth in HWMR-5, Part VI, 40 CFR Section 265.112 (d)(4). To meet this deadline, I would appreciate your assigning a high priority to this request for technical information.

Thank you for your cooperation. If you have any questions, please do not hesitate to call Bruce Swanton at (505) 827-0142.

Sincerely,

Jack Ellvinger
Bureau Chief
Hazardous Waste Program

cc: Sharon More, HAFB
     Lynn Prince, USEPA-Region 6, Dallas
     Court Fesmire, USEPA-Region 6, Dallas
REPLY TO
ATTN OF:
DEV

SUBJECT: Notice of Disapproval, NM 6572124422 (Your Ltr, 13 Jul 89)

TO:
Environmental Improvement Division
Attn: Jack Ellvinger
Harold Runnels Bldg.
1190 St. Francis Drive
Santa Fe, NM 87503

1. To implement the "Superfund Public Health Evaluation Manual", EPA publication 5401/1-86/060 (re: cmt 1, subject letter) assumptions made by the State need to be discussed. We request the State provide the calculations, assumptions, and justification on which those assumptions were based which produced the residual PCB soil concentration to be 250 ppb.

2. Upon receiving this information, our contractor, the U.S. Army Corps of Engineers, Omaha District, can then prepare a timely response to this comment. For the base to respond to all comments in the subject letter, an expeditious reply is imperative.

3. Please reply to: 833CSG/DEV, Bldg 55, Holloman Air Force Base, NM 88330-5000; with a carbon copy and FAX sent to the following:

   FAX (402) 221-7807
   U.S. Corps of Engineers
   Attn: Brian Stewart
   215 N. 17th St.
   Omaha, NE 68102-4978

4. Your rapid response is appreciated. The point of contact for this matter is Sharon Moore, 833CSG/DEV, 479-3981.

HOWARD E. HOFF
Deputy Base Civil Engineer

FAX cy: Brian Stewart, 24 Jul 89
         Bruce Swanton, 24 Jul 89

cc: U.S. Army COE/Brian Stewart
    HQ TAC/DEEV (Brent Johnson)
    NMEID/Bruce Swanton
    EPA/Court Fesmire
MEMO FOR RECORD

25 Jul 89

Subject: Holloman Air Force Base Sewage Treatment Lagoons/Closure Plan

Prepared by: Sharon N. Moore
Base Environmental Coordinator

Page 1 of 3

1. On 25 July 1989 at 0900 hrs, the HAFB Commander, Lt Col John Mollison; HAFB Legal Staff - LtCol Howard Donaldson, Capt John Spurlin, Capt Phil Sheuerman, USAFR; Base Civil Engineer, Lt Col Robert Bittner; Deputy, Base Civil Engineer, Howard Moffitt; and Base Environmental Coordinator, Sharon Moore met to discuss the NMEID Ltr, 13 July 1989, NOTICE OF DISAPPROVAL (NOD) NM 6572124422. The NOD was issued by the NMEID as a result of the noted deficiencies in the Holloman Air Force Base Sewage Treatment Lagoon Closure Plan.

2. In January 1989, this Closure Plan was submitted to the New Mexico Environmental Improvement Division (NM EID) pursuant to the Federal Facilities Compliance Agreement signed on 20 December 1988. On 13 July 1989, Bruce Swanton, NM EID, sent an unofficial FAX copy of the NM EID comments on subject plan. Brian Stewart, U S Army Corps of Engineers, Omaha District, received this FAX at the Holloman Air Force Base (HAFB) resident Corps Building while he was attending a meeting there. Upon his receipt of these comments Mr Stewart sent them FAX to Vicki Hodges, HQ TAC/DEEV. On 14 July 1989, Holloman received Certified Mail Return Receipt Requested the official NM EID comments on the subject plan (again re: NM EID Letter 13 July 1989, NOTICE OF DISAPPROVAL NM6572124422).

3. The Closure Plan submitted was determined by the NM EID to be incomplete in accordance with the New Mexico Hazardous Waste Regulations (HWMR-5). The deficiencies noted in this 6-page response will require a technical evaluation and cost analysis. As the Environmental Coordinator understands it, TAC has already initiated this action in that TAC has requested the Corp of Engineers, Omaha District, to provide a cost analysis and a technical response to each deficiency listed in the NOD.

4. The purpose of this MFR is to document the discussion which developed during this meeting between the individuals listed in paragraph 1 above.

5. Mr. Moffitt opened the meeting by stating the Base Legal Staff and the Base Environmental Coordinator had expressed concern to him with the direction of an overall TAC plan for cleanup and the closure of the Holloman Lagoons. He stated that per conversation between General Goodwin and Lt Col Bittner, it was TAC's stand we would clean up the lagoons sufficient to allow long term operation of the lagoon system. General Goodwin stated he would ensure the TAC DE and JA would appropriately elevate the issue to Air Staff and Mr. Vest's office.

E-73
6. Lt Col Donaldson stated he was concerned that the position TAC was taking was not consistent with the law. He also indicated that we may be taking the wrong course from a practical view. We should avoid a situation where we only try to do the absolute minimum to satisfy immediate concerns while ignoring the future costs that will result from this. We should look at the total long term costs before choosing short term actions.

7. Sharon Moore read the Paragraph IV Objectives in the Federal Facilities Compliance agreement which states: "All plans, studies, construction maintenance, and monitoring programs, and other obligations created directly or indirectly by this Agreement shall be implemented in a manner calculated to bring the Respondent into compliance with Subtitle C of the Resource Conservation and Recovery Act as well as the provisions of other applicable Federal and State permits, laws and regulations."

Ms. Moore stated it was her opinion that by signing this Agreement Col William Koelm has agreed to comply with 40 CFR 265.

8. Ms Moore read para. 265.113(a)(2)(b) which states, "The owner or operator must complete partial and final closure activities in accordance with the approved closure plan and within 180 days after receiving the final volume of hazardous waste management unit facility, or 180 days after approval of the closure plan, if that is later".

(NOTE: The sentences and paragraphs that follow this 40 CFR make allowances for extension to closure period - Ms. Moore did not discuss this.)

9. Capt Sheuerman stated he believed in the near future Federal law would require lagoons to be lined regardless if they are hazardous waste surface impoundments or sewage treatment lagoons. He also mentioned it was difficult to control hazardous wastes discharges to the lagoons. Ms. Moore pointed out that with the constant change of young personnel on base, it is very difficult to keep everyone informed and trained as to waste handling requirements. Those present then discussed the possible alternatives to continued use of the lagoons. The alternatives were construction and operation by third party financing, construction under the MPC of a treatment plant, or contracting with the City to handle the waste in their plant. The pros and cons of these alternatives were discussed including the potential costs, time schedules, and control over the facility.

10. Capt Spurlin reiterated a conversation previously held between himself and Sharon Moore which addressed interim status and the requirements to have the approved Part B. Ms. Moore had previously expressed concern to him that the Part B for HAFB must be approved by 1992. Ms. Moore stated it was her understanding that in order to obtain an approved permit, all outstanding Notices of Violations must be corrected or satisfactorily addressed. Capt Sheuerman advised that the Federal Facility Compliance Agreement (FFCA) had no self-enforcing mechanisms. It had no stipulated damage provisions. It could only be enforced by suit. This meant that the probable means of enforcement by the EID would be through issuance of the RCRA Part B permit rather than the expense of legal action.
11. Paragraph VIII. FUNDING of the Federal Facilities Compliance Agreement was discussed. Ms. Moore read this paragraph in its entirety. It was then decided HAFB would send a message to HQ TAC to request the funding to comply with the law and the compliance agreement in its entirety. In regard to funding, the subject of who was running the program was discussed. The problem is that HAFB has legal responsibility but HQ TAC has control of the problem and there is insufficient communication among the players. HAFB’s priority for funding also came up. Because HAFB isn’t an NPL site, it has low funding priority but has nevertheless received more than any other TAC base.

12. Paragraph IX. FORCE MAJEURE was discussed and the requirements therein for Holloman to make timely requests for such funds as part of the budgetary process as set forth in Part VIII FUNDING of the Compliance Agreement.

13. Col Mollison requested Sharon Moore prepare for his signature a message to HQ TAC/DE requesting this money by the afternoon on 25 July or early 26 July. Capt Sheuerman advised that the FFCA had a provision for extensions of schedules and that an extension should be requested for submission of the closure plan.

I concur with this MEMO as written:

ROBERT J. BITTER, Lt Col, USAF
Base Civil Engineer

HOWARD L. DONALDSON, Lt Col, USAF
Staff Judge Advocate

JOHN C. MOLLISON, Lt Col, USAF
Deputy Base Commander
July 26, 1989

Ms. Sharon Moore
833 CSG/DEV
Holloman AFB, NM

Dear Ms. Moore:

In response to the Holloman Air Force Base (HAFB) PAX of July 24, 1989, the New Mexico Environmental Improvement Division (EID) herein provides the assumptions and the calculations which resulted in EID's value for the acceptable residual soil PCB concentration as stated in its July 13, 1989 Notice of Disapproval.

Variables:

- Chronic Daily Intake (CDI)
- Carcinogenic Potency Factor (PF)
- Risk (R)

Definitions and Assumptions:

CDI is the daily intake of the toxic substance in mg per kg body weight. The Superfund Public Health Evaluation Manual (SPHEM) identifies the highest at-risk individual as a 10 kg child consuming 100 mg of soil daily (pg 66 SPHEM).

SPHEM lists the PF for PCB's as 4.34 (pg 140).

\[ R = CDI \times PF \]

An acceptable R must be in the order of \( 10^{-4} \) to \( 10^{-7} \) (SPHEM, page 83).

The calculations as applied to PCB contamination are as follows:

\[ CDI = 100 \text{ mg soil}/10 \text{ kg*day} \times 25 \times 10^{-6} \text{ g PCB/g soil} = 2.5 \times 10^{-4} \text{ mg PCB/kg body weight} \]

\[ R = 2.5 \times 10^{-4} \times 4.34 = 1.08 \times 10^{-3} \]

Setting the target goal (R) as \( 10^{-5} \), HAFB's proposed 25 ppm residual PCB concentration after clean closure is 100 times too large. The acceptable residual concentration is 250 ppb.
HAFB should also recognize that the detection limits listed for the carcinogens benzene, carbon tetrachloride, dichloroethane, dichloroethene, 1,1,1 TCA and TCE in the Radian Corporation document 269-001-02 (dated August 1988) in Table B-2 are all 400 times the practical quantification limits listed for method 8240 (SW-846, third edition). EID considers the possible contribution to total risk posed by these and other toxic organic compounds to be unresolved at this time. The calculation of risk (R) as discussed on page 77 of the SPHEM is the R resulting from exposure to individual concentrations of all toxic substances. Thus the excavation depth required to reduce the lagoon soils to acceptable levels of total toxic contamination may be greater when all toxic substances are evaluated than when only PCB's are considered.

Any questions concerning EPA's policy on this matter should be addressed to Mr. Reed Rosnick or Mr. James Michael of the Office of Solid Waste and Emergency Response at (202) 562-2231. For questions concerning EID's application of EPA policy please call Bruce Swanton at (505) 827-2925.

Sincerely,

[Signature]

Boyd Hamilton
Program Manager
Hazardous Waste Program

cc: Court Fussmire, US-EPA
July 27, 1989

Certified Mail: Return Receipt Requested

Colonel William Koelm, USAF
Commander
833 Combat Support Group
Holloman Air Force Base, New Mexico 88330

Dear Colonel Koelm:

The Environmental Protection Agency (EPA) and the New Mexico Environmental Improvement Division (NMEID) have completed independent reviews of the Closure Plan for the sewage treatment lagoons at Holloman Air Force Base (HAFB), which was submitted by the Department of the Army, Corps of Engineers on January 19, 1989. NMEID transmitted their comments to HAFB on July 13, 1989. Upon comparison of NMEID's comments with ours, we have determined that the two sets of comments are substantially the same and as NMEID is the approving agency for the closure plan, NMEID's comments will take precedence. EPA's comments have been transmitted to and reviewed by NMEID. Based on these considerations, EPA will not transmit its comments to you to avoid confusion.

EPA concurs with NMEID's comments to the Closure Plan and the remedial action they require for that plan. The plan does not yet meet the requirements of Section VI.D.1 of the Federal Facilities Compliance Agreement which was signed on December 20, 1988, between EPA, HAFB and NMEID.

If you have any questions about the comments, I would suggest you call Bruce Swanton of NMEID at (505) 827-0142. If your staff has any other questions, please have them call Court Fesmire at (214) 655-2192.

Sincerely,

[Signature]

Harriet Tregoning
Chief
ALONM Section
RCRA Enforcement Branch

cc: Jack Ellvinger
Bureau Chief
NMEID
Closure Plan for Sewage Treatment Lagoons

Mr. Jack Ellinger
Bureau Chief, Hazardous Waste Program
New Mexico Environmental Improvement Division
P. O. Box 968
Santa Fe, NM 87504

1. On 14 July 1989, we received your Notice of Disapproval, wherein you provided your comments on our proposed Closure Plan for the sewage treatment lagoons at Holloman AFB, and requested additional information to enable you to complete your review of our plan. On 31 July 1989, we received the U.S. Environmental Protection Agency's concurrence with your comments.

2. We have reviewed your comments and are providing the technical information and clarification you requested (Atch 1) in the form of a supplement to our Closure Plan. Additional support documents and technical information are provided under separate cover (reference Atchs 2-8).

3. I would like to state our position on where we currently stand, procedurally, regarding our Federal Facility Compliance Agreement (FFCA). I believe we are in the posture described on page 9, paragraph D.2 - during your review of our plan, we (the parties of the FFCA) are discussing the plan. I do not view our status as being at the beginning of the dispute resolution phase. In other words, at page 14, paragraph A., the action you have taken of providing us with your comments (reference your letter, 13 July 1989, Notice of Disapproval NM6572124422) has not generated a dispute. Therefore, the 30-day time limit is not a factor in the current status of this matter. Only when there are solidified positions of disagreement which cannot be resolved at the project manager level, will a dispute have arisen.

4. I propose that when you complete your review of our response to your comments, we arrange a meeting to discuss the aforementioned issues. This would be in keeping with the spirit of cooperation and negotiation with which we reached the FFCA.

WILLIAM W. KOELM, Colonel, USAF
Commander

Atchs:
1. HAFB's Clarifications and Responses to New Mexico EID Comments on the Closure Plan in Notice of Disapproval, dated 14 Aug 89, NM6572124422

(Atchs 2-8 continued on Page 2)
Holloman Air Force Base's
Clarifications and Responses to
New Mexico EID Comments of the Closure
Plan in Notice of Disapproval,
Dated 14 August 1989.
NM6572124422

EID Comment 1.

HAFB has failed to provide an adequate description of how the facility will be closed to meet the performance standards set forth in HWMR-5, Part VI, 40 CFR Section 265.111 as required by Section 265.112(b)(1). Cleanup levels have been specified only for PCBs. The stated cleanup target level of 25 ppm PCBs is not consistent with the EPA guidance regarding clean closure for surface impoundments stated in the March 19, 1987 Federal Register, page 8704. Standards for acceptable residual contamination are to be based on Agency-approved health-based limits. See the "Superfund Public Health Evaluation Manual," EPA publication 640/1-86/060 for a discussion of the procedures involved. Questions regarding the EPA guidance can be directed to Mr. James F. Michael of the Office of Solid Waste and Emergency Response at (202) 382-2231. EID has calculated the acceptable residual PCB soil concentration after clean closure to be 250 ppb using the above guidelines. HAFB must set target goals for all hazardous constituents based on these guidelines.

HAFB's Response to Comment 1.

Samples of the ponds' sludge were analyzed for PCBs, volatile and semi-volatile organic compounds, and metals. The results indicated that PCBs are the significant contaminants of concern found in Ponds A and B. Therefore, closure of the ponds requires removal of the PCB-contaminated sludge. Low levels of semi-volatiles were identified, but these were correlated with the locations of higher concentrations of PCBs, thus, they will be removed with the PCBs.
Because the Holloman AFB domestic sewage treatment lagoons are in a restricted access area, the selection of 25 ppm PCBs as the cleanup criterion is based on the EPA PCB Spill Cleanup Policy as it applies to restricted access areas (Federal Register, 2 April 1987, p. 10693). It is also stated therein: "EPA believes that the level of risk posed by 25 ppm PCBs in soil at a restricted access facility should not present significant risks either to the typical worker or to the general public" (p. 10701).

The site accessibility to the general public that would allow for a 10 kg child to eat the sludge does not take into account that the lagoons of PCB concern (Ponds A & B) are fenced on the lagoon systems perimeter with an eight-foot fence with retardant barb wire on the top. Also, the site is within the perimeter fence of the U.S. Air Force Base Property which has controlled public access points. To further illustrate the restricted nature of the site, the non-contaminated sludge and sediments that will remain on site after the contaminated sludge is removed, will be totally submerged under several feet of wastewater and will present no possibility for contact by the general public.

Therefore, the pathway suggested of a 10 kg child ingesting 100 mg of soil/sludge, which yields a cleanup criterion of 250 ppb, is not applicable or appropriate for the site conditions at Holloman AFB.

EID COMMENT 2.

HAFB has failed to provide an estimate of the maximum extent of the operation which will be unclosed during the active life of the facility as required by HWR-5, Part VI, 40 CFR Section 265.112(b)(2).
HAFB's RESPONSE TO COMMENT 2.

By definition of the term "unclosed" the reviewer has assumed that Holloman AFB plans to leave on-site hazardous waste that could release into the atmosphere, migrate into the Class III groundwater, or be greater than the acceptable amount of residual sludge that could be ingested (which should be calculated with proper site condition assumptions) that would be considered unsafe by definition outlined in the Superfund Public Health Evaluation Manual.

Holloman AFB believes that the lagoons should be considered to be closed and the lagoons have not received any hazardous waste materials since 1984. It is also HAFB's belief that the lagoons, based on the above criteria and all the analytical sampling of the lagoon system, should be considered closed to hazardous waste after the PCB plumes found in the first two Ponds are removed down to a level that is 25 ppm for a non-access area as per the Federal Register, 2 April 1987, pages 10693 and 10694.

EID COMMENT 2a.

The detection limits for the SW846 method 8240 volatile organic compounds are not listed in HAFB's submitted closure plan. EID has located this data in the HAFB's earlier submittal, "Hazardous Waste Sewage Sludge Removal" (Radian Document No. 269-001-22). The method 8240 detection limits reported for the Computrac data are unacceptably high. EID considers the question of volatile organic compound contamination in the HAFB sewage lagoons to be unresolved at this time.

HAFB's RESPONSE TO COMMENT 2a.

The detection limits listed in the August 1988 Radian document "Proposing Information, Plans, and Specifications, Hazardous Waste Sewage Sludge Removal, Holloman AFB, NM" are for Method 8240 performed using the methanol extraction.
Samples are extracted with methanol before the purge-and-trap determination of volatiles.

EID's letter responding to HAFB's request for clarification on residual soil PCB concentration of 26 July 1989 states that the reported detection limits for six specific volatiles are 400 times higher than the detection limits in SW-846. EID's math is correct, but the premise behind their calculation is incorrect: EID simply compared Radian's detection limits with those for "low soil/sediments" in SW-846. (Such samples are analyzed by a direct-sparge technique rather than the methanol-extraction technique.) The sludge samples may have been apparently "low" concentration with respect to target analytes, but they were not low with regard to non-target analytes, primarily hydrocarbons from the decomposition processes, which were matrix interferences. That is why the methanol-extraction technique was chosen. The water content of the samples can also be a contributing factor; as the water content increases, the detection limits on a dry-weight basis also increase.

No volatile organic compounds (EPA Method 8240) were detected above the levels found in the 1988 samples. Analytical results from these samples are contained in the January 1989 Radian report "Quality Control Summary Report (A-E QCSR), Hazardous Waste Sewage Sludge Removal, Holloman AFB, NM" as well as in the December 1988 Radian report entitled "Quality Control Summary Report (A-E QCSR), Additional Sampling at Sewage Lagoons, Holloman Air Force Base, New Mexico." Since no volatile compounds were detected in either the May and August 1988 samples or during previous sampling efforts (see response to 2d), their effects on closure procedures are minimal. As stated on page 6-5 in the Closure Plan, selected samples will be analyzed following sludge removal for volatile organic compounds to ensure that these contaminants have been removed. This analysis will also be performed on selected samples outside the removal zone to further confirm no volatile organics are present in any detected quantity.
EID COMMENT 2b.

The detection limits for SW846 method 8270 as indicated on Table 4-8 in the closure plan are unacceptably high. EID considers the question of semi-volatile organic compound contamination in the HAFB sewage lagoons to be unresolved at this time.

HAFB's RESPONSE TO COMMENT 2b.

As stated in the response to comment 2a, matrix interferences from hydrocarbons and the high water content of the samples render the idealized SW-846 detection limits impractical. Verification sampling for semi-volatiles shall be performed in the same manner as described in the last part of HAFB's response to comment 2a.

EID COMMENT 2c.

Extraction procedure-toxicity (EP-tox) values are not relevant to the health-based guidelines used in the clean closure of surface impoundments. Total metal concentrations should be used to determine the depth to which the sludge/soil must be removed to satisfy the requirements of HWMR-5, Part VI, 40 CFR Section 265.111 with respect to heavy metal residues.

HAFB's RESPONSE TO COMMENT 2c.

Total metals analytical results for Ponds A and B are presented in Sections 4.2.2, 4.2.3, and 5.3 of January 1989 Closure Plan. EP Toxicity was performed on only eight samples of soil below the two lagoons. EP Toxicity testing was used to screen the underlying soil to determine whether it was characteristically hazardous. EP Toxicity results of all eight samples were reported as non-detect. In addition, after removal of the contaminated sludge, sampling for both Total Metals and EP Toxicity shall be performed inside and outside
the removal zone to verify that metals do not exist in elevated concentrations.

EID COMMENT 2d.

No analytical data have been presented to EID characterizing any hazardous constituents in lagoons D, E, G, or in sump F.

HAFB's RESPONSE TO COMMENT 2d.

Several studies have been performed which indicate that the sludge contained in ponds D, E, G, and sump F is nonhazardous. A January 1982 document entitled "Evaluation for Hazardous Waste at Holloman AF3 Sewage Treatment Plant" and a December 22, 1983 document entitled "Report to EPA Regarding Holloman Air Force Base Lagoons and T-38 Washrack Oil-Water Separator" report that analysis by EP-Toxicity shows that no contaminants exceeded the maximum concentration limits allowed under 40 CFR 261.24. Analysis was performed on sludge and water from the ponds as well as the wastewater discharging from pond G. Analysis by Wadsworth/Alert Laboratories (August 18, 1987) for Appendix IX constituents in Lake Holloman water showed no detectable organics. A report, "Evaluation for 129 Priority Pollutants", March 1986, in which water and sludge were sampled in ponds A, B, and C concluded that the levels of contaminants present in the water and sludge were not high enough to warrant concern. Levels of organics found in the water and sludge were low, and heavy metal concentrations did not exceed RCRA standards. Based on results given in an August 24, 1987 memo to Terry Boone (HAFB) from Brian Karnofsky (Computrac, Inc.), no organics which had been identified as potential problems by the EPA were detected in ponds A, B, C, D, E, F, and G or in Lakes Holloman and Stinky. These documents are submitted as enclosures for your office's review and clarification.
EID COMMENT 2e.

HAFB must include a coring program for each lagoon to be closed in order to determine the total estimated depth of contamination. The closure plan must include a detailed description of the sampling and analysis program that will be used to determine the extent of contamination. The sampling program should detail the location of soil and background samples taken to establish the presence and areal extent of contamination, the specific sampling methods, the type of sample containers and sample preservation methods which will be used, field quality control procedures, and chain-of-custody procedures. The analytical program should detail the analytical parameters, analytical methods, laboratory quality control procedures, and must include the method detection limits as stated by the laboratory to be used. HAFB must provide EID with a reasonable estimate of the total volume of contaminated soil and sludge which will be removed to satisfy the closure performance standards of HWMR-5, Part VI, 40 CFR Section 265.111.

HAFB's RESPONSE TO COMMENT 2e.

The sampling which was conducted in May 1988 was designed to determine the nature and extent of contamination (see the enclosed copy of the A-E Quality Control Summary Report, dated January 1989 by Radian Corporation for the sampling results). Based on that data, PCBs were the only constituents that were found in quantity that required removal; therefore, a closure cleanup design ("Proposing Information, Plans, and Specifications, Hazardous Waste Sewage Sludge Removal, Holloman AFB, NM", August 1988) was prepared to perform the closure of the ponds by removing the contaminated sludge and underlying soil. As a part of that construction, the contractor is required to prepare a Contractor Quality Control Plan Program to address sampling and analysis. This plan must be submitted to the U.S. Army Corps of Engineers Omaha District's Hazardous and Toxic Waste Environmental Branch for review and approval before any sampling and analysis activities begin. This review
process is required for any projects administered or designed by the Omaha District.

Because of the nature of PCB sorption onto soils, PCB contamination is not expected to extend to any significant depths. When the initial excavation is completed, the contractor is to conduct verification sampling on the remaining soil and adjacent sludge. If contamination extends either deeper or over a larger area than that which was removed, additional excavation will be required. Therefore, the verification sampling will assure that all contamination is removed.

The total volume of sludge that is estimated to be removed from Ponds A and B is 2,150 cubic yards and 1,310 cubic yards, respectively. This information is provided in Section 6.1 of the Closure Plan.

EID COMMENT 2f.

A testing program to determine that the standard for decontamination has been met at the completion of cleanup activities must be established. The program should include a description of sampling procedures, test parameters and specific analytical methods. The basis for designating a level of waste residue cleanup as adequate should be fully justified based on human health guidelines described in Item A.1, above.

HAFB's RESPONSE TO COMMENT 2f.

As discussed in the Closure Plan and in the August 1988 Radian Document entitled "Proposing Information, Plans and Specifications, Hazardous Waste Sewage Sludge Removal, Holloman Air Force Base, NM" (August 1988), soil verification sampling will be conducted in accordance with the EPA Guidance Document, "Field Manual for Grid Sampling of PCB Sites to Verify Cleanup" (EPA 560/5-86-017, May 1986). The EPA Guidance Document (EPA 560/5-86-017) provides complete information concerning sampling equipment and materials.
sample design, sample collection, handling and preservation, quality assurance/quality control, and documentation and records. As presented in the specifications, the Contractor shall submit a Quality Control Plan and a Verification Sampling Plan for acceptance by the U.S. Army Corps of Engineers, Omaha District, Hazardous and Toxic Waste Environmental Branch before collecting and analyzing samples.

EID COMMENT 3.

HAFB has failed to comply with additional requirements of HWMR-5, Part VI, 40 CFR Section 265.112(b)(3). HAFB has not adequately described: the steps involved in removing the hazardous waste, the methods of transporting the hazardous waste, how the hazardous waste will be stored prior to transportation, or the ultimate means of treating the hazardous waste. HAFB has failed to identify the off-site treatment facility which will treat the hazardous waste. HAFB must include a description of the treatment or disposal methods, the operating status of the disposal facility, and the facility’s EPA I.D. number.

HAFB's RESPONSE TO COMMENT 3.

Hazardous sludge removal, transportation, and disposal are discussed in Section 6.3.1 of the January 1989 Closure Plan. In Sections 2B, 2D, and 2E of the August 1988 Radian Document "Proposing Information, Plans, and Specifications, Hazardous Waste Sewage Sludge Removal, Holloman Air Force Base, NM", each of the above activities is discussed in detail. In all cases, the Contractor is responsible for preparing a program which lists all removal, transportation, and disposal activities. This program is subject to approval by the Omaha District, Hazardous and Toxic Waste Environmental Branch. Transportation of the sludge from HAFB to final disposal will be performed by Aptus Environmental Services. Sludge will be trucked to the Aptus storage (EPA I.D. No. KSD 980964993) and incineration (EPA I.D. No. KSD 981506025) facility in Coffeyville, Kansas, where it will be incinerated.
EID COMMENT 4.

HAFB has failed to comply with HWMR-5, Part VI, 40 CFR Section 265.112(b)(4). The decontamination procedures used for all equipment and structures contaminated prior to or during closure should be identified. Cleaning agents for solvents should be specified. Washing protocols, procedures used to collect and dispose of contaminated residues and a description of the testing and analytical methods used to ensure successful decontamination must be described. A description of the steps needed to dispose of contaminated residues generated from the decontamination of equipment and structures must be included. Indicate how and where contaminated residues will be disposed.

HAFB's RESPONSE TO COMMENT 4.

Decontamination procedures, personnel, vehicles, and equipment are specified in Section 2L of the August 1988 Radian report "Proposing Information, Plans, and Specifications, Hazardous Waste Sewage Sludge Removal, Holloman Air Force Base, NM". Depending on analytical results, contaminated liquid collected from decontamination activities may require off-site disposal or disposition on site. The Contractor will prepare a Materials Handling Plan for the collection, storage, handling, testing, and disposition of all collected and potentially-contaminated liquids. All plans are subject to final approval by the Omaha District, Hazardous and Toxic Waste Environmental Branch.

EID COMMENT 5.

HAFB has failed to comply with HWMR-5, Part VI, 40 CFR Section 265.112(b)(5). EID cannot provide its complete comments on HAFB's groundwater monitoring plan at this time, but three areas of concern directly affect the closure process.
HAFB's RESPONSE TO COMMENT 5.

The U.S. EPA, Region VI and the NMEID received the Groundwater Monitoring Plan on 18 August 1988. On 27 January 1989, HAFB received a letter from EPA which announced that the comments enclosed were both EPA's and NMEID. It is written in the agreed upon Federal Facilities Compliance Agreement that all comments of concern on the GWMP would be forwarded to HAFB through the "Complainant" (EPA). On 31 July 1989, HAFB received a letter from US EPA Region VI stating their concurrence with NMEID comments. EPA further stated they would not send any additional comments. At this time, to clarify GWMP comments by the Closure Plan NMEID reviewers, HAFB will provide brief responses to these three comments.

EID COMMENT 5a.

HAFB must sample its background wells (MW-1 and SW-2) for the parameters listed in HWMR-6, Part V, 40 CFR Section 264, Appendix IX. The presence of hazardous constituents would indicate that the groundwater yielded by the well was not unaffected by the facility as required by Section 265.91(a)(1)(ii) and, therefore, could not serve as the background well.

HAFB's RESPONSE TO COMMENT 5a.

In March 1987 at a meeting at Headquarters EPA, HAFB was requested to perform a very extensive Hydrogeologic Investigation in the vicinity of the lagoon system to provide documented data as to where the monitoring wells should be placed for the Detection Monitoring System. This requirement was completed and the results are included in the EPA/NMEID approved "Final Hydrogeologic Investigation Report and Proposed Groundwater Monitoring Plan for the Sewage Treatment Lagoons, Holloman AFB, NM, dated July 1989.

Because the Sewage Lagoons are classified as being in Interim Status, the regulations that the Groundwater Monitoring System were developed and reviewed
under are located in 40 CFR Section 265. Therefore, it is not a requirement to sample upgradient or downgradient wells for Appendix IX parameters. The requirement to provide an "outline" of a groundwater quality assessment program shall be carried out within the next few months and will most likely include parameters associated with the contaminants reported to EPA previously.

**EID COMMENT 5b.**

Any Section 264 Appendix IX constituent identified in any of HAFB's downgradient wells must be included as a parameter in all subsequent sample analyses. Any hazardous constituent which has been released into HAFB's sewage lagoons and which is determined to be in any of HAFB's downgradient wells must also be included in all subsequent analyses.

**HAFB's RESPONSE TO COMMENT 5b.**

Prior to the designated fifth round sampling (listed as the first year sampling in 40 CFR Section 265.92(d), the outline for Groundwater Quality Assessment Monitoring shall be submitted to EPA/NMEID according to 40 CFR Section 265.93.

The results of the semi-annual collection and analysis of groundwater samples will determine if assessment parameters shall be required in future sampling rounds. These future requirements shall be reported addressed according to 40 CFR Section 265.93.

**EID COMMENT 5c.**

The correct indicator parameter for organic halogens is TOX as per HWMR-5, Part VI, 40 CFR Section 265.92(b)(3).
HAFB's RESPONSE TO COMMENT 5c.

The indicator parameter named in 40 CFR Section 265.92(b)3 is TOX. However, local groundwater properties influence TOX analysis using SW-846 Method 9020. TOX analyses by SW-846 Method 9020 use carbon adsorption with a microcoulometric-filtration detector. Method 9020 detects all organic halides containing chlorine, bromine, or iodine that are adsorbed by granular-activated charcoal under the conditions of this method. The limitations of the method are that it is not applicable to samples (groundwater) in which the inorganic-halide concentration exceeds the organic-halide concentration by more than a factor of 20,000. For this reason, SW-846 Method 9020 analysis for TOX should not be applied in saline conditions such as those that exist at Holloman AFB.

NMEID has stated in a memorandum to Mr. David Maiefski from Mr. Guy Tidmore, dated 2 December 1988 that an alternative method be used instead of Method 9020, and suggested that a preferred method could be 9021, because of the high saline conditions that exist. In turn, our technical reviewers recommended that the method that should be used is Method 9021. This recommendation was received by NMEID and EPA in the final version of the GWMP on 9 March 1989. Our comment response was adequate and your reviewers approved the use of method 9021. This method does not use activated charcoal to sorb the halides. Instead, the volatile organic halides are purged into a pyrolysis furnace using a stream of CO₂, and this hydrogen halide (HX) pyrolysis product is trapped and titrated electrolytically using a microcoulometric detector.

EID COMMENT 6.

HAFB's closure plan does not include a detailed implementation schedule as required by HWMR-5, Part VI, 40 CFR Section 265.112(b)(6). The implementation schedule must assign a specific time interval over which each closure activity will be initiated and completed, including alternate scheduling which would be implemented based on data to be acquired at a later date.
HAFB's RESPONSE TO COMMENT 6.

The schedule that was prepared to commence Closure has been revised numerous times due to the many reiterations of the Closure Plan. Because of the plans to remove the contaminated sludges from Ponds A and B as closure, we would like to defer this requirement of submitting an actual schedule of closure until our offices can meet and discuss the issues related to these comments.

EID COMMENT 7.

HAFB's closure plan does not include provision for its amendment as per HWMR-5, Part VI, Section 265.112(c)(3). The closure plan should state that HAFB will submit a revised closure plan to the Director of EID no later than 30 days after any unexpected event that occurs during closure proceedings which affects the closure plan.

HAFB's RESPONSE TO COMMENT 7.

Section 2.3 of the Closure Plan presents the mechanism by which amendments may be made to the Closure Plan. As stated in 40 CFR Section 265.112, if an unexpected event occurs which affects closure activities, an amended plan will be submitted for approval no later than 60 days after the occurrence of that event. A provision as per 40 CFR Section 165.112 will be incorporated which states that NMEID will receive a revised Closure Plan no later than 30 days after the occurrence of an unexpected event during the partial or final closure period.

EID COMMENT 8.

HAFB's closure plan does not specify the procedures to be followed in obtaining a certification of closure as per HWMR-6, 40 CFR Section 265.115. The certification of closure must be submitted to the EID within 60 days of the completion of the closure activities, and the closure schedule should state
this. The certification of closure must be signed by an independent regis­
tered professional engineer rather than one employed by HAFB or any of its
operators.

HAFB’s RESPONSE TO COMMENT 8.

As per 40 CFR Section 265.115, HAFB will submit certification of closure to
NMEID and EPA Region VI within 60 days of the completion of closure
activities. Certification will be sent by registered mail and will be signed
by a representative of Holloman Air Force Base and an independent registered
professional engineer. Please refer to Section 8.0 of the Closure Plan for
further information.

EID COMMENT 9.

The closure plan should state that upon completion of the closure activities,
HAFB shall submit a Final Closure Report to EID. The report should document
the final closure and contain, at a minimum, the following:

a. The certification described in item 8, above.
b. Any variance from the approved closure activities and the reason for the
   variance.
c. A tabular summary of all sampling results, if applicable, showing:
   1. The datum and associated detection limits reported,
   2. Identification of analytical procedure, and
   3. Identification of analytical laboratory.
d. The location of the file of supporting documentation:
   1. Field log books,
   2. Laboratory sample analysis reports,
   3. The QA/QC documentation, and
e. Disposal location of all waste residues.
f. A certification of accuracy of the report.
HAFB's RESPONSE TO COMMENT 9.

A Final Closure Report to EID from HAFB will be submitted upon completion of the closure activities. The report will include, at a minimum, Items a thru f listed above.
November 9, 1989

Colonel William Koelm
Base Commander
Holloman Air Force Base
833 Combat Support Group
Holloman Air Force Base, NM 88330

RE: Closure Plan for Sewage Treatment Lagoons
NM6572124422

Dear Col. Koelm:

The Hazardous Waste Program of the New Mexico Environmental Improvement Division (EID) has reviewed the responses by Holloman Air Force Base (HAFB) to EID's Notice of Disapproval regarding HAFB's closure plan, dated August 14, 1989.

It is EID's understanding that EID and HAFB will be meeting to discuss the closure plan on Monday, November 13, 1989. EID is providing its comments to HAFB at this time to facilitate the upcoming discussion. Dr. Bruce Swanton will be represent EID during the meeting's morning session. The goal of this session will be to delineate all outstanding technical disputes with HAFB's technical representatives.

The afternoon session will run from 1:30 pm until 3:30 pm and will include both legal and administrative staff. At the outset of the afternoon session EID and HAFB technical personnel will summarize the conclusions of the morning session. This summary will include a discussion of any tentative agreements reached during the morning session and a listing of any items on which tentative agreements were not achieved.

The item numbers of the following comments refer to those in Attachment 1 to HAFB's letter of August 14.

Acceptable residual PCB's. EID agrees to a residual PCB level of 10 ppm as there is a precedent for this cleanup level under EPA authority in the state of New Mexico and EID considers

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ENVIRONMENTAL IMPROVEMENT DIVISION
Harold Runnels Building
1190 St. Francis Dr.
Santa Fe, New Mexico 87503
Col. William Koelm  
November 9, 1989  
Page 2

this to be a level protective of human health and the environment. EID has chosen the 10 ppm level rather than the 25 ppm proposed by HAFB. This level represents the allowable residual PCB contamination in unrestricted areas under the TSCA regulations, section 761.125(c)(3), and is the level for which the precedent cited above exists.

2. Estimate of the maximum extent of the operation which will be unclosed. EID does not assume that HAFB will leave on-site hazardous waste after closure. EID's intent in this item is to convey HAFB's obligation to provide EID with an estimate of the maximum areal extent occupied by the surface impoundments over their operating history. This would be the current acreage of the lagoon system plus any area formerly occupied by lagoons which may have been subsequently covered over.

2a. Detection limits Method 8240 volatile organic data. EID was in error in stating that detection limits for volatile organic contaminants should be as listed for "low soil/sediments". Matrix interferences in evaluation of HAFB's sewage sludge would result in detection limits on the order of 1-2 ppm; however, as knowledge of the hazardous constituents in HAFB's lagoon sludge is critical to EID's evaluation of HAFB's closure plan, EID will require HAFB to determine the concentration, with a detection limit in the 5-10 ppb range, of a limited list of specific target compounds. This can be achieved using compound-specific sample clean-up and compound-specific detection procedures. The list of target compounds must include carbon tetrachloride, 1,1,1-trichloroethylene, 1,1,2-trichloroethane, 1,1-dichloroethylene, 1,2-dichloroethane, ethylene dibromide, Heptachlor, Lindane, Dieldrin, Chlordane, Diazinon, Dioxin, dinitrotoluene, naphthalene, benzene, 2,4,6-trichlorophenol, methyl isobutyl ketone, freon 113, methylene chloride, acetone, toluene, xylene, acetonitrile, 1,2,4-trichlorobenzene, benzo(a)pyrene, phenanthrene, pyrene, and chloroform.

2b. Detection limits for Method 8270 semivolatile organic data. This has been addressed under item 2a, above.

2c. EP Toxicity/total metals. This response is satisfactory and must be included in the next revision of HAFB's closure plan.
2d. Analytical data on sludges from lagoons D, E, G and sump F. The documents identified by HAFB as containing this information are here identified by date and are inadequate for the reasons stated:

January 22, 1982: This study concluded that there were no PCB's in any of HAFB's lagoons. The remaining data are suspect for this reason.

December 22, 1983: No analytical data are presented.

August 19, 1987: This study did not detect PCB's in lagoons A, B or C. The remaining data are suspect.

March 1986: This study concerned only lagoons A, B and C.

August 24, 1987: No PCB's were detected in this study. Only one sludge sample was taken per lagoon.

2e. Coring program description. This response is satisfactory. HAFB's next closure plan revision must include details of the coring program described. Undisturbed cores must be taken from the surface to the depth of the uppermost aquifer. Appendix IX parameters, or an acceptable subset thereof, must be evaluated in these cores at acceptable depth intervals.

2f. Testing program. The response to item 2e also addresses this issue.

3. Requirements of section 265.112(b)(3). Reference to documents secondary to the closure plan is unacceptable. The closure plan must be a stand-alone document containing all relevant material. Additionally, the sections of the secondary documents referenced by HAFB in its response to this item are generally unacceptable. For example, HAFB references the August 1988 Radian document "Proposing Information, Plans, and Specifications, Hazardous Waste Sewage Sludge Removal, Holloman Air Force Base, NM", section 2D, page 2D-1, paragraph 1.1. This section does not detail the procedures the contractor will follow nor does it describe the facilities which will be constructed to execute the program. This document is a generalized description of program goals which
the contractor will be tasked to accomplish and is thus inadequate as an inclusion in the next revision of HAFB's closure plan.

4. Decontamination procedures. There is no section 2L. section 2C in the "Proposing Information..." document referenced in item 3 does address decontamination procedures, but is unacceptable to EID for the same reason as detailed in item 3.

5. Groundwater monitoring.

5a. Appendix IX parameters. According to section 270.1(c), all units that received hazardous waste after July 26, 1982 must either obtain a post-closure permit or successfully demonstrate clean closure under section 264. EID will require sampling of all RCRA monitoring wells for Appendix IX parameters or an acceptable subset thereof.

5b. Inclusion of identified Appendix IX constituents. EID will require the inclusion in HAFB's sampling program of any Appendix IX constituents previously identified.

5c. HAFB is correct in its response to this item.

6. Implementation schedule. EID will require a detailed implementation schedule.

7. Amendments to the closure plan. HAFB's response to this item is satisfactory.

8. Certification of closure. HAFB must submit certification of closure as required by section 265.115.

EID looks forward to discussing the items above with HAFB's representatives on November 13, 1989, and any other issues involving the closing of HAFB's surface impoundments. If you have any immediate questions on this matter, please contact Dr. Bruce Swanton of my staff at (505) 827-2925.

Sincerely,

Julie Wanslow, Supervisor
Hydrogeology Section
Hazardous Waste Program

js/bac
February  6, 1990

Colonel William Koelm
Base Commander
Holloman Air Force Base
833 Combat Support Group
Holloman Air Force Base, NM  88330

RE: Sewage Treatment Lagoons
NM6572124422

Dear Col. Koelm:

The Hazardous Waste Section of the New Mexico Environmental Improvement Division (EID) is providing the attached memo for your information.

If you have any questions regarding this matter, please contact me at (505) 827-2925.

Sincerely,

Bruce Swanton
Hazardous Waste Section
FROM: BRUCE SWANTON
TO: BOYD HAMILTON, ELIZABETH GORDON, COURT FESMIRE, TOM O'BRIAN
DATE: JANUARY 2, 1990
SUBJECT: HOLLOMAN AIR FORCE BASE SEWAGE LAGOONS
NM 6572124422

Holloman Air Force Base (HAFB) wishes to close its sewage lagoons as RCRA units and to subsequently continue to use them as sewage treatment lagoons. The contaminant of greatest concern in the sludges of Lagoons A and 3 are the PCB's 1254 and 1260, which range in concentrations up to 191 ppm. The following table summarizes the results of semi-volatile analyses in HAFB's Lagoon A and B sewage sludges and is taken from HAFB's closure plan (submitted January 19, 1989):

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Number of Times Detected</th>
<th>Maximum Value (ppm)</th>
<th>Detection Limit (ppm)</th>
<th>Location of Maximum Value</th>
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<tr>
<td>1,2,3-trichloroanisole</td>
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<td>1.28</td>
<td>31++</td>
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<td>31++</td>
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Holloman reported no volatile organic constituents above the detection limit and no EP-tox metals.

HAFB is currently removing the most highly contaminated sludges from Lagoons A and B. The inlet into these lagoons is at the center of each lagoon. A sludge mound has developed over the years at and around each inlet point. HAFB has presented evidence that removal of the sludges based on PCB content will also remove sludges contaminated with other constituents.

The New Mexico Environmental Improvement Division (EID) and the U.S. EPA have required HAFB to install an adequate groundwater monitoring system which consists of eight downgradient wells and two upgradient wells. Lagoons A and B are the first to receive sewage effluent in the lagoon system and are likely to be the most contaminated. These lagoons are specifically monitored by three downgradient wells. Based on current information, EID considers the groundwater monitoring system to be adequate to immediately detect a release from the lagoon system.

If EID determines that HAFB can continue to use its lagoon system for treatment of solid wastes, HAFB will also be required to periodically sample its monitoring wells for Appendix IX parameters and to conduct regular evaluations of the water in Lagoons A and B for Appendix IX parameters as long as the system is in operation. Prior to EID's determination, HAFB will have removed the most contaminated sludges from Lagoons A and B and will have conducted a coring program to determine what, if any contaminants exist in the subsoils of Lagoons A and B from the surface down to groundwater (approximately 20 feet). This post-removal program will also include a 37-point sampling of the sludges remaining in Lagoons A and B. HAFB will also have conducted sludge analyses at the inlet to Lagoon C.

Prior to any final determination EID must be convinced that:

1) The sludge removal in Lagoons A and B has succeeded in removing contaminants from the lagoons as is practically possible.

2) The coring and post-removal sampling program must enable EID to know with confidence that the remaining sludges in Lagoons A and B do not represent a threat to the environment or to the public health in the event that solid waste disposal is allowed to continue.
Holloman Air Force Base
Memo on Lagoon System
January 2, 1990
Page 3

3) HAFB implements a sludge sampling program for Lagoons C, D, E, F, and Lakes Holloman and Stinky. Five sludge samples should be taken in locations acceptable to EID and analyzed for all constituents which have been identified in Lagoons A and/or B.

4) HAFB commits to a periodic sampling program of all monitor wells and the waters in Lagoons A and 3 to continue as long as the lagoon system is in operation.

5) HAFB must commit to an enforceable contingency plan to include increased frequency and intensity of monitoring and/or an accelerated corrective action program in the event that a release is detected at any time in the future. To this end, HAFB must comply with all requirements of Section 265.113(d) and 265.113(e) as set forth in the August 14, 1989, Final Rule (Federal Register page 33394).

I have investigated two sections of the regulations which might allow HAFB the continued use of the lagoon system for sewage treatment: 1) Section 264, Subpart G, the issuance of a post closure care permit, and 2) Section 264.113 as set forth in the August 14, 1989, Final Rule (Federal Register page 33394). The RCRA hotline suggested HAFB investigate the possibility of delisting the facility and re-defining the lagoon system as a Title D solid waste system. HAFB's response to this suggestion is given last.

Post-Closure Care Permit

A synopsis of these regulations is as follows:

264.111: Must close in a manner that

264.111.c: complies with the requirements stated in 265.228

264.228(a)(2)(i): eliminate free liquids by removing or decontaminating

-228(a)(2)(ii): stabilizes remaining waste

-(2)(iii): cover with a final cover designed to result in

-111(A): long-term minimization of migration
Holloman Air Force Base
Memo on Lagoon System
January 2, 1990
Page 4

---(iii)(B): minimize maintenance
---(iii)(C): promote drainage and minimize erosion
---(iii)(D): accommodation of soil settling
---(iii)(E): reduce permeability of the cover
-228(b): if waste residues remain comply with all post-closure care requirements.

Delay of Closure

This option is formally restricted to facilities operating under the Section 264 permit regulations or under interim status. HAFB lost interim status in 1985.

The newly promulgated "delay of closure" regulations would enable HAFB to continue to use the lagoon system for receipt and treatment of solid waste and would commit HAFB to submit an amended Part 8 application detailing the nature of the RCRA unit and its future intended use. Section 265.113(e) lists the "delay of closure" requirements:

265.113(e)(1): if the surface impoundment is not double lined, submit

---(e)(1)(i): a contingent corrective measures plan
---(e)(1)(ii): plan for removing hazardous waste
---(2): remove all hazardous waste by removing all hazardous liquids and removing all hazardous sludges to the extent practicable
---(4): if there is a statistically significant release
---(4)(i): implement corrective measures
---(4)(ii): receive non-hazardous with appropriate demonstrations
---(4)(iii): conditions for ceasing receipt of wastes
---(e)(5): reporting requirements under delay of closure
-(e)(6): failure to implement corrective action - closure

-(e)&7): failure to implement corrective action -
Administrator notifies facility of consequences

Delisting - Subtitle D Redefinition

Sharon Moore, HAFB's Environmental Coordinator, stated that HAFB had considered delisting the lagoon system as an option, but was concerned that the delisting effort could cost "millions" and the outcome was too unpredictable.
January 26, 1990

Mr. Court Fesmire
U.S. EPA Region VI - 6H-CS
1445 Ross Avenue
Dallas, TX 75202

Re: Holloman Air Force Base Sewage Lagoons
NM6572124422

Dear Mr. Fesmire:

In December of 1988 the Environmental Improvement Division (EID) signed a Federal Facility Compliance Agreement (FFCA) made between Holloman Air Force Base (HAFB), the U.S. Environmental Protection Agency (EPA), and EID. EID recognized it was signing a document with some inherent problems. It is now clear that the FFCA will generate more work than EID originally anticipated and has placed EID in a "no-win" situation with respect to the production of a mutually acceptable closure plan.

EID reviewed HAFB's initial closure plan and believes that an acceptable closure protective of human health and the environment can be obtained; however, 40 CFR section 255.228(a) does not allow continued use of a surface impoundment unless the unit is clean closed. Clean closure of the surface impoundments at HAFB cannot practicably be achieved. During the meeting between EID and HAFB in November of 1989 HAFB stated directly that it would not discontinue the use of its lagoons for sewage treatment under any circumstances. HAFB stated that any attempt to cause HAFB to discontinue this use would be cause for immediate dispute resolution.

If EID drafts a closure plan for HAFB's lagoon system, it will be forced to include the capping and discontinuance of use of the sewage lagoons. Dispute resolution would then be triggered and the time EID had committed to writing the closure plan for HAFB would have been wasted.

EID does not have the time or the resources to pursue dispute resolution, nor does it have the time to write a closure plan that
complies with federal and state regulations for a RCRA closure which would only trigger dispute resolution. EID also believes that regulating military sewage lagoons which are identical to exempt POTW's is a questionable practice. Finally, in the event that HAFB were to close its lagoon system, it is unclear how it would then dispose of its sewage effluent.

EID believes that there are two acceptable courses of action for resolution of the problems at HAFB: 1) allow a modified closure, call for a post-closure care plan and permit, and process these documents immediately; or 2) accept a delay of closure pursuant to the August 14, 1989, final rule. The first option may provide the best regulatory control by allowing long-term monitoring and any necessary future corrective action. The second option would require some type of LOIS waiver from EPA.

EID is requesting written approval to proceed with one of the two options discussed above within thirty (30) days of the receipt of this letter. EID recognizes that this is a short time for EPA to establish the precedent which will be required under either option. If EPA cannot authorize either of the two options within this time frame, then this letter serves as a formal referral to EPA of the HAFB closure plan for final processing. Should EPA refuse acceptance of this closure plan then EID will immediately initiate formal dispute resolution.

Should you have any questions regarding this matter please contact me at (505) 827-2926.

Sincerely,

Boyd Hamilton
Program Manager
Hazardous Waste Program

BH/bas

cc: Lynn Prince, U.S. EPA
Tracy Hughes, NMEID Counsel
Composite Sample Analyses for Lagoons A-G, Lake Holloman, and Lake "Stinky"

Bureau of Land Management
Attn: Jim Fox
1800 Marquess
Las Cruces, New Mexico 88001

1. Per our discussion on 6 Feb 90, we are providing you a copy of our Appendix IX Composite Samples of Lagoons A, B, C, D, E, F, G, Lake Holloman, and Lake "Stinky". We will provide the A-E Groundwater Monitoring Report/Quality Control Summary for the First Groundwater Sampling Round during the week of 22 Feb.

2. Second Round Sampling was conducted in Sep 1989; report has not yet been provided to the base. When we receive this report, copies will be sent to the NMEID, US EPA Region VI, and you.

3. We would like to express our thanks to the BLM for coordinating our recent meeting. We believe it was necessary in the development of understanding of each of our interests. We would like to invite you to meet on a semiannual basis in the future to discuss our continued efforts for closure of the lagoons as hazardous waste surface impoundments. These meetings could be held here at Holloman in January and July at a mutually-agreed upon date and time.

4. As stated during our meeting, at this time we have no plans to conduct sampling in Lake Holloman or Lake Stinky. Given the protocol we have established to clean our lagoons; i.e., clean Lagoons A & B and conduct verification testing in Lagoon C; if contamination is found in Lagoon C then clean Lagoon C and conduct verification testing in Lagoon D; etc.; at this time, we do not believe such a study would be of benefit. However, if at some point in the future there is a requirement by regulation or by the NMEID or US EPA Region VI, we will pursue funding sources for such a study.

5. If at any time you have questions, please contact Sharon Moore at 479-3931.

SIGNED
WILLIAM W. KOELM, Colonel, USAF
Commander

Atch
Appendix IX

cc: w/Atch
Raymond P Churan, DOI
Tom O'Brien, F&W Service
Bruce Swanton, NMEID

Coord: DEV (see attached copy)
DE

DEV/S.Moore/3931/jmb/12 Feb 90/#0479V, Pq 16
May 7, 1990

Mr. Court Pasmine
U.S. EPA Region VI 6H-CS
1445 Ross Avenue
Dallas, TX 75202

Re: Holloman Air Force Base Sewage Lagoons
NM6572124422

Court:

This is a note confirming our conversation of this morning. The resolution of the HAFB matter has become so confusing that I wanted a letter in our files simply describing the point we have reached.

It is my understanding that EPA now intends to take the position with HAFB that HAFB has never complied with corrective measure D.1 listed on page 9 of the Federal Facilities Compliance Agreement (Docket Numbers VI-502-H and VI-661-H). EPA will require HAFB to submit a closure plan detailing exactly how the surface impoundments will be taken out of use and capped or excavated. EPA will remind HAFB of its dispute resolution option.

It is my understanding that until HAFB responds to EPA's letter, EID has no further role to play in the process.

Thanks for your help in this matter. It is always a pleasure working with you.

Sincerely,

Bruce Swanton
Hydrogeology Section
Hazardous Waste Program

cc: Sharon Moore, HAFB
    Lynn Prince, U.S. EPA
    Tracy Hughes, NMEID Counsel
833 CSG/DEV

Contaminant Study/Lake Holloman & Lake Stinky

US Department of the Interior
Office of the Secretary
Attn: Raymond Churan
Office of Environmental Affairs
PO Box 649
Albuquerque, NM 87103

1. On 5 June 1990, the base received a Scope of Work (attached) from the Fish and Wildlife Service for a contaminant study in Lake Holloman and Lake Stinky. Prior to submitting this scope to our headquarters, Holloman AFB requests a letter of concurrence from the Department of the Interior (DOI) that this scope will address all concerns from any agency under the DOI. Should other agencies under the DOI have additional concerns, we would like to address them at the same time.

2. We are rapidly approaching the end of the third quarter of FY90. The base needs to submit this funding request, as soon as possible, in order to be considered for late FY90 funds that may not have otherwise been obligated. Consequently, your immediate attention to this scope of work is requested as the base will not act upon it until we receive your letter, stating this scope will address all concerns of all agencies under the DOI or a concurrence with this scope and an additional statement of work.

3. We look forward to working with you on this project. If you have any questions, please contact Sharon Moore at 479-3931.

SIGNED

HOWARD E MOFFITT
Deputy Base Civil Engineer

Atch
Scope of Work

cc: w/Atch
BLM (Jim Fox)
F&W Service (Tom O'Brien)
NMEID (Bruce Swanton)

Coord: DEV  

E-111
JUN 14 1990

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Colonel William W. Koelm
Commander
833rd Combat Support Group
Holloman Air Force Base, New Mexico 88330-5000

Dear Col. Koelm:

In accordance with Section VI.D.2. of the Federal Facilities Compliance Agreement (FFCA) for Holloman Air Force Base (HAFB), which was effective December 20, 1988, Region 6 of the Environmental Protection Agency (EPA) has reviewed comments from the New Mexico Environmental Improvement Division (NMEID) on the proposed closure plan for the HAFB lagoons. Region 6 has determined that HAFB failed to submit a closure plan that meets the requirements set forth in Section VI.D.1. of the FFCA.

Section VI.D.1. requires submittal of a closure plan that accords with Title 40, Part 265 Subparts G and K, Code of Federal Regulations. Subpart G (Closure and Post-Closure) in Section 265.111(c) requires compliance with Section 265.228 which is the closure performance standard for surface impoundments. Section 265.228 requires that closure of hazardous waste surface impoundments meet one of two conditions: (1) clean closure, or (2) closure in place. Clean closure requires the removal or decontamination of all waste residues, contaminated containment system components, and contaminated subsoils. Closure in place requires the elimination of free-liquids and installation of a final cover.

Either of these options is inconsistent with the proposed HAFB plan which would remove some contaminated soils and allow for continued use of the lagoons as sewage treatment lagoons. Further, the HAFB plan does not address the closure of all the lagoons. The entire lagoon system (seven lagoons) has been used to treat hazardous waste. Therefore, as the requirement under Section VI.D.1. of the FFCA called for submittal of a closure plan which met the § 265.228 requirements and as HAFB has clearly not submitted such a plan, the EPA is, by this letter, requiring submittal of a closure plan meeting those requirements within thirty (30) days of receipt of this letter.
A copy of this letter will be sent to NMEID. If you have any questions about the letter, please have your staff call Court Fesmire at (214) 655-2192.

Sincerely yours,

[Signature]

Allyn M. Davis
Director
Hazardous Waste Management Division (6H)

cc: Bill Blankenship
    New Mexico Environmental and Improvement Division
Application Form 2C - Wastewater Discharge Information

Permit Contact (6AEP)
U.S. Environmental Protection Agency
1445 Ross Avenue
Dallas, TX  75202-2733

1. Recently the Holloman AFB Environmental Coordinator requested information from the New Mexico Environmental Improvement Division (NMEID) about the requirements for a NPDES Permit for the discharge from the sewage treatment lagoons to Lake Holloman. As a result of the request, we received Form 2C to submit.

2. Up until now the base has not applied for a NPDES permit because correspondence (see attachment) between the NMEID and EPA Region VI indicated the EPA did not intend to regulate Holloman AFB Lagoons under the Clean Water Act until the RCRA issues were resolved. We have not received any further information from EPA on this subject...

3. Holloman AFB is in the process of revising the Part A and B Applications for the Defense Reutilization and Marketing Office and submitting them to the NMEID for approval. On the Part A Application, we checked "Yes" to Item II-C on Form 1, acknowledging discharge to waters of the United States based on the wildlife habitat and recreational use of the area by people or organizations, such as the Audobon Society. The application instructions state that if one checks this item "Yes", then they are required to submit Form 2C.

4. At this time, Holloman AFB has not submitted the Form 2C, based on the previous correspondence referenced above.

5. If you have any comments, please contact Sharon Moore at (505)479-3931.

SIGNED

HOWARD E. MOFFITT
Deputy Base Civil Engineer

Atch Correspondence

cc: With Atch
Program Manager
NMEID, Surface Water Section

Coord: DEV  SM

E-114
DEV/snm/21 Jun 90/#0479V, Pg 41
June 27, 1990

Albuquerque District, Corps of Engineers
Holloman Resident Office,
P O Box A
Holloman AFB, New Mexico 88330-0401

Attn: Mr. Max Johnson, P.E., Authorized Representative of the Contracting Officer

Ref: Hazardous Waste Sewage Sludge Removal
DACA45-88-C-0148
Holloman Air Force Base, New Mexico

Subj: Test Results - PCB Residuals in Pond A, Zone II

Dear Mr. Johnson,

Please refer to the information in the attached copy of a June 27, 1990, Western Technologies, Inc. report of data received back from the project testing lab, Hunter ESE.

Note that sample points A-19, A-21 and A-23 show PCB's remaining in the sludge at levels above 25 parts per million. The results are tabulated for easy reference:

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<tr>
<th>Point</th>
<th>PCB Concentration</th>
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<tr>
<td>A-19</td>
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<tr>
<td>A-21</td>
<td>30 ppm</td>
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<tr>
<td>A-23</td>
<td>37 ppm</td>
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These points are outside the area of the stipulated removal zone number II. Our contract requires that we remove contaminated sludge only within the boundaries of Zone II.

Please review the data and let us know if you have any questions. Since the levels of PCB's detected are above a contract-stipulated action level for additional removal, we await U.S. Army Corps of Engineers directives as to what to do next in order to fully comply with the contract requirements. If the Government finds that the work we have accomplished, as determined by the testing reported above, fully meets contract requirements, please let us know at once.

Thank you for your time and attention to this matter.

Sincerely yours,

Phillip E.A. Armstrong
Senior Project Manager

cc: J. Bradley, Bill Schwettmann,
E-115
1. On 19 June 1990, I received your letter requesting Holloman Air Force Base (HAFB) submit a closure plan for the sewage treatment lagoons that accords with Title 40, Part 265 Subparts G and K, Code of Federal Regulations. Today we are submitting to you, under separate cover, our closure plan which incorporates the New Mexico Environmental Improvement Division's (NMEID) comments provided to us in a meeting in Santa Fe on 13-14 November 1989. This closure plan provides for the continued use of the sewage treatment lagoons and outlines the corrective actions undertaken by HAFB to remove PCB contaminated sludges from the affected areas of Holloman's sewage treatment lagoons. Currently our contractor is in the completion stages of a risk assessment which will quantify the impact, if any, to health and the environment, given the continued use of the lagoons for non-hazardous wastewater treatment.

2. On 13 July 1989, the NMEID submitted to HAFB a Notice of Disapproval (NOD) of our Sewage Lagoon Closure Plan. Following our request for your formal comments on our closure plan, Mr. Courtland Fesmire of your staff informed my Environmental Coordinator and the HQ TAC Judge Advocate Director of Environmental Law that the NMEID would be acting as lead regulatory agency for the processing of the Holloman Sewage Lagoon Closure Plan. Because the NMEID had the lead, we met with them to discuss their concerns and comments. We agreed there were two acceptable courses of action for resolution of the problems at HAFB, either of which is protective of human health and the environment and would allow for the continued use of the lagoons. These options are as follows: 1) allow a modified closure and submit a post-closure care plan and permit, or 2) allow HAFB to file a delay of closure pursuant to the August 14, 1989, final rule.

3. If you disagree with our approach to closure, we request that you respond in writing and identify those portions of our submitted closure plan which you find deficient. Upon receiving your response, we would then propose a meeting to discuss our differences such that we make every reasonable effort to informally resolve any dispute at the project manager or immediate supervisor level.

JOHN C. MOLLISON, JR, Lt Col, USAF
Commander

cc: See Attached Distribution List

Readiness is our Profession

E-116
United States Department of the Interior

OFFICE OF THE SECRETARY
OFFICE OF ENVIRONMENTAL AFFAIRS
POST OFFICE BOX 649
ALBUQUERQUE, NEW MEXICO 87103

July 23, 1990

William E. Moffitt
Deputy Base Civil Engineer
Department of the Air Force
Headquarters 833D Combat Support Group (TAC)
Holloman AFB, NM 88330

Dear Mr. Moffitt:

This is in response to your June 7, 1990 letter concerning a contamination study of Lake Holloman and Lake Stinky at Holloman AFB, New Mexico.

In our meeting on February 6, 1990 with Holloman AFB (HAFB) Staff and in subsequent discussions and correspondence, we have identified concerns that past and present discharges from HAFB treatment lagoons: (1) not create a threat to public health or safety on trust lands of this Department or (2) not adversely impact migratory birds (trustee resources of the Department) that use the area.

On May 31, 1990 the Fish and Wildlife Service (FWS) provided your office with a Scope of Work for a contaminants study in Lake Holloman and Lake Stinky to assess potential impacts to migratory birds. Your letter of June 7, 1990 to our office indicates that prior to your submitting this Scope of Work to your headquarters for possible funding in the third quarter of FY90 you request our concurrence that "this scope will address all concerns from any agency under the DOI." We find this scope of work will adequately address the issues concerning potential impacts to migratory birds and, in this regard, will meet the needs of both the FWS and Bureau of Land Management (BLM). We recommend that you consider funding this work in FY90.

However, we have not completed a proposed scope of work to address a potential threat to public health and safety on trust lands of this Department. This is a more difficult issue to define and address. The BLM is working with you to address this issue. We believe that the scope of work necessary to address this issue of public health and safety will not duplicate the work included in the scope of work to address potential impacts to migratory birds. Therefore, we suggest the work related to
potential public health and safety be considered for funding in FY91 as soon as an adequate scope of work is developed. Ms. Joan Resnick, from the BLM Las Cruces District, has been in contact with Ms. Sharon Moore, of your staff, to develop this scope of work.

We appreciate your cooperation in helping to address these potential natural resource trustee issues of concern to this Department.

Sincerely,

Raymond P. Churan
Regional Environmental Officer

cc:
Field Supervisor, FWS, Albuquerque
District Manager, BLM, Las Cruces
Contaminant Study - Lake Holloman & Lake Stinky

1. During the past few months Holloman Air Force Base (HAFB) personnel have met with employees of the Department of the Interior (DOI), the Fish and Wildlife Service (FWS), and the Bureau of Land Management (BLM). They have expressed their concern with regard to toxic materials that may have been discharged through the HAFB sewage treatment lagoons and ultimately into Lake Holloman and Lake Stinky. As you are aware, during Phase I of the Installation Restoration Program several toxic materials were identified as having been discharged into the sewer system.

2. In April 1990, Mr Raymond Churan, DOI Regional Environmental Officer, met in Albuquerque with Mr Karl Kneeling, HQ USAF, at a conference sponsored by the Hazardous Waste Management Society. Mr Kneeling works with the restoration section of HQ USAF. During their discussions, Mr Kneeling indicated to the DOI that funds from the Defense Environmental Restoration Account (DERA) may be available to conduct studies such that their concerns could be addressed. A memorandum from Mr Churan to Mr H James Fox, BLM District Manager, Las Cruces, discussing recent conversations between Mr Churan and Mr Karl Kneeling is provided for your information (see Atch 1).

3. On 20 April 1990, base personnel met with the FWS to discuss their concerns such that they might be addressed in a risk assessment presently under preparation by Radian Corporation. The purpose of the risk assessment is to justify the environmental position of the base for the continued use of the lagoons for the treatment of non-hazardous wastewaters. During this meeting, the FWS suggested that HAFB fund a contaminant study to investigate the presence of organic or inorganic compounds and the potential impact on the migratory birds that frequent the area. On 5 June 1990, HAFB received a scope of work and cost estimates for their recommended study (see Atch 2).

4. This information is provided to you for planning and budgeting. Request HQ TAG provide a response to HAFB indicating the likelihood that DERA funds would be available for this study.

5. The point of contact for this is Sharon Moore at AV 867-3931.

HOWARD E. MOFFITT
Deputy Base Civil Engineer

DEV Coord: S. Moore

2 Atchs
1. Memorandum
2. Scope of Work/Cost Estimate

cc: W/o Atchs
Raymond Churan, DOI
James Fox, BLM
John C. Peterson, FWS

DEV/S.Moore/26 Jul 90/#0479V, Pg 18
Colonel Ira Hester, USAF  
Commander  
833 Combat Support Group  
Holloman Air Force Base, New Mexico 88330

Dear Colonel Hester:

On July 18, 1990, my office was sent a letter from Lt. Col. John C. Mollison of Holloman Air Force Base (HAFB). This letter was in reference to the closure plan submitted by HAFB for the seven sewage treatment lagoons. These lagoons are the subject of a Federal Facilities Compliance Agreement (FFCA) signed by HAFB, the Environmental Protection Agency (EPA), and the New Mexico Environmental Improvement Division (NMEID) in December of 1988. The FFCA addressed violations by HAFB of the hazardous waste regulations promulgated under the Resource Conservation and Recovery Act (RCRA). One of the requirements of the FFCA was the submittal of a closure plan for the lagoons that met the requirements of closure under Title 40 of the Code of Federal Regulations (40 CFR) for hazardous waste surface impoundments. This was fully explained in my letter of June 14, 1990, to Colonel William W. Koelm.

In Colonel Mollison's letter, he expressed confusion about the lead agency for the review of the closure plan, NMEID or EPA. As stated in the FFCA, EPA will process the plan to an approvable condition and NMEID will approve it, when warranted. When the FFCA was negotiated, NMEID did not have the resources available to review the plan. That is why EPA agreed to review it. After the plan was submitted, for a time NMEID felt sufficient resources were available for the review. As the approving authority, this was a less cumbersome solution. Therefore, NMEID took the lead in the review to the point of issuance of the Notice of Disapproval. As the closure plan process will apparently take significantly more time than NMEID anticipated, they have requested that EPA retake the lead in the review. Therefore, EPA will be the lead agency in the review of the closure plan.

Regarding the two options Colonel Mollison's letter discusses for the closure of the lagoons, neither is acceptable. The delay of closure is not available to HAFB because the sewage lagoons no longer have interim status to operate. Interim status is a temporary authority to operate facilities that were in existence prior to November 1980. This authority to operate exists until the permit is issued or until the status is revoked. In 1984, Congress amended RCRA to include the loss of interim status provisions. To retain interim status, a land disposal facility had to have a ground water monitoring system in place. HAFB did not have a ground water monitoring system in place on November 8, 1985, as required by the statute. The loss of interim status was automatic and nondiscretionary as set out in the statute. To operate the lagoons after November 8, 1985, HAFB must have a permit.
The other option discussed is the modified closure. Modified closure is not an option open to a facility. As was fully discussed in the June 14, 1990, letter to Colonel Koelm, the RCRA regulations only allow two options for closure of hazardous waste land disposal units. Those options are (a) clean closure, or (2) closure in place. Clean closure means all waste is removed. After clean closure, the lagoons could be used again as sewage lagoons. Closure in place means that waste remains in place but a cover is engineered and installed to prevent migration of hazardous constituents from the unit. This is what was meant in the June 14, letter as a plan that accords with Title 40 Part 265, Subparts G and K. A modified closure which would remove some but not all of the hazardous constituents and continue to use the lagoons does not meet the requirements.

Preliminary review of the revised closure plan submitted by HAFB in July 1990, indicates that HAFB is still pursuing modified closure. HAFB is still out of compliance with Section VI, D.1 of the FFCA which requires submittal of a closure plan that accords with 40 CFR Part 265, Subparts G and K. Therefore, by this letter, EPA is requiring submittal, within thirty (30) days of your receipt of this letter, of a closure plan that calls for removal of all hazardous waste constituents from the seven lagoons or dewatering and capping of the seven lagoons.

A copy of this letter will be sent to NMEID and EPA's Federal Facilities Hazardous Waste Compliance Office.

Sincerely yours,

Allyn M. Davis
Director
Hazardous Waste Management Division (6H)

cc: Ms. Kathleen M. Sisneros, Chief
    Hazardous and Radiation Waste Bureau
    Environmental Improvement Division
    The Health and Environment Department

Gordon M. Davidson
Director
Federal Facilities Hazardous Waste Compliance Office (OS-530)
MEMO FOR RECORD: EPA Region VI letter of 11 Dec 90, received at HAFB 17 Dec 90
Ref Sewage Lagoon Closure Plan

DE
CSG/CC

The following actions have been taken/planned as a result of receiving above
EPA letter restating their position that HAFB remains in noncompliance with the
Federal Facilities Agreement signed in December 1988. EPA requests a response
from HAFB within 30 days.

-- Telecon between Col Ira Hester and Mr Bill Cox, AFRCE/Dallas liaison
between Air Staff and EPA, Region VI: Mr Cox suggested meeting in Dallas with
his office, HQ TAC, and HAFB to "plan" coordinated strategy.

-- Telecon between Howard Moffitt and Brent Johnson, HQ TAC/DEV: Requested
above referenced meeting. Per Mr Johnson, they are working up alternate propo-
sals at the request of Col McAuliff and cannot be ready to discuss options and
establish a plan of action until first part of January. There previously was
a meeting scheduled in Austin, TX, on 3 January 91 to review the contracted
risk assessment for the sewage lagoons. This will probably be an integral part
of our strategy. It was, therefore, decided to move this 3 January meeting
from Austin to Dallas, review the draft risk assessment and then use this same
meeting to formulate a coordinated strategy for our follow-on actions.

-- The 3 Jan 91 Dallas meeting is scheduled for 0800 at the AFRCE office. It
will be attended by HAFB, HQ TAC, AFRCE, Corps of Engineers, and Radian Corpor-
ation (engineers and lawyers from each).

-- Mr Cox is attempting to set up a working meeting on 4 Jan 91 with EPA,
Region VI (Dallas), to discuss solutions to the sewage lagoons. If this meet-
ing is unsuccessful at negotiating a settlement with EPA, we will have acted
IAW the FFCA and made an attempt to resolve our differences before initiating
disputes resolution.


Howard E. Moffitt
Deputy Base Civil Engineer

Update - EPA cannot meet til 11 Jan 91

Working schedule with TAC - May 20th base

AFRCE meeting on 3 Jan 91

26 Dec update: Meeting has been scheduled for 4 Jan.
E: Call me if you have comments.

833 CSG/DE

Closure Plan — Sewage Treatment Lagoons, Holloman AFB, NM

Mr Allyn M. Davis
Director
Hazardous Waste Management Division (6H)
USEPA Region VI
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

1. Thank you for meeting with us on 4 Jan 1990. We prepared a memorandum of record based on the meeting. We are requesting you sign and return it to us if you concur with the memo as prepared. Otherwise, please give us your comments and we will revise it to a mutually acceptable record.

2. As we agreed in our meeting, Holloman AFB will not be submitting a revised closure plan referenced in your letter of 11 Dec 1990. Instead, as you requested, we are working with the NMEID to establish a meeting date and location that is mutually acceptable to the NMEID, USEPA Region VI, Holloman AFB, and HQ TAC. It appears the NMEID may not be able to meet during the week of 14-18 January. We propose a meeting during the week of 28-31 January 1990.

3. We look forward to meeting with you as soon as the meeting can be coordinated.

IRA L. HESTER, Col, USAF
Commander

Attachments

Memorandum of Record

cc: See Distribution List

Coord: DEV________; DE________;

USEPA: CERTIFIED MAIL RETURN RECEIPT REQUEST P
NMEID: CERTIFIED MAIL RETURN RECEIPT REQUEST P
MEMORANDUM FOR RECORD

1. REGARDING: Meeting on 4 Jan 1991
2. SUBJECT: Holloman Sewage Treatment Lagoons
3. LOCATION: EPA Region VI; Dallas, Texas
4. PERSONNEL CONTACTED: (see attached listing)
5. IMPORTANT POINTS:

a. Col Ira Hester, Commander, 833d Combat Support Group, Holloman AFB, NM, informed Mr Allyn Davis, USEPA Region VI, that Holloman AFB proposes to comply with the Federal Facility Compliance Agreement, signed on 20 December 1988, by pursuing a clean closure supported by a site-specific demonstration (i.e., risk assessment). Site specific demonstration of clean closure is discussed in the preamble to the final rule for Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities, 40 CFR Part 265, published 52 Federal Register 8704, 8706, 19 Mar 1987.

b. Mr Davis' answer to Col Hester was that EPA Region VI could not approve a site specific risk assessment to support a clean closure; however, the state of New Mexico having authority for RCRA closure in the matter of Holloman AFB, could approve a clean closure supported by a site specific risk assessment. Mr Davis added that Holloman would have to meet with the state and convince them to set a precedent in this matter and, if the state agrees to proceed with this option, EPA Region VI would be performing the technical review of Holloman's closure plan and risk assessment.

c. Col Hester requested that, in lieu of submitting an incomplete closure plan to EPA Region VI to comply with their 11 December 1990 letter, we meet with the state regulators and representatives from EPA Region VI in Santa Fe, NM in two weeks to discuss Holloman's proposal of a clean closure supported by site specific risk assessment. Mr Davis agreed.

We, the undersigned, agree that the events described in this Memorandum for Record are factual and reflect the current position of the parties at the meeting.

IRA L. HESTER, Colonel, USAF
Commander, 833d Combat Support Group
Holloman AFB, New Mexico

ALLYN M. DAVIS, US EPA Region VI
Director, Hazardous Waste Management Division
MEETING ON CLOSURE OF SEWAGE LAGOONS AT HAFB
January 18, 1990

Attendees: Bruce Swanton, EID
Ed Lopez, Department of the Air Force
Regional Environmental Officer
Ronald Jahns, Environmental Engineer, Regional
Environmental Office

Summary from Ed Lopez:

At the meeting on January 4, 1991 between Air Force and EPA the Air Force (HAFB) proposed a partial clean closure based on direct soil ingestion risk assessment.

EPA's position was that this method of evaluation (direct ingestion risk assessment) was only in the Preamble to the Rule, not in the rule itself (see 52 FR March 19, 1987 @ 8704). EPA would accept such a process if the state ok'd it, but did not want to set a regional precedent.

Current Meeting Outcome:

The Regional Environmental Office representatives propose the following closure approach: All lagoons which contain sludges which exceed risk-based standards for contamination will be clean closed to the direct soil ingestion standard. Those lagoons which cannot be closed to this standard would be closed in place and capped.

EID will impose the requirement that if any of the lagoons cannot be clean closed all existing RCRA monitoring wells will continue to be monitored pursuant to a closure plan to be submitted by HAFB and approved by EID.

EID will require that the risk assessment performed be done on the cumulative risk effects posed by the collective residual contaminants left after clean closure.

Conclusion

The Regional Environmental Office and EID agree that binding agreements can only result from written communications from home offices after full staff deliberations on the matters above.
MEMORANDUM FOR RECORD

1. REGARDING: Meeting on 31 January 1991

2. SUBJECT: Holloman Sewage Treatment Lagoons

3. LOCATION: Hilton Hotel, Santa Fe, New Mexico

4. PERSONNEL CONTACTED: (see attached listing)

5. IMPORTANT POINTS:

   a. This meeting was requested by the Air Force as a follow up to the meeting on 4 Jan 91 with EPA Region VI in Dallas, TX. At the Dallas meeting, Holloman (HAFB) proposed to comply with the Federal Facilities Compliance Agreement (FFCA), signed 20 December 1988, by meeting the requirements of a "clean closure" as referenced in the preamble to the final rule for Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities, 40 CFR 265, published in 52 FR 8704, March 19, 1987.

   b. EPA Region VI, delivered a draft Clean Closure Requirements Document dated January 1991. Ms Ellen Graber, EPA, explained the contents of the document as follows: (1) the draft document is guidance, not regulation, and is intended to provide a basic frame work for HAFB to prepare an approvable closure plan; (2) risk-based closure levels are defined as the strictest standard, applying direct ingestion considerations and (3) risk-based closure levels for carcinogens must be established for the more stringent risk level of 10^-6.

   c. Dr Bruce Swanton, New Mexico Environmental Improvement Division (NMEID) stated that if hazardous constituents are present in ground water, clean closure would no longer be an option to HAFB. EPA's evaluation of monthly and semianual sampling events indicates a statistically significant increase in Total Organic Carbon (TOC) between upgradient and downgradient wells such that HAFB must begin groundwater assessment monitoring. Discussion of this issue resulted in the following action: Air Force will be given EPA's evaluation of the statistically significant increase in TOC. Within 7 days of receiving EPA's data, the Air Force will either certify that Air Force data is correct or, notify EPA of a statistical increase in TOC and proceed with preparation of a ground water assessment monitoring plan.

   d. Mr Brent Johnson, Air Force, asked EPA and NMEID if any physical characteristics such as location and quality of naturally occurring groundwater, soil conditions and climate may be considered in assessing risk and determining "site-specific" cleanup standards vice those which are cited in the EPA draft Clean Closure Requirements Document. Dr Swanton responded that the state interprets the meaning of "site-specific" such that certain physical characteristics unique to a given site may not be factored into a risk assessment such that alternative, presumably less stringent, cleanup standards may be derived for a particular site. Further discussion of this matter resulted in the following action: EPA will conduct a literature search and consult its higher headquarters to investigate Agency-recommended exposure limits and risk factors to determine their degree of flexibility on
constituent cleanup standards applicable to the Holloman Sewage lagoons. EPA will provide a written position on this matter to the Air Force within four weeks.

e. Lt Col Craig Anderson, Air Force, suggested that the Air Force proceed with preparation of a sampling and analysis plan which would satisfy the requirements for a site-specific demonstration of a Clean Closure for surface impoundments. Further discussion of this matter resulted in the following action: Within 30 days, Air Force will submit an outline for a proposed sampling and analysis plan. EPA shall have 30 days to review and provide comments to the Air Force on the proposed sampling and analysis plan for the Holloman sewage lagoons.

f. Mr Thomas O'Brien, Fish and Wildlife Service (FWS), indicated that the FWS is concerned about the potential effects of bioaccumulation of hazardous constituents in lake organisms and migratory waterfowl that inhabit Lakes Holloman and Stinky. FWS requested that the Air Force support a study to address their concerns. Dr Swanton, NMEID, indicated that FWS concerns are not subject to enforcement under the current closure actions; however, Dr Swanton recommended that the Air Force respond to FWS concerns.

g. Mr Brent Johnson, Air Force, offered to draft meeting minutes. Discussion of this matter resulted in the following action: Within 7 days Air Force will prepare meeting minutes and distribute copies to the attendees.

We, the undersigned, agree that the events described in this Memorandum for Record are factual and reflect the current position of the principle parties at the meeting.

CRAIG ANDERSON, Lt Colonel, USAF
Director of Environmental Law
Headquarters Tactical Air Command

DR BRUCE SWANTON, Supervisor Enforcements
Hazardous Waste Bureau
Environmental Improvement Division
New Mexico Health and Environment Department

MR MARK POTTS, Chief ALONM Section
U.S. Environmental Protection Agency, Region VI
The purpose of this letter is to summarize our responses to the comments from the U.S. Fish and Wildlife Service (FWS) on the draft risk assessment report. These comments were received at our 31 January meeting with representatives from EPA Region VI, FWS, the Bureau of Land Management, HQ TAC, HAFB, and yourself. Some of these comments were addressed (to the extent possible) in the final version of the report. However, as you know, the scope of work included only a qualitative assessment of ecological effects. Therefore it was not possible to address all of the FWS comments in the report.

Item 1. Section 7.1 Contaminants of Concern: FWS commented that this section of the report addressed only human health effects data. Polycyclic aromatic hydrocarbons (PAHs) do not bioaccumulate in higher organisms, but may do so in lower organisms. Effects of arsenic, barium, benzo(a)pyrene, boron, cadmium, chromium, copper, cyanide, lead, mercury, nickel, polychlorinated biphenyls (PCBs), and selenium on wildlife have been documented.

Response: We amended the list of contaminants that pose a threat to wildlife to include those listed by FWS. As stated in this section of the report, the threat presented by these contaminants in the lagoon system could not be quantified in this risk assessment.

Item 2. Section 7.2 Exposure Assessment: FWS disagreed with the statement that small fish in Lake Holloman "are not likely to be a significant pathway of contaminant exposure to wildlife because of the relatively small numbers of fish in the lake and their small size". This was based on information obtained in 1991 from Ms. Anne Dahl, a graduate student in the Cooperative Fish and Wildlife Research Unit at New Mexico State University. This information was considered significant by FWS, because (1) the
type of fish present is known to bioconcentrate contaminants and (2) fisheating birds frequent Lake Holloman.

Response: The 1991 information was not available to us at the time the draft report was written (November 1990). We removed the statement about the lack of significance of the fish in Lake Holloman.

Item 3. Section 7.2 Exposure Assessment: FWS commented that statements in Section 7.2 about availability of quantitative data on the use of the lagoons by wildlife, the types of activities, and the species that feed on benthic organisms and plants in the lagoons do not reflect information reported by Cole et al. (1984) and Ms. Dahl (1991) on species use, nesting activity, and food habits. Moreover, the specific food habits of many species present at the lakes and lagoons have been reported in peer reviewed journals.

Response: As stated by FWS, some information is available. However the information is inadequate to quantitate the exposure of a particular species (even for the resident species, the fraction feeding from contaminated versus uncontaminated sediments is unknown). The scope of work for this project included a qualitative risk assessment only; collection of the additional data necessary to quantitate the exposure of each species was not within the scope.

Item 4. Section 7.3 Qualitative Risk Assessment, and Section 8.5 Qualitative Ecological Risk Assessment: FWS concluded that a serious risk may exist for migratory birds utilizing the lagoons. Further, FWS stated that retrieval of dead birds by HAFB personnel for pathologic investigation requires a permit from FWS.

Response: A statement was added to Section 7.3 indicating that additional data must be collected to conduct a quantitative risk assessment. Section 8.5 states that "a potential adverse effect on wildlife cannot be ruled out." The permit for removal of dead birds is beyond the scope of this project.

Item 5. Section 8.6 Overall Conclusions: FWS stated that the conclusion in Section 8.6 that "it is appropriate to proceed with operation of the lagoons without additional clean up activity required" is premature based on previous statements regarding threats to wildlife. Contaminants that may pose a threat include PAHs, trace elements, PCBs, and 2,3,7,8-TCDF. FWS recommended conducting a quantitative ecological risk assessment including review of the literature and biological sampling.
8 March 1991
U.S. Army Corps of Engineers
Page 3

Response: It was clear in the draft report that the conclusion cited above applied only to human health risks. However, for clarity, a sentence was added to Section 8.6 as follows: "Assessment of possible ecological effect cannot be completed without data on the levels of contamination in resident fish and wildlife." It should be noted that 2,3,7,8-TCDF has not been identified in the lagoons. The analysis reported only "dibenzofurans" without speciation; the toxicity values for 2,3,7,8-TCDF were used for the risk assessment to ensure a conservative approach. A quantitative risk assessment for wildlife was not included in the scope of work for this project.

If you have any questions or comments about these responses, please feel free to call me.

Sincerely,

E. Jane Hixson, PhD
Senior Staff Toxicologist

cc: S. Moore/HAFB
    B. Johnson/HQ TAC
    N. Lund/Radian
    W. Hise/Radian
    File 269-004-08
April 18, 1991

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Ms. Kathleen Sisneros, Director
Water and Waste Management Division
New Mexico Environmental Department
1190 St. Francis Drive
Santa Fe, New Mexico 87503

Re: Holloman Air Force Base (NM6572124422)

Dear Ms. Sisneros:

On March 13, 1991, the State of New Mexico adopted a final rule on Delay of Closure for certain hazardous waste management units, including surface impoundments. According to this rule, a facility which lost interim status may submit a closure/post-closure permit application, which, if approved, would allow it to extend the final closure period to accept non-hazardous wastes.

EPA believes this rule is applicable to the sewage treatment system at Holloman Air Force Base. Within 90 days of the effective date of New Mexico's rule, Holloman would be required to submit a permit application. The permit application must include a closure plan for removing all hazardous liquids and sludges to the extent practicable, a schedule for achieving final closure, and a post-closure care plan.

Between now and June 11, 1991, an opportunity exists for Holloman, NMED, and EPA to reach an equitable, legal, and environmentally sound solution to a vexing problem. If you have any questions, please contact me, or your staff may contact Dr. Ellen Graber of my staff at (214) 655-6790.

Sincerely yours,

Allyn M. Davis
Director
Hazardous Waste Division

cc: Col. Ira L. Hester
833 CSG/CC
Holloman AFB, NM 88330

Lt. Col. Craig Anderson
HQ TAC/JA
Langley AFB, VA 23665
May 3, 1991

Colonel Ira Hester, USAF
Commander
833rd Combat Support Group
Holloman Air Force Base, New Mexico 88330

Re: TOC in wells downgradient of the sewage treatment lagoons

Dear Colonel Hester:

During our January 31, 1991, meeting, EPA provided evidence to Holloman Air Force Base (HAFB) of a statistically significant increase in Total Organic Carbon (TOC) in monitoring wells downgradient of the sewage treatment lagoons. Representatives of HAFB requested that EPA document this determination, and discuss their reasons for rejecting the first round of TOC data.

Organic carbon in ground water occurs dominantly as dissolved organic carbon (DOC), and ranges in concentration from 0.2 to 15 mg/L with a median concentration of 0.7 mg/L (Thurman, 1985a). The majority of all ground water has less than 2 mg/L DOC (Barcelona, 1984). In semi-tropical regions where organic-rich surface waters recharge ground waters, and in coal-rich regions, DOC may be as high as 5-15 mg/L (Thurman, 1985b; Feder and Lee, 1981).

Total organic carbon (TOC) is equal to the sum of DOC and particulate organic matter (POC). Values for TOC in excess of natural levels of DOC therefore reflect excessive POC.

The first monthly ground water sampling report had levels of TOC greatly in excess of natural DOC for monitoring wells 1, 2, 3, 4, 5, 7, and 8. Reported values ranged from 19 to 51 mg/L TOC. For the same samples, turbidity varied between 18 and 112 NTU, whereas maximum acceptable turbidity is 5 NTU.

EPA's CME team obtained split samples for monitoring wells 1, 5, and 7 during the first monthly event. The results for TOC were <1, 4, and 3 mg/L, respectively. These values correspond closely to results from subsequent sampling events, and are geochemically reasonable. In contrast, Holloman reported 19, 31, and 28 mg/L, respectively. These results presumably derive from excessive particulate matter in the samples, as indicated by unacceptably high turbidity. Furthermore, replicate analyses by Holloman for MW-1 range from less than 1 to 19 mg/L, another indication of sampling and/or analytical problems.
Therefore, EPA has concluded that Holloman's first monthly results for TOC cannot be used to compute background. EPA rejects all the TOC data for that event, as it is not possible to differentiate between "possibly good" data and bad data. In place of the value for upgradient well MW-1, Holloman may substitute EPA's result (enclosed). Holloman may alternately use the second, third, and fourth monthly events, and the first semi-annual event to compute background for MW-1. Background should then be compared with results from downgradient wells from the first semi-annual event.

According to our statistical analysis, there is a significant increase in TOC between upgradient well MW-1 and downgradient wells. Therefore, Holloman shall submit a groundwater quality assessment plan within fifteen days of receipt of this letter, as specified in the compliance agreement.

Finally, examination of the potentiometric data provided by HAFB indicates that well S-2 is not exclusively upgradient of the lagoon system. This well cannot be used as an upgradient well for statistical comparisons. HAFB should note this fact in the appropriate ground water monitoring document and act accordingly in all statistical evaluations.

References:

If you have any questions, please have your staff contact Dr. Ellen Graber of my staff at (214) 655-6790.

Sincerely yours,

Allyn M. Davis
Director
Hazardous Waste Management Division (6W)

Enclosure
Dear Dr. Davis

I'm glad we had a chance to meet and briefly discuss the most recent developments concerning a fix for the Holloman lagoons. I'm also glad I was there to hear your candid (and clearly unflattering) assessment of the relationship which apparently exists between Region VI and our bases in New Mexico. While I'm new to TAC and to this job, you have years of experience in dealing with Holloman and Cannon and, for whatever reasons, you have been "underwhelmed" by past events and/or personalities. I believe that the current senior leadership and members of the environmental teams at both Holloman and Cannon AFBs are eager to change your perception regarding TAC's willingness (and desire) to get on with cleaning up our bases, maintaining a program of total environmental compliance, and initiating aggressive pollution prevention and waste minimization programs. We clearly cannot achieve these goals unless there is a spirit of cooperation and trust among all the players, and I intend to work with the leadership of our bases to promote that cooperation and trust.

Colonel Hester and his staff at Holloman are orchestrating a meeting with New Mexico authorities to clarify the recent change in their state policy regarding closure of certain hazardous waste units and, in particular, to discuss our course of action concerning Holloman's sewage lagoons. Once we have established a time and place for the meeting, my action officer, Mr Brent Johnson, will contact you through Dr Graber as you recommended. Among the issues we would like to see addressed are the "acceptable" effluent standard which a new sewage treatment plant must meet, the state's willingness to delay closure pending construction of a new sewage treatment plant, and Holloman's status as a "non-complier." A definitive list of our questions/concerns will be provided to you and the state in advance of the meeting.

As you know, some items remain outstanding from the 31 Jan 91 meeting in Santa Fe.
a. Review comments on our Draft Sampling and Analysis Plan Outline, submitted to Region VI on 28 Feb 91. Per the agreement, EPA comments were to be sent to us by 30 Mar 91.

b. Comments concerning the statistically significant increase in total organic carbon in Holloman's groundwater.

c. Results of EPA's research into the matter of Agency-recommended exposure limits and risk factors to determine their degree of flexibility on constituent cleanup standards applicable to the Holloman lagoons. A written position on this issue was to have been submitted to us within four weeks of the 31 Jan meeting.

d. A signed copy of the Memorandum of Record concerning the decision/agreements made during the 31 Jan meeting.

It may be that the need for some of these has been overcome by events, but until all parties convene again we are uncertain as to what is/is not specifically required. Our belief is that once we have the above info from Region VI we will be much better prepared for the next meeting with the state and your staff and better able to finally decide upon a course of action which will satisfy all parties. If any or all of the above cannot be provided, I would appreciate a call from Dr Graber to Ms Sharon Moore, our Environmental Coordinator at Holloman, so we can proceed accordingly. Ms Moore can be reached at (505) 479-3931.

Finally, I want to initiate discussions aimed at satisfying the commitment Mr Vest made to establish a "model program" involving Holloman, Cannon, and Kirtland AFB's. I am contacting my counterpart at Military Airlift Command headquarters ("owners" of Kirtland) to advise him of Mr Vest's offer. Since Mr Vest suggested this initiative in response to your comments regarding a need for such a focused effort at Holloman and Cannon, I am entirely open to your suggestions concerning what needs to be done and how we might best proceed. I have asked my staff to consult with the environmental offices at the bases to formulate our ideas/approach. I promise full cooperation in any initiative which will speed up cleanup actions, has the potential to achieve better return for the dollar, or improves our ability to comply with EPA and/or state environmental laws and regulations. I look forward to hearing from you concerning this initiative and am prepared to return to Dallas for further discussion.
Thanks again for meeting with us last week. I hope you will be able to help us in making our TAC bases leaders in the federal facilities environmental arena.

Sincerely

[Signature]

EARNEST O. ROBBINS, II, Lt Col, USAF
Director, Environmental Programs

cc: 833 AD/CC
     833 CSG/CC/DE
     27 CSG/CC/DE
     12 AF/DE
     HQ USAF/MIQ
     HQ USAF/CEV
     HQ MAC/DE
     HQ TAC/JA
     HQ USAF/LEEV-CR
Reference telecon between Dr Bruce Swanton, NMEID, Ms Sharon Moore, HAFB, and Mr Brent Johnson, HQ TAC/DEVC on 8 May 91.

1. Dr Swanton stated that due to a recent change in NM regulations affecting RCRA closure, Holloman AFB may now choose to delay closure of the existing sewage lagoons and continue to use them with some provisions. Holloman has until 11 Jun 91 to submit a post-closure care permit application IAW the Final Rule for Delay of Closure Period for Hazardous Waste Management Facilities (FR, 14 Aug 89) as adopted by NM on 13 Mar 91.

2. The post-closure permit application must include: (1) a final closure plan which satisfies current standards for Final Closure (i.e., Clean Close or Close-In-Place); (2) a plan to remove existing hazardous waste "to extent practicable" which would allow safe operation of the existing system pending final closure at an unspecified time and (3) a contingency plan to expedite cleanup of any unforeseen release from the operational units.

3. Dr Swanton added that NM and EPA will expect HAFB to make peace with the Fish and Wild Life Service as a pre-condition to approving HAFB's post-closure permit application. The FWS requests that HAFB provide funds to support a study to investigate the effects of pollutants in lake Holloman on birds, fish and lower forms of aquatic species.

4. Mr Johnson explained that HAFB has programmed a new wastewater treatment facility for FY 93 and that justification of this new facility is contingent on obtaining a NPDES permit for HAFB's effluent outfall, Lake Holloman. The Air Force believes it is unacceptable to construct a new WWTP if it is regulated as a RCRA solid waste management unit. Mr Johnson asked if NM will support HAFB in their effort to obtain a NPDES permit if HAFB chooses to construct a new WWTP? Dr Swanton agreed to bring this matter to Dr Allyn Davis' attention with the state's recommendation that EPA issue the NPDES permit to Holloman. Dr Swanton closed by saying that a new wastewater treatment system would be the best environmental solution; however, if HAFB does not construct a new plant because EPA denies HAFB a NPDES permit, NM will allow HAFB to continue using the existing system under the terms of a post-closure care permit.
MEMO FOR RECORD

Reference telecon between Ms Laure Burch, RCRA Permits Division, EPA Region 6 and Mr Brent Johnson, HQ TAC/DEVVC on 13 May 91.

1. Ms Burch stated that she had been backbriefed by Dr Swanton, NM EID, on the issues discussed in a three-way telecon between the state, Holloman and TAC on 8 May 91 (Atch). Ms Burch stated that Dr Swanton's statement that Holloman would be allowed to continue to use their existing lagoons under the terms of a post-closure care permit, irregardless of whether Holloman builds a new wastewater treatment plant (WWTP), was in EPA's view "out of line" and is therefore being retracted by EPA in this telephone call. EPA understood that Holloman was planning to construct a new WWTP. Therefore, EPA recommended that Holloman apply for a delay of closure to obtain time to use the existing lagoons pending completion of a new WWTP, and agreement with EPA and the state on an acceptable solution to final closure of the lagoons.

2. Mr Johnson re-iterated that the Air Force may cancel plans to construct a new WWTP at Holloman if EPA, or the state, does not impose treatment standards via an NPDES permit. Mr Johnson added that Holloman has already contacted EPA's wastewater division and requested an NPDES permit application, but had not yet received the necessary forms. Ms Burch stated that she would contact EPA's wastewater division to check on the status of this matter and call me back tomorrow.

Reference Telecon between Dr Ellen Graber, EPA Region 6 and Mr Brent Johnson, HQ TAC/DEVVC on 14 May 91. Ms Burch is Dr Graber's supervisor in EPA's RCRA permits division.

1. Dr Graber stated the application forms for an NPDES permit were sent to Holloman today. She added that Holloman appears to be eligible for an NPDES permit to discharge into Lake Holloman on the basis that Lake Holloman is considered by EPA to be a "natural playa" and therefore, a "water of the U.S.."

2. Mr Johnson asked, "would Holloman be allowed to delay the "final" closure of the existing sewage lagoons indefinitely after completion of a new WWTP under the terms of a post closure care permit?" Dr Graber response was "no." She explained that delay of closure allows owner/operators to delay final closure for a finite period of time which must be specified in the application to delay closure. In Holloman's case that final closure must be implemented once the new WWTP goes on line.

3. Mr Johnson asked, "will Holloman be able to use any of the existing lagoons as part of a new WWTP outfall?" Dr Graber said that once final closure is implemented, the existing lagoons could not be used as part of the new system unless each individual lagoon meets the requirements of "clean closure".
4. Mr Johnson asked, "would Holloman be required to perform an interim cleanup of the lagoons given final closure must take place as soon as a new WWTP is on line?" Dr Graber said, "yes".

5. Mr Johnson asked, "Would the cleanup levels for an interim cleanup be less stringent than the cleanup levels required for final closure. Dr Graber, "yes." Mr Johnson, "How much less?" Dr Graber said they would tell us after further review of the existing data from Holloman's previous efforts to clean up the lagoons. The state and EPA will determine interim cleanup levels and define "to the extent practicable" and then tell Holloman what cleanup levels must be met in their interim cleanup plan.

6. Mr Johnson, "the Air Force may decide to implement final closure if the cost of an interim cleanup is too high; would EPA support the decision to implement final closure now?" Dr Graber explained that the reason EPA recommended a delay of closure to Holloman is because Holloman would not agree to the cleanup standards required for a final closure. Delay of closure gives Holloman the opportunity to get into compliance while we construct a new WWTP and look for other options to final closure.

Note: Holloman's post-closure permit application must include their proposed plan for final closure (i.e., clean close or close in place). If Holloman proposes a plan for clean closure supported by a site-specific risk assessment as the final closure method, EPA will deny Holloman's permit application. Therefore, Holloman must commit to a high-cost, Agency-approved, closure alternative now in order for EPA and the state to approve the post-closure permit and allow Holloman to delay final closure until the new WWTP is on-line. Once the permit application is approved Holloman may seek to have it modified (i.e., propose an alternative plan for final closure).
Dear Col. Hester:

The Hazardous and Radioactive Waste Bureau (HRWB) of the New Mexico Environment Department (NMED), together with the U.S. EPA, has agreed that it is appropriate that Holloman Air Force Base (HAFB) submit a post-closure care permit (PCCP) application for the sewage lagoon system which services HAFB. HRWB agrees that it will be appropriate to include in the application a delay of closure under HWMR-6, Part V, 40CFR §264.113. The PCCP application must include both a closure plan and a post closure care plan.

HWMR-6 was adopted by NMED on March 13, 1991. The application for continued use of RCRA units for receiving non-hazardous wastes under delay of closure must be submitted no more than ninety (90) days from the date these regulations became effective. The final date on which a Part B application can be accepted is June 11, 1991.

The subject application must include, at a minimum, the following sampling program for the lagoon system:

1. Lagoons D, F, and G must be sampled as follows:

Eight samples must be taken radially around the inflow point to each unit, four at a depth below the surface of the sludge layer equal to one-third of the total sludge layer thickness and four samples at a depth below the sludge layer equal to two-thirds of the total sludge layer thickness. These twenty-four (24) samples must be analyzed for all parameters which have been identified at or above the Practical Quantitation Limit in any
previous lagoon water, soil or sludge sample. The twelve (12) samples taken at the lower sludge layer depth must also be analyzed for all SW-846 Method 1311 Toxic Characteristic Leaching Procedure (TCLP) parameters. In addition, all eight (8) samples collected from lagoon D must be analyzed for the complete list of parameters in SW-846 methods 8015 and 8280.

2. Three samples must be taken from the sump ("F") between four and five feet from the inflow point and at a depth of two-thirds the total thickness of the sludge layer. These must be evaluated for SW-846 Method 1311 Toxic Characteristic Leaching Procedure (TCLP) parameters by the procedure given in Appendix II to 40CFR §261.

3. Five samples each must be taken in Lakes Holloman and Stinky from the surface of the sediment layer and no more than six (6) inches below the surface of this layer. These must be analyzed for the complete list of parameters in Appendix IX to 40 CFR §264.

4. HAFB must commit to a semi-annual detection monitoring program to include all RCRA monitor wells in which these wells will be analyzed for SW-846 Method 8240 volatile constituents and PCBs, and a compliance monitoring program which includes quarterly sampling of all RCRA wells for Appendix IX parameters. The waters in Lagoons A and B must be sampled quarterly for SW-846 Method 8240 volatile and Method 8270 semivolatile constituents. The sampling program must continue as long as the lagoon system is in operation.

5. HAFB must commit to a contingency plan which must include increased frequency and intensity of monitoring and/or an accelerated corrective action program in the event that a release is detected at any time in the future. To this end, HAFB's permit application must specify those delay of closure procedures which will result in compliance with all requirements set forth in §§264.113(d) and 113(e).

HAFB must implement the sampling program detailed in items 1-3, above, such that data will be available during the HRWB evaluation of the permit application. Based on this data, HRWB will determine whether the sludges currently in place in the lagoon and playa lake system present a threat to the public health or the environment, and, if necessary, will require removal to the extent practicable of any such material.
If you have any questions regarding these matters, please contact me at (505) 827-2211.

Sincerely,

Dr. Bruce A. Swanton, Compliance Supervisor
Hazardous and Radioactive Waste Bureau (HRWB)

cc: Kathleen M. Sisneros, NMED Division Director
    Benito J. Garcia, HRWB Chief
    Tracy Hughes, Office of General Counsel
    Ellen Graber, U.S. EPA VI (6H-PC)
    Mike Donahoo, U.S. Fish and Wildlife Service
    Dave Schafersman, Bureau of Land Management

fax: Sharon Moore, HAFB Environmental Engineers
Lt. Col Earnest O. Robbins II  
Director, Environmental Programs  
Department of the Air Force  
Headquarters Tactical Air Command  
Langley Air Force Base, VA 21665

Dear Lt. Col Robbins:

Thank you for your candid and cordial letter of May 7, 1991. As you know, the relationship between Holloman Air Force Base and the U.S. Environmental Protection Agency (EPA) has been strained in the past. However, it now appears that Holloman and EPA are working in tandem to promote cooperation, trust, and compliance with the regulations.

I was encouraged by Mr. Vest's comments regarding a "model program" for Holloman, Cannon, and Kirtland Air Force Bases. We share your desire to make Federal Facilities models of compliance for the regulated community. You are aware that there are many outstanding issues at Holloman, Cannon, and Kirtland. Among these are: (1) closure of the lagoons and construction of a new sewage treatment plant at Holloman; (2) closure certification of the land disposal facility at Cannon; and (3) waste minimization, additional ground water wells, and development of a citizens working group at Kirtland. These areas would be good places to begin your initiative, and we would be happy to review and discuss any plans in the context of our oversight role with NMED.

In your letter, you requested specific information concerning certain issues raised during the January 31 meeting in New Mexico. The following is intended to clarify any unresolved issues.

(a) A telephone conversation between members of my staff (Mark Potts, Courtland Fesmire, and Ellen Graber) and yours (Craig Anderson and Brent Johnson) was held the week of March 11 concerning the draft sample and analysis plan. At that time, EPA explained that the draft plan did not meet the standards for clean closure. On the basis of that conference call, EPA understood that a revised plan would be submitted.

To reiterate EPA's comments and concerns, Holloman's draft sample and analysis plan is based on SW 846 (Test Methods For Evaluating Solid Waste). The SW 846 plan is designed to determine whether wastes exhibit any characteristics above regulatory thresholds. In the pursuit of clean closure,
Holloman's sampling and analysis goals are three-fold: (1) to determine which listed wastes are present; (2) to delineate the distribution of wastes in each lagoon; and (3) to identify sludge removal needs. The proposed method from SW 846 will not meet Holloman's goals for a number of reasons: (1) the regulatory threshold concept does not apply, as the wastes of concern are listed or derived-from-listed wastes; (2) if the statistical procedures from SW 846 are followed substituting a cleanup level for the regulatory threshold, a significant under-sampling of the sludge for known contaminants would result; (3) for unknown contaminants, the SW 846 method does not offer any guidance on numbers of samples needed; and (4) the SW-846 method does not provide for complete waste characterization or for delineating waste distribution. Thus none of Holloman's goals would be met.

During the January 31 meeting, EPA gave Holloman guidance on sampling and analysis requirements for the clean closure process. We suggest Holloman use this guidance in the future to draft sampling and analysis protocols for clean closure.

(b) A letter discussing the statistically significant increase in total organic carbon (TOC) in Holloman's ground water was mailed May 3, 1991. On May 13, during a telephone conversation between Sharon Moore of your staff and Ellen Graber of my staff, Holloman AFB verbally requested an extension of the deadline in the Federal Facilities Compliance Agreement (FFCA) for submitting a ground water quality assessment plan. Holloman was informed it must request an extension in writing before the deadline passes. On May 15, an extension request was received in our office. An extension of the due date for the ground water quality assessment plan until June 26, 1991, is hereby granted.

In a telephone call to Ellen Graber on May 14, Brent Johnson requested clarification of the requirements for a ground water quality assessment plan. He was informed that Holloman must submit and implement a plan to sample all the monitoring wells around the lagoons and test for all 40 CFR §264 Appendix IX constituents. Additional guidance can be found in 40 CFR §265.93(d)(3), as referenced in the FFCA.

(c) EPA staff at Region 6 sought guidance from Headquarters and other Regions nationwide concerning Agency-recommended cleanup levels for clean closure. According to the experts consulted, the use of cleanup levels determined by a use-based risk assessment is unacceptable for a RCRA clean closure. Therefore, as stated in the guidance provided January 31, cleanup levels for clean closure are defined as the strictest standard established by maximum contaminant levels (MCLs),
health-based criteria for carcinogens, health-based criteria for systemic toxins, practical quantification limits, or background.

Copies of the guidance provided to Holloman January 31 were also sent to other regions to be reviewed for consistency and comments. Only one reviewer disagreed with any portion of the guidance; the reviewer believed the "Lagoon Requirements" section was not stringent enough.

(d) A corrected, unsigned copy of the Memorandum of Record concerning the January 31 meeting is enclosed.

The results of our investigations and conversations with your staff, both at the January 31 meeting and afterwards, led EPA to conclude that Holloman believed sampling, analysis, and removal requirements for clean closure were too extensive and cost-prohibitive. In addition, there is the outstanding question of possible ground water contamination which has not yet been addressed by Holloman. Therefore, EPA pursued other possible avenues for solving this problem.

On April 18, EPA mailed a letter to the New Mexico Environment Division (NMED) concerning a "Delay of Closure" option for the Holloman sewage treatment lagoons. Copies were also sent to Col. Hester and Col. Anderson. In the letter, it was pointed out that New Mexico adopted the Delay of Closure Rule on March 13, 1991. Under the rule, facilities which lost interim status are eligible to submit a closure/post-closure permit application and, if approved, to extend the final date of closure to accept non-hazardous wastes. According to the rule, facilities like Holloman which last accepted hazardous wastes before the date of promulgation have only 90 days from the date of promulgation to submit the permit application. Thus, the deadline for Holloman's permit application submittal is June 11, 1991.

It appears that both Holloman AFB and NMED favor this approach. EPA, NMED, and Holloman are in constant contact concerning requirements for the permit application. A list of necessary components for the application was given to Sharon Moore on May 3 by EPA. Several discussions have subsequently been held to clarify issues, and several more are planned.

There are two key issues that Holloman AFB and TAC must understand concerning Delay of Closure. First, "Delay" is associated with a finite time component. EPA and NMED will only approve a closure plan that specifies a time when the lagoons will be decommissioned and closed. Holloman must proceed to construct an alternate sewage treatment system. There are still two options for closure of the lagoons: any one or several of the lagoons may be clean closed; the rest must be closed in place. Any that are clean closed may subsequently be used for any purpose. Lagoons closed in place have
very limited future use (e.g., parking lots). The second key issue is the meaning of "remove to the extent practicable." The Delay of Closure regulation specifies that any surface impoundments which do not meet minimum technological requirements (MTRs) must be cleaned to the extent practicable. This standard will be defined by NMED and EPA after reviewing all the available data. The standards for "to the extent practicable" are less stringent than those for clean closure, and will not prove overly burdensome. NMED will provide in writing to Holloman the sampling and analysis requirements.

I hope this letter clarifies outstanding and new issues concerning the sewage lagoons at Holloman AFB. We will be pleased to meet with you any time to discuss these or other issues. If you have any further questions, please contact me or have your staff contact Dr. Ellen Graber of my staff at (214) 655-6790.

Sincerely,

Allyn M. Davis
Director
Hazardous Waste Management Division

Enclosure

cc: Col. Ira Hester
    833 CSG/CC
    HAFB, NM 88330

Col. Craig Anderson
HQ TAC/JA
Langley AFB, VA 23665

Brent Johnson
HQ TAC/DEV
Langley AFB, VA 23665

Sharon Moore
833 CSG/DEV
HAFB, NM 88330

Bruce Swanton
NMED
DEPARTMENT OF THE AIR FORCE
HEADQUARTERS TACTICAL AIR COMMAND
LANGLEY AIR FORCE BASE VA 23665

REPLY TO
ATTN OF:

DEVI

SUBJECT:
Lake Holloman Contaminant Study, Holloman AFB NM

TO:
U.S. Fish and Wildlife Service
Mr Michael J. Spear
Regional Director
P.O. Box 1306
Albuquerque NM 87103

1. As you will recall, the Service and the BLM have expressed concern that treated sewage effluent from Holloman Air Force Base in Alamagordo NM may have, over the years, introduced into Lake Holloman contaminants that could now pose the risk of an adverse effect on Department of Interior Trust Resources. However, since no quantitative data was available, it was impossible to draw firm conclusions or develop mitigative strategies. Consequently, in May 1990 the Service prepared a Scope of Work (See Atch 1) outlining a proposed contaminant study to address these concerns by collecting and analyzing a variety of biological samples to determine not only if contaminants were present in the system, but also their concentrations at various points of the food chain. At the time, unfortunately, funds were unavailable, so the Air Force established a budget line item for it. Funds for this project have now become available.

2. In recent conversations between our Mr Barker and Mr Donahoo of your Albuquerque Ecological Services field office, it was agreed that the original Scope of Work remains mutually acceptable. Although earlier discussions had considered the use of Air Force contractors to perform some of the work, it is now agreed that field work will be provided by Service personnel, with analytical work performed by Service contract labs.

3. Service recalculations have set total project cost at $108,493. A funding transfer document in the form of a Military Interdepartmental Purchase Request (DD Form 448) for that amount is attached for your review and signature.

4. We look forward to working cooperatively to address and resolve the Service's concerns, and request copies of progress reports and lab analyses as they become available, as well as copies of the final report. Headquarters Tactical Air Command contact for this project is Mr Roy Barker, (804) 764-2909. Holloman AFB contact is Ms Sharon Moore, 479-3931.

ROY L. BARKER
Chief, Natural Resources Division

2 Atch
1. Scope of Work
2. DD Form 448, 448-2

cc: 833 CSG/DEV

Readiness is our Profession
E-147
DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 833D COMBAT SUPPORT GROUP (TAC)
HOLLoman AIR FORCE BASE, NM 88330-5000

REPLY TO
ATTN OF
833 CSG/DEV

SUBJECT
RCRA Post Closure Care Permit Application

07 JUN 1991

NEW MEXICO ENVIRONMENT DEPARTMENT
KATHLEEN SISNEROS, DIRECTOR
WATER AND WASTE DIVISION
1190 ST FRANCIS DRIVE
SANTA FE, NM 87503

1. ATTACHED PLEASE FIND OUR APPLICATION FOR A POST CLOSURE CARE PERMIT, INCLUDING OUR REQUEST FOR DELAY-OF-CLOSURE OF THE HOLLoman AFB SURFACE IMPOUNDMENTS.

2. SHOULD YOU HAVE QUESTIONS REGARDING THE APPLICATION OR REQUIRE ADDITIONAL INFORMATION, PLEASE CONTACT SHARON MOORE AT 479-3931.

I. B. HESTER, COL., USAF
COMMANDER

Post Closure Care Permit Application

cc: SEE DISTRIBUTION LIST
Sharon Moore  
Environmental Planning Bureau  
233 CSG/DEV  
Holloman Air Force Base, New Mexico

Re: Soil and sludge sampling and analytical needs for establishing "practicable" removal levels at the Savage Lagoons

Dear Ms. Moore:

This letter outlines sampling and analytical needs identified by the U.S. Environmental Protection Agency (EPA), explained in a telephone conversation on June 18. These requirements supplement those specified by Bruce Swanton of the New Mexico Environment Division (NMED) in his recent letter. As discussed, soil and sludge need to be analyzed for organic carbon content.

EPA and NMED will use fate and transport calculations to determine the permissible levels of contamination in the sewage lagoons during the delay of closure. In turn, the permissible levels will dictate the amount (if any) of sludge to be removed to meet the regulatory requirement of "removal to the extent practicable." To perform these calculations, certain data are needed which are not yet available. In particular, we need to know the soil and sludge organic carbon contents, and the soil mineralogy.

Specifically, we need two 20 to 25 foot boreholes, one each downgradient of lagoons A and D, near monitoring wells MW-3 and MW-1. Soil samples from distinct lithologic units or, if uniform lithologically every five feet, will suffice. These samples should be analyzed for organic carbon content and characterized for mineralogy. In addition, we need to know the organic carbon content of sludge from lagoons D and G, and, if possible, either A or B. Two samples from the lower portion of the hot spot in each lagoon are needed.

E-149
EPA appreciates your readiness to undertake this sampling and analysis. If you need further details, please contact Mr. Ellen Graber of my staff at (214) 655-6700.

Sincerely,

Laurie Burch, Chief
Closure Section
RCRA Permit Branch

cc: Brent Johnson
HQ TAC/DEVC
Langley AFB, VA 23665

Bruce Swanton, SNED
CERTIFIED MAIL: RETURN RECEIPT REQUESTED

Colonel Ira L. Hester
Base Commander
833 CSG/CC
Holloman Air Force Base, NM 88330-5000

Re: Ground Water Quality Assessment Plan for Sewage Treatment Lagoons

Dear Colonel Hester:

The Environmental Protection Agency (EPA) and New Mexico Environment Department (NMED) have completed their review of your Ground Water Quality Assessment Plan for the Sewage Treatment Lagoons. The plan was submitted in response to the Federal Facilities Compliance Agreement, Part IV Corrective Measures, Section C, number 13. The plan needs to be revised to reflect our joint comments, enclosed. The revised assessment plan is due three weeks from the receipt of this letter.

EPA is planning to split samples with Holloman Air Force Base during the first assessment round. We will be ready to sample the wells the first week of September or the final week of August. Please have your staff contact Barry Feldman of my staff at (214) 655-6790 to confirm a sampling schedule and to answer any other questions.

Sincerely yours,

[Signature]
Randall E. Brown
Chief
RCRA Enforcement Branch

Enclosure

cc: Dr. Bruce Swanton, NMED (w/enclosure)
    Ms. Sharon Moore, 833 CSG/DEV (w/enclosure)
COMMENTS ON THE GROUND WATER ASSESSMENT MONITORING PLAN FOR THE SEWAGE TREATMENT LAGOONS HOLLOMAN AIR FORCE BASE (HAFB), NM

1. Solute transport calculations which include sorption/desorption phenomena require data on the organic carbon content of soils and aquifer materials. This critical data is not currently available, and plans should be made to obtain it.

2. Continuous core should be recovered and logged by a geologist for all boring operations.

3. According to our files, neither Table 7-1, Analytes Detected in Soil or Sludge Samples Collected from Ponds A, B, and C, nor Table 7-2, Analytes Detected in Surface Water Samples Collected From the Sewage Treatment Lagoons, is complete. Tables 7-1 and 7-2 must be revised to accurately reflect all constituents currently and historically detected in the soils, sludges, and waters of the sewage treatment lagoons, Lake Holloman, and Lake Stinky.

4. Total Cyanide (9012) and Total Sulfides (9030) should be added to the parameter list.

5. Concentration levels should be reported to method detection limits (MDLs) rather than practical quantification limits (PQLs).

6. Additional wells, if required, should be constructed from PVC rather than stainless steel due to the high salinity of the ground water. However, in areas where the salinity of the ground water does not justify the use of PVC, stainless steel wells will be required.

7. The sampling and analytical activities to be undertaken if any hazardous constituents are detected in the ground water should be clarified. The regulations require quarterly re-sampling of the wells. Will only those parameters detected, or will all Appendix IX parameters, be analyzed for during the immediate re-sampling?
TO: U.S. Army Engineer District  
ATTN: CEMRO-ED-EA (Ron Stirling)  
215 North 17th Street  
Omaha, Nebraska 68102-4978  

CONTRACTOR: Sirtine Environmental Consultants, Inc.  
SUBCONTRACTOR: Radian Corporation  
CONTRACT NUMBER: DACW45-89-D-0515  
DELIVERY ORDER NUMBER: Unknown. Radian DO #18  
TITLE: Regulatory Support for Sewage Lagoon Closure  
DATE OF THIS REPORT: 21 August 1991  
SUBJECT: Status Review Meeting for Sewage Lagoon Closure  
PARTICIPATING PERSONNEL: See Attached List

On 14 August, a meeting was held at Holloman AFB to discuss the current status of the sewage lagoon closure project, including planned activities and funding. Following is a summary of the meeting.

1. Risk Based Approach to Closure

Dr. Bruce Swanton of the New Mexico Environment Department (NMED) recently informed Ms. Sharon Moore that there are no regulatory references for EPA Region VI clean closure requirements (received in a January 1991 meeting in Santa Fe, NM) for the sewage lagoons. EPA Region VI is promoting a "compound-specific" clean-up criteria, rather than a "total accumulated risk" as proposed by Radian. Dr. Swanton's conclusion was that Radian's approach is valid. This new interpretation, if accepted by EPA Region VI, will affect the post-closure care permit application and delay-in closure scenario recently prepared for regulatory review.

2. Soil and Sludge Sampling in Downstream Lagoons

The USACE has prepared a draft scope of work to address NMED and EPA Region VI requirements for sampling sludge and soil in lagoons downstream of Pond C (reference NMED letter dated 22 May 1991). Results from this additional investigation are intended to support the post-closure care permit application. However, in light of Dr.
Swanton's comments (see item 1), the study should be structured such that additional data can also be used to support the risk assessment approach.

3. **Groundwater Sampling**

Preparation of the Assessment Monitoring Plan and conduct of the Appendix IX sampling and analysis are in response to elevated levels of TOC in monitor wells downgradient of the sewage lagoons. Appendix IX sampling and analysis is currently contracted to Radian and will be used in support of the assessment monitoring program. (The groundwater sampling delivery order does not have a provision for reporting Appendix IX results.) It was suggested that a Sampling and Analysis Plan be prepared for EPA approval prior to conducting groundwater sampling.
20 September 1991

U.S. Army Corps of Engineers
ATTN: CEMRO-ED-EA (Ron Stirling)
215 North 17th Street
Omaha, Nebraska 68102-4978

Re: Scope of Services for Sewage Lagoon Investigation
Holloman Air Force Base, NM

Dear Ron:

I recently spoke to both Bruce Swanton (NMED) and Ellen Graber (EPA Region VI) as a follow up to the memo I prepared on 10 September to Bruce describing the proposed sampling strategy for the lagoons. Their consensus is that the strategy is acceptable. However, if any sludge is present in a lagoon, it must be sampled and characterized. Failure to do so will imply that Holloman intends to remove the sludge as a part of final closure. Ellen added that samples collected from Lakes Holloman and Stinky should be from the influent areas, and that one of the soil borings for TOC samples should be collected in a background location (i.e., upgradient of the lagoons).

You and I have discussed the unknown conditions existing in the sewage lagoons, and the need to determine up front whether there is in fact sludge in each lagoon. This is required to prepare an accurate Chemical Data Acquisition Plan (CDAP) for the project, and to get the plan approved by EPA and NMED prior to commencing field work. A reconnaissance trip will be conducted by Radian personnel on 1-3 October, during which time "visual samples" will be collected for information purposes. This trip will be incorporated into the new scope of work.

Bruce mentioned to me that his recent conversations with EPA headquarters indicated that Radian's risk-based approach to closure (presented during the January 1991 meeting in Santa Fe, NM) may be acceptable. As Sharon Moore and I have discussed, any additional investigation conducted in the lagoons should yield data sufficient to 1) satisfy regulatory requirements, and 2) support a risk-based approach to closure. Jane Hixson and I carefully reviewed the Scope of Services dated 29 August 1991. In general, we feel that concentrating all samples around lagoon/lake inflow points will not yield data representative of the ponds, and while meeting the criteria set forth by Bruce and Ellen, may ultimately be rejected in a closure argument. As an example, based on the analysis of six samples collected around the inflow points of Pond C in March 1990, we are considering the entire 20 acre pond to be contaminated. This may or may not be true. Therefore, we recommend that the sampling strategy be modified as shown below (see attached figures for sample locations).
Reference: Holloman Appendix IX
Sludge/Soil Sampling (269-069-02)

Dist: JSGibson/Radian
IM Yangeman/Radian
Ron Stirling/USACE

TELEFAX

FROM: BRUCE SWANTON, TECHNICAL GROUP SUPERVISOR
Hazardous and Radioactive Materials Bureau
New Mexico Environment Department
(505) 827-4300

DATE: November 7, 1991

SUBJECT: Sampling plan for delay of closure of HAFB
Sewage Lagoons

TO: Wally Hise

FAX NUMBER: 512 454-8807

TEL NUMBER:

Wally: I am in agreement with the understanding between EPA
and Radian/HAFB on the sampling plan, as amended
by the 11/6/91 teleconference. Attached is the
Hazardous and Radioactive Materials Bureau QA/QC
plan requirements.
November 18, 1991

General Lloyd Newton
Installation Commander
Holloman Air Force Base
49th CES/CEV
Holloman Air Force Base, NM 88330


Dear Col. Newton:

The Hazardous and Radioactive Materials Bureau (HRMB) has reviewed the subject document and has found it to be satisfactory. It is HRMB's understanding that the proposed sampling plan is designed to substitute for the plan set forth in the May 22, 1991 letter from Dr. Bruce Swanton to Col. Ira Hester. HRMB regards the current, November 1991, plan to be an acceptable substitute for the May 22, 1991 sampling program.

If you have any questions regarding this matter, please contact Dr. Bruce Swanton or my staff at (505) 827-4300.

Sincerely,

Edward Horst, RCRA Programs Manager
Hazardous and Radioactive Materials Bureau

cc: Tracy Hughes, Office of General Counsel
    Rick Roy, U.S. Fish and Wildlife Service
    Dave Schaefersman, Bureau of Land Management
    Wallace Hise, Project Director, Radian
December 17, 1991

General Lloyd Newton
Installation Commander
Holloman Air Force Base
49th CES/CEV
Holloman Air Force Base, NM 88330


Dear Col. Newton:

The Hazardous and Radioactive Materials Bureau (HRMB) has reviewed subject documents 1 and 2. The data prompts HRMB to require that Holloman Air Force Base resample the sewage lagoon RCRA monitoring wells and characterize the samples by the following methods for the stated reasons:

1. Method 8080, due to the detection of several target compounds in this method.

2. Method 8240, due to the presence of methylene chloride and acetone in samples and in trip blanks. HRMB cannot dismiss the possibility that these method 8240 compounds are present in groundwater downgradient of the lagoon system simply because they appear to be common contaminants at the laboratory in question.

3. Method 8270, for two associated reasons. Subject document 2 reports 2-butanone at 25 ppb and 4-methyl-2-pentanone at 31 ppb in MW-3, both compounds detected at levels below the Practical Quantitation Limit (PQL) but presumably above the Method Detection Limit (MDL) as defined below. HRMB questions the analytical limits used in this study. HRMB requested that EPA require HAFB to use Method Detection Limits (MDLs) rather than Practical Quantitation Limits (PQLs) in this assessment project. It was HRMB's understanding that HAFB had agreed to this. HRMB did not notice that the values in Appendix B of the "Analytical Plan for Groundwater Assessment Monitoring" (August 1991) corresponded to PQL's rather than MDL's. The MDL is that level of a target parameter in a sample at which the laboratory can report with 99% confidence that the sample does contain the parameter in question. HRMB concludes from the data in subject document 2 that 2-butanone and 4-methyl-2-pentanone exist in groundwater downgradient of the sewage lagoon system.
If you have any questions regarding this matter, please contact Dr. Bruce Swanton of my staff at (505) 827-4300.

Sincerely,

Edward Horst, RCRA Programs Manager
Hazardous and Radioactive Materials Bureau

cc: Tracy Hughes, Office of General Counsel
    Rick Roy, U.S. Fish and Wildlife Service
    Dave Schafersman, Bureau of Land Management
    Wallace Hise, Project Director, Radian
Colonel Ira Hester, USAF
Commander
833 Combat Support Group
Holloman Air Force Base, New Mexico 88330

Dear Colonel Hester:

The Environmental Protection Agency (EPA) acknowledges receipt of the revised conceptual plan for sludge and soil sampling at Holloman AFB, New Mexico (HAFB). We have reviewed and approved the plan prepared by Radian Corporation dated October 28, 1991, and revised November 11, 1991. The sampling plan is to support a Post-Closure Care Permit Application and Delay-of-Closure Plan for the surface impoundments at HAFB as required by the Federal Facilities Compliance Agreement (FFCA).

If there are any questions about the requirements in the FFCA, please contact Barry Feldman at (214) 655-2192; or direct questions concerning permitting issues to Jon Rinehart at (214) 655-6790.

Sincerely yours,

Allyn M. Davis
Director
Hazardous Waste Management Division

cc: Dr. Bruce Swanton
Hazardous Waste Division
New Mexico Environment Department
MEMORANDUM FOR THE RECORD

Subject: Results of a 12/23/91 1300 MST conference call regarding Holloman
AFB sewage lagoon investigations.

Participants:
Dr. Bruce Swanton, New Mexico Environment Department (NMED)
Dr. Fred Fisher, Holloman Air Force Base (HAFB)
Mr. Wallace Hise, Radian Corporation, Austin
Mr. Steve Gibson, Radian Corporation, Austin
Ms. Danielle Lakin, Army Corps of Engineers, Omaha (ACE)
Mr. Barry Feldman, Environmental Protection Agency Region 6, Dallas (EPA)

(1) NMED approved HAFB/ACE/Radian plans to resample wells early in January.
EPA indicated that they will perform QA analyses on split samples.

(2) NMED stated that labs need to isolate method 8240 analyses from other
activities to eliminate contamination by acetone and methylene chloride. NMED
expressed reservations about drawing conclusions regarding the
presence/absence of hazardous constituents when blanks were contaminated. ACE
stated that the contaminants in question, acetone and methylene chloride, are
very common and that the presence of similarly low levels in blanks and
samples is normally assumed to indicate an absence of significant hazardous
constituents in the samples. Radian indicated their awareness of the problem
and that they will seek ways to minimize contamination in future samples.

(3) Considerable discussion focused on the use of contract required
quantitation limits (CRQL) vs. minimum detection limits (MDL) vs. practical
quantitation limits (PQL). NMED stated that the MDL is 3X the standard
deviation of known sample above the blank value. This is chosen as a
conservative value to trigger verification sampling. NMED questioned Radian's
reported MDL's for methods 8240 and 8270 which are similar to the PQL values
published in Appendix IX. NMED expected MDL's to equal .2X to .33X the
PQL. Radian responded that the MDL's they use are based on several instruments and
that they are lower than CRQL's developed in EPA's contract laboratory
program. NMED asked Radian if MDL's for individual instruments could be used
but gave Radian the option of responding at a later date.

(4) A telecon was scheduled for 31 Dec 1000 MST to further discuss
MDL/PQL/CRQL questions. It will be useful to revise the presentation of results to show values below CRQL with a
J flag. NMED advised HAFB/ACE/Radian that if the revised results showed hits
for method 8270 or any other method besides 8080 and 8240, that these
additional analyses will also need to be verified in the early Jan sampling.

(5) The NMED HRMB QA/QC document "Components of an Adequate Laboratory
Quality Assurance/Quality Control Plan" was discussed. HAFB and Radian
expressed concern that the proposed recovery limits of 80-120% were
considerably more strict than the usual EPA limits of 50-150%. NMED responded
that these values are for reagent blanks or spikes, not for trip blanks or
matrix spikes. Radian commented that this is still "pushing the analysis".
NMED stated that 80-120% is more of a goal than a requirement and that a
revised document clarifying this will be forwarded to all telecon
participants. All participants agreed that the issues raised by this document
had been resolved.
(6) HAFB/Radian expressed concern to NMED that the still unresolved MDL/CRL/QL question might adversely affect the scheduled (Feb 1992) sludge/soil sample collection. Radian cautioned NMED that the MDL's for sludge are quite high because of dewatering problems, interferences, etc. NMED responded that standards for evaluating sludge/soil samples were less restrictive because they were health-based limits. NMED offered to fax documentation on these limits to all participants. NMED stated that EPA document 540-1-89-002 was used as the basis for risk assessments to establish limits.

Fred M. Fisher 12/26/91
January Assessment Confirmation Sampling of Lagoon Groundwater

Dr Bruce Swanton
Hazardous and Radioactive Materials Bureau
Environment Department
1190 St. Francis Dr.
P.O. Box 26110
Santa Fe, NM 87502

1. This is to verify your conversation with our Dr Frederick Fisher regarding corrections to the letter addressed to Brig Gen Lloyd Newton dated 12/17/91.

2. Item 3 indicated that method 8270 sampling and analyses should be repeated because detectable levels of 2-butanone and 4-methyl-2-pentanone were found by one of the two laboratories. Since these two constituents are detected by method 8240, and not by method 8270, the letter was corrected accordingly.

3. In summary, it was agreed that the letter directs Holloman AFB to repeat groundwater sampling and method 8080 and 8240 analyses. Results should be reported using method detection limits (MDL's) to define analytical limits. The letter also indicates concern about contamination of method 8240 blanks.

SIGNED
HOWARD E. MOFFITT
Deputy Base Civil Engineer
TELEFAX

FROM: BRUCE SWANTON, TECHNICAL GROUP SUPERVISOR
Hazardous and Radioactive Materials Bureau
New Mexico Environment Department
(505) 827-4300

DATE: December 23, 1991

SUBJECT: January HAFB Sampling Event/
Data from Sept HAFB Sampling Event

TO Fred Fisher

FAX NUMBER: 479-7015
TEL NUMBER: 
Risk Assessment Calculations for Carcinogens and Noncarcinogens

Following are the two types of calculations for acceptable residual soil contaminants based on risk assessment calculations. These calculations assume a daily exposure duration of 8 hours/day, 40 hrs/week. The resulting figure for acceptable contamination \( C \), should be modified to reflect a larger value for \( C \) if the daily or weekly exposure is less, and a smaller value for \( C \) if the soil ingested is greater than the assumption due to local conditions. The first two equations below are suitable for situations involving only one contaminant, the second two are for multiple contaminant scenarios.

**For single, noncarcinogenic contaminants**

Where \( C \), the acceptable residual soil concentration, will be equal to the \( RfD^* \) divided by the amount of soil ingested daily per kilogram of body weight (the standard RCRA model for noncarcinogenic contaminant exposure is a 10 kg child ingesting 200 mg soil/day) = 20 mg/kg weight per day:

\[
C = \frac{RfD(\text{mg constituent})}{\text{kg*day}} \times \frac{20 \text{ mg soil}}{\text{kg*day}}
\]

\( RfD \) is the reference dose. RCRA clean closures require use of the assumption that intake is by direct soil ingestion, so you will want to use the oral intake \( RfD \) for noncarcinogens. The Integrated Risk Information System (IRIS) will supply this data (513 569-7254).

**For single, carcinogenic contaminants**

Where \( C \) is the acceptable residual contamination, \( R \) is the acceptable risk and is generally set at \( 1 \times 10^{-6} \), \( SF \) is the carcinogenic slope factor. IRIS data includes this value in the carcinogen, oral intake data section. \( DI \) is the average daily soil ingestion. This calculation assumes a 70 kg adult consuming 100 mg of soil daily, so the \( DI \) is 100 mg/70 kg = 1.42 mg soil/kg weight per day.

\[
C = \frac{R}{SF (\text{day/mg*kg}) \times 1.42 \text{ mg/(kg*day)}}
\]

If the total constituent concentration of any chemical in the residual soil is above the limit calculated, the contaminated media must be removed to a permitted hazardous waste treatment, disposal or storage facility. Site specific factors may allow an adjustment of the assumptions used in the above calculations.

For situations involving multiple contaminants, the risk from each is summed and the total risk from residual contaminants must be acceptable.
multiple, carcinogenic contaminants

\( R = \text{Risk} \), and is set at \( 1 \times 10^4 \) incidences of cancer (one incidence in a population of one million). CDI = chronic daily intake of the carcinogen not of contaminated soil. CDI is equal to the daily soil intake times the concentration of the individual contaminant. SF is the slope factor (same as in the previous example).

\[
R = 1 \times 10^{-4} (\text{Cd} \times \text{SF})
\]

Total R will equal the calculated R from carcinogen 1 + R from carcinogen 2, etc. Cleanup levels will be considered adequate with respect to the carcinogens when \( R \) is less than \( 1 \times 10^4 \).

For multiple, noncarcinogenic contaminants

CDI is as immediately above, RFD is as in the first example, above. Calculate the total Chronic Hazard Index as follows:

\[
\text{Total hazard index} = \text{CDI}_1 \times \text{RFD}_1 + \text{CDI}_2 \times \text{RFD}_2 + \text{etc.}
\]

The total hazard index must be less than 1, i.e., 0.99 or less.

All analytical data must be submitted to the New Mexico Environment Department (NMED) and must be accompanied by complete QA/QC data documenting that the laboratory has followed appropriate EPA SW-846, chapter one QA/QC procedures and SW-846 analytical methods.

Ref: Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual, Part A
TABLE 2

BFB KEY IONS AND ABUNDANCE CRITERIA

<table>
<thead>
<tr>
<th>Mass</th>
<th>Ion Abundance Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td>30.0 - 60.0 percent of mass 198</td>
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<tr>
<td>68</td>
<td>less than 2.0 percent of mass 69</td>
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<tr>
<td>70</td>
<td>less than 2.0 percent of mass 69</td>
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<tr>
<td>127</td>
<td>40.0 - 60.0 percent of mass 198</td>
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<td>197</td>
<td>less than 1.0 percent of mass 198</td>
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<tr>
<td>198</td>
<td>base peak, 100 percent relative abundance</td>
</tr>
<tr>
<td>199</td>
<td>5.0 - 9.0 percent of mass 198</td>
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<tr>
<td>275</td>
<td>10.0 - 30.0 percent of mass 198</td>
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<tr>
<td>366</td>
<td>greater than 1.00 percent of mass 198</td>
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<tr>
<td>441</td>
<td>present but less than mass 443</td>
</tr>
<tr>
<td>442</td>
<td>greater than 40.0 percent of mass 198</td>
</tr>
<tr>
<td>443</td>
<td>17.0 - 23.0 percent of mass 442</td>
</tr>
</tbody>
</table>
Components of an Adequate Laboratory Quality Assurance/Quality Control Plan

New Mexico Hazardous and Radioactive Materials Bureau
Technical Support Group
(505) 827-4300

The Hazardous and Radioactive Materials Bureau (HRMB) requires that analytical QA/QC meet the following minimum standards:

1. All constituents identified above the MDL must be reported.

The Method Detection Limit is defined as the estimated concentration at which the signal generated by a known constituent is three standard deviations above the signal generated by a blank, and represents the 99% confidence level that the constituent does exist in the sample.

2. The "tune" of the GC/MS for volatile organic constituents must be checked and adjusted (if necessary) each twelve (12) hour shift by purging 50 ng of a of a 4-bromofluorobenzene (BFB) standard. The resultant mass spectra must meet the criteria given in Table 1 before sample analysis proceeds.

3. The "tune" of the GC/MS for semi-volatile organic constituents must be checked and adjusted (if necessary) each twelve (12) hour shift by injecting 50 ng of a Decafluorotriphenylphosphine (DFTP) standard. The resultant mass spectra must meet the criteria given in Table 2 before analysis proceeds.

4. For every 20 samples perform and report:
   A) Duplicate spike for organics.
   B) Duplicate sample analysis or matrix spike for inorganics.
   C) Reagent blank, results provided for organic work.
   D) One check sample at or near the Practical Quantitation Limit for a subset of the parameters.

5. Analytical results must not be "blank corrected."

6. Any deviation from EPA-approved methodology must have a Written Standard Operating Procedure and NMED approval.

7. Detection limits must be generally in line with those listed in Appendix IX to §264.
8. The laboratory must document:

a. That all samples were extracted, distilled, digested, or prepared (if appropriate) and analyzed within specified holding times.

b. That if a sample for volatile analysis is received with headspace, this is reported.

c. The date of sample receipt, extraction and analysis for each sample.

d. Any problems or anomalies with the analysis should be documented.

e. That all solids were analyzed dry and that the reported results are corrected to reflect a dry weight basis.

9. The name and signature of the lab manager must appear on each report.

10. The laboratory's historical surrogate spike recoveries should fall within plus or minus 20% of the true value, and these recoveries must be achieved in the QA/QC associated with data submitted to HRMB.

**TABLE 1**

**BFB KEY IONS AND ABUNDANCE CRITERIA**

<table>
<thead>
<tr>
<th>Mass</th>
<th>Ion Abundance Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>15.0 - 40.0 percent of the base peak</td>
</tr>
<tr>
<td>75</td>
<td>30.0 - 60.0 percent of the base peak</td>
</tr>
<tr>
<td>95</td>
<td>base peak, 100 percent relative abundance</td>
</tr>
<tr>
<td>96</td>
<td>5.0 - 9.0 percent of the base peak</td>
</tr>
<tr>
<td>173</td>
<td>less than 2.0 percent of mass 174</td>
</tr>
<tr>
<td>174</td>
<td>greater than 50.0 percent of the base peak</td>
</tr>
<tr>
<td>175</td>
<td>6.0 - 9.0 percent of mass 174</td>
</tr>
<tr>
<td>176</td>
<td>greater than 95.0 percent but less than 101.0 percent of mass 174</td>
</tr>
<tr>
<td>177</td>
<td>5.0 - 9.0 percent of mass 176</td>
</tr>
</tbody>
</table>
30 December 1991

Dr. Bruce Swanton
New Mexico Environment Department
1190 St. Francis Drive,
P.O. Box 26110
Santa Fe, NM 87502

Subject: Responses Related to 23 December Conference Call, Holloman AFB Groundwater Monitoring Program

Dear Bruce:

This letter is to respond to two issues remaining unresolved following the 23 December conference call involving you and representatives of the Army Corps of Engineers (USACE), the Environmental Protection Agency (USEPA), and Radian. The topic of the conference call was the data obtained for groundwater samples taken in September 1991 in support of the groundwater monitoring program at Holloman AFB. The two remaining issues are:

1) The data for volatile organic compounds obtained using Method 8240 and a suggestion that GC/MS instruments used to perform Method 8240 be isolated from sources of contamination.

2) The difference between reporting data to a reporting limit and to a method detection limit.

Below, I address these issues.

Issue 1: NMED is reluctant to dismiss the possibility that methylene chloride and other compounds detected in samples and trip blanks are present in the groundwater although these compounds are common contaminant in the laboratory.

The problem of contamination by airborne solvents during sample collection and determination of volatile organic compounds has been long recognized by EPA, regulatory bodies, analytical laboratories, and the regulated community. The problem continues to vex data validators despite efforts in the field and laboratory to minimize contamination during shipment of sample containers to and from the sampling site, during sample collection, and during chemical analysis. Contamination during analysis is usually by methylene chloride, toluene, acetone, and other ketones such as 2-butanone. These solvents, particularly methylene chloride, are commonly used in laboratories. The impact of these solvents on determination of volatile organic compounds may be profound although they are used some distance from where volatile organic compounds are being determined.

The analysis of trip blanks, field blanks, and system blanks, respectively, contribute data which often prove useful in documenting potential sources of suspected contamination.
Trip blanks provide data concerning contamination during transit and analysis. Field blanks provide data concerning contamination during decontamination, return transit, and analysis. System blanks provide data concerning airborne contamination during analysis. Examination of the September 1991 data for volatile organic compounds suggests that the data obtained are valid and defensible for the following reasons:

a) The similarity of the data for Method 8240 for trip blanks and associated system blanks suggests that the methylene chloride detected by Radian during the September 1991 analyses is due to airborne contamination within the laboratory. The concentrations of methylene chloride in several of the samples were only slightly greater than the concentrations in the trip and system blanks. Please note that this assessment was made using previously unreported data which were less than the reporting limit; see below.

b) The data obtained by the EPA subcontract laboratory using Method 8240 on split samples showed low levels of methylene chloride in samples and trip blanks as did Radian's data, but also showed acetone unlike Radian's data. These data document the identities and relative levels of airborne contaminants which may prevail in two laboratories analyzing identical samples.

c) The data obtained by a third laboratory employing Method 8010 showed no contamination by methylene chloride down to 2 µg/L.

d) One yardstick of reasonable GC/MS system blanks for volatile compounds is provided by the criteria for EPA's Contract Laboratory Program (CLP) which supplies analytical data for CERCLA enforcement actions. The most recent CLP Scope of Work (OLM01.0) carries acceptance criteria which mandate that system blanks must contain less than 50 µg/L of methylene chloride, acetone, and 2-butanone, respectively, and less than 10 µg/L for other target analytes. Otherwise, analyses for volatile compounds may not proceed. The criteria published in the Holloman project Analytical Plan, dated 28 August 1991, mandated a maximum concentration of 25 µg/L for methylene chloride in system blanks. The system blank data for the September 1991 analyses certainly meet the criteria of CLP and the Holloman project Analytical Plan.

The recent relocation of Radian's laboratories to a new facility should significantly reduce the impact of airborne solvents on the determination of volatile organic compounds using Methods 8240 and 8010. The instruments used to perform these methods are physically segregated from all other instruments. A further measure of isolation is afforded by segregating the ventilation system of this dedicated work area from the rest of the laboratory building and particularly the area in which solvent extractions are performed. Preliminary results are very promising. Acetone has been seen as an intermittent contaminant despite the careful planning in designing the laboratory. The suspected
source of acetone is the standard construction material used to construct the building and the resulting contamination of reagents.

Issue 2: New Mexico Environmental Department has chosen the method detection limits (MDLs) as the action levels triggering verification sampling. Radian’s data were reported down to our standard reporting limits which are greater than our demonstrated MDLs but meet the published practical quantitation limits (PQLs). These reporting limits appear under the header Method Detection Limit in Appendix B of the Holloman project Analytical Plan dated 28 August 1991.

The data reported for the September 1991 analyses were reported down to Radian’s standard reporting limits carried on its laboratory information management system (LIMS). These laboratory reporting limits (LRLs) are typically the published practical quantitation limits (PQLs) listed in the method except where the published PQLs are unattainable. The laboratory is obligated to demonstrate that its method detection limits (MDLs) for laboratory-grade water are less than the LRLs. A similar approach is taken by the EPA CLP in which the LRL is contractually known as the contract required quantitation limits (CRQLs). Typically, the EPA PQLs, EPA CRQLs, and most laboratories’ LRLs are identical or, at least, comparable for most tests and analytes.

The MDL is defined in a regulatory sense as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero. The MDL for a compound is determined by analyzing numerous spiked aliquots of pristine, laboratory-grade water and then performing the prescribed calculations using the resulting data. The MDLs are thus obtained at a single interval of time for reference samples which undoubtedly differ in most regards from the aqueous investigative samples subsequently analyzed. Radian has found that these calculated MDLs usually underestimate the prevailing detection limits even for laboratory-grade water for which they are obtained. That is, if standards prepared at the concentration of the MDLs are analyzed, the target compounds may or may not be detected. Clearly, this experience is contrary to the regulatory definition of MDL. Further, after the MDLs are calculated, the prevailing detection limits of the instrument will necessarily change over time under the influence of subsequent analyses on the analytical system. Detection limits for specific investigative samples are also influenced by the levels of target and non-target constituents present and physical/chemical matrix interferences.

Most laboratories elect, therefore, to report data down to LRLs at which they feel they can report data of specified accuracy and precision. The foremost reason for reporting down to LRLs is that data are necessarily reported on a sample-by-sample basis and it is impractical to determine and report MDLs for each sample analyzed. To report down to the MDL calculated for laboratory-grade water may overestimate the sensitivity actually realized for a particular sample analyzed. This approach also allows use of a single LRL for a compound in the face of differences in sensitivity between redundant instruments used to perform the same test. Such an approach is absolutely necessary given the nature
and volume of the data obtained from these instruments and the practical need to report data on a timely, ongoing basis.

Radian understands that NMED needs to take a conservative stance with regard to the data it reviews. One approach which accommodates this need and the data obtained in September 1991 would be that taken by the EPA CLP for GC/MS data. Data obtained less than the LRL could be reported using the "J-flag" convention of CLP. This approach would allow for reporting of data less than the LRL as qualified. For example, if the LRL is 10 µg/L for an analyte detected in a sample at 3 µg/L, the reported value would appear as 3J µg/L. The "J-flag" denotes that a greater degree of quantitative uncertainty is associated with the data reported than data closer to or exceeding the LRL. The lower end of the reporting range would approximate the prevailing detection limit with the additional confidence that the mass spectral identification criteria of retention time and mass spectral match must be met.

This situation is contrasted with that for determinations with chromatographic methods using conventional detectors (e.g., Method 8080). The prevailing detection limit for such methods are very dependent on matrix interferences which cannot be distinguished from analyte response. It is recommended that LRLs be used for chromatographic methods, as the data were initially reported, since values below the LRL are generally of limited value. The LRLs for methods involving inorganic parameters are very close to the MDLs; these data may be used as initially reported.

I hope this letter adequately responds to the two remaining issues regarding the September 1991 data for the Holloman groundwater monitoring program. I will be glad to discuss these issues further during our next scheduled conference call on 31 December at 10:00 a.m. MST.

Sincerely,

J. Steven Gibson, PhD
Senior Staff Scientist
Client Services Coordinator

JSG:kla

c: R. Stirling/USACE
B. Johnson/HQ TAC
F. Fisher/HAFB
J. Rinehart/USEWPA
W. Hise/Radian
MEMORANDUM FOR THE RECORD

Subject: Results of a 12-31-91 1000 MST conference call regarding Holloman AFB sewage lagoon investigations.

Participants:
Dr Bruce Swanton, New Mexico Environment Department (NMED)
Ms Sharon Moore, Holloman Air Force Base, NM
Dr Fred Fisher, Holloman Air Force Base, NM
Mr Wallace Hise, Radian Corporation, Austin, TX
Dr Steve Gibson, Radian Corporation, Austin TX
Ms Jean Youngerman, Radian Corporation, Austin TX
Mr Ron Stirling, Army Corps of Engineers, Omaha NE (COE)
Ms Danielle Lakin, Army Corps of Engineers, Omaha NE (COE)
Mr Dave Splichal, MRD Laboratory, COE, Omaha NE
Mr Jon Rinehart, Environmental Protection Agency Region 6, Dallas (EPA)
Mr Brent Johnson, HQ Tactical Air Command (TAC), Langley AFB

RECORDED'S NOTE: All subsequent references to pages or tables refer to "A-E Sampling and Quality Control Summary Report (A-E SQCSR) for Appendix IX Groundwater Sampling Holloman Air Force Base, Radian Corp., November 1991" unless otherwise noted.

(1) All participants agreed that method 8010 results for methylene chloride performed by Environmental Sciences and Engineering (ES & E) show blank values <2 ug/L (Table 3-1, p. 3-9). It was agreed that this indicates that hits of methylene chloride in method 8240 samples performed by Radian and PDP Analytical (EPA contractor) are laboratory contamination (assuming that ES & E's method 8010 results are not blank-corrected).

(2) All participants agreed that acetone was found only in PDP Analytical's samples (compare Table 3-1, p. 3-9 to PDP Analytical's summary table, included as an attachment to the 5 Nov 91 letter from Radian to COE). It was agreed that acetone was therefore a laboratory contaminant.

(3) NMED stated that, pending verification that method 8010 results were not blank corrected, resampling for method 8240 would not be necessary. Radian will contact ES & E to verify that the method 8010 results were not blank corrected.

(4) Radian elaborated upon a letter concerning method detection limits that was sent to participants prior to the call. GC-MS techniques (method 8240) were contrasted to conventional GC techniques such as method 8080 which uses electron capture detection.

GC-MS allows reliable detection of substances below quantitation limits because both retention time and mass spectra are used to verify the identity of a compound. However, limits for accurate quantitation are rather high compared to conventional GC techniques. Interferences are reduced in GC-MS by the use of two independent methods to identify the compound (retention time and mass spectra). Therefore, reporting values below quantitation limits with J flags will provide a reliable indication of the presence of the compound.
Conventional GC is subject to more interferences than is GC-MS, so Radian does not recommend the reporting of flagged values below quantitation limits. Confirmation of hits in conventional GC requires running the sample through a second column with different phases than the original. Typically, this is accomplished by splitting samples after injection and passing the samples through two columns in parallel. Identical detectors are normally attached to both columns. Hits may also be confirmed with GC-MS, but this is not advised because of the lower sensitivity.

NMED noted that Radian's reporting limits for several method 8080 constituents were similar to MDL's in SW-846, 3rd edition. NMED requested that Radian attempt to meet the MDL's listed in SW-846, 3rd edition.

(5) NMED stated that HAFB/Radian is not required to measure detection-monitoring indicator parameters during the upcoming resampling for method 8080. NMED stated that if no hits are found and if the sampling is otherwise successful, HAFB will be permitted to resume detection monitoring by sampling indicator parameters in Jun/Jul 1992.

(6) ACE asked to receive QA samples for two wells. Radian agreed to collect samples from well MW-5, which had the most method 8080 hits, and from one other well to be specified later.

(7) HAFB, HQ TAC, COE and Radian agreed that it would be necessary to schedule a separate resampling trip late in Jan 1992 because there was no longer sufficient time to organize the resampling effort to coincide with the upcoming IRP site sampling trip during the week of 6 Jan. The sludge/soil sample collection has now been scheduled for late Feb, and it was agreed that the groundwater resampling needed to be completed before then.

RECORDER'S NOTE: Radian contacted ES & E on 12-31-91 following the conference call. ES & E confirmed that they do not blank correct method 8010 analyses.

Recorder,

Dr Fred M. Fisher
49 SG/DEV
Holloman AFB, NM 88330
505 479-3931
Re: Detection Limits for Sludge and Soil Sampling  
Sewage Lagoon Investigation, Holloman AFB, New Mexico

Dear Bruce:

This letter addresses the issue of method detection limits (MDLs) and corresponding health-based levels (HBLs) for contaminants of concern associated with the upcoming sewage lagoon sampling at Holloman AFB. Included as Attachment 1 to this letter is a revised table from Radian's Chemical Data Acquisition Plan for this project. Table 3-2 lists: 1) the constituents that will be analyzed for this project (Appendix IX constituents); 2) the method that will be used for analysis of each constituent; 3) the MDL for each constituent; and 4) the HBL for each constituent. In addition, the Appendix IX constituents that have been detected in past samples collected from the sewage lagoons are noted with an asterisk (*) in the table.

We would like to reach a consensus with the NMED over the information in this table prior to conducting the field work at Holloman AFB, which is scheduled to begin the week of February 10. We believe that several issues deserve attention, some of which have been discussed with NMED before. Radian is bringing these issues to your attention once again, not because we foresee them being a problem, but to help ensure that the upcoming activities conducted at the Holloman AFB sewage lagoons will proceed smoothly.

The issues of concern to us are discussed in the following paragraphs, preceded by an explanation of the information presented in the attached Table 3-2.
Source of Data in Table 3-2

The MDLs listed in the table are the lowest detection limits that are expected to be achieved for samples of sludge using the standard analytical methods noted. All of the analytical methods chosen are taken from Test Methods for Evaluating Solid Wastes (SW-846), third edition. As noted in the table and discussed during previous conference calls, the MDLs are "matrix dependent" and may not be achievable in all cases due in large part to the nature of the sewage sludge. Therefore, the MDLs actually reached by our laboratory when analyzing the upcoming samples of sludge from Holloman AFB may not agree entirely with those presented in Table 3-2.

The HBLs are divided into two categories. The values in the first column under the HBL heading, titled "RCRA," are tabulated values taken from an EPA Region VI document: "Draft Preliminary Standards for RCRA Risk Assessment," Appendix 3, 20 February 1991. Appendix 3 of this EPA Region VI draft risk assessment document is equivalent to Appendix A of a proposed rule published in the 27 July 1990 Federal Register, "Corrective Action for SWMUs at Hazardous Waste Management Facilities," which is currently being implemented as policy by EPA. The second column of HBLs are calculated values using EPA's method for calculating action levels published in Appendix 4 of "Draft Preliminary Standards for RCRA Risk Assessment," EPA Region VI, 20 February 1991 (which is equivalent to Appendix E of the proposed rule "Corrective Action for SWMUs at Hazardous Waste Management Facilities," 27 July 1990, Fed. Reg.).

The reference doses (RfDs) and slope factors (SFs) used in these calculations are taken from one of four sources which are footnoted in Table 3-2 and described in detail at the end of the table. The two primary sources are: 1) EPA's Integrated Risk Assessment Service (IRIS); and 2) Health Effects Assessment Summary Tables (HEAST), EPA, January 1991. The calculated HBLs are subject to change as the RfDs and SFs included in IRIS and the HEAST tables are revised. Radian will use the most current available RfD and SF factors to calculate the HBLs at the time that the results of the upcoming sampling effort are reported.

Not all of the Appendix IX constituents have a "RCRA" HBL, since not all are included in Appendix 3 of the EPA Region VI draft RCRA risk assessment document. Similarly, not all of the Appendix IX constituents have a "calculated" HBL because there is no known published RfD or SF. However, where the constituent is listed in Appendix A of the EPA Region VI draft risk assessment document and there is a published RfD or SF, both a "RCRA" and a "calculated" HBL are provided in Table 3-2.
Method of Calculating HBLs

The equations provided to Radian by NMED at an earlier date were not used to calculate HBLs due to inconsistencies with the EPA method noted above. Attachment 2 contains a memorandum prepared by a member of the Radian project team outlining the discrepancies between the two approaches.

Constituents With Conflicting HBLs

In some cases, the "RCRA" HBL is equivalent to the "calculated" HBL. However, there are a number of instances where the two HBLs for a given constituent are not equivalent. It is our understanding that, in these instances where a constituent has an HBL listed in Appendix 3 of the EPA Region VI draft RCRA risk assessment document that is not equivalent to the HBL that is calculated using EPA's method, the calculated HBL takes precedence over the RCRA HBL. This is understandable, since the calculated HBLs are based on EPA documents and information services (i.e., IRIS and HEAST) that are updated on a regular basis. Therefore, where there is both a calculated and RCRA HBL for a given constituent, the calculated HBL will be used when evaluating the results of the upcoming sewage lagoon investigation activities.

Constituents With No HBL

Some (over 50) of the Appendix IX constituents do not have an associated HBL listed in Table 3-2. This is because: 1) the constituent is not listed in Appendix 3 of the EPA Region VI draft RCRA risk assessment document; and 2) the constituent has no known published RfD or SF from which to calculate an HBL. There are two Appendix IX constituents that have been detected previously in the Holloman AFB sewage lagoons—kepone and sulfide—that have no HBL. All of the other constituents for which there is no HBL listed have not been detected previously in the sewage lagoons and are, therefore, not of concern.

Constituents With an MDL Above the HBL

There are a number of Appendix IX constituents that have an MDL that is greater than the HBL. Most of these constituents have not been identified as a constituent that could be expected to be present in the Holloman AFB sewage lagoons, based on knowledge of the operations that have been conducted historically at the base and on past analytical results. There are several constituents that have been detected in a past sewage lagoon sample for which the MDL is expected to be greater than the HBL. However, there are no alternative standard analytical techniques that are available that
will achieve a detection level for these constituents that is lower than the corresponding HBL.

Summary

NMED’s requirement for this sampling effort was to analyze for all constituents previously identified at or above the Practical Quantitation Limit. We have addressed this requirement using previous sampling results, current EPA guidance, and standard risk assessment procedures. A comparison of the MDLs and HBLs shows that, for a majority of the "constituents of concern" (i.e., those previously identified), the standard approved analytical method will achieve a detection level that is below the HBL. However, for several constituents that have been previously detected in the sewage lagoons, an MDL that is at or below the HBL cannot be achieved using standard analytical techniques. In addition, for two "constituents of concern," there is no HBL.

Radian believes that our sampling and analytical approach fully addresses NMED's requirement for this sampling effort. We would appreciate your review of this letter and attachments prior to the start of field activities. We will contact you next Wednesday (February 5) to discuss these issues further.

Thank you for your attention to this matter.

Sincerely,

Wally Hise
Program Manager

cc: Mr. Ron Stirling, USACE
    Mr. Sharon Moore, Holloman AFB
    Ms. Cris Hine, Radian
Dear Bruce:

This letter reviews the issues that were discussed in the teleconference held on 6 February regarding the 31 January 1992 letter prepared by Radian and sent to NMED for review.

The 31 January letter provided an excerpt (Table 3-2) from the Chemical Data Acquisition Plan (CDAP) that was prepared for the sewage lagoon investigation to be conducted during the next few months. The purpose of the letter was to bring up some issues for discussion that have been of concern to Radian in order to ensure that the upcoming activities conducted at the Holloman AFB sewage lagoons will proceed smoothly.

During our conference call, we discussed the 31 January letter and several issues surrounding the use of reporting limits and health based levels (HBLs). Our understanding of the appropriate way to address these issues is summarized below.

1) In cases where the tabulated HBL and calculated HBL for a given constituent are not equivalent, it is appropriate to use the calculated HBL.

2) There are two Appendix IX constituents that have been detected previously in the sewage lagoons that have no HBL—kepone and sulfide. For kepone, it was decided that 1.0 mg/Kg would be used as the HBL. This value (1.0 mg/Kg) is equal to one-half of the HBL for DDT. Sulfide was not discussed because it is not a contaminant of concern.

3) There are a number of Appendix IX constituents with an expected reporting level that is greater than the HBL listed in Table 3-2. For those constituents that have not been detected previously in the sewage lagoons,
this is not a concern. However, there are six constituents that have a reporting limit above the HBL and have been detected previously in the sewage lagoons. The six constituents in this category and their reporting limits and calculated HBLs are shown below:

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Reporting Limit (mg/Kg)</th>
<th>HBL (mg/Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthracene</td>
<td>1</td>
<td>0.2</td>
</tr>
<tr>
<td>Benzo(a)anthracene</td>
<td>1</td>
<td>0.4</td>
</tr>
<tr>
<td>Benzo(a)pyrene</td>
<td>1</td>
<td>0.06</td>
</tr>
<tr>
<td>Benzo(b)fluoranthene</td>
<td>1</td>
<td>0.4</td>
</tr>
<tr>
<td>Benzo(k)fluoranthene</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>Pyrene</td>
<td>1</td>
<td>0.8</td>
</tr>
</tbody>
</table>

Slope factors are not available for many EPA Class B2 polycyclic aromatic hydrocarbons (PAHs), including anthracene, benzo(a)anthracene, benzo(b)fluoranthene, and benzo(k)fluoranthene. To derive an HBL for these compounds, a slope factor was calculated by multiplying the relative potency factor for each PAH by the slope factor for benzo(a)pyrene (11.5 mg/kg/day). The relative potency factors and associated methodology are described in the EPA sponsored document Comparative Potency Approach for Estimating the Cancer Risk Associated with Exposure to Mixtures of Polycyclic Aromatic Hydrocarbons, Interim Final Report, ICF-Clement Associates, Fairfax, Virginia, April 1, 1988. The constituents listed in Table 3-2 for which the relative potency slope factor method was used to calculate the HBL are identified by a superscript "g."

The HBL listed in Table 3-2 (and above) for pyrene, 0.8 mg/Kg, was calculated using the slope factor from the January 1991 Health Effects Assessment Summary Tables. However, the January Integrated Risk Information Service (IRIS) no longer lists pyrene as a Class D carcinogen. Therefore, the appropriate method for calculating the HBL for pyrene is to use the reference dose (RfD), which results in an HBL of 2,400 mg/Kg (above the expected reporting limit of 1 mg/Kg). The HBL for pyrene to be included in Table 3-2 of the final CDAP will be 2,400 mg/Kg, instead of 0.8 mg/Kg.

Therefore, the only constituent previously detected in the sewage lagoons for which the HBL is truly below the expected reporting limit is benzo(a)pyrene. The expected reporting limit for benzo(a)pyrene is 1 mg/Kg, while the HBL is 0.06 mg/Kg. However, as mentioned in the 31 January letter, Radian will be using standard analytical procedures for the sewage lagoon investigation, and, as a result, we believe that the goals of the project will be met.
We hope that this letter, in conjunction with the 31 January letter, provides sufficient information to allow NMED to evaluate the issues of concern and to reach a consensus with Radian on the appropriate approach to be followed for the sewage lagoon investigation. As we mentioned during our telephone call, we will be collecting sludge samples during the weeks of February 17 and 24. Therefore, after discussing these issues with your supervisor, please provide Holloman AFB a written response at your earliest convenience in order to complete the base's documentation.

Thank you for your help in this matter. If you have any questions or need to discuss this further, please contact me or Cris Hine.

Sincerely,

Cris Hine
Program Manager

cc: Ms. Sharon Moore/Holloman AFB
    Mr. Ron Stirling/USACE
    CL Hine/Radian
    EJ Hixson/Radian
    JS Gibson/Radian
CONFIRMATION NOTICE NO. 1

TO: U.S. Army Engineer District
ATTN: CEMRO-ED-EA (Ron Stirling)
215 North 17th Street
Omaha, Nebraska 68102-4978

CONTRACTOR: Radian Corporation

contract number: DACW45-91-D-0018

DElIVERY ORDER NUMBER: 0006. Radian DO #02

TITLE: Conduct Soil and Sludge Sampling at the
Sewage Lagoons, Holloman AFB, New Mexico

DATE OF THIS REPORT: 14 February 1992

SUBJECT: Analytical Reporting Limits versus Health Based Levels

PARTICIPATING PERSONNEL: Dr. Bruce Swanton/NMED
Mr. Wally Hise/Radian
Ms. Jane Hixson/Radian
Dr. Steve Gibson/Radian
Ms. Cris Hine/Radian

On 6 February 1992, Radian personnel held a teleconference with Dr. Bruce Swanton of the New Mexico Environment Department (NMED) to discuss some issues of concern to Radian regarding: 1) the reporting limits that Radian expects to achieve for the Appendix IX constituents that will be analyzed during the sewage lagoon investigation; and 2) the associated health based levels (HBLs) for these constituents.

I. Introduction

On 31 January, Radian prepared and submitted a letter to NMED which addressed several issues of concern regarding reporting limits and HBLs. The letter included a revised Table 3-2 from the Chemical Data Acquisition Plan (CDAP) prepared by Radian for the upcoming sewage lagoon investigation activities. A copy of this letter and attachments was provided to Mr. Ron Stirling (USACE) and Ms. Sharon Moore (Holloman AFB). Dr. Swanton was asked to review the information provided in this letter in order to reach a consensus on the issues prior to conducting the field activities.
II. **Summary of Discussion**

The principal issues discussed with Dr. Swanton are summarized below.

1) Dr. Swanton recognized that NMED's previous guidance (22 May 1991 letter to Holloman AFB) on the approach to look for constituents that have been detected previously in the sewage lagoons above their Practical Quantitation Limit (PQL) is inconsistent with the current approach of using health based levels (HBLs). He agreed that our approach to use HBLs for action levels is appropriate and should be continued.

2) Dr. Swanton questioned why we were not proposing to use various analytical cleanup methods to help achieve lower reporting limits for some of the constituents that have a reporting limit above their HBL. Dr. Steve Gibson (Radian) explained the technical reasons for why there are no appropriate standard cleanup methods beyond what we are already proposing. Steve’s explanation apparently cleared up Dr. Swanton’s misconceptions regarding the ability to reach lower reporting limits.

3) Dr. Swanton told us about a case involving mercury-contaminated soil in a non-residential area (closest house was more than five miles away). In this case, the exposure scenario used to establish health based action levels was based on exposure to workers rather than the usual child exposure scenario. The worker exposure scenario results in a higher health based action level in comparison to the child exposure scenario. Dr. Swanton suggested that the worker exposure scenario could possibly be applied to the Holloman AFB sewage lagoon closure activities. We (Radian) agreed to explore this further when we move into the reporting phase of this project.

Some additional issues discussed with Dr. Swanton are summarized in a letter (copy attached) sent to NMED following the teleconference. This letter was sent to Dr. Swanton for overnight delivery, and he will reportedly be discussing these issues with his supervisor. We asked Dr. Swanton to provide Holloman AFB with a written response to the 14 February and 31 January letters.
13 April 1992

U.S. Army Corps of Engineers
ATTN: CEMRO-ED-EA (Ron Stirling)
Brandels Building
210 South 16th Street, 3rd Floor
Omaha, Nebraska 68102

Re: Results for Confirmation Sampling, Groundwater Assessment Monitoring Program, Holloman AFB, NM

Dear Ron:

Enclosed are three copies of the draft report entitled "Results of Confirmation Sampling and Comparison to Initial Sampling, Assessment Monitoring Program, Holloman Air Force Base, NM." This documents the resampling conducted in February for EPA Method 8080 organochlorine pesticides. I have also provided copies of this report to Sharon Moore at Holloman and Brent Johnson at HQ TAC for their review.

In general, the results show very low levels of pesticide contamination in groundwater at the sewage lagoon site. Specifically, the presence of alpha-BHC and delta-BHC were confirmed in monitor wells MW-5 and MW-7, respectively. However, these constituents are present at concentrations less than five times the detection limit, and therefore, the quantitation should be considered an estimate. In order to substantiate a recommendation to resume detection monitoring, we have provided an in-depth discussion of all pesticides detected in either sampling round including their mobility, toxicity, and concentrations relative to established or calculated health-based levels.

Based on our previous conversations with EPA Region VI and NMED personnel, I feel that the regulators will not allow detection monitoring to resume without some assurance that there is no "pesticide plume" in the groundwater. Therefore, the recommendations provided in Section 6 of this report represent a minimum effort that could provide this assurance. Informal discussions with Holloman AFB personnel indicate that these recommendations are reasonable. However, there are certainly other possibilities, and we should discuss the technical merits and cost of any proposed action to ensure that the "revised" detection monitoring program is in the Base's best interest.

Ron, I apologize for the delay in delivering this report. Due to the political nature of this program and potential consequences for the Base, we felt that additional time and effort were warranted to ensure that a strong technical case is presented.
Please distribute this report to the appropriate technical reviewers on your staff and assemble comments to forward to me. I anticipate combining a revised copy of this report with a final version of the A-E SQCSR for initial sampling (draft dated November 1991) into one comprehensive report for submittal to the regulatory agencies. I would like to receive comments from all parties no later than 24 April so we can submit a final document to EPA and NMED by 1 May. Feel free to call me if you have any questions.

Sincerely,

Wallace Hise
Project Manager

Enclosure

cc: S. Moore/HAFB
    B. Johnson/HQ TAC
    N. Lund/4
    T. Holcomb/4
    J. Youngerman/3
49 CES/CEV

HAFB Lagoon Groundwater Assessment Monitoring Results.

DISTRIBUTION (See Atch 1)

1. Please find at Atch 2 the document by Radian Corp "Assessment Monitoring Results: Appendix IX and Confirmation Sampling" for the Sep 1991 and Feb 1992 groundwater sample collections at the Holloman AFB Lagoons. At Atch 3, (for NMED only) are the laboratory reports signed by the laboratory manager. We would like to schedule a conference call before the end of May to discuss these results and our proposed response. Dr Fred Fisher will contact you to make arrangements for the conference call.

2. The assessment monitoring indicates a low level of groundwater contamination by organochlorine pesticides. Radian Corp found alpha-benzene hexachloride (BHC) in Well MW-5 and delta-BHC in Well MW-7 in both the Sep 1991 and Feb 1992 samples, therefore confirming the presence of these contaminants. Radian Corp also detected other pesticides in either the Sep 1991 or Feb 1992 samples, including aldrin, dieldrin, beta-BHC, gamma-BHC (lindane), 4,4' DDD, endosulfan I, endosulfan sulfate, endrin, heptachlor, and heptachlor epoxide. The concentrations of the individual contaminants did not exceed 0.5 parts per billion. Please note that the Quality Assessment laboratory for the Feb 1992 sampling, the US Army Corps of Engineers, Missouri River Division (MRD) Laboratory in Omaha, NE, did not detect any organochlorine pesticides. Detection limits for the MRD Laboratory were about 5X higher than those for Radian Corp. This partially explains the difference between the two labs. We can offer no explanation at present for the failure of MRD labs to detect at least some of the pesticides.

3. The aquifer below Holloman AFB is naturally saline, exceeding New Mexico Human Health Standards or federal primary and secondary drinking water Maximum Contaminate Levels for total dissolved solids, sulfate, and chloride. Based on the New Mexico Water Quality Control Commission Regulations (WQCC 82-1, as amended through 18 Aug 1991, Parts 3-100 through 3-103) and "Guidelines for Groundwater Classification Under the EPA Groundwater Protection Strategy", (EPA, 1986), the groundwater is not considered a source or a potential source of drinking water.

4. The levels of organochlorine pesticides were unrelated to levels of total organic carbon (TOC), the increase of which triggered the assessment monitoring. The increased downgradient TOC undoubtedly results from the large amount of non-hazardous organic matter accumulated in the lagoons owing to their primary function as a wastewater treatment facility, (closure scheduled for 1996). Therefore, TOC is not a useful parameter for detecting contamination at the Holloman lagoons, and we propose to eliminate it from the detection monitoring program. Instead, we propose to add method 8080 organochlorine pesticides for a subset of the wells to the detection monitoring program.
5. A related issue is the use of a single upgradient well (MW-1) for comparison with downgradient wells. The well originally designated as the second upgradient well (S-2) was found to be downgradient during unusually wet periods, and was eliminated from the monitoring network by EPA in 1991. A single well cannot estimate spatial variation in groundwater chemistry which recent data from a basewide survey of 83 monitoring wells shows to be very high (Radian Corp study in progress). Use of a single well to estimate background therefore increases the risk of false positives, (RCRA Groundwater Monitoring Technical Enforcement Guidance Document, EPA, 1986). Accordingly, we have constructed two new upgradient wells which we will propose to add to the monitoring network in another communication.

6. In view of the low level of contamination and the nonpotable, saline aquifer, we propose to return to the detection monitoring program modified to eliminate TOC and add method 8080 pesticides on some wells. We propose that assessment monitoring in the future be triggered by increases of an order of magnitude compared to values established during assessment monitoring. We would like to discuss in the conference call the possibility of installing two additional monitoring wells downgradient from lagoons A and C where the pesticides were detected. As these wells will be located on land administered by the Bureau of Land Management, it will be appropriate to involve them in the decision process.

7. If you have any questions, please contact Dr Fred Fisher at (505) 479-3921.

IRA L. HESTER
Colonel, USAF
Commander, 49 Support Group

3 Atch
1. Distribution List
2. Assessment Monitoring Results
3. Laboratory Results for Assessment Monitoring (RMED only)
CONFIRMATION NOTICE NO. 5

TO: U.S. Army Engineer District
ATTN: CEMRO-ED-EA (Ron Stirling)
215 North 17th Street
Omaha, Nebraska 68102-4978

CONTRACTOR: Radian Corporation

CONTRACT NUMBER: DACW45-91-D-0018

DELIVERY ORDER NUMBER: 0006. Radian DO #02

TITLE: Conduct Soil and Sludge Sampling at Sewage Lagoons, Holloman AFB, New Mexico

DATE OF THIS REPORT: 31 July 1992

SUBJECT: Sewage Lagoon Closure and Groundwater Monitoring Presentation

PARTICIPATING PERSONNEL: Ron Stirling /USACE
Scott Ludwig /BLM/LCDO
Mike Howard/BLM/Caballo R.A.
Mary Orms/USFWS
Clent Bailey/USFWS
Timothy M. Murphy/BLM/Caballo R.A. Mg.,
Jo Ann Hubbard/HQ ACC/DEVR
Brent Johnson/HQ ACC/CEVC
Wally Hise/Radian
Fred Fisher/HAFB
Tom Zink/USACE
Bob Saari/USACE
Sandy Frye/USACE
Danielle Lakin/USACE
Tom Holcomb/Radian
Steve Alexander/NMED
Stephanie Stoddard/NMED
Jane Hixson/Radian
Marc Sides/NMED/EPA

On 27 July 1992 a meeting was held with representatives of the New Mexico Environment Department (NMED), Bureau of Land Management (BLM), and U.S. Fish and Wildlife Service (FWS) attended by representatives of Radian Corporation (Radian),
U.S. Army Corps of Engineers (USACE), and Holloman AFB. The Base is currently conducting Assessment Monitoring to evaluate a "release" identified in 1991. The purpose of this meeting was to discuss the current status and future direction of the Holloman AFB groundwater monitoring program for the sewage lagoons, to determine the requirements of NMED for a return to detection monitoring, and to discuss the options available for closure of the lagoons.

Mr. Wallace Hise of Radian summarized the regulatory history of the sewage lagoons and lakes projects since approximately 1985. Results of the initial and confirmation sampling and analysis conducted in 1991 and 1992 for the lagoons groundwater monitoring well network revealed very low concentrations of organochlorine pesticides in some of the downgradient monitoring wells. Because the aquifer underlying the lagoons and lakes is not potable (TDS > 10,000 mg/L), the concentrations of pesticides found do not represent a threat to human health or the environment. The Base intends to pursue "closure by demonstration" for some (or all) of the lagoons in accordance with the preamble to the 19 March 1987 Federal Register concurrently with continued assessment of the groundwater downgradient of the lagoons. Mr. Hise presented the elements of the approach Holloman AFB is proposing:

- Install five additional downgradient monitoring wells to determine the lateral extent of migration of the contaminants;
- Redefine the monitoring well network to include the five new wells, the two new upgradient wells (MW-9 and MW-10) and to exclude the former upgradient piezometer S-2;
- Sample the entire network as redefined for SW-846 Method 8080 pesticides only;
- Resample the network in 15 days for Method 8080 pesticides only;
- Perform risk assessments for each lagoon, the Pond G-to-Lake Holloman ditch and the lakes to determine the risk to human health and the environment under existing conditions of use;
- Pursue administrative closure for the lagoons that present acceptable risk, allowing selected lagoons to remain in service for wastewater treatment;
• Prepare and submit a petition for Alternate Concentration Limits (ACLs) for Method 8080 pesticides as an amendment to the pending Post-Closure Care Permit (PCCP) application; and,

• Return to detection monitoring as part of the PCCP requirements using the ACLs as trigger levels for assessment monitoring.

Participants in the meeting expressed comments and/or concerns with the proposed approach; these are summarized below.

NMED: Steve Alexander expressed a preference for analyzing the wells in the network for all Appendix IX constituents rather than for Method 8080 pesticides only. He suggested analyzing for Appendix IX once yearly or perhaps every other year to confirm no other releases are taking place. Mr. Alexander asked whether future technologies that could render the aquifer potable had been considered. Removal of TDS and metals to make the aquifer potable would be considered by the State in evaluating the proposed approach. If the aquifer were made potable the exposures being evaluated for the ACL petition might no longer be applicable. However, since the specific technology has not been identified its impact on low concentrations of organochlorine pesticides cannot be assessed in the Holloman AFB approach. Mr. Alexander was unaware of the existence of metals concentrations above MCLs in background wells located throughout the Base; it may be beneficial to prepare a summary of background metals data for his review. He indicated that risk assessments could be used to support closure decisions for each pond.

Ed Horst was primarily interested in the schedule for the installation of new wells and for closure of the lagoons. He confirmed with Mr. Ludwig (BLM) that the existing downgradient wells provided only stock water. He requested clarification of the location of the Boles wellfield (southeast of the Base) and confirmed that well water was not used to irrigate the Base golf course. Finally, he emphasized the need for a timeline/schedule for the upcoming work, and that we need to get out of a "study" mode and make use of a regulatory driver to assure timely completion of the work.

BLM: Tim Murphy is the Caballo Resource Area Manager assigned to Lake Holloman. His primary concerns include the current status and future conditions of the habitat at Lakes Holloman and Stinky. Additional concerns include the possibility of adverse health impacts on the public using the lake for recreational purposes. He suggested some possibility of development of an industrial/residential complex off-Base. Current exposures involve primarily birders and hunters using the area.

Scott Ludwig is the BLM hydrologist. He also expressed a preference for Appendix IX sampling of the new wells. He is concerned that, since four of the five new wells will be
located on BLM land, there is a possibility that a contaminant plume will enter public land. He agreed with Mr. Hise that Lake Holloman likely recharges groundwater; discharge of contaminants from groundwater to the lake is unlikely. Mr. Ludwig expressed interest in the details of the Microtox assay results from the FWS wildlife contaminant survey recently completed. Current concerns include exposures to surface water and to the "sediments" in Lake Stinky after the lake has evaporated, especially during dry periods when wind-blown contaminants can be dispersed from the lake. Although the lakes are posted with signs that prohibit swimming, people are known to walk out onto the lakebed to retrieve birds, and BLM is concerned about contaminants being brought into the home on shoes. In addition, the Stinky lakebed generates substantial fugitive dust during windy seasons. Both Mr. Ludwig and Mr. Murphy expressed a desire to review the sampling and analysis plan for the wells and lakes.

FWS: The representatives from FWS are relatively new to the Holloman AFB project. Ms. Orms participated in the field sampling conducted by FWS. Because of recent staff changes it is uncertain when the report of the field study will be available. Ms. Orms was involved in the sediment pore water sampling conducted to provide samples for the Microtox assay; she agreed to provide copies of the data to BLM and Radian.

ACTION ITEMS:

Radian will prepare a letter summarizing the proposed monitor well locations and sampling and analysis plan. After approval by USACE and Holloman AFB, the letter will be faxed to NMED, BLM and FWS for comments. A one-week comment period will be requested to allow incorporation of any changes in the upcoming Scope of Work prior to final costing and negotiation.

USACE will prepare a preliminary Scope based on the current approach so that Radian can begin costing.
03 August 1992

Mr. Steve Alexander  
New Mexico Environment Department  
Hazardous and Radioactive Materials Bureau  
525 Camino de Los Marquez  
Santa Fe, New Mexico  87502

Re:  Proposed Sewage Lagoon Project for Holloman AFB

Dear Steve:

At the meeting held last Monday at your office (see attached list of attendees), Mr. Wallace Hise of Radian presented a summary of the Holloman AFB sewage lagoon project to date and a proposed course of action to address the unresolved groundwater monitoring and closure issues. Holloman AFB intends to pursue the "closure by demonstration" option as described in the preamble to the 19 March 1987 Federal Register. As a result of the meeting, Holloman AFB has a better understanding of the concerns of most parties involved in the sewage lagoon closure project. This letter was prepared in response to your request to document our proposal for future work in order to get your review and approval. The letter is divided into three categories to address what we understand to be the governing regulatory areas.

**Sewage Lagoons (Ponds A - G) Closure**

The sewage lagoons include Ponds A through G, currently defined as hazardous waste management units (HWMUs) subject to the requirements of RCRA and the Federal Facilities Compliance Agreement. Appendix IX sludge and soil sampling was recently conducted by Radian in an effort to determine the nature and extent of contamination in the sewage lagoon sludge and underlying soils. Results indicate that the primary contaminants of concern are organochlorine pesticides, and that contaminant concentrations are highest in the sludge layer. Work to be conducted to support the sewage lagoon closure is described below.

1. **Conduct Surface Water Sampling** - Past sampling conducted by Radian (October 1990) did not include analysis for Method 8080 pesticides or surface water quality parameters. The purpose of this effort will be to generate surface water quality data for use in determining an appropriate closure scenario. Procedures will include collecting one water sample from each impoundment for analysis of organochlorine pesticides by EPA Method 8080. Samples will also be analyzed for pH, conductivity, hardness, alkalinity, and total dissolved solids.
2. Conduct an Analytical Study of Biota - The purpose of this effort will be to generate data to complement the study recently performed by the U.S. Fish and Wildlife Service (FWS). Procedures will include collecting a total of three samples per impoundment: one composite sample each of algae, benthos, and fish. Samples will be analyzed for organochlorine pesticides (EPA Method 8080), metals, semivolatile organic compounds (EPA Method 8270), and dioxins/furans (EPA Method 8280). These classes of compounds were detected in some of the FWS samples.

3. Conduct Statistical Modeling - The purpose of this effort will be to determine if the Appendix IX sludge and soil sampling recently completed was adequate to characterize the extent of contamination in the sewage lagoons. Procedures will include selecting constituents of concern in each impoundment (based on criteria such as exceedance of action levels, highest detected concentrations, and/or most frequent detections) and using an appropriate statistical method to determine if additional samples are required. Modeling procedures accepted by EPA, such as probability Kriging, will be considered for this task.

4. Prepare a Risk Assessment - The purpose of this effort will be to determine the risk to human health and the environment currently posed by levels of contaminants present in the sewage lagoons. Standard risk assessment procedures consistent with proposed Subpart S regulations will be followed using historical sampling data, as well as data generated from items #1 and #2 above. Resulting documentation will be used in support of the "closure by demonstration" option proposed by Holloman AFB. If risks are unacceptable, target cleanup levels will be determined for sludge/soil treatment and/or removal.

5. Prepare a Feasibility Study - The purpose of this effort will be to determine the most cost-effective option for closing the sewage lagoon system. Procedures will include evaluating options of treatment or removal of hazardous waste constituents on the basis of technical feasibility and cost. The resulting document will be used for internal decision making by Holloman AFB.
Groundwater Assessment Monitoring

The Holloman AFB sewage lagoon groundwater monitoring wells are currently in assessment monitoring, guided by the EPA- and NMED-approved "Groundwater Assessment Monitoring Plan" (Radian, September 1991). Appendix IX sampling and confirmation sampling were conducted in September 1991 and February 1992, respectively. Results indicate that the contaminants of concern are organochlorine pesticides. Work to be conducted in support of the assessment monitoring program is described below.

1. **Monitor Well Installation and Sampling** - The purpose of this effort will be to determine the lateral extent of contamination hydraulically downgradient of the existing monitor well network. A total of five wells is proposed as follows. Three wells will be installed west of monitor wells MW-5 and MW-7 where the presence of pesticides (\(\alpha\)- and \(\delta\)-BHC) was confirmed. Two wells will be installed near MW-3, one south and one west, where detected pesticide levels (aldrin and dieldrin) were not confirmed but were above health-based action levels.

   A field screen will be conducted using the HydroPunch® technique and GC analysis for Method 8080 pesticides to optimize the placement of monitor wells at the downgradient edge of contamination. Monitor wells will then be installed and developed. The complete monitor well network will be sampled twice for organochlorine pesticides (Method 8080). The two sampling rounds will be conducted 15 days apart and will be analogous to the Appendix IX and confirmation sampling. At this time, Holloman AFB believes that analysis for Appendix IX constituents is not warranted for proposed monitor wells in this area in light of the September 1991 sampling results. Appendix IX sampling and analysis is proposed for several wells on BLM land (reference item #5 for Lakes Holloman and Stinky).

2. **Monitor Well Upgrades** - The purpose of this effort will be to ensure consistent and quality sample collection from the monitor well network. Procedures will include installing automated purging and sampling equipment (pneumatic bladder pump and controller) in each monitor well for use in future sampling events.

3. **Sample Deep Piezometers** - The purpose of this effort will be to determine whether the clay layer underlying the sewage lagoons is preventing vertical migration of contaminants. Procedures will include developing and sampling existing deep piezometers D3 (upgradient), and D4 and D5 (downgradient), installed in 1987 for the hydrogeologic investigation (reference attached.
figure). The piezometers will be sampled twice for Method 8080 organochlorine pesticides concurrent with the sampling described in item #1 above.

4. Conduct a Water Level Survey - The purpose of this effort will be to determine the hydraulic connection between surface water and groundwater, and the potential for discharge of groundwater to the sewage lagoons and lakes. Procedures will include measuring water levels in all existing and new monitor wells, and the following piezometers installed in 1987 as part of hydrogeologic investigation: S6, S7, S8, S9, S10, S11, S16, D1, D2, and D6 (reference attached figure). The water level survey will be conducted concurrently with the groundwater sampling described in item #1 above.

5. Submit Alternate Concentration Limit Petition - The purpose of this effort will be to submit documentation to support establishing alternate levels of pesticides in groundwater considering current and anticipated future use. Procedures will include determining allowable concentrations of each Method 8080 constituent based on analytical results, site-specific exposure scenarios, modeling, and hydrogeologic and chemical properties. The ACLs will be used as "trigger" levels to determine when further action is required.

RCRA Facilities Investigation for Lakes Holloman and Stinky

Lake Holloman (and the ditch between Pond G and Lake Holloman) and Lake Stinky are solid waste management units (SWMUs) listed on Holloman AFB's HSWA permit, and were recently investigated during the Appendix IX sludge and soil sampling. This work is considered Phase 1 of a RCRA Facilities Investigation (RFI). In addition, these units are the primary concern of the Bureau of Land Management (BLM) and FWS with regard to recreational land uses and wildlife habitat. Work to be conducted in support of the RFI and to address BLM and FWS concerns is described below.

1. Conduct Surface Water Sampling - Similar to item #1 under the sewage lagoons closure, the purpose of this effort will be to generate surface water quality data by collecting samples from Lake Holloman and the ditch for analysis of Method 8080 pesticides, pH, conductivity, hardness, alkalinity, and total dissolved solids. This will also address the BLM's request for surface water sampling (reference 28 February 1992 letter). Previous sampling conducted by Radian (October 1990) provides surface water data for all sewage lagoons and Lake Holloman; however, samples were not analyzed for organochlorine pesticides by Method 8080.
2. **Conduct an Analytical Study of Biota** - Similar to item #2 under the sewage lagoons closure, the purpose of this effort will be to generate data to complement the recent FWS wildlife contaminant study by collecting algae, benthos, and fish samples for analysis of organochlorine pesticides, metals, semivolatile organics, and dioxins/furans. Three composite samples each of algae, benthos, and fish will be collected from Lake Holloman; one composite sample each of algae and benthos will be collected from the ditch.

3. **Soil Sampling in Lake Stinky** - The purpose of this effort will be to collect data to determine whether contaminants are present in the southern portion of Lake Stinky (south of Highway 70/82). Procedures will include collecting two soil samples for analysis of Appendix IX constituents. Two soil samples each north and south of the highway will also be collected from Lake Stinky and analyzed for geotechnical properties (grain size distribution and hydrometer testing) to determine the potential for wind erosion and dispersion of contaminants. This effort will specifically address the concerns of Mr. Tim Murphy, BLM, regarding potential exposure to contaminants in Lake Stinky during dry periods.

4. **Prepare a Risk Assessment** - Similar to item #4 under sewage lagoon closure, the purpose of this effort will be to determine the risk to human health and the environment currently posed by levels of contaminants present in the lakes and ditch. Standard Subpart S risk assessment procedures will be followed using historical data, as well as data generated from items #1, #2, and #3 above. If risks are unacceptable, target cleanup levels will be determined for sludge/soil treatment and/or removal.

5. **Monitor Well Installation and Sampling** - The purpose of this effort will be to determine whether groundwater has been impacted as a result of contaminants present in Lakes Holloman and Stinky, and to address the concerns stated by you and Mr. Scott Ludwig, BLM, regarding Appendix IX sampling of monitor wells on public lands. Procedures will include installing a total of three monitor wells in the following locations: one north of S16, one south of S16, and one north of S9 (reference attached figure). In addition, piezometers S9 and S16 will be redeveloped. This set of five wells will be sampled and analyzed for Appendix IX constituents.

All work outlined in this letter will be summarized in a Decision Document prepared at the conclusion of reporting activities. This summary document will describe the final closure scenario for each of the sewage lagoons, lakes, and the ditch.
This letter was faxed to NMED's Steve Alexander and Barbara Hoditschek for informal review. The letter was never signed.

Mr. Steve Alexander
03 August 1992
Page 6

As we discussed last week, due to the time constraints in contracting and appropriating funds, Holloman AFB requests that you respond in writing by FAX to Mr. Roger Wilkson at Holloman AFB (FAX #505/479-7015) no later than 4 pm on 10 August so we can incorporate your comments into a final scope of work. Also attached is a preliminary project schedule for the proposed work. We are assuming a start date of 1 October 1992 after contract award, and a project duration of roughly 15 months.

HOWARD E. MOFFITT
Deputy Base Civil Engineer

Distribution:

Ed Horst, NMED
Stephanie Stoddard, NMED
Barry Feldman, EPA Region VI
Rich Mayer, EPA Region VI
Tim Murphy, BLM Las Cruces
Mary Orms, FWS Albuquerque
Jo Ann Hubbard, HQ ACC
Brent Johnson, HQ ACC
Ron Stirling, USACE Omaha District
Wallace Hise, Radian Corporation
This letter was faxed to NMED’s Steve Alexander and Barbara Hoditschek for informal review. The letter was never signed.

# HOLLOMAN SEWAGE LAGOON MEETING

27 July 1992

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<thead>
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<tbody>
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<tr>
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This letter was faxed to NMED's Steve Alexander and Barbara Hoditschek for informal review. The letter was never signed.
MEMORANDUM

TO: Barbara Hoditsche
Permitting Program Manager

FROM: Steve Alexander, Technical Section Supervisor

THROUGH: Edward Horst, Enforcement and Technical Program Manager

DATE: August 12, 1992

SUBJECT: Proposed Sewage Lagoon Project for Holloman AFB, August 3, 1992

The following review was conducted on the "Groundwater Assessment Monitoring" section. Quotes in parenthesis are taken directly from the text. Technical comments follow the quotes.

ITEM

1 Page 3, 1. Monitor Well Installation and Sampling: (A field screen will be conducted using the HydroPunch technique...). A complete Sampling and Analysis Plan including constituents, quality assurance/quality control and a description of the HydroPunch method will be required.

2 Page 3, 1. Monitor Well Installation and Sampling: (The complete monitor well network will be sampled twice for...). A listing of the actual wells to be sampled must be provided.

3 Page 3, 1. Monitor Well Installation and Sampling: (At this time Holloman AFB believes that analysis for Appendix IX constituents is not warranted for proposed new wells...). All new groundwater monitoring wells must be sampled and analyzed for all Appendix IX constituents.

4 Page 3, 3. Sample Deep Piezometers: (Procedures will include developing and sampling existing deep piezometers.). In which flow zone and/or aquifer does "deep" refer to?
Page 4, 5. Submit Alternate Concentration Limit Petition: (The ACLs will be used as "trigger" levels to determine when further action is required.). No regulatory provision exists for facilities under 40 CFR Part 265: Interim Status to submit an Alternate Concentration Limit (ACL) petition. Under 40 CFR, Section 265.90(d) HAFB may propose an alternate groundwater monitoring system which would incorporate information obtained from the organochlorine pesticide assessment process and the changes proposed in the May 1992 letter: "HAFB: Lagoon Groundwater Assessment Monitoring Results", which requested changes to the detection monitoring program. Bureau review of a proposed alternate groundwater monitoring system would follow completion of the ongoing organochlorine pesticide assessment process.
August 17, 1992

Mr. Howard E. Moffitt
49 CES/CEV
Holloman AFB, New Mexico  88330-5000

The Permitting Program of the Hazardous and Radioactive Materials Bureau (HRMB) has received Holloman AFB's 03 August 92 letter regarding the Proposed Sewage Lagoon Project and has the following preliminary comments. Clean closure demonstrations for surface impoundments are evaluated against requirements in the HWMR-6, Part IV, Section 40 CFR 265.228, associated Federal Registers and relevant guidance documents and policy directives. Prior to approval of any proposed approach for closure and/or corrective action, the Permitting Program will need more detailed information.

The following comments by the Permitting Program are based on review of the "Sewage Lagoons (Ponds A-G Closure" Section. Comments by the Technical Section regarding the "Groundwater Assessment Monitoring" are attached. The portions of text in parentheses are taken directly from the text. HRMB comments follow the quotes.

ITEM

1. Page i, opening paragraph: (Holloman AFB intends to pursue the "closure by demonstration" option as described in the preamble to the 19 March 1987 Federal Register.) The 19 March 1987 Federal Register outlines requirements for "closure by removal" or "clean closure demonstration". To obtain NMED certification for this type of closure, HAFB must demonstrate, once the vertical and horizontal extent of contamination is known, that no hazardous constituents remain in any media above Health-Based Action Levels. Media contaminated with metals must be cleaned up to background concentrations. As described in the 19 March 1987 Federal Register, these demonstrations must be waste specific and site specific, assume no attenuation, and consider all potential exposure pathways. The other proposed closure option discussed in the preamble has never been finalized.
2. Page 4, number 5: (Submit Alternate Concentration Limit Petition) Your 03 August 92 letter does not clarify how HAFB intends to close the sewage lagoons. In the case of closure by removal of all lagoons, no post-closure permit is required and no groundwater monitoring is necessary; thus there is no need to petition for Alternate Concentration Limits. Closure by removal requires that the lagoons be taken out of service, cleaned, sampled, certified, and NMED-inspected. Once the certified closure is approved by NMED, the units may be reopened to receive non-hazardous waste. HAFB would also need to monitor influent to ensure that no hazardous waste enters the units.

If HAFB intends to close some of the lagoon units by removal and others by leaving the waste in place, NMED will require a detailed proposal describing how the "waste-in-place" lagoons will be isolated and properly monitored. This is necessary in order to determine the source of any potential releases to the environment.

Our technical review of HAFB's Post-Closure Care Permit Application for Surface Impoundments (6/91) has not begun and is not scheduled for FY-93. Any changes necessitated by HAFB's plans for the impoundments that are not reflected in the 6/91 post-closure permit application may be incorporated without any permit modifications. HAFB must have the groundwater plume defined and a groundwater monitoring program in the permit application.

If you have any questions regarding this response, please contact Ms. Stephanie Stoddard or Mr. Steve Alexander at (505) 827-4308 or 827-4313.

Sincerely,

Ms. Barbara Hoditschek
RCRA Permit Program Manager

Attachment.

xc with attachment: David Morgan, NMED
Thomas Manning,
Air Force Center for Environmental Excellence
FROM: 49 CES/CEV
550 Tabosa Avenue
Holloman AFB, New Mexico 88330-8458

SUBJ: Holloman Air Force Base (HAFB) Lagoons: Sediment and Sludge Contamination

TO: DISTRIBUTION (See Atch 1)

1. Please find enclosed the Site Characterization Report for the 1992 study of contamination of the sludge and sediments in Holloman AFB (HAFB) sewage lagoons C-G, Lakes Holloman and Stinky, and associated drainage ditches (Atch 2). Also enclosed are data from Lagoon C collected previously during 1990-91 but not reported in the A-E SQCSR report of June 1991 (Atch 3). These data are submitted to NMED to support the Post-Closure Care Permit (PCCP) application and to USEPA as part of the Phase I, RCRA Facility Investigation (RFI), of Solid Waste Management Units (SWMUs) identified on Table 1 of the HSWA portion of HAFB's RCRA Part B permit.

2. As originally planned, these data would complete the PCCP, which would now be ready for technical review during FY93. HAFB proposes to postpone technical review of the PCCP until FY94 in order to supplement the plan with a detailed feasibility study of closure alternatives. Several studies will provide information for the feasibility study, including: (1) collection of surface water samples analyzed for what is now recognized as the most significant contamination in the lagoons, organochlorine pesticides; (2) an analytical study of contamination of biota not previously characterized by the US Fish and Wildlife Service study, including benthic organisms, algae, and fish; (3) a statistical study to determine if the existing data adequately characterize the contamination; and (4) a detailed assessment of the health and environmental risk of the lagoons. These studies, as well as additional studies of Lake Stinky soils, will also supplement the HSWA RFI investigation.

3. If you have any questions, please contact Dr Fred M. Fisher, 49 CES/CEV, HAFB, at (505) 479-3931.

HOWARD E. MOPPLET
Deputy Base Civil Engineer

3 Atch
1. Distribution List
2. Site Characterization Report
3. A-E SQCSR Report, Jun 91

Global Power for America
Distribution List

w/Atchs

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US Environmental Protection Agency, Region VI, 6H-CS
First Interstate Bank Tower
1445 Ross Avenue
Dallas, TX  75202-2733

Mr Mark Peycke  (Certified Mail - Return Receipt Request P 987 699 439)
US Environmental Protection Agency, Region VI, 6C-H
First Interstate Bank Tower
1445 Ross Avenue
Dallas, TX  75202-2733

Mr Scott Ludwig
US Department of the Interior
Bureau of Land Management
1800 Marquess
Las Cruces, NM  88005

cc w/o Atchs

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Omaha District
215 N 17th Street
Omaha, NE 68102-4978

Mr Barry Feldman
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Mr Mark Blakeslee
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PO Box 27115
Santa Fe, NM 87502

Ms Mary Orms
Fish and Wildlife Service
3530 Pan American Highway NE
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Air Force Regional Civil Engineer
(AFCEE/CCR-D))
Attn:  Mr Lopez & Mr Jahns
PO Box 116
525 Griffin St.
Dallas, TX  75202

Capt Joe Miller
49 FW/JA

Mr Wallace Hise
Radian Corp
8501 Mo-Pac Blvd
Austin, TX 78720-1088

Ms Jo Ann Hubbard
HQ ACC/CEVR

Mr Brent Johnson
HQ ACC/CEVC

ATCH 1
FROM: 49 CES/CEV  
550 Tabosa Avenue  
Holloman AFB, New Mexico 88330-8458  

17 SEP 1992

TO: Ms Stephanie Stoddard  
Hazardous & Radioactive Materials Bureau  
New Mexico Environmental Department  
525 Camino de los Marquez  
Santa Fe, NM 87502-6610

SUBJ: Holloman Air Force Base (HAFB) Lagoons: Sediment and Sludge Contamination

1. Please find enclosed the Site Characterization Report and the AE-SQCSR for the 1992 study of contamination of the sludge and sediments in Holloman AFB (HAFB) sewage lagoons C-G, Lakes Holloman and Stinky, and associated drainage ditches (Atch 2, 3). Also enclosed are data from Lagoon C collected previously during 1990-91 but not reported in the A-E SQCSR of June 1991 (Atch 4). These data are submitted to NMED to support the Post-Closure Care Permit (PCCP) application and are submitted to USEPA as part of the Phase I, RCRA Facility Investigation (RFI), of Solid Waste Management Units (SWMUs) identified on Table 1 of the HSWA portion of HAFB's RCRA Part B permit.

2. The lagoon C-G sludge and sediment data were collected in response to a letter from Dr Bruce Swanton of NMED Hazardous and Radioactive Materials Bureau (HRMB), dated 22 May 1991, to Col Ira L. Hester, Commander, 49th Support Group of HAFB (Atch 5). In this letter, Dr Swanton identified a five-item sampling program, of which three items were required to complete technical review of the HAFB's Post-Closure Care Permit (PCCP) application. A conceptual plan to address these items was presented in November 1991 and accepted by NMED and USEPA; the enclosed data fulfill these requirements. As originally planned, these data would complete the PCCP, which would now be ready for technical review during FY93.

3. HAFB proposes to postpone technical review of the PCCP until FY94, in order to supplement the plan with a detailed feasibility study of closure alternatives. Several studies will provide information for the feasibility study, including: (1) collection of surface water samples analyzed for what is now recognized as the most significant contamination in the lagoons, organochlorine pesticides; (2) an analytical study of contamination of biota not previously characterized by the US Fish and Wildlife Service study, including benthic organisms, algae, and fish; (3) a statistical study to determine if the existing data adequately characterize the contamination; and (4) a detailed assessment of the health and environmental risk of the lagoons. These studies, as well as additional studies of Lake Stinky soils, will also supplement the HSWA RFI investigation.
4. A disadvantage to postponing technical review is that HAFB paid a $28,000 permit fee at the end of FY91 to fund the technical review and permit preparation (Atch 6). This fee should be applied towards this task, even if it is delayed until FY94. HAFB requests that NMED provide notification if the proposed delay of technical review will jeopardize the availability of these funds.

5. The two remaining items in Dr Swanton's 22 May letter are monitoring requirements for post-closure care and are not addressed by the enclosed reports. One is a requirement to initiate a groundwater detection monitoring program. This is also required by the FFCA; HAFB currently has a monitoring network of 10 wells and is preparing to install 5 more as part of an assessment monitoring project. These efforts will fulfill the stated requirement.

6. The last requirement of Dr Swanton's letter was to initiate a program of surface water sampling in lagoons A and B for volatile and semi-volatile organic compounds. HAFB believes that new data and events, since May 1991, make this requirement unnecessary. Most importantly, all data collected since that time point to organochlorine pesticides and PCBs as the contaminants of concern. (The presence of PCBs has been confirmed only in lagoons A and B.) Surface water samples are most useful for detecting ongoing contamination. HAFB currently does not discharge hazardous wastes into the lagoons, and none of the detected pesticides or PCBs are currently in use on base. Judging from recent groundwater and sludge samples, known past discharges of volatile and semi-volatile organics appear to have long since volatilized. Finally, HAFB no longer intends to use the lagoons as part of the new wastewater treatment system, so there will be no water to collect during the post-closure care period. Therefore, an expensive surface water monitoring program for volatile and semi-volatile organics appears to be unjustified.

7. In summary, HAFB wishes to include the enclosed reports as part of its PCCP application, and requests an official letter of concurrence from NMED, accordingly. HAFB wishes to delay technical review of the PCCP until FY94 because several recently initiated studies will impact the application. It is our understanding that our PCCP is not scheduled for technical review during FY93 and we do not wish to change this. We request that NMED officially notify us of the appropriate time to request review of our application during FY94 so that we may be assured a place on NMED's work plan. HAFB is also submitting the enclosed reports to USEPA as part of our RFI for Table 1 of our HSWA Part B permit, the rest of which was previously submitted during July 1992.

8. If you have any questions, please contact Dr Fred M. Fisher, 49 CES/CEV, HAFB, at (505) 479-3931.

SIGNED
HOWARD E. MOFFITT
Deputy Base Civil Engineer

6 Atch
1. Distribution List
2. Site Characterization Report
3. A-E SQCSR Report, Jun 91
4. A-E SQCSR Rpt, Aug 92
5. NMED Ltr to 49 SG/CC, 22 May 91
6. Permit Fee
Memo for the Record
Meeting with NMED in Santa Fe, 25 Jan 93
Fred M. Fisher - 29 Jan 93

1. Roger Wilkson, Warren Neff and Fred Fisher attended informal meetings with NMED personnel from several bureaus at the Runnells Building in Santa Fe on 25 Jan 93.

2. Investigator-derived wastes were discussed with David Morgan and Alan Jager of the Ground Water Bureau. They indicated that it would be acceptable to leave drummed wastes at the collection site until TCLP tests are complete. Drums which testing shows contain non-hazardous soil and water can be dumped at the site. NMED should be notified by filing a Notice of Intent (NOI) to discharge with David Morgan. A single annual NOI will be sufficient.

3. David Morgan and Steve Alexander (Hazardous Wastes) delivered a letter to HAFB signed by Kathleen Sisneros, the director of the division containing the Hazardous Waste and Ground Water Bureaus. The letter states that remediation of HAFB ground water will not be required at the present level of contamination. Annual ground water monitoring will be required to detect any deterioration which would indicate new or unknown contamination. HAFB agreed to submit a monitoring plan at a later date. It was agreed that modeling would not be a major part of the program. Mr. Alexander indicated that Appendix IX samples would not be required for this routine monitoring.

4. Alan Jager noted that HAFB’s discharge plan for spray irrigation from Lake Holloman (DP-56) would expire this summer. We informed him that HAFB would not renew this plan. However, a written notification will also be required. Jager also indicated that HAFB should prepare discharge plans for the main base sewage treatment plant and for the test track, as these discharges exceeded 2000 gpd and are not covered by any existing NPDES permits. HAFB indicated that the discharge plans would be prepared in the next few months.

5. Issues related to the new sewage treatment plant were discussed with Glenn Saums of the Surface Water Bureau. He indicated that EPA must make the determination that Lake Holloman is "Waters of the United States" before a NPDES permit can be processed. Playa lakes are considered on a case-by-case basis and a formal written request to review the status of the lake must be made to:

   Mr Myron O. Knudson, Director
   Water Management Division
   US EPA Region 6 (6W)
   1445 Ross Ave
   Dallas, TX 75202-2733

He noted that a request for such a determination had been made 24 Feb 1988 but, apparently, the determination had never been made. Mr. Saums also noted that the new sludge regulations (40 CFR 503) were due "any day now." Based on his reading of the draft regulation, he did
not think that drying bed capacity would need to exceed the currently required 90 days (40 CFR 257); however, he stressed that the new regulations should be consulted as soon as available.

6. The status of the 20,000# EOD monitoring study was discussed briefly with Steve Alexander. He could not say too much because the permitting section was not present at the meeting. He did indicate that he was unaware that the purpose of the study was to establish a monitoring program for an active site; instead he thought that the study was intended to support closure. He agreed that ground water monitoring was the highest priority for an active site. Appendix IX sampling will be required for the first sample collection. HAFB requested the regulations indicating under what circumstances Appendix IX was required, but Mr Alexander was unable to respond.

7. Roger Wilkson and Warren Neff met with the Air Quality Bureau about vapor recovery on fuel tanks. These issues will be documented elsewhere pending further discussion with NMED.

Fred Fisher 1/29/93
On 23 February Radian attended a meeting at Holloman AFB with representatives of the U.S. Fish and Wildlife Service (USFWS) and Bureau of Land Management (BLM). The topics discussed are summarized below.

1. Marty Tagg, the Base archaeologist, summarized the results of a recent environmental inspection that identified a lack of plans for managing wildlife. As a result of this inspection, the Base has contracted with Pat Melkop of the local chapter of the Nature Conservancy. She will perform a reconnaissance of threatened and endangered (T&E) species present on-Base and will prepare a plan for management of T&E species for one year. The Base plans to request a wetlands delineation by the USFWS funded by HQ ACC through the Base; the Base may request a wetlands management plan. The Base has prepared a wildlife management plan to be reviewed by the New Mexico State Game and Fish commission.

2. Fred Fisher reviewed briefly the history of wildlife investigations for the sewage lagoons and lakes. He requested that USFWS expedite completion of the final report on the study done in 1991 and funded in part by the Base. Geomarine has done a survey of T&E species of a 500-acre area near the lakes and lagoons to support design and installation of the new sewage treatment system. The results have not been received, but will be distributed to Radian when available.

3. Mike Howard of BLM summarized their interest in getting USFWS involved at Holloman AFB. Lake Holloman is a heavily utilized wildlife area: at least 211 species use the area. At least 90 species of shorebirds and waterfowl have been observed in the area (at Lake Holloman there are mainly puddle ducks and diving ducks, at Lake Stinky primarily wading birds). Twelve to 13 special status species (state endangered species or federal candidate or endangered species) have been
observed, including peregrine falcons and aplomado falcons and snowy plovers. Previous sampling activities have documented the presence of hazardous chemicals in the lagoons and/or lakes (such as BHC isomers). Therefore the USFWS needs to be consulted about potential impacts of the chemicals on the species at the lakes.

BLM will send a letter requesting that Holloman AFB officially request consultation with the USFWS on this issue under Section 7 of the Endangered Species Act. BLM wants to remain involved in the consultation and resolution of the issue because they manage approximately 70% of the area at the lakes. The purpose of this consultation is to document whether there are actual or potential impacts on the T&E species.

The Base will request that USFWS provide a list of the species utilizing the area. Radian raised the question of residence time of the species in the area; it is difficult to quantitate impacts on migratory species that only stay at the lakes for a short period. USFWS can provide information on residence time as well as a species list. The species list and residence time information will be provided to Radian for the ecological assessment portion of the investigation.

4. BLM agreed to send the letter to Holloman AFB within a week. Once that has been received, Fred Fisher will request the species list and residence time information from USFWS. USFWS will attempt to finish the report on the previous study by mid-March. Radian will monitor progress on these issues so that the schedule for the risk assessments is not adversely impacted.

Attachments
Holloman AFB T&E Meeting
23 Feb 92

Agenda

1. Introduction & explanation of current & future T&E work on HAFB by HAFB Natural and Cultural Resource staff.

2. Discussion of T&E work going on around Lake Holloman by BLM, Radian, and US Fish and Wildlife.

3. Discussion of proposed HAFB T&E Plan by Nature Conservancy and HAFB staff.

4. German Air Force Tornado Complex Live Load Pad T&E survey and results by WSMR contractor and HAFB staff.

5. Open discussion of any T&E issues and concerns

Organizations invited to meeting:

Nature Conservancy
US Fish and Wildlife
NM Game and Fish
White Sands National Monument
White Sands Missile Range
Omaha Corp of Engineers
Radian Corporation
Bureau of Land Management
<table>
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<th>Name</th>
<th>Title</th>
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<tbody>
<tr>
<td>Scott Bailey</td>
<td>Biologist</td>
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<td>505-285-7877 505-285-7876</td>
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<tr>
<td>Jane Green</td>
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<td>Tom Zink</td>
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<td>(402) 221 7385</td>
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<td>Scott Ludwig</td>
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<tr>
<td>Mike Howard</td>
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<td>Marty Tagg</td>
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<tr>
<td>Fred Fisher</td>
<td>Ecologist</td>
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<td>Rich Wareing</td>
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1. Holloman AFB (HAFB) wishes to request a species list and open an informal consultation with U.S. Fish and Wildlife Service (FWS) under Section 7 of the Endangered Species Act. This action is initiated in coordination with the Caballo Resource Area of the Bureau of Land Management-Las Cruces District (BLM) (Atch 1). Several actions by HAFB concerning wastewater facilities, both in the past and in the future, may affect threatened and endangered species. These actions include (1) past practices that led to the designation of the sewage lagoons as hazardous waste management units under the Resource Conservation and Recovery Act (RCRA), (2) closure of the lagoons to resolve violations of RCRA, and (3) construction and operation of a new wastewater treatment plant.

2. Past operation of the seven HAFB sewage lagoons resulted in contamination of groundwater with low levels of benzene hexachloride. Sludge and sediments of the downstream lagoons and the receiving water, Lake Holloman, are contaminated with low levels of benzene hexachloride and other organochlorine pesticides. Several inorganic constituents in the sludge exceed background levels, including arsenic, barium, copper, lead, and zinc. These findings are detailed in "Assessment Monitoring Results: Appendix IX and Confirmation Sampling," April 1992, Radian Corp, and in "Site Characterization Report," August 1992, Radian Corp, which are available from HAFB upon request.

3. Wastewater from HAFB has augmented habitat for migratory waterfowl in natural playas near the southwest corner of the base. Three water bodies provide distinctive habitats for a variety of waterfowl and shore birds (Atch 1). Lagoon G, located on HAFB, and Lake Holloman, located on land administered by BLM, are formed by damming natural playas and are permanently inundated. The overflow from Lake Holloman provides seasonal flow into another natural playa known as Lake Stinky, also located on BLM land. The other six lagoons (A-F) are artificial structures with lined banks, although there is some use by waterfowl.

4. Plans are now under way to replace the lagoons with a modern sewage treatment plant discharging effluent to Lake Holloman and to new evaporation lagoons. The old lagoons are planned to be closed and overflow to Lake Stinky is to be eliminated. The closure of the lagoons is required to resolve RCRA violations. The exact form of the closure (i.e., are the lagoons to be completely abandoned, or, are they not to be used for primary wastewater
treatment) is unknown pending the completion of a feasibility study during 1993 and technical review by NMED during 1994. The elimination of overflow to Lake Stinky is in response to past complaints about odors from the public and from New Mexico Environment Department. There are also concerns about the long-term stability of the non-engineered Lake Holloman Dam which can be partly resolved by lowering the water level of Lake Holloman and eliminating overflow to Lake Stinky. At this writing, the Albuquerque District of the U.S. Army Corps of Engineers (ACE) is working with an Architect Engineering firm to award a contract for design of a new wastewater treatment plant. Obviously, the nature of the treated effluent and the method of its disposal will impact wildlife habitat and possibly endangered species.

5. In summary, the past operation of the HAFB lagoons has created wildlife habitat but may have endangered wildlife through contamination. Future activities may eliminate water and associated wildlife habitat from lagoon G and from Lake Stinky. New lagoons, which will be constructed and possibly lined, will be added. The nutrient content of the wastewater will be reduced, but to what degree is unknown, pending negotiation of a NPDES permit.

6. HAFB believes much of the data necessary to evaluate the effects of (1) past operation of the lagoons, (2) closure of the lagoons, and (3) construction and operation of a new wastewater treatment plant already exists or is currently being collected. FWS sampled waterfowl and other biota for contamination during 1991 and presumably the analyses of these results are nearing completion. The Omaha District of ACE has contracted Radian corporation to sample contamination in lower trophic levels and other biota not sampled by FWS. These results will be reported in May, 1993. BLH and the Mesilla Valley Audubon Society maintain records of species occurrences.

7. HAFB requests FWS provide guidance regarding a Section 7 consultation. Please direct questions to Dr. Fred H. Fisher or Mr. Martyn Tagg at 505 479-5040/3931.

HOWARD E. MOFFIT
Deputy Base Civil Engineer

1 Atch
BLM Coordination Letter

cc: w/Atch

see DISTRIBUTION
On Tuesday 6/29/93 a meeting was held with representatives from the RCRA Permitting Program of New Mexico Environment Department (NMED) to discuss the sewage lagoons and lakes at Holloman Air Force Base (AFB); Attachment 2 is the agenda for the meeting. Radian Corporation made a presentation summarizing the regulatory history of the lagoons, the closure objectives, the studies in progress and upcoming, and the timeline for submissions. During and following the presentation substantial discussion occurred about various aspects of the regulatory status of the lagoons and the options for closure. The important points of the discussion are summarized below.

1. The current regulatory status of the lagoons is very complicated. The lagoons are Hazardous Waste Management Units (HWMUs) based on alleged past disposal of listed wastes, while the lagoons and lakes are Solid Waste Management Units (SWMUs) listed on the Base's HSWA Permit. However, the lagoons lost interim status in 1988. Thus at present the lagoons fall under neither Part 264 nor Part 265. This makes the approach to closure uncertain due to the lack of regulatory guidance for these units.

The possibility of closing the lagoons as SWMUs under Subpart S (Corrective Action) was discussed. In other instances where this has been suggested the State has required that the units be closed in accordance with HWMU requirements.

2. Regulatory authority for the lagoons has changed several times. Initially NMED was responsible for the lagoons, but authority was transferred to EPA. Although both NMED and EPA recognize that regulatory authority for the lagoons has been transferred back to NMED, there is no documentation of this transfer.
3. The Base prefers to pursue closure options that will allow administrative closure of the lagoons as HWMUs but continued operation of the lagoons to receive nonhazardous wastewater. The Base plans to install a new wastewater treatment plant (WWTP) in 1995-1996. The new WWTP will still require substantial water evaporative capacity. Therefore the Base would like to be able to continue to use as many of the existing lagoons as possible.

The U.S. Fish and Wildlife Service (FWS) has expressed a preference for maintaining Pond G and Lake Holloman as year-round water bodies to provide habitat and drinking water for migratory and nesting birds. There is a possibility for a conflict between the desire of FWS to keep these open versus a potential need for physical closure to protect human health expressed by NMED. NMED stated clearly that in the State's RCRA program a danger to human health would supersede possible impacts of habitat loss on wildlife.

4. A Closure Plan was submitted to the State and EPA, revised in response to comments, and resubmitted in 1990. Substantial additional work has been performed since the Closure Plan was submitted, however, and the Base's approach to closure has changed. It is unlikely the Closure Plan in its current form would be found acceptable.

A Post-Closure Care Permit application was submitted in 1991, was declared administratively complete, but technical comments were never received. The application includes the 1990 Closure Plan. Because the Base's approach to closure has changed, this application is no longer entirely appropriate, and should be revised.

5. NMED prefers that clean-up be accomplished by "clean closure". Their definition of "clean closure" is clean-up to levels that are acceptable from a health risk standpoint rather than to background or nondetect. Thus the approach we have been pursuing will likely be acceptable to the State. The technical reviewers prefer to see a "standard" baseline risk assessment, including domestic use of groundwater and standard default exposure assumptions first. If these risks are unacceptable, which is likely to be the case for some of the lagoons and the groundwater, then a site-specific risk assessment can be performed. This should include all contaminated media, and should include preliminary remediation goals for each contaminant in each medium.

6. The Base has discussed with Headquarters, Air Combat Command (HQ ACC) the possibility of renegotiating the Federal Facility Compliance Agreement (FFCA) for Holloman AFB signed by the Base, NMED, and EPA in 1988. Many of the actions required by the FFCA have been accomplished, but since closure of the lagoons has not occurred the FFCA is still shown as incomplete. The Base would like to renegotiate the FFCA to remove the work completed and reduce the outstanding requirements. It may be advantageous to include a schedule for
compliance in the FFCA to facilitate obtaining funding for the required projects. NMED would like to receive a draft of the proposed FFCA as soon as possible to begin reviewing it.

7. NMED agreed to review the regulatory status of the lagoons and to research whether closure should be pursued under Part 264 or Part 265. They will also review the existing Closure Plan and supplementary data in their possession, provided the Base identifies the information to be reviewed. After the State has identified the approach to closure that should be pursued, the Closure Plan should be revised to reflect this approach and resubmitted.

The following action items and schedule were established:

• The Base will send a letter to Ms. Hoditschek including the following:
  - A list of reports/information already in NMED files to be reviewed with the Closure Plan;
  - A list of upcoming submittals and the schedule for their submission; and
  - A request for review of the Closure Plan, the regulatory status of the lagoons, and guidance for the approach to closure.

• The following submittals were requested by NMED for review prior to the determination of closure:
  - The data collected in the 1992-93 field program;
  - The RFI report for the lakes and the Phase II Groundwater Assessment Monitoring Report; and
  - The risk assessments for each pond and lake.

• All submittals should be received by NMED by 1 October 1993 for a determination to be made in late 1993. Although the Base should request that the determination be made by 31 December 1993, the State may need until February 1994 to make the determination.

• A presentation on the results of the risk assessments was requested by NMED to understand the significance of the data.

The following action items for Radian were established following the meeting with NMED.
1. Prepare the letter identifying previous submittals, upcoming submittals and the schedule, and requesting regulatory review. The letter will be reviewed by USACE and Holloman AFB, and will be sent to NMED by the Base.

2. The meeting in Santa Fe scoped for review and discussion of the ACL Petition will be replaced by the meeting to present the risk assessment results.

3. An ACL Petition will not be prepared at this time.

4. The work scoped for the ACL petition will be reviewed in the context of preparing risk assessments as required by NMED (i.e., baseline plus site-specific). A letter will be prepared for USACE indicating whether the ACL Petition budget will be sufficient to cover the out-of-scope work now required in the risk assessments.

5. The Feasibility Study and Decision Document tasks will be delayed until NMED provides guidance on regulation determination.
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<tr>
<th>Name</th>
<th>Organization</th>
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<tr>
<td>Ron Stirling</td>
<td>U.S. Army Corps of Engineers-CEMRO-ED-EA</td>
<td>(402) 221-7664</td>
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<td>Stephanie Stoddard</td>
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<td>Barbara Hoditschek</td>
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<td>Mike Holder</td>
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CONFIRMATION NOTICE NO. 12

TO: U.S. Army Engineer District
ATTN: CEMRO-ED-EA (Ron Stirling)
215 North 17th Street
Omaha, Nebraska 68102

CONTRACTOR: Radian Corporation

CONTRACT NUMBER: DACW45-91-D-0018

DELIVERY ORDER NUMBER: USACE DO #0029

TITLE: Sewage Lagoons and Lakes Investigation

DATE OF THIS REPORT: 7/7/93

SUBJECT: Meeting with U.S. Fish and Wildlife Service

PARTICIPATING PERSONNEL: Clent Bailey, FWS, 505/883-7877
Mark Wilson, FWS, 505/883-7877
Matt Custer, FWS, 505/883-7877
Jane Hixson, Radian, 512/454-4797
Wallace Hise, Radian, 512/454-4797

On Monday, 28 June, representatives of Radian Corporation met with the U.S. Fish and Wildlife Service (FWS) in Albuquerque, NM to discuss the sewage lagoons closure project and requirements for the upcoming Biological Assessment. The meeting is summarized below.

1. The recent FWS biota study was briefly discussed; results are expected to be published in report form within one week.

2. Radian personnel gave a brief overview of the sewage lagoons project and objectives for the ongoing work.

3. Clent Bailey expressed concerns of the FWS regarding future use of the sewage lagoons in the context of a wildlife management program. It is desirable to use as many of the existing lagoons as possible in conjunction with the new wastewater treatment plant.

4. Mark Wilson outlined the three major components of a Biological Assessment as follows:
• A biological diversity index survey for the site in question as compared to a control site. The biological diversity index should include a determination of the species and numbers of organisms present in a comparative study. Things to look for include plants/organisms that are indicative of water quality (e.g., "pollution tolerant" and "pollution intolerant" species). The control site should be one with similar water chemistry; candidates include Lake Lucero and the City of Alamogordo wastewater treatment plant, although neither will be "a perfect match."

• Toxicity studies including pore water and sediment bioassays. The approach should include tests using fish and invertebrates, if possible, and should not be the Microtox test.

• Chemical analyses of organisms in the ecosystem with respect to the food chain (e.g., algae, macroinvertebrates, etc.).

A higher level of testing encompassing histopathological studies is not recommended at this time.

5. A brief discussion of the proposed duckling kill concluded that the use of whole-body homogenates may not provide the maximum information. An alternate approach would be to analyze a breast fillet separately to assess possible exposures to those eating duck meat. The remainder of the duckling would be analyzed as a whole-body homogenate to assess impacts on wildlife eating ducks. The breast fillet results could be recombined with the homogenate results to determine total exposure to predators.

ACTION ITEMS:

• Mark Wilson will provide Radian with a copy of an outline for a Biological Assessment (see Attachment 1, received 7/2/93).

• Holloman AFB/USACE/Radian will provide the FWS a proposal for the duckling sampling and analysis for their review and comment.
SUCCESSFUL ECOLOGICAL ASSESSMENTS IN THE RI/FS PROCESS

OR,

THE CARE AND FEEDING OF NATURAL RESOURCES TRUSTEES

by

Mark Wilson, Contaminant Specialist
U.S. Fish & Wildlife Service

December 3, 1991
A. Who is the Fish & Wildlife Service?

1. CERCLA identifies the Department of the Interior (DOI) as one of several federal Trustees for Natural Resources. The Fish & Wildlife Service (FWS) is an agency within the Department of the Interior. The FWS is the United States Government's principal agency for conserving and managing the nation's wild bird, mammal and fish resources for the enjoyment of people.

2. FWS responsibilities include:
   a. managing the National Wildlife Refuge System
   b. managing National Fish Hatcheries & anadromous fish stocks
   c. enforcement of federal fish and wildlife laws
   d. protecting fish and wildlife habitat
   e. protecting federally-listed threatened & endangered species

   d. + e. = Division of Fish & Wildlife Enhancement = Contaminant Specialists + Section 7 (End. Species Act) Biologists + a cadre of other elite professionals (known principally for their humility)

B. FWS's Role in CERCLA

1. We conduct Preliminary Natural Resource Surveys for EPA to assist in identifying site-related risks to important components of the eco-system.

2. In certain instances, we will conduct natural resource damage assessments.

3. We provide DOI with recommendations regarding whether or not to become a party to a pre-ROD covenant-not-to-sue.

4. We can participate in negotiations with PRP's to assist DOI in seeking monetary compensation or mitigation for damages to natural resources.

5. We will assist you in organizing a biological assessment of site-related threats and impacts to federally-listed threatened and endangered species of fish, wildlife and plants, and "evaluate" your determination of "may affect" or "no affect"!

6. We can provide technical assistance of various sorts to EPA personnel (this is our primary role relative to RI/FS ecological assessments).
GENERIC OUTLINE OF AN ECOLOGICAL INVESTIGATION

Level I - Scan of the area for both ecological risks and Evidence of harm.

Level II - Determine the extent of risks and harm identified in a Level I investigation.

Level I Investigation

A. Risk Measurement Techniques

1. Bioassays - These types of studies indicate whether or not site related releases are potentially toxic, along with the degree of potential toxicity to important biological components of the ecosystem.

2. Tissue Analysis - These studies indicate whether or not contaminants are present in the tissues of environmental receptors. (AC/DC - can be both a measure of risk to higher trophic level consumers, or a measure of damage to individuals with a body burden of contamination).

3. Ecological Site Characterization - An overview of the amount and quality of resources that are potentially at risk on or near the site. This is usually done via literature surveys, cartographic review and on-site inspections.

4. Identification of High-Value Resources - Note the presence of sensitive habitats (e.g., wetlands, wildlife mgmt. areas, spawning grounds) or high-value resources (State fishing lakes, natural areas, etc.).

a. Endangered Species Survey - Literature review and personal contact with federal and state fish and wildlife officials to determine if threatened and/or endangered species or their critical habitats are present near the site.

1. T & E's not present - other risk measures sufficient

2. T & E's "may occur" in site vicinity - Section 7 of ESA requires EPA to prepare a biological assessment

I. Physically survey for presence of T & E's on-site or within the zone of influence.
II. Determine if site releases or remediation measures "may affect" directly, or indirectly (i.e., through habitat modifications or food supply alterations).

III. Submit Biological Assessment to FWS, NOAA and State Fish and Game Management Agency for concurrence.

B. "Evidence of Harm" Survey Techniques

1. Ecological Community Investigations - (biological indices or indicator species studies) These techniques compare the present biological community to a "theoretically pristine" community. These methods may indicate that certain sensitive environmental receptors are absent from the biological community, "possibly as a result of site-related releases". However, since other environmental factors (e.g., climatic extremes) also can result in a decline or disappearance of sensitive species, the data generated by these investigations tend to be ambiguous, unless they are supported by data from bioassays, tissue residue analyses and reliable historical information. (e.g., EPA's Rapid Bioassessment Protocol II) Note that these techniques are best developed for aquatic ecosystems and they generally utilize benthic invertebrates or fish species.

2. Identification of Stressed Environments - Note dead or dying vegetation, fish kills, off-color in streams, the lack of common species of wildlife, or other visual, chemical or biological signs of ecological stress.

Level II Investigation - Initiated when level I studies are inconclusive and high value resources are at risk, or when level I studies have identified a serious ecological problem.

A. Necropsy/Histopathological/Oncological Analysis - These types of studies indicate whether or not toxic substances that may be emanating from the site are actually causing deleterious effects in environmental receptors and describe the nature of the effects. Competent veterinary toxicology and histopathology labs, are capable of conducting examinations of the
other organs and systems of small mammal and fish samples collected in the affected area. The information provided by this type of testing indicates whether or not site-related mutagenic, oncogenic, teratogenic and/or other lethal and sublethal impacts are occurring in food chain organisms.

B. Map the Extent of the Ecological Contamination

C. Develop a Plan to Remediate the Ecosystem - Work with federal and state natural resources officials to design a suitable method for remediating the ecosystem.

SUMMARY

The preceding information is a general set of principles for eco-assessments. Your site may require more or less effort. Your best bet for a successful eco-assessment is to make certain it covers all of the areas of concern to your natural resources trustees. The way to achieve this is to make certain you involve federal and state natural resources trustees in the RI/FS process in the following ways:
FORMULA FOR A SUCCESSFUL RI/FS WORK PLAN ECO-ASSESSMENT
(key ingredient: communication)

1. **Tour the Site Together** - (state & federal trustees, EPA personnel, contractors, PRP’s, etc.)

2. **Involve the Trustees**
   
a. Hold meetings so that your RI/FS contractors can communicate with the natural resources trustees when designing the RI/FS work plan.

b. Make certain the natural resources trustees review and comment on the RI/FS work plan, particularly the eco-assessment.

3. **Comply With Section 7 ESA Requirements**
   
a. Determine if threatened & endangered species are present.

b. Prepare an adequate biological assessment (if necessary).

4. **Involve Trustees in Remedial Alternative Development**

   Ensure that the remedial alternatives protect the environment as well as human health. *(The selection of a remedial alternative that adequately protects ecologically important components of the environment is "your ticket" to a pre-ROD covenant-not-to-sue from DOI).*
Gordon J Ewing
Conservation Committee
Mesilla Valley Audubon Society
PO Box 3127 UF B
Las Cruces, NM 88001

16 August 1993

Jennifer Fowler-Propst
US Fish and Wildlife Service
Ecological Services
Suite D, 5330 Pan American HWY NE
Albuquerque, NM 87107

Dear Ms Fowler-Propst

The Mesilla Valley Audubon Society has a long-standing
interest in Holloman Lake and Lake Stinky. These lakes along
with the upper lagoons form the most important wetlands in
Southern New Mexico, from the standpoint of bird habitat. We
are very interested in the preservation of these wetlands.

While it seems a little strange to defend sewage ponds, I
would like to make a special plea for the preservation of
Lake Stinky. Holloman AFB, in their letter to you, dated 30 April 1993, stated that "overflow to Lake
Stinky is to be eliminated." There are at least two reasons
for preserving this playa. 1. It is the best (nearly the
only) shorebird habitat in the complex, and 2. It currently
functions to keep the salt content of Holloman Lake from
getting any higher than it now is. I would like to comment
on each of these two points.

1. Holloman Lake has relatively steep banks except for the
extreme north end. This means that when it is full it has
very little shorebird habitat. Mud flats and shallow water
can be found only at the north end. Currently, Holloman
Lake is about one meter below the spillway, and this has
temporarily exposed a lot of good shorebird habitat (the most
I have ever seen). This, however, is very dependent on
fluctuating water levels. Already vegetation is moving down
into the exposed mud. If the level of Lake Holloman were
held at the current level for a couple of years, salt cedar
and salt grass that grows around the lake would migrate to
the new water level and eliminate most of this new shorebird
habitat. On the other hand, Lake Stinky in a typical playa
fashion, is frequently flooded and just as frequently nearly
dry. During a typical year, all of the surface area of the
playa is good shorebird habitat and the fluctuating water
level and salt keeps the vegetation from eliminating the mud
flats. Snowy Plovers, Avocets, Black-necked Stilts and
Killdeers all nest around Lake Stinky. The best way to
insure good shorebird habitat is to keep Lake Stinky as an
active playa. This can be done by having evaporative ponds
with the right surface area so that Lake Holloman overflows in times of high run-off and in times of low evaporation. Those with sensitive noses can hold their breath while driving by.

2. Lake Holloman is intermediate between fresh water and ocean water in salinity. If evaporation lagoons with sufficient surface area are built above Lake Holloman, then overflow into Lake Stinky might be nearly eliminated. This would make Holloman Lake the end of the line for the system and salt would build up in the lake radically changing the nature of the lake. At current salinity levels, the organism that can survive are limited. To maintain the diversity of life at Holloman Lake, its salinity should not be increased. A change in the environment is generally bad for what is already there.

A modern sewage treatment plant would likely be beneficial to the area. Holloman Lake has nutrient levels that are generally too high. Lowering these nutrients would lessen the tendency toward eutrophic conditions, increasing the likelihood of fish surviving in the lake (provided salt buildup is controlled) which would favor carnivorous birds. Most of the lake is so productive now that sunlight does not reach the bottom. Significant photosynthesis is now only possible in a small fraction of the water of the lake (the upper foot or two) and bottom plants cannot grow because the bottom of the lake is almost all in darkness. A sewage disposal system that removes most of the nutrients would increase the variety of life at the lake, but enough nutrients should reach the lake so that productivity is optimized. Dabbling ducks would (and currently do) profit from extensive plant growth. Limnologists and hydrologists should be consulted when the sewage treatment plant is designed to optimize the productivity of this unique area in Southern New Mexico.

The Mesilla Valley Audubon Society will be happy to help in any projects that we feel will improve the Lake Holloman area for wildlife habitat.

Sincerely,

Gordon J. Ewing
Mesilla Valley Audubon Society
Conservation Committee

cc:

Tom Wootten
MVAS Conservation Chairman
Scott Ludwig  
Bureau of Land Management  
1800 Marquess  
Las Cruces NM 88005

Howard E Moffitt  
49 CES/CEV  
550 Tabosa Ave  
Holloman AFB, NM 88330-8458

Sartor O Williams, III  
Department of Game and Fish  
Villagrasa Building  
PO Box 25112  
Santa Fe, NM 87504
FROM: 49 CES/CD
550 Tabosa Ave
Holloman AFB, NM 88330-8458

SUBJ: Land Transfer of Lake Holloman from Department of Interior to Department of the Air Force

TO: Mesilla Valley Audubon Society
Conservation Committee
Attn: Dr Gordon Ewing
P.O. Box 3127 UPB
Las Cruces, NM 88001

1. As a result of your past interest in Lakes Holloman and Stinky, we are notifying you of the pending transfer of land from the Department of Interior, Bureau of Land Management (BLM) to the Department of the Air Force. This action is required for Holloman AFB (HAFB) to construct a new wastewater plant partially located on this land. All land receiving wastewater from the new plant will be transferred, including all Department of Interior land north of Highway 70 and land south of the highway including Lake Stinky. The Air Force plans to allow public access to Lakes Holloman and Stinky.

2. We thank you for your comments regarding effluent management from the new plant. Based largely upon this, the effluent disposal plan has been altered to include seasonal overflow from Lake Holloman to Lake Stinky.

3. Construction of the new wastewater plant is dependent upon completion of this land transfer. We hope the Audubon Society will support this action as it will significantly improve environmental quality. Rest assured HAFB, as well as BLM, must comply with all federal and state environmental regulations. The new plant will be operated under a National Pollution Discharge Elimination System (NPDES) permit, which defines the quality of the effluent and requires regular effluent sampling and reporting of results to the United States Environmental Protection Agency. In contrast, the current antiquated lagoon system is incapable of meeting NPDES standards and is discharging effluent with excessive organic matter contributing to the eutrophic conditions in Lake Holloman.

4. We appreciate the interest of the Audubon Society in the valuable wildlife habitat of Lakes Holloman and Stinky. HAFB strongly supports the preservation of this habitat and hopes to work with the Audubon Society to accomplish this.

5. Please direct any questions to Dr Fred Fisher or Mr Tim O'Donnell of the HAFB Environmental Flight at 475-3931, or Mr Scott Ludwig of BLM at 525-4361.

SIGNED
HOWARD E. MOFFITT
Deputy Base Civil Engineer

cc: Mr Scott Ludwig
Department of Interior

Mr Clint Bailey
Fish and Wildlife Service

E-235

[Redacted text]
FROM: 49 SPTG/CC  
490 First Street, Suite 2650  
Holloman AFB, New Mexico  88330-8277  

SUBJ: HAFB Sewage Lagoons and Lakes Investigations/Wildlife Management Assistance  

TO: Mesilla Valley Audubon Society  
Conservation Committee  
Attn: Dr Gordon J. Ewing  
P.O. Box 3127 HPB  
Las Cruces, New Mexico 88001  

1. Permission is granted to Dr Gordon J. Ewing of the Mesilla Valley Audubon Society to intermittently access the Holloman AFB sewage lagoons over a period of two (2) years beginning with the date of this clearance letter. Dr Ewing will provide volunteer assistance to the 49th Civil Engineering Squadron Environmental Flight with wildlife management of the sewage lagoons and lakes.  

2. Dr Ewing is allowed travel through the base via the main entrance or the west entrance to the sewage lagoons. He may also enter Lagoon C from Bureau of Land Management land directly west of the base.  

3. Please direct questions to Mr Tim O'Donnell, Dr Fred Fisher, or the Environmental Flight, 49 CES/CEV, at 475-3931.  

MICHAEL D. ANTHONY, Col, USAF  
Commander, 49th Support Group  
cc: 49 SPS/CC
SUBJ: Minutes of the Holloman Air Force Base Sewage Lagoon and Waste Water Treatment Plant Meeting 4 Nov 93

1. Meeting attendance: LtCol Anderson ACC/JAV (804) 764-3532
   Mr Gil Burnet ACC/CEVC (804) 764-6196
   Mr James Parker ACC/ESOU (804) 591-4334
   Mr Bob Tuck ACC/ESEW (804) 591-4318
   Dr Fred Fisher 49CES/CEV (505) 475-3931
   Ms Sharon Moore ACC/CEVP (804) 764-2016
   Mr Brent Johnson ACC/CEVC (804) 764-4430
   Ms Sheryl Parker ACC/CEVA (804) 764-7844
   Mr Wally Hise Radian Corp (801) 261-2187
   Ms Kathleen Alsup Radian Corp (512) 424-4797
   Mr Larry Isaacs ACC/CEVC (804) 764-3553

2. Purpose: The purpose of this meeting was to conduct a program review of the Holloman sewage lagoon closure and review the new waste water treatment plant project, evaluate the progress of each against established milestones, identify shortfalls and identify solution strategies as needed, and plan for partnering with regulators to ensure an economically and environmentally acceptable solution is achieved for the Air Force. Additionally, determine if it is practicable to re-open the federal facility compliance agreement to have the open enforcement action removed.

3. Mr Isaacs opened the meeting by introducing the objectives of the meeting outlined above.

4. Dr Fisher provided an overview of the sewage lagoons. Mr Jim Parker and Mr Bob Tuck provided an overview of the design of the WWTP, and finally Mr Wally Hise outlined the current status of the closure plan and post closure care permit.
Meeting Minutes of the Holloman AFB Sewage Lagoon and Waste Water Treatment Plant 4 Nov 93

5. The following is a list of key action items.
   a. Confirm with the state of New Mexico on the de-chlorinating requirement. We need to be sure this proposed law change is applicable to the new WWTP project. (ACTION: Mr Fisher)

   b. Contact AFCEE and the COE. Review the current status of the NPDES permit application. Develop a time line to complete the NPDES permit process to ensure construction of the new WWTP is not delayed. (ACTION: Mr Isaacs)

   c. Determine the current status of the Bureau of Land Management (BLM) land transfer time line. (ACTION: Mr Isaacs)

   d. Confirm the water bowl samples/study/analysis is available from the US Fish and Wildlife Service to complete the biological assessment. POC at HQ ACC is Mr Roy Barker. (ACTION: Mr Isaacs)

   e. We need to submit a formal letter to Region 6 on the Federal Facility Compliance Agreement advising them item #9, requiring the installation of ground water monitoring wells, has been completed and "we deem to be closed." (ACTION: Mr Fisher)

   f. The delivery order through COE to Radian Corporation needs to be reworked for the closure plan and PCCP. (ACTION: Mr Fisher)

   g. We need a recommended most economical practicable solution to the sewage lagoon closure issue. The sampling strategy, for example, needs to be reworked. This is already included and awarded to Radian via the existing contract. (ACTION: Mr Hise)

   h. BLM requires the biological assessment to be completed to demonstrate there are not adverse impacts. The data was collected by USFWS and needs to be passed to the contractor (item d. above). This work is being negotiated. The report needs to be done. (ACTION: Mr Hise)

   i. An agenda and objectives lists needs to be prepared for the December 1993 meeting with the state of New Mexico. (ACTION: Mr Fisher)

   j. A state permit to construct and operate needs to be obtained for the WWTP. A ground water protection plan must be also prepared for the state (state discharge permit). The design agent should prepare these. (ACTION: Mr Bob Tuck)

   k. There is still the potential for a RCRA violation with the WWTP plant design. The Clean Water Act allows discharges to waters of the U.S. via a NPDES permit. If discharges are sent to anything other than a water of the U.S. (like a golf course) than the discharge is regulated under RCRA. Regulation under RCRA is unacceptable and threatens to invalidate the purpose of constructing a the new WWTP. (ACTION: Mr Isaacs)
Meeting Minutes of the Holloman AFB Sewage Lagoon and Waste Water Treatment Plant 4 Nov 93

6. A follow-up meeting has been set up for 22 Nov at 0900 hrs in the ACC/CEV technical library to discuss the RCRA and CWA issues. This meeting will be for Air Force personnel only. The purpose of this meeting will be two-fold. First, to flow diagram all the components of the Holloman sewage lagoon closure and construction of the new WWTP, and second, to evaluate how to construct or modify all command waste water treatment systems to comply with CWA requirements in lieu of RCRA. Completion of these two actions will then enable us to manage all major components of the Holloman AFB closure/construction project and identify a course of action for all existing ACC waste water treatment systems.

LARRY K. ISAACS, PE, REM
Base Liaison
Holloman AFB

Archs
1. Block diagram of new WWTP
2. Location site plan
3. Existing lagoon layout
FROM: 49 CES/CEV
550 Tabosa Ave
Holloman AFB, NM 88330-8458

TO: US Environmental Protection Agency
Region VI, 6H-CS
Attn: Mr Lowell Seaton
First Interstate Bank Tower
1445 Ross Avenue
Dallas, TX 75202-2733

SUBJ: Lakes Holloman and Stinky RCRA Facility Investigation Report

1. A draft of Phase 2 Resource Conservation and Recovery Act (RCRA) Facility Investigation Report for Lakes Holloman and Stinky is attached. Please review and provide comments. We will contact you regarding the meeting in Dallas to discuss the results.

2. We would also like to inquire regarding the review status of the following documents:
   a. Preliminary Assessment/Site Investigation of Four Waste Sites
   b. Table 1 Phase 2 RCRA Facility Investigation Work Plan
   c. Permit Modification of Table 1 Solid Waste Management Units.

   We would appreciate receiving your comments as soon as possible so we can proceed with investigation, clean-up and closure. Funding is presently available for these activities and we would like to use this opportunity to continue our efforts in improving the Holloman AFB environment.

3. Please direct questions to Mr Warren Neff or Mr Tim O'Donnell at (505) 475-3931.

   HOWARD E. MOFFETT
   Deputy Base Civil Engineer

   Atch
   Lakes RFI Report

   cc: (see attached list)
cc: w/ Atch

Mr David Morgan  
NM Environment Department  
Ground Water Protection & Remediation  
1190 St Francis Dr  
Santa Fe, NM 87503

Mr Scott Ludwig  
Bureau of Land Management  
Las Cruces District Bureau  
1800 Marquess  
Las Cruces, NM 88005

cc: w/o Atch

Mr Barry Feldman  
US EPA, Region VI, 6H-CS  
First Interstate Bank Tower  
1445 Ross Avenue  
Dallas, TX 75202-2733

Mr Larry Isaacs  
HQ ACC/CEVCM  
129 Andrews St, Suite 102  
Langley AFB, VA 23665-2769

Mr Steve Alexander  
NM Environment Department  
Hazardous and Radioactive Materials  
525 Camino de los Marquez  
Santa Fe, NM 87502-6610

Mr Brent Johnson  
HQ ACC/CEVCM

Ms Stephanie Cruse  
NM Environment Department  
Hazardous & Radioactive Materials Bureau  
525 Camino de Los Marquez  
Santa Fe, NM 87502-6610

Mr Don Calder  
HQ ACC/CEVRC

Mr Mark Blakeslee  
Bureau of Land Management  
P.O. Box 27115  
Santa Fe, NM 87502

Mr Ron Stirling  
U.S. Army Corps of Engineers  
Omaha District/CEMRO-ED-EA  
215 N. 17th Street  
Omaha, NE 68102-4978

Ms Kathleen Alsup  
Radian Corp  
8501 Mo-Pac Blvd.  
Austin, TX 78720-1088

Mr Clent Bailey  
Fish and Wildlife Service  
3530 Pan American Highway NE  
Albuquerque, NM 87107

Mr Tom Manning  
AFCEE/CCR-D  
525 Griffin St, P.O. Box 116,  
Dallas, TX 75202

Ms Kathleen Alsup

Mr Charles MacDonald  
49 FW/IA
A meeting was held at the offices of NMED to present the results of the recent field investigations and the risk assessments for the lagoons and Lakes Holloman and Stinky. The agenda for the meeting is presented in Attachment 2. Following is a summary of the key points made in the presentation and the associated technical discussions.

1. Fred Fisher started the meeting with a summary of its purpose and the topics to be discussed. Kathleen Alsup then presented a brief review of the regulatory history of the lagoons. The most important current issue is the loss of interim status and resulting uncertainty about the regulatory framework for closure.

2. Tom Holcomb presented the results of the Phase II Groundwater Assessment Monitoring for the lagoons and the Phase II RCRA Facility Investigation (RFI) for the lakes. The contaminants of concern in groundwater have been clearly identified as Method 8080 (organochlorine) pesticides and possibly some metals. Steve Alexander of NMED had a number of questions, including the source of contaminants (most likely the sludge, which was contaminated by improper disposal as well as aerial spraying for mosquito control); the values used as action levels (MCLs or RCRA Action Levels); the need to define specifically the wells that should be considered upgradient, as opposed to background, for the lagoons well network; and the need to track the movement of contaminants.
Mr. Alexander also brought up uncertainties about the mechanism under which long-term monitoring will be done (under a post-closure care permit rather than an operating permit); NMED is the lead agency for the lagoons, while EPA is the lead agency for the lakes RFI. NMED anticipates some involvement with EPA, in evaluating the RFI for the lakes, even though the State is not the lead agency.

Steve Pullen expressed a concern about the vertical extent of contamination. He may prefer to include the deep piezometers in the well network. The proposed long-term monitoring plan should emphasize that the lower transmissive zones are protected by clay layers; this may alleviate Mr. Pullen's concern.

Lucy Fraiser summarized the results of the ecological and human health risk assessments. Mark Wilson indicated that reproductive capacity and/or histopathologic studies on fish would clarify the potential for adverse impacts of contaminants present in the lagoons and lakes. Mr. Alexander indicated that future land use is an unknown that drives the need for a "baseline" (future on-site residential development) scenario. The State might accept a baseline scenario with no use of groundwater for domestic purposes (the aquifer is considered nonpotable) as appropriate; however the site-specific assessments included in the current report may not be acceptable because of the future land use question.

Tim Sanders asked whether the ecological risk assessment for mallards at Lake Stinky took into account the fact that the lake is dry most of the year; this was not considered.

It was pointed out that Subpart S of RCRA allows for "interim measures" for a period as long as the owner/operator has the land, with reassessment of risks when (if) the land is sold for another purpose; however Mr. Alexander indicated the State is not authorized for Corrective Action. It was further noted that federal property (such as an Air Force Base) must be assessed under CERCLA prior to transferred to another owner. Mr. Alexander indicated the State may look to EPA for assistance in understanding what scenario is appropriate for assessment.

Dr. Fisher concluded the presentation by reiterating some of the uncertainties associated with the analytical results for organic lead in surface water and for heptachlor epoxide in sludge/soil, and the impacts of these uncertainties on the risk assessment results.

Jane Hixson presented the results of the statistical modeling and a summary of the accomplishments of the 1992-1993 investigations.
Barbara Hoditschek joined the meeting for the presentation of future activities (made by Wally Hise) and the general discussion. During discussion of the Biological Assessment, Tim Sanders expressed interest in evaluation of the effects of varying water levels in Lake Holloman on the habitat. Dr. Fisher indicated that public access to the lakes will be continued after the federal land transfer.

Following the technical presentation a general discussion of regulatory issues and schedule occurred. Ms. Hoditschek is concerned about the schedule because of the current workload and other commitments for her staff. She requested 2-3 quarters to review the Closure Plan and Post-Closure Care Permit application. NMED will want to review the Treatability Study workplan in detail, as well as the Corrective Measures Studies workplan. Ms. Hoditschek requested that she be notified approximately one month prior to submittal of any document for NMED review. She also requested that a schedule of future activities be provided to her as soon as possible to support her request to upper management for additions to staff.

Ms. Hoditschek agreed to provide a decision on the regulatory status of the lagoons by April of 1994. She has not located in her files all of the reports listed in the 29 July letter from Howard Moffitt. She will provide a copy of the letter indicating the missing information so that the Base can provide additional copies. Ms. Hoditschek agreed that conceptual plans are a useful tool to communicate strategies and approaches provided they are clear and concise, and include sufficient information to minimize "back and forth" requests for clarification. She also requested that some documents be sent in electronic format on a disk; clarification will be requested as to what types of documents should be sent this way.

Ms. Hoditschek was informed that a Conceptual Plan will be sent to her in early January describing the upcoming sampling event, the rationale for the samples to be collected, the analyses to be performed, and the anticipated uses of the data. It was agreed that the schedule would be updated and included with the submittal.
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<tr>
<th>Name</th>
<th>Organization</th>
<th>Telephone No.</th>
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<tbody>
<tr>
<td>Kathleen Alsup</td>
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<td>Clent Bailey</td>
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<td>Fred Fisher</td>
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<td>Barbara Hoditschek</td>
<td>NMED</td>
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HOLLOMAN AFB
MEETING AGENDA
SANTA FE, NM

SEWAGE LAGOONS AND LAKES INVESTIGATION
14 DECEMBER 1993
8:00 am - 4:00 pm

1. Background
   Kathleen Alsup

2. Phase 1 Groundwater Assessment Monitoring
   Tom Holcomb

3. Phase 2 RCRA Facility Investigation
   Lakes Holloman and Stinky
   Tom Holcomb

   --BREAK--

4. Risk Assessment Overview
   Jane Hixson

5. Ecological Risk Assessment
   Lucy Fraiser

   --LUNCH BREAK--

6. Human Health Risk Assessment
   Lucy Fraiser

7. Statistical Modeling
   Jane Hixson

8. Summary
   Jane Hixson

9. Future Activities
   Wally Hise
Mr. Frederick M. Fisher, Ph.D.
United States Air Force
49 CES/CEV
Holloman AFB, New Mexico 88330-5000

Dear Mr. Fisher:

We have completed the final draft of the Fish and Wildlife Service's survey report on contaminants in biota, pore water and sediment at the Holloman AFB waste water treatment system. Please review this report and provide us with your comments by February 15, 1994. If you have any questions, contact Mark Wilson of this office at (505) 883-7877. Thank you for your patience in awaiting the completion of this report.

Sincerely,

[Signature]

Jennifer Fowler-Propst
State Supervisor
MEMORANDUM FOR New Mexico Environment Department
Hazardous and Radioactive Materials Bureau
Attn: Ms Barbara Hoditschek, Program Manager Permitting
525 Camino de Los Marquez
Santa Fe, NM 87502-6610

FROM: 49 CES/CEV
550 Tabosa Ave
Holloman AFB, New Mexico 88330-8458

SUBJECT: Review of Closure Plan/Post-Closure Care Permit Application—
Holloman Sewage Lagoons and Lakes Investigation

1. This is to request that the existing Closure Plan/Post-Closure Care Permit Application for the Holloman Sewage Lagoons and Lakes Investigation not be reviewed at this time. Investigative results from FY 1993 indicate additional data is needed to determine the extent of contamination in the lower lagoons. Information pertaining to scheduling will be forthcoming.

2. For further information, please contact Dr Fred Fisher or Mr Tim O'Donnell at 475-3931.

[Signature]
HOWARD E. HOPPITT
Deputy Base Civil Engineer

cc: Mr Barry Feldman
US EPA, Region VI, (6H-CS)
First Interstate Bank Tower
1445 Rose Ave
Dallas, TX 75202-2733

Mr Ron Stirling
US Army Corps of Engineers
Omaha District/CEMRG-ED-EA
215 N. 17th St
Omaha, NE 68102-4978

Ms Kathleen Alsup
Radian Corp
8501 Mo-Pac Blvd
Austin, TX 78720-1088
A conference call was held with representatives from NMED, Holloman AFB, USACE and Radian to discuss the sewage lagoons and lakes closure project at Holloman AFB. Agenda items included resolution of the regulatory status, closure concerns, and project schedule. Pertinent issues discussed and action items are listed below.

1. **Regulatory Status of the Sewage Lagoons and Lakes**

Stephanie Kruse: The lagoons have lost interim status and, therefore, will require closure/post-closure plans to be prepared under Part 264. Lakes Holloman and Stinky and the ditch are HSWA units under EPA Region VI authority; NMED will request that EPA "release" the ditch and lakes to their (state) authority. NMED is considering classifying the sewage lagoons, ditch, and lakes as one "regulated unit". This would require that the entire system ("regulated unit") be closed under 40 CFR Part 264.
Until now, the lagoons were considered RCRA regulated units being closed in accordance with provisions of the Federal Facilities Compliance Agreement (FFCA). The ditch and lakes were considered solid waste management units (SWMUs) being investigated under the HSWA portion of Holloman AFB's RCRA permit.

Fred Fisher: There could be some problems classifying the lakes as HWMUs since they are also waters of the U.S. and an ecological habitat for wildlife and endangered species. If clean closure cannot be met under 40 CFR Part 264, the lakes would have to be closed by backfilling and capping. This would conflict with the intended use of the lakes by the Fish and Wildlife Service (FWS). Fred would like the lakes to stay under HSWA to allow more flexibility in closure.

Stephanie Kruse: Regulatory compliance does not always let you "take the easiest option," and the final judgement of the regulatory status of the lakes ultimately lies with NMED. Steve Alexander stated that the reason for NMED considering the lakes as part of the "regulated unit" was that if listed waste was introduced to the wastewater treatment system, then the downstream lagoons and lakes also received hazardous waste since they are all hydraulically connected. Additionally, the interpretation of "regulated unit" is dependent of the date of last receipt of hazardous waste.

The definition of "closure" was briefly discussed; closure can be of the administrative form which would not require taking the impoundments out of service. Regarding closure of the lakes, Steve thinks that there may be some exceptions to capping if clean closure cannot be achieved under 40 CFR Part 264.

NMED agreed to discuss the lakes issue with the EPA (Barry Feldman, Lowell Seaton) and consider their input prior to making a final determination on regulatory status.

### 2. Closure Approach (conceptual)

Barbara Hoditschek: What is Holloman's proposed approach to closure? Holloman has stated their intention to remediate Ponds A and B, but what are the plans for the remaining lagoons and lakes.

Fred Fisher: Ponds A through F will be backfilled. The Base is awaiting a determination from the Corps of Engineers to decide if Pond G is considered a wetland. If it is, the Base would prefer to leave Pond G open to contain nonhazardous water. The ditch will remain open since it is part of the Base's storm water management system. The lakes are intended to remain open as part of the new NPDES-regulated wastewater treatment plant. "Hot spot" removal will be performed as necessary to achieve health-
based cleanup levels.

Groundwater monitoring will continue during the "interim closure period." Holloman will submit a proposal for the return to detection monitoring. The monitoring network, sampling frequency, and analytical parameters will be detailed in the forthcoming Groundwater Monitoring Plan.

3. Appendix IX Analyses

Wally Hise: The requirement for testing for Appendix VIII constituents versus Appendix IX constituents for demonstration of clean closure should be re-visited. The regulations indicate Appendix VIII constituents are required for soil and sludges. However, during discussions in previous years (1991) with NMED's technical personnel (e.g., Dr. Bruce Swanton) Appendix IX constituents were agreed upon. This was based on the fact that there are no analytical methods available for several of the Appendix VIII constituents.

It was noted that the "Conceptual Plan for Additional Sampling" submitted to NMED in January 1994 had further narrowed down the list of constituents to organochlorine pesticides and some metals for the next investigation. This is based on the findings of the previous investigations that did not identify any other chemicals of concern. If Holloman now has to go back and look at all Appendix VIII constituents, they would essentially be starting the investigation all over again.

Steve Alexander agreed to research this issue further with the NMED permits group and get back to Holloman with an answer. He pointed out that the rationale for using Appendix IX analyses could also include the "knowledge of process" argument.

4. Cleanup Levels (Use of Health-Based Levels for Clean Closure)

Steve Alexander: The proposed approach to using health-based levels vs. detection limits for listed constituents is similar to that used for another site in New Mexico; EPA concurred with the approach in that instance. The Subpart S corrective action tables have been used as a screen for preparing risk assessments at other sites. Since the action levels in Subpart S are very conservative, if these levels are not exceeded then no further assessment would be required. However, the baseline risk assessment approach which is being used for the sewage lagoons and lakes is more defensible and is probably the better approach for Holloman since the groundwater in the vicinity of Holloman AFB is not potable.
5. **Treatment Alternatives**

Kathleen Alsup: What is the practicality of using on-site *ex situ* treatment of the sludges removed from the lagoons and lakes? Would the sludges be considered hazardous waste since listed hazardous waste had been introduced into the system several years ago? It was noted that no hazardous constituents associated with those listed wastes identified to be introduced to the system have ever been detected in the sludges. If the sludges are considered hazardous waste, will the *ex situ* treatment approach have to be permitted under RCRA?

NMED does not know the answer to this and requested that a letter with supportive information be sent to NMED requesting a determination be made.

6. **Project Schedule**

Barbara Hoditschek: The final project schedule should be submitted for the State's planning purposes. A draft project schedule was provided prior to the conference call. NMED should be notified by September 1994 if submittal of the closure plan and post-closure care permit application will be delayed past August and September 1995.

Several other documents/reports will be submitted to NMED for review prior to the closure plan and post-closure care permit application. These include: Groundwater Monitoring Plan, Project Assessment Report, Chemical Data Acquisition Plan, Biological Assessment, Revised Risk Assessment, Site Characterization Report, Treatability Study Work Plan, and Corrective Measures Plan. NMED requested a list of these documents/reports along with an estimated submittal date for each.

7. **Future Calls**

A monthly conference call should be set up to continue the open lines of communication. The next conference call was set for Tuesday, 22 March 1994 at 10:00 AM Mountain Standard Time/11:00 AM Central Standard Time. Radian will set up the call.

8. **Documentation**

A confirmation notice will be prepared and submitted to all participating parties for each conference call. Radian will be responsible for this.
ACTION ITEMS

- Steve Alexander to check with NMED permits section on the use of analyzing for Appendix IX constituents in the sludge/soils instead of Appendix VIII for demonstration of clean closure.

- Steve Alexander to determine point of compliance for applying health-based levels to demonstrate clean closure.

- NMED to convene with EPA Region VI for a final determination of the regulatory status.

- Radian/Holloman to prepare a letter requesting a determination be made regarding the classification of the sludge in the lagoons for \textit{ex situ} treatment on-site. The letter will present information to support NMED's decision.

- Radian/Holloman to provide NMED with a list of documents and deliverable dates that will require NMED's review and comments.

- Radian/Holloman to provide a Timeline schedule of the project to NMED.
MEMORANDUM FOR New Mexico Environment Department (NMED)
Hazardous and Radioactive Materials Bureau
RCRA Permits Program
Attn: Ms Barbara Hoditschek, Program Manager
525 Camino de Los Marquez
Santa Fe, NM 87502-6610

FROM: 49 CES/CD
550 Tabosa Ave
Holloman AFB, NM 88001-6458

SUBJECT: Regulatory Status and Investigation Schedule of Holloman AFB (HAFB) Lagoons (ref 22 Feb 94 conf call)

1. As discussed in the referenced conference call between NMED, Omaha Corps of Engineers, Radian Corp, and HAFB, it is necessary to determine if the sludge in the HAFB lagoons is considered a listed hazardous waste or if it is considered hazardous only if it possesses one or more hazardous characteristics (toxic, corrosive, reactive, and ignitable). HAFB believes the sludge is not a listed hazardous waste and would like your concurrence before researching remedial alternatives. Supporting documentation is found in the Project Assessment Report (Radian Corp, August 1990) and is summarized below.

2. A February 1987 Notice of Noncompliance alleged the following listed wastes may have entered the lagoons prior to August 1984: F001 (halogenated degreasing solvents), F003 (non-halogenated solvents), U228 (trichloroethene), U161 (methyl isobutyl ketone), U227 (1,1,2-trichloroethane), U188 (phenol), U154 (methanol), U002 (acetone), U122 (formaldehyde), U165 (naphthalene), U220 (toluene), U239 (xylene), U003 (acetonitrile), U233 (?), P095 (phosgene), P012 (arsenic trioxide), and P106 (sodium cyanide). The estimated quantities suspected to have been discharged (Atch 1) are very small compared to the volume of wastewater processed (1.2 million gallons per day), and are considerably less than de minimis losses of hazardous constituents allowed under 40 CFR 261.3(a)(2)(iv)(A), (B) and (D). Extensive investigation of surface water, sludge, and underlying soils in the lagoons has, in most cases, failed to detect the above listed wastes. Of those detected, the amounts found were well below levels of concern. These investigations did identify other contaminants of concern, including polychlorinated biphenyls (PCBs), organochlorine pesticides, and metals.

3. Several alternatives to closure are being evaluated, including both in situ and ex situ treatment. The regulatory status of the sludge will determine the treatment technologies required to meet land disposal treatment standards for sludge treated ex situ and returned to the lagoons or disposed of off site.

4. As requested during the referenced conference call, a list of submittals with estimated dates (Atch 2) and a revised project schedule (Atch 3) are provided. Note the final revision of the Post Closure Care Permit (PCCP) is not scheduled for submission until July 1996. This reflects our discussion that the PCCP be as detailed and accurate as possible. The July 1996 submittal date allows the PCCP to include final results of the treatability and
corrective measures studies. Also, note that some activities depend upon the status of the new wastewater treatment plant, which has experienced some delays.

5. Please direct questions to Dr Fred Fisher or Mr Tim O'Donnell of the Environmental Flight at 475-3931.

Attachments:
1. Estimated Discharge to Sewage Lagoons
2. Submittals with Estimated Dates
3. Revised Project Schedule

cc: w/Atchs

Mr Larry Isaacs
HQ ACC/CEVC

Ms Kathleen Alsup
Radian Corp
8501 Mo-Pac Blvd.
Austin, TX 78729-1008

Mr Barry Feldman
US Environmental Protection Agency, Region VI, 6H-CS
First Interstate Bank Tower
1445 Ross Avenue
Dallas, TX 75202-2733

Mr Ron Stirling
U.S. Army Corp of Engineers
Omaha District/CEMRO-ED-EA
215 N. 17th Street
Omaha, NE 68102-4978
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<td>Trichloroethane</td>
<td>15 gal</td>
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### Holloman AFB Lagoons and Lakes Project

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*Printed: 03/24/94*
April 6, 1994

49 CES/CEV
550 Tabosa Avenue
Holloman Air Force Base, New Mexico 88330-8458
ATTN: Mr. Howard E. Moffitt
Deputy Base Civil Engineer

Dear Mr. Moffitt:

Holloman Air Force Base has asked for a determination of the regulatory status of the Holloman sewage lagoons and lakes. This issue was also discussed in a conference call with personnel from Holloman, the US Army Corps of Engineers, and Radian on February 22, 1994. It was agreed that these units have lost interim status under RCRA.

We have discussed the matter of regulatory authority with the US Environmental Protection Agency (EPA). As a result of this discussion, it is agreed 1) that Lake Holloman, Lake Stinky, and the ditch to Lake Holloman are HSWA units and will remain under the authority of EPA, and 2) the seven sewage lagoons are RCRA regulated units and will be closed under the authority of the State of New Mexico in accordance with the New Mexico Hazardous Waste Management Regulations (HWMR-7), Part V, 40 CFR 264.

A copy of EPA's letter to this Department confirming this interpretation of regulatory status is enclosed for your files.

Please call Stephanie Kruza of my staff at 505/827-4308 if you have any questions or comments.

Sincerely,

Barbara Hoditschek
Program Manager
RCRA Permits Program
Hazardous and Radioactive Materials Bureau

Enclosure

xc: Fred Fisher, Holloman AFB
Wally Hise, Radian
Steve Alexander NMED
Mr. Benito Garcia, Chief
Hazardous and Radioactive Waste Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

Re: Holloman Air Force Base, Lakes Holloman and Stinky

Dear Mr. Garcia:

This letter is intended to clarify the regulatory status of Lake Holloman and Lake Stinky at Holloman Air Force Base. There is a question as to whether the two lakes and the drainage ditch leading into Lake Holloman are subject to RCRA authority and hence are required to compile with the closure standards of RCRA and the New Mexico Environment Department (NMED). In lieu of an RCRA closure, the two lakes and drainage ditch are subject to HSWA authority and hence are required to compile with HSWA corrective action conditions with approval of the Environmental Protection Agency (EPA), Region 6.

The key point to determine if a solid waste management unit (SWMU) is a RCRA unit is whether or not the unit has ever handled hazardous wastes after May 19, 1980. As far as we can determine, Lakes Holloman and Stinky, as well as the drainage ditch leading into Lake Holloman, have never managed hazardous wastes and therefore fail the criteria for RCRA units.

Lake Holloman, Lake Stinky, and the drainage ditch are included on Table 1 of the HSWA permit (SWMUs 139 and 140) for an RCRA Facility Investigation (RFI). EPA, Region 6 has authority for the RFI and is currently reviewing the RFI report for Lakes Holloman and Stinky. Based upon the findings of the RFI, EPA will require a Corrective Measures Study (CMS) and remedial action or no further action.
EPA, Region 6 will oversee and approve any necessary remedial activities at Lake Holloman, Lake Stinky, or the drainage ditch in accordance with the HSWA permit. Region 6 will request and welcome any comments that NMED has regarding the lakes or drainage ditch as EPA proceeds with the RFI and CMS.

If you have any questions regarding this letter, please contact me at (214) 655-6785.

Sincerely yours,

David Neleigh, Chief
New Mexico/Federal Facilities Section (6H-PN)
May 4, 1994

49 CES/CEV
440 Tabosa Avenue
ATTN: Mr. Howard E. Moffitt
Deputy Base Civil Engineer
Holloman Air Force Base, New Mexico 88330-8458

Dear Mr. Moffitt:

We have received your letter requesting that the existing Closure Plan/Post-Closure Care Permit Application for the Holloman Sewage Lagoons and Lakes not be reviewed at this time, due to the need for additional data to determine the extent of contamination in the lower lagoons. We look forward to receiving the letter containing a submittal date for a new or revised closure/post-closure plan application for the lagoons.

Also, this letter provides confirmation that, as we discussed with Holloman Air Force Base staff and contractors in a conference call on April 21, 1994, it is appropriate for Holloman to demonstrate clean closure for sewage lagoons A-G based on 40 CFR 264, Appendix IX constituents.

Please call Stephanie Kruse of my staff at 827-4308 if you have any questions or comments.

Sincerely,

Barbara Hoditschek

xc: Lee Winn, NMED
    Fred Fisher, HAFB
    Wally Hise, Radian

CC: Alsop / Radian, E3
    Holcomb / Radian, I
    Stirling / USACE
    Strickland / ENSERCH
    Michna / Radian, A
A conference call was held with representatives from NMED, Holloman AFB, HQ ACC, USACE, ENSERCH, and Radian to discuss the sewage lagoons and lakes closure project at Holloman AFB. Agenda items included the project schedule, NMED review of the Conceptual Plan for Additional Sampling, discussion of the regulatory status, and closure issues. Pertinent issues discussed and action items are listed below.

1. **Project Schedule and Deliverable Dates**

Barbara Hoditschek (NMED): She has received the letter containing the project schedule from Holloman AFB and will review it. She asked Holloman AFB to confirm that the final closure plan will be submitted in mid-year 1996. As discussed later, there could be a change
in timing for submitting the closure plan in order to receive official comments from NMED regarding the sampling requirements.

Kathleen Alsup (Radian): The latest schedule submitted to NMED (April 1994) shows the final closure plan is scheduled to be submitted on 15 June 1996, assuming the corrective measures study (CMS) reports and the treatability study reports will be submitted prior to the submittal of the final closure plan. The project assessment report and the groundwater monitoring plan will be submitted to NMED within two to three months of contract award to Radian. It was pointed out that the current schedule assumed the contract award to be around 1 April 1994; however, the expected award date is now estimated to be around 30 June 1994. This delay will cause some sliding of the proposed submittal dates, especially for the initial field work and reports shown on the schedule.

2. **HSWA vs. RCRA Status for Lakes Holloman and Stinky and the Ditch**

We discussed NMED and EPA's letters dated 6 and 4 April 1994 concerning the HSWA status of the lakes and ditch. Basically these letters confirmed that the lagoons were RCRA units that lost interim status, but the lakes and ditch were under HSWA. This results in the lagoons being under the authority of NMED and the lakes and ditch under EPA Region VI authority.

Barbara Hoditschek (NMED): She noted that NMED expects to get partial HSWA authorization in June or July 1994. NMED will inform Holloman AFB which parts they are authorized for.

3. **Pond G Determination**

Fred Fisher (Holloman AFB): Pond G has been determined to be a wetland by the USACE. A 404 permit will be needed to put fill it in. Pond G is classified as a "lower quality wetland" so Holloman AFB will be permitted to fill it in. Holloman AFB may have to establish other wetland areas to compensate for the loss of Pond G.

4. **NMED Comments on Conceptual Plan for Additional Sampling**

Kathleen Alsup (Radian): If the field work is to begin in June 1994, Holloman AFB would like to have NMED comments on the Conceptual Plan for Additional Sampling by 1 May 1994. One change to this plan was noted—surface water samples will also be analyzed for total lead as well as for organolead.

Barbara Hoditschek (NMED): Official comments will be provided with the review of the Closure Plan. NMED appreciates Holloman AFB proceeding with the investigation of the
lagoons, but cannot assure the Base at this time if the proposed sampling effort will be complete.

5. **Discussion of Lagoons's Sludge Waste Classification**

Holloman AFB sent a memorandum to NMED discussing the waste classification of the sludge. This information was discussed during the conference call; however, NMED had not had time to review the memorandum between themselves or the EPA to make a decision.

Kathleen Alsup (Radian): Holloman AFB believes that the sludge in the sewage lagoons and lakes is not a listed hazardous waste because there have been few detections of listed compounds. And as shown in Table 4-1 of the Project Assessment Report, the listed waste that was alleged to have entered the lagoons was only in small or "de minimis" quantities.

Steve Alexander (NMED): NMED would like to have time to review the memorandum before responding with a decision on the sludge waste classification. However, they tend to believe the sludge will not be classified as a listed hazardous waste. NMED will review this information with the EPA prior to making a decision, since the EPA has authority over investigation of the lakes and ditch.

Fred Fisher (Holloman AFB): EPA Region VI is reviewing the listed hazardous waste issue.

6. **NMED's Findings on Appendix IX vs. Appendix VIII Constituents to Demonstrate Clean Closure**

We discussed the fact that early in the overall investigation of the lagoons and lakes, NMED approved monitoring for Appendix IX constituents only. Appendix IX constituents were selected because there were several Appendix VIII constituents that either did not have analytical methods or the detection levels were unrealistic for the sludge matrix.

Steve Alexander (NMED): Agreed to using Appendix IX constituents to define extent of contamination and final acceptance of closure. NMED will provide this decision in writing to Holloman AFB.

7. **What is the point of compliance for the sewage lagoons?**

Steve Alexander (NMED): NMED has no defined point of compliance for closure demonstration. It is up to the owner/operator to propose the point of compliance, and get NMED's concurrence. For the lagoons, Steve suggested that all the lagoons be considered one system and have one set of "points of compliance" rather than a set of points for each individual lagoon.
Fred Fisher (Holloman AFB): Holloman may want to split Ponds A through F from Pond G. Ponds A through F are separated from Pond G.

8. **Some impoundments may be clean closed. Are there health-based levels for clean closure?**

Steve Alexander (NMED): The Risk Assessment Guidance for Superfund (RAGS) would apply for determining health-based closure levels. Proposed Subpart S concentrations are typically used for initial screening levels since they tend to be more conservative. If no analyses exceed the proposed Subpart S levels, the site may be considered clean. If these concentrations are exceeded, RAGS or comparison to a baseline risk assessment may be required to determine closure levels.

9. **Is a Delay of Closure Plan needed, and if so what should it contain?**

Holloman AFB previously submitted a delay of closure plan, but it needs updating. Holloman AFB no longer receives hazardous waste at the lagoons and is in the process of investigating the impoundments for final closure once the new wastewater treatment system is brought on-line.

Stephanie Kruse (NMED): Holloman AFB should request in a letter to NMED a decision as to whether the delay of closure plan should be resubmitted. NMED will respond. NMED can provide a topical outline of actions for the delay of closure plan if needed.

10. **Miscellaneous Closure Discussions**

Stephanie Kruse (NMED): Regarding the minutes from the 22 February conference call (page 2, paragraph 4), Ms. Kruse did not think she'd used the term "administrative closure" and did not know what it referred to.

Wally Hise (Radian): Administrative closure refers to demonstration of closure through investigation, and that no further removal or remediation actions are required.

Steve Alexander (NMED): Don't use the term "administrative closure." Call it closure in place with monitoring or clean closure.

11. **NMED's Review of Closure Process**

Barbara Hoditschek (NMED): NMED can't approve the sampling plan for field investigation in 1994 if the closure plan is not submitted until 1996. NMED will not review the conceptual plan in terms of a characterization for closure. It is possible that
characterization under the conceptual plan may be sufficient for closure, but NMED is not in the position to make that decision at this point in time. NMED is trying to get away from informal reviews.

Stephanie Kruse (NMED): Holloman AFB may want to submit the closure plan with the plans for the CMS. Holloman AFB can submit the closure plan with the site characterization results.

Barbara Hoditschek (NMED): Holloman AFB may want to submit the closure plan by 1st quarter 1995 and submit the CMS later. NMED cannot approve cleanup criteria until the closure plan is submitted.

Fred Fisher (Holloman AFB): If clean closure is not approved, Holloman AFB needs to get a quick response (within 90 days) on the post closure care plan.

Stephanie Kruse (NMED): The requirements for the closure plan are listed in 40 CFR Section 264.112. Review of the closure plan may take 3 quarters (9 months). Holloman AFB may want to submit the closure plan just before the CMS process begins. Holloman AFB should ask NMED for a determination on "administrative closure." NMED will respond, but is not prepared to respond at this time.

ACTION ITEMS

• NMED to discuss the listed hazardous waste issue with Lowell Seaton (EPA Region VI).

• NMED to write a letter to Holloman AFB summarizing the decision that Appendix IX constituents will be used for the lagoons closure.

• Holloman AFB/Radian to prepare a letter to NMED regarding the proposed point of compliance.

• Holloman AFB/Radian to prepare a letter to NMED regarding the closure plan and the delay of closure. Radian/Holloman AFB will review the current schedule for submitting the closure plan and determine if it should be moved up in the schedule basis discussions on NMED's review process in this conference call.

• Holloman AFB/Radian to prepare a letter to NMED requesting that requirements be specified for administrative closure.
CONFIRMATION NOTICE NO. 3

TO: U.S. Army Engineer District
    ATTN: CEMRO-ED-EA (Ron Stirling)
    215 North 17th Street
    Omaha, Nebraska 68102-4978

CC: David Dentino, HQ ACC

CONTRACTOR: Radian Corporation

CONTRACT NUMBER: DACA45-93-D-0027

DELIVERY ORDER NUMBER: USACE DO# To be determined

TITLE: Sewage Lagoons and Lakes Project
        Holloman AFB, NM

DATE OF THIS REPORT: 7 July 1994

SUBJECT: 30 June 1994 Conference Call with NMED—Scheduling

PARTICIPATING PERSONNEL: Stephanie Kruse, NMED 505/827-4308
                            Barbara Hoditschek, NMED 505/827-4308
                            Mark Sites, EPA 505/827-4313
                            Fred Fisher, Holloman AFB 505/475-3931
                            Tim O’Donnell, Holloman AFB 505/475-3931
                            Ann Strickland, ENSERCH 505/986-6701
                            Kathleen Alsup, Radian 512/454-4797
                            Tom Holcomb, Radian 512/454-4797
                            Robert Michna, Radian 512/454-4797

A conference call was held on 30 June 1994 with representatives from NMED, Holloman AFB, ENSERCH, and Radian to discuss scheduling of the Holloman AFB sewage lagoons and lakes closure project. The meeting began with an overview of the past two conference calls including both resolved and unresolved issues. Specific discussions are summarized below along with action items.
1. **Overview of Past Conference Calls**

See bulleted items on attached agenda for resolved and unresolved issues.

2. **Sludge Waste Classification**

Holloman AFB submitted a letter on April 15, 1994 to NMED requesting a determination of whether or not the sludge in the lagoons and lakes is a "listed hazardous waste".

Holloman AFB believes that the sludge in the sewage lagoons and lakes is not a listed hazardous waste because there have been few detections of listed compounds, and the listed waste that was alleged to have entered the lagoons was only in small or "de minimis" quantities. During the last conference call, Steve Alexander (NMED), commented that he believed the sludge would not be classified as a listed hazardous waste, but would confirm with EPA Region VI.

Holloman AFB will resubmit the April 15, 1994 letter to NMED for review. After reviewing the letter, NMED will discuss the classification of the sludge with EPA Region VI, and respond to Fred Fisher (Holloman AFB).

3. **Project Schedule**

The current schedule proposes to begin sampling in the Fall of 1994. Analytical results should be available during the beginning of 1995 and a report characterizing the findings could be submitted to NMED in the Summer of 1995.

NMED pointed out that sampling is typically presented in a closure plan and performed after the closure plan has been approved. NMED suggested that a closure plan be submitted up front before additional sampling.

It was pointed out that the closure of the sewage lagoons is not a typical RCRA closure, since the primary use of the lagoons is not for the treatment, storage, or disposal of hazardous waste. Therefore, until sampling and analysis are performed it cannot be determined what areas need to be closed and how the waste should be treated or disposed of.

Since NMED indicated that it would be 1995 before they could review a closure plan, Holloman AFB would like to continue as planned with the sampling this Fall rather than wait until a closure plan can be approved.
4. Closure Plan

Stephanie Kruse noted that Los Alamos National Laboratories (LANL) was submitting a closure plan that would present what types of work efforts would be performed during a closure process including schedules, deliverables, and decision points. If Holloman AFB would submit this type of closure plan, issues could be resolved as noted in the closure plan.

Stephanie Kruse will submit her LANL closure plan notes to Fred Fisher (Holloman AFB) and Kathleen Alsup (Radian). A closure plan will be prepared as soon as possible for NMED's review. Schedule for this submittal will be discussed in the next conference call scheduled for August 3, 1994.

5. NMED Comments on Conceptual Plan for Additional Sampling

Since, the field work is currently anticipated to begin in the Fall of 1994, Holloman AFB requested that NMED conduct an informal review of the Conceptual Plan for Additional Sampling by 1 August 1994. NMED could then give Holloman AFB an opinion of the proposed sampling effort. Barbara Hoditschek will discuss this schedule with Ron Kern (NMED Technical Group) during the week of July 5th and notify Fred Fisher (Holloman AFB) if this review schedule is feasible.

ACTION ITEMS

- NMED to review the January 1994 Conceptual Plan for Additional Sampling and respond informally to Holloman AFB during the next conference call.
- NMED to discuss the listed hazardous waste issue with Lowell Seaton (EPA Region VI).
- Stephanie Kruse to submit LANL closure plan notes to Fred Fisher (Holloman AFB) and Kathleen Alsup (Radian).
- Holloman AFB and NMED schedule an NMED site visit of the lagoons and lakes, if budget available.
- Next conference call scheduled for Wednesday, August 3, 1994 at 10:00 (Mountain).
AGENDA FOR NMED/HOLLOMAN AFB CONFERENCE CALL
30 JUNE 1994/10:00 PM Mountain Time

I. OVERVIEW OF PAST CONFERENCE CALLS (~5 minutes)

Resolved Issues:
- Lagoons covered under RCRA, Lakes and Ditch covered under HSWA
- Pond G was Determined to be a Wetland by the Army Corps of Engineers
- NMED's approved using Appendix IX constituents to demonstrate clean closure
- An addendum to the current risk assessment will be submitted after collecting, analyzing, and reviewing the data from the proposed sampling efforts

Unresolved Issues:
- NMED comments on proposed sampling plan
- Lagoon's Sludge Waste Classification probably "Not Listed Waste", but NMED will discuss with EPA, Lowell Seaton
- Does delay of closure plan need to be amended and resubmitted?
- Schedule for submitting closure plan
- Timing of HSWA authorization to NMED

II. GENERAL SCHEDULE FOR PROJECT (~15 minutes)

- Field work
- Reporting
- NMED comments

III. NMED REVIEW OF SAMPLING PLAN AND CLOSURE PLAN (~10 minutes)

- NMED comments on timing needed for review
MEMORANDUM FOR Commander, Holloman AFB, ATTN: 49CES/CBV
(Dr. Fisher), 550 Tabosa Avenue,
Holloman AFB, NM 88330-8458

SUBJECT: Jurisdictional Status of Lagoon G if it is Disconnected
From the Waste Treatment System

1. Reference is made to the Memorandum regarding the
Jurisdictional Status of Lagoon G for Commander, Holloman AFB
from Robert E. Meehan, P.E., Chief, Construction and Operations
Division dated 3 March 1994 and the telecon between
Dr. Frederick M. Fisher, Ph.D., of the Holloman Environmental
Staff and Mr. Daniel Malanchuk of the District’s El Paso
Regulatory Office of 1 July 1994 (Action ID No. 199450019).

2. Lagoon G was determined to be functioning as part of the
waste treatment system and therefore exempt from regulation under
Section 404 of the Clean Water Act.

3. Holloman Environmental Staff requested a determination of the
jurisdictional status of Lagoon G if it were disconnected from
the waste treatment system.

4. Once the connection between Lagoon G and the waste treatment
system is severed, Lagoon G loses its waste treatment function
and its Section 404 exemption. Lagoon G would then be classified
as a lake. The shallower parts of this lake may become wetlands.
Lakes are considered to be waters of the United States. Wetlands
are not only waters of the United States but also special aquatic
sites and as such receive additional protection. Excavation or
filling in Lagoon G after it is disconnected from the waste
treatment system would then be regulated under provisions of
Section 404 of the Clean Water Act and a Department of the Army
Permit would be required.

5. Part of the protection that wetlands receive is the
rebuttable presumption that there is a less environmentally
damaging upland alternative to the contemplated work. Because
Lagoon G is functioning as a wildlife nesting, spawning, and
rearing area, the presumption of a less environmentally damaging
alternative may be difficult to rebut. Excavation in Lagoon G
may also cause regulatory difficulties since at this time it is
connected to a known source of pollutants and any sediments
removed from it may need to undergo rigorous testing before
disposal.
CESWA-CO-R

SUBJECT: Jurisdictional Status of Lagoon G if it is Disconnected From the Waste Treatment System.

6. As Lagoon G is exempt from Section 404 of the Clean Water Act as long as it is connected to the waste treatment system, any contemplated work, such as filling all or part of the lagoon, can be accomplished without a Department of the Army permit. Section 404 of the Clean Water Act regulatory constraints would be implemented when the connection to the waste treatment system is severed.

7. Should you have any questions or desire additional information, please contact Mr. Daniel Malanchuk of the El Paso Regulatory Office at (915) 568-1359.

FOR THE COMMANDER:

[Signature]

Robert E. Meahan, P.E.
Chief, Construction and Operations Division
Mr. Howard E. Moffitt
49 CES/CEV
550 Tabosa
Holloman Air Force Base, NM 88330-6458

Dear Mr. Moffitt

This is in response to the meeting on July 12, 1994, between Dr. Fred Fisher, Dr. Hildy Reiser, and Mr. Rich Warring of 49 CES/CEV, Mr. Roy Barker, and Mr. Clent Bailey of my staff. At that time the New Mexico Ecological Services State Office of the U.S. Fish and Wildlife Service (Service) was requested to provide input concerning mitigative actions to protect western snowy plovers, (Charadrius alexandrinus nivosus), that could be adversely affected by construction activities at Lake Holloman, Otero County, New Mexico.

Proposed construction consists of the installation of a pipe and outfall structure that will transport water from the new Waste Water Treatment Facility (WWTF), proposed for Holloman Air Force Base (HAFB), directly into Lake Holloman. Associated with the proposed WWTF is construction of approximately 300 acres of evaporative ponds consisting of twelve 20-25 acre cells. Plans for the proposed WWTF have reached the final design phase and are currently being reviewed by the U.S. Army Corps of Engineers (Corps) and HAFB. As a result of a July 25, 1994, telephone conversation between Clent Bailey and Ms. Joan Coffing of the Corps, a copy of the plans will be forwarded to this office.

Proposed construction is complicated by the need to clean and close 7 existing evaporative ponds that have shown varying degrees of contamination, and by the presence of wildlife that utilize the area. Western snowy plovers (plovers) are among approximately 10 category 2 candidate species known to occur at Lake Holloman. Category 2 candidate species are afforded no legal status under the Endangered Species Act; however, they are considered candidates for listing as threatened or endangered due to low population diversity, density, and/or threats to their habitat. Also, as pointed out in Appendix C of the HAFB Fish and Wildlife Plan (Plan), reviewed by this office in Cons. #2-22-92-1-322 dated October 26, 1993, federally listed species such as the endangered bald eagle, peregrine falcon, and whooping crane potentially occur in the area as well.

The proposed WWTF outfall will alter Lake Holloman’s shoreline morphology and water chemistry, displacing plovers and other shorebirds that use the Lake. Short term protection for plovers can normally be accomplished by scheduling work activities...
around their breeding season, roughly March to July, and maintaining overall saltflat or sand shoreline acreage. In this case, long term protection for plovers can possibly be achieved by allowing sufficient water flow into Lake Stinkey to provide a dispersal area for displaced plovers from Lake Holloman.

However, planning work around plovers could present adverse impacts to sensitive migratory species that use the area in winter. Also, concentration on the preservation of shoreline habitat to accommodate plovers fails to consider habitat needs of other avian species such as dabbling/diving feeders and species that prefer vegetated shorelines. Maintenance of existing habitat and enhancement of the natural resource potential for all species would be the optimal course of action. The Service recommends that a long term, holistic approach be considered for the Lake Holloman area. The proposal outlined below would negate the need for an outfall pipe at the north end of Lake Holloman, and enhance the areas potential for all avian species.

Lake Holloman, Pond G, and the interconnecting canal, offer wildlife an oasis of habitat in an otherwise arid region. Hydric soils in the area and historical evidence indicate the area was originally a large wetland that was manipulated and altered prior to wetlands receiving state and federal legislative protection. HAFB has the opportunity to restore this area as a viable, functioning wetland, while concurrently improving water quality of WWTF effluent. HAFB should consider options that not only support their military mission, but also offer long term, cumulative benefits to wildlife.

The Service recommends that HAFB conduct a feasibility study to analyze the possibility of a constructed/re-established wetland in the vicinity of Lake Holloman. An engineering prerequisite for the wetland would be the installation of a forced main to transport WWTF effluent to a point near Pond G. Delivery of water to this point would allow for the downgradient area between Pond G and Lake Holloman to reestablish its wetland characteristics. It would also negate the disturbance to plover habitat on the north end of Lake Holloman.

Also, direct discharge into Lake Holloman requires a National Pollutant Discharge Elimination System permit from the Environmental Protection Agency (EPA). The Lake is classified as Waters of the United States, whereas Pond G, initially utilized in a waste water treatment system, does not require this permit. However, we recommend that the EPA, Corps, and the New Mexico Environment Department, be consulted for water quality concerns that could arise from a constructed wetlands.

Wetlands provide natural pollutant filtering/water purification, contribute to groundwater recharge, reduce erosion, and influence microclimates by modifying air temperature. Wetlands enhance nutrient and organic material cycling, augment cultural resources, ameliorate air and noise pollution, and provide habitat to a wide range of floral and faunal species. Approximately 20 percent of species currently listed as threatened or endangered rely on wetlands at some point in their life cycle; the loss of wetlands has contributed to their current sensitive status.

The major costs normally associated with constructed wetlands would not be necessary. Preliminary treatment of water would be accomplished by the WWTF, and no additional land needs to be acquired. Initial ground and surface water monitoring has largely been accomplished and has resulted in a comprehensive picture of
Mr. Howard E. Moffitt

contamination hotspots in the area. Also, additional funding is potentially available from a variety of sources for initial wetland construction and follow-up monitoring.

This office has not reviewed proposed WWTF design and cannot judge its effectiveness at eliminating the metals and metalloid compounds that emerged from past HAFB waste water treatment systems. Constructed wetlands are often capable of receiving water with a higher nutrient load than that discharged directly into a lake, however, this assumes that contaminants are not contained within the wetland influent that would present bioaccumulatory risks to wildlife. A comprehensive monitoring program of all influent and effluent water quality would be necessary for an environmentally friendly wetland.

Ponds A-G are proposed to be drained and cleaned, and we recommend the feasibility study examine the possibility of their reutilization. If the contamination problems in Ponds A-F can be resolved this area could be used for some of the proposed cells or the buildings associated with the new WWTF. This would reduce the additional 300 acre ground disturbance currently anticipated. Pond G has shown only minimal contamination, and is currently used by numerous avian species. After draining and sediment scraping this pond could be reused as well. As much as possible of existing disturbed areas should be reused. The existing forced main to the golf course could be used to provide wetland headwaters, or other existing pipes could be converted into a forced main for this purpose.

The suggested forced main could discharge directly into a cleaned Pond G, or the canal upgradient of Pond G. The area between Pond G and Lake Holloman could be terraformed to facilitate wetland creation. Earth moving would be minimized due to the areas past wetland history; the existing gradient is ideal for wetland re-establishment. Revegetation of the area could begin by removal of some of the salt cedar and establishment of vegetation test plots to determine the best woody species for the area. We recommend revegetation efforts concentrate on the establishment of indigenous species like cottonwood and willow, however, a Russian olive/willow mixture would be preferable to the salt cedar monoculture that currently exists.

Concerns have been raised in other wetland projects over elevated mosquito populations as a result of standing water. Mosquitos can be effectively controlled by the use of natural predators such as mosquitofish, water level manipulations, or the use of the bacterium Bacillus thuringensis var. israelensis. White Sands pupfish, a category 2 candidate species endemic to the Tularosa Basin, is another mosquito control possibility that could be explored in a feasibility study. Habitat enhancement for this species could proceed concurrently with constructed wetlands creation.

The canal connecting Pond G and Lake Holloman currently borders the golf course for a portion of its length. This office is aware of other cases in which herbicides, fungicides, and fertilizers used for golf course maintenance entered receiving waters via runoff. The introduction of these chemicals into the canal, or into a proposed wetland, could cause adverse affects to biota. We recommend that golf course maintenance procedures be thoroughly examined, and consideration given concerning methods to prevent the downgradient migration of potential contaminants from the golfcourse.
The above suggestions for wetland construction are rudimentary and unrefined, and touch on only a few of the wildlife habitat enhancement possibilities that present themselves. HAFB planners should explore every available asset that could be used for the funding, planning, construction, and monitoring of the wetland. Numerous federal, state and private conservation groups could potentially assist HAFB in creating a landmark project that would enhance New Mexico's wildlife and culture.

The Service appreciates the opportunity to provide input concerning wildlife habitat enhancement possibilities in the vicinity of Lake Holloman. We strongly recommend HAFB leadership provide impetus and support for the preliminary study necessary for this project. If we can be of further assistance please call Clint Bailey at (505) 883-7877.

Sincerely,

[Signature]

(Confidential) Jennifer Fowler-Proost
State Supervisor

cc:
Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico
Director, New Mexico Energy, Minerals and Natural Resources Department, Forestry and Resources Conservation Division, Santa Fe, New Mexico
Regional Administrator, Environmental Protection Agency, Dallas, Texas
Director, New Mexico Environment Department, Santa Fe, New Mexico
Command Natural Resources Manager, United States Air Force Headquarters Combat Command, HQ ACC/CEVAN (Attn. Mr. Roy Barker)
Regional Biologist, Bureau of Land Management, Las Cruces District Office, Las Cruces, New Mexico (Attn. Mr. Tom Custer)
President, Mesilla Valley Audubon Society, Las Cruces, New Mexico (Attn. Mr. Gordon Ewing)
Director, Southwest Wetlands Group, Santa Fe, New Mexico (Attn. Mr. George Naugles)
Regional Director, U.S. Fish and Wildlife Service, Ecological Services, Albuquerque, New Mexico
August 3, 1994

49 CES/CEV
550 Tabosa Avenue
Holloman Air Force Base
New Mexico 88330-8458
ATTN: Mr. Fred Fisher

Dear Mr. Fisher:

As we discussed during the conference call on June 29, 1994, enclosed is an outline detailing the internal reports and approvals to be contained in a proposed closure plan for two sewage lagoons at another facility. The proposed closure plan assumes no listed hazardous wastes in the lagoons. The facility wants to clean close these lagoons by demonstration that performance standards are met, i.e., that there is no threat to human health or the environment. A sampling and analysis plan is already contained in the plan, as well as a methodology for a risk assessment.

The closure plan will state that the New Mexico Environment Department (NMED) will approve each report described below before the facility proceeds to the next step.

I believe that a variation on this format will provide both Holloman Air Force Base and this Department with a necessary overview of, and time frame for, potential closure activities, rather than reviewing these activities as piecemeal actions. At the same time, Holloman will not be required to structure activities which may not be necessary.

Please call Stephanie Kruse of my staff at 505/827-4308 if you have any questions or comments.

Sincerely,

Barbara Hoditschek, Manager
RCRA Permits Program
Hazardous and Radioactive Materials Bureau

Enclosure

xc: Ron Kern, NMED
    Kathleen Alsup, Radian
    Red file - 94
FORMAT FOR INCLUSION OF DECISION POINTS IN CLOSURE PLAN

I. After sampling and before commencing any implementation of closure activities, the facility will submit an intermediate report to NMED which will:

i. identify sampling results; and

ii. propose one of three actions (discussed in II-IV below), based on sampling results.

II. Clean closure in place, the preferred action.

a. Clean closure in place will be allowed if, based on sampling results, no hazardous constituents are detected or one hazardous constituent which is below the screening action level for that constituent is detected. Screening action levels are already contained in the closure plan.

The facility will proceed to complete a final closure report.

* When NMED approves this final report, CLOSURE IS COMPLETE.

b. If more than one hazardous constituent is detected, the facility will do a very conservative risk assessment, which does not take fate or transport into account, and which considers the cumulative effects of all hazardous constituents present. The facility will prepare a final closure report for NMED approval which will also:

i. detail the assessment of risk for the two impoundments.

* If there is no threat to human health or the environment, based on the risk assessment, NMED will approve clean closure in place, as in II.a. above. When NMED approves this report, CLOSURE IS COMPLETE.

III. Removal of "hot spots".

If the risk assessment shows that there is some threat to human health or the environment, i.e., that some "hot spots" are present, the facility will prepare an intermediate report which will also:

i. detail the assessment of risk for the two impoundments, including the location of the risk;
ii. propose a sampling and analysis plan to delineate the extent of the "hot spots";

iii. detail how contaminated soil will be removed, including storage and final disposal areas; and

iv. propose a confirmatory sampling and analysis plan.

* When NMED approves this plan, the facility will implement closure.

Upon completion of closure activities, the facility will prepare a final closure report which will also:

i. detail removal of contaminated soil and decontamination of equipment, etc.; and

ii. detail the results of the confirmatory sampling.

* When NMED approves this final closure report, CLOSURE IS COMPLETE.

IV. Closure as a landfill.

If, based on risk assessment results, extensive contamination is apparent (not a likely scenario), the facility will prepare a closure/post-closure plan for closure as a landfill.
Gordon J Ewing  
Conservation Committee  
Mesilla Valley Audubon Society  
PO Box 3127 UPB  
Las Cruces, NM 88001  

13 August 1994  

Ms Jennifer Fowler-Probst  
US Fish and Wildlife Service  
Ecological Services  
Suite D, 3530 Pan American Highway, NE  
Albuquerque, NM 87107  

Dear Ms Fowler-Probst  

I have read with interest your letter of 29 July 1994 to Holloman Air Force Base. The Mesilla Valley Audubon Society has a long standing interest in the Holloman Lake area so we are happy to see the Fish & Wildlife Service making suggestions concerning the improvement of these wetlands. I am concerned that you are not appreciative of the current value of Lake Stinky (or Stinky Playa) to shore birds in the area. In wet years, Holloman Lake has almost no shorebird habitat while Stinky spreads out to maybe as much as 100 acres of shallow water. In dry years Stinky offers the best Snowy Plover nesting habitat in the region. Lake Stinky must be a major part of any plan for water control. I would like to see the playa flooded at least as far as Highway 70 almost every year. It should not be viewed as just "a dispersal area for displaced plovers from Lake Holloman." I am also concerned that Holloman AFB will not have enough water to keep Stinky as a live playa if they are building 300 acres of evaporative ponds. For a year and a half, Lake Stinky has been nearly dry. Currently Lake Holloman is about a meter below the spillway, mosquito fish are dying, the drain from Lagoon G is dry and Lagoon G is half a meter below its overflow level.  

The suggestion that the drain between Lagoon G and Holloman Lake could be easily converted to wetlands is an exciting suggestion. Salt cedar control would probably be the greatest single problem in this conversion. In addition to the increased wildlife habitat, the wetlands would contribute lots of surface area (both water and plants) for evaporation and decrease the need for evaporating ponds. The mosquito fish already in the drain would keep the mosquitoes under control, I believe. I have binned this area for years and mosquitoes are seldom a problem. Concerning the replacement of salt cedar with indigenous trees, this spring Mike Howard, BLM; Fred Fisher & Marty Tagg, HAFB; Bill Fuchs, WSNM and G Ewing, MVAS planted several cottonwood and willow poles at various places to see if they would survive. All of the poles sprouted leaves, but this exceptionally hot and dry
summer seems to have killed them all. I could see no living leaves last week when I was out there. I hope we can try again next spring.

I am sure someone has pointed out that the drain from Lagoon G to Holloman Lake does not border the golf course. The golf course is above Lagoon G. This, of course, does not decrease the desirability of eliminating pesticide and fertilizer run-off from the golf course.

Finally, I believe that the Stinky-Holloman-Lagoon G complex has more Snowy Plovers in July than any other location in the state. I counted nearly 100 Snowy Plovers on one day this summer. I have also seen Peregrine Falcons several times there. My bird lists are all computerized and if you would like any bird lists for this area, I would be happy to supply them.

Sincerely

Gordon J Ewing

cc:
Tom Wooten, MVAS
Hildy Reiser, HAFB
Mike Howard, BLM
Bill Fuchs, WSNM
Sandy Williams, NMG&F
Dear General Miller,

Since Holloman Lake and the surrounding area comprise the most important wetland in South-Central New Mexico, the Audubon Societies of New Mexico are concerned about its preservation and improvement. We were very happy to hear that HAFB was planning to build a tertiary waste water treatment plant. We felt that improving the water quality at Lake Holloman and Stinky Playa (usually called Lake Stinky) would make the wetlands an even better habitat for shorebirds and waterfowl.

We understand that part of the construction plan calls for about 300 acres of lined evaporation ponds. We see this as a mostly unnecessary cost and a serious step backward for the wetland. The lagoon system at HAFB has about 300 acres of water surface where evaporation now occurs. This seems more than adequate for the system. During the last two years, Stinky Playa has been almost dry and Lake Holloman currently is only about half full. These two entities make up two thirds of the current 300 acres of evaporative surface. Both will be part of the new system so 200 new acres of evaporative ponds seems unnecessary.

We had hoped that Lagoon G would be preserved, although we were aware of the pollution problems in the sediment. This pond furnishes another 40 acres of evaporative surface. It is unlined and currently is heavily used by both shorebirds and waterfowl. Between Lagoon G and Lake Holloman, where a drain has been excavated, is a flat low area that was once an intermittent wetland. Just below Lagoon G, to the south and especially to the west, can be seen emergent wetlands that could be extended in a broad all the way to Lake Holloman. The current drain would have to be refilled and possibly a low dyke constructed at the lower end to keep the water flowing into Lake Holloman instead of going directly into the Stinky Playa. This could add 50 to 100 acres of emergent wetland which is more efficient for water clean-up and evaporation that a pond of similar area. Nearly 300 acres of evaporative surface could be obtained without building a single evaporation pond. If Lagoon G can be saved over 300 acres are possible.
We hope that it is not to late to consider this modification.

The Mesilla Valley Audubon Society because it is nearby will be happy to contribute volunteer help in any projects that could use hand labor. Salt Cedar removal is a possibility.

A more detailed statement of the things that we would like to see done in the Lake Holloman area is attached.

Sincerely

Catherine Sandell
President, New Mexico Audubon Council

cc:
Brig. General Bryan G. Hawley, Langley AFB
Mr. Roy Barker, Langley AFB
Hildy Reiser, Holloman AFB
Clent Bailey, US Fish & Wildlife Service
Tom Wootten, Mesilla Valley Audubon Society
ATTACHMENT

Holloman Lake and the surrounding area is the most important wetland in Otero County. Historically this area was a natural wetland but in more recent years the wetlands have been extended and incorporated as the major portion of a series of lagoons used to treat and store waste water from Holloman Air Force Base. The main wetlands of the area (Lake Holloman and Stinky Playa) were managed by the Bureau of Land Management and in August of 1986 Mesilla Valley Audubon Society (MVAS) entered into a Cooperative Management Agreement with BLM and have kept records of sightings in the area since then.

Holloman Lake and the surrounding area is to be withdrawn for military purposes and will come under the management of Holloman AFB and Holloman AFB is about to start building a new waste water treatment plant. Gordon Ewing has had extensive discussions and correspondence with personnel from HAFB and the US Fish and Wildlife Service to develop a well conceived plan to accommodate the needs of the treatment plant and wildlife. A plan was being developed which, we believe, has the support of the US F&W and HAFB. Certainly it has the support of the base Environmental Department. MVAS has found much to support in the plan. We understand the HAFB is being required to move ahead with another plan for construction of the waste water treatment plant. This plan calls for the construction of 12 lined evaporative ponds (300 acres) and will eliminate Lagoon G and the possibility of restoring the wetlands in the area between Lagoon G and Holloman Lake. We are aware that Lagoon G has some contamination problems that would have to be addressed if it were saved, but that may be cheaper than building so many evaporative ponds.

Though the MVAS is concerned about all forms of life in this area, we will primarily concern ourselves with birds in this letter. Birds live in the Lake Holloman complex during all seasons but it is most important as a refueling stop for some birds during migration and as a wintering area for others. Forty or fifty species can be seen in the area almost any day of the year. Over a thousand individuals of a single species can be seen (for example Wilson's Phalaropes in the late summer or Northern Shovelers in the winter). The sewage effluent is rich (to rich) in nutrients making the water very productive. Large numbers of waterfowl are supported there.

Three distinct types of wetland habitat can be identified in this area:

1. Saline Ponds - Lake Holloman and Lagoon G. Diving, dabbling and some wading birds inhabit these lakes. Lake Holloman is about half as salty as seawater.
2. Salt flats and beaches. Mostly found in the Stinky Playa along with the fringe of the two lakes. Inhabited mainly by shorebirds. The Snowy Plover, a candidate for listing as endangered, nests here in substantial numbers.

3. Emergent Wetlands. A small area below Lagoon G is the best example of this. A wide variety of birds are found here. These wetlands were much larger prior to the excavation of the drain between Lagoon G and Holloman Lake. We, who are members of various Audubon Societies, are concerned that all of these types of habitat be preserved and even enhanced with the construction of a new waste water treatment plant at HAFB. Here is a list of specific things that we hope can be accomplished.

A. Decrease the nutrient level in Lake Holloman and in Lagoon G (assuming that Lagoon G can be preserved). This would decrease the tendency for developing anaerobic conditions and lessen algal and bacterial blooms, and, by allowing sunlight to reach the bottom, would likely permit bottom dwelling plants to become established. The waste water treatment plant should assist greatly in achieving these conditions.

B. Keep the water levels in Lake Holloman and Lagoon G relatively stable at current spillway levels. With more or less continuous drainage, the salinity of the lakes will be kept relatively constant and low, and the tendency for anaerobic conditions will be decreased. Both "A" and "B" will provide better habitat for dabbling and diving waterbirds. Mosquito fish die-offs that now occur during the summer when the lakes go anaerobic would be mostly avoided. The loss of shorebird habitat that will result from the high water level will be more than made up in the Stinky Playa (see item C).

C. Some water should spill into Stinky Playa most of the time and the playa should be flooded annually at least to Highway 70. This active playa would provide much more habitat for shorebirds than the fringes of the two lakes. The playa will also collect the salt that would otherwise build up in Lake Holloman.

D. "Protected" areas should be available for ground-nesting birds. Snowy Plovers nest out on the playa salt flats and are relatively safe there. On the other hand, Avocets, Black-necked Stilts, Kildeers and several species of ducks nest along the shore where predators can easily destroy the nests. Evidence for this destruction can be seen by walking around Lake Holloman in the spring or early summer. To give some protection to these ground nesters, a large island could be created in Lake Holloman by cutting a channel at the neck.
of one of the several peninsulas that extend out from the west shore of the lake.

E. Emergent Wetlands could be established in the natural drainage between Lagoon G and Holloman Lake. This area was once a wetland or at least an intermittent wetland and could be reestablished at relatively low cost. The drain that was excavated between the two lakes could easily be refilled and salt cedar eradication might be relatively inexpensive if conservation groups (such as MVAS) were called on to help. Probably over 50 acres of emergent wetlands could be reestablished. This would not only be utilized by wildlife, but the area would remove nutrients from the water as well as providing for substantial evaporation. Water from the waste water treatment plant might be piped to Lagoon G or, if G is to be eliminated, the pipe could open into the wetlands just below where Lagoon G now is located.

F. Try to replace salt cedars with cottonwoods and willows. In an experimental planting this spring, a few willow and cottonwood poles were planted. The trees all started well with green leaves evident well into June, but late planting coupled with the hottest summer on record seems to have killed all of the trees. Winter planting of cottonwood and willow poles should be tried again and with some cooperation from the weather the trees might be established. It should be noted that native cottonwoods grow in the dunes at White Sands National Monument only 4 or 5 miles west of Lake Holloman.

Most of these suggestions could be carried out at relatively low cost. The clean-up of Lagoon G and the removal of salt cedars are likely to be the most expensive. Lagoon G, the proposed wetland below it, Holloman Lake and Stinky Playa should yield at least 300 acres of evaporation surface which should mean that most of the proposed evaporation ponds need not be constructed. The money saved in not constructing some of the evaporation ponds should more than pay for the conservation work proposed above.
TO: DISTRIBUTION

CC:

CONTRACTOR: Foster Wheeler Corporation and Radian Corporation

CONTRACT NUMBER: DACA45-94-D-0003

DELIVERY ORDER NUMBER: USACE DO# 2 WAD 5

TITLE: Sewage Lagoons and Lakes Closure Project  
Holloman AFB, NM

DATE OF THIS REPORT: 20 October 1994

SUBJECT: 1 September 1994 Conference Call with NMED

PARTICIPATING PERSONNEL: Stephanie Kruse, NMED 505/827-4308  
Ron Kern, NMED 505/827-4308  
Fred Fisher, Holloman AFB 505/475-3931  
Ann Strickland, ENSERCH 505/986-6701  
Jon Decker, ENSERCH 303/980-3520  
Kathleen Alsup, Radian 512/454-4797  
Tom Holcomb, Radian 512/454-4797  
Robert Michna, Radian 512/454-4797  
Sandy Frye, Omaha USACE 402/221-7684  
Craig Olson, Omaha USACE 402/221-7711  
Tom Zink, Omaha USACE 402/221-7833

A conference call was held on 1 September 1994 with representatives from NMED, Holloman AFB, ENSERCH, Omaha USACE, and Radian to discuss the Holloman AFB sewage lagoons and lakes closure project. An agenda of the conference call is attached.

Pertinent decisions addressed in the conference call are:

- Sludge in lagoons are not considered a listed hazardous waste as determined by both EPA Region VI (Lowell Seaton and Barry Feldman) and NMED (Stephanie Kruse).
Contents of the closure plan should summarize the results of past investigations and describe what steps will follow along with a schedule for those steps.

Next conference call is anticipated to be the first week of November 1994.

Action items resulting from the conference call include:

**Radian:** Send examples of actual semivariograms to NMED (Ron Kern), see attached. The effects of anisotropy were not considered, because there was no clear correlation of concentrations with direction. However, spacing for the grid nodes for each lagoon and Lake Holloman was based on the contaminant with the smallest range determined from the semivariogram.

Provide NMED with information on discussion in December 1993 with Steve Alexander regarding the adequacy of soil sampling.


**NMED:** Send Holloman a brief letter indicating that NMED does not consider the sludge in the lagoons to be listed waste.

**USACE:** Send NMED (Ron Kern) information on the 1:20 TCLP rule.

More specific information addressing the discussions of the conference call are summarized below.

**I. Status of Sludge Waste Classification**

Holloman AFB submitted a letter on 15 April 1994 to NMED requesting a determination of whether or not the sludge in the lagoons and lakes is a "listed hazardous waste". Stephanie Kruse discussed this letter with EPA Region VI (Lowell Seaton and Barry Feldman).

Both representatives from EPA Region VI believed the sludge should not be considered a listed hazardous waste since such small amounts of hazardous waste were believed to be discharged to the lagoon system.
Stephanie Kruse agreed with the "no listing" determination and will prepare a written letter stating this to Holloman AFB (Fred Fisher) and copied to Radian (Kathleen Alsup) and Omaha USACE (Craig Olson).

II. NMED Review of Conceptual Plan for Additional Sampling

Ron Kem, the new Head of Technical Compliance, indicated that he had reviewed the "Conceptual Plan for Additional Sampling" (January 1994), but had many questions because he did not know the complete history of the lagoons and lakes project. Below is a list of some of these questions/concerns and responses issued to try and address the concerns during the conference call.

Ron Kem asked what background information was used for the soil? Tom Holcomb (Radian) responded that the groundwater and soil background information was in Appendix B of the Phase I Groundwater Assessment Monitoring Report (December 1993). The background information was basewide.

Stephanie Kruse asked why most of the Appendix IX constituents had been eliminated for sampling. Fred Fisher (Holloman AFB) noted that Bruce Swanton had approved this around December 1991 or early 1992.

Ron Kem stated that a summary of the site background information should be included in the closure plan.

Ron Kem thought that sampling was sporadic and incomplete in 1991, and wanted to know why soils were not proposed to be sampled again. The base needs to provide assurance to NMED that adequate vertical and horizontal delineation is made. Fred Fisher (Holloman AFB) noted that soil sampling had not been budgeted for the next round of sampling and that it is a totally separate technique than used for sludge. Fred Fisher stated that approximately six (6) samples of the soil and sludge matrices from each impoundment were collected in 1991/92. None of the soil samples detected any hazardous constituents. Basis the nondetect results we discussed if this was a sufficient amount of samples to indicate that no more soil samples were needed. Tom Holcomb (Radian) also noted that Steve Alexander (previous NMED Technical Support) had agreed that additional information on soils was not needed. Stephanie Kruse wanted to know if there was any documentation of this approval.

Ron Kem would like to see actual semivariograms from the geostatistical analysis for determining where and how many additional samples should be collected from the lagoons.
Ron Kern wanted to know why analyses were narrowed down from Appendix IX contaminants to pesticides and metals for the proposed sampling. Tom Holcomb (Radian) noted the previous sampling results indicated that the concentration of constituents in sludge from Ponds C through G appear to by homogeneous. Therefore, only those constituents found to pose a potential risk or were detected in significant concentrations were proposed to be sampled. Kathleen Alsup (Radian) noted that sampling for predominant constituents and those potentially posing a risk to human health or the environment could evaluate the extent of contamination in the lagoons without the need for sampling all other Appendix IX constituents.

Ron Kern was also curious why no PCB sampling and analyses were proposed. Fred Fisher (Holloman AFB) noted that PCB hot spot areas were removed from Ponds A and B, but only down to TSCA levels (25 ppm). No sampling was planned for Ponds A and B because they are known to be contaminated and will have to be cleaned up regardless of sampling results. Pond F is of such a small size that no sampling is planned for it either, instead the sludge will be remediated.

III. Contents of the Closure Plan

We discussed Stephanie Kruse's letter dated 3 August 1994 to Holloman AFB defining what should be included in a closure plan.

Stephanie Kruse (NMED) stated the closure plan should: 1) sum up what has happened; 2) tell what the base thinks should happen; and 3) present a schedule for future deliverables and activities. As each decision point arises in the closure plan, HAFB should wait until NMED approves it before proceeding to the next step.

The closure plan should summarize the original and background data, and refer to the appropriate reports. Stephanie noted that a summary table of the ranges of constituents detected would be the best approach for summarizing the data. Data should address surface water, groundwater, and soil. Text should be included to describe how the previous data helped determine the sampling proposed in the closure plan. All data needs to be summarized in one place, and the closure plan is the appropriate document.

Stephanie Kruse (NMED) indicated it was time for Holloman AFB to get started on the closure plan in order to proceed with the closure of the lagoons.

Ron Kern (NMED) would like to see the Quality Assurance Project Plan (QAPP) in the closure plan.
Kathleen Alsup (Radian) asked if NMED would review an outline of the closure plan to make sure all issues and NMED concerns were being addressed in the closure plan before it is submitted. Stephanie Kruse (NMED) said to send the outline to Barbara Hoditschek and that Stephanie would review it.

Stephanie Kruse (NMED) asked about the schedule for seeing a closure plan. Kathleen Alsup (Radian) noted that at the earliest it would be at least two months.

IV. Groundwater Monitoring Plan

Tom Holcomb (Radian) noted that a *Groundwater Assessment Report* had been submitted to NMED at the December 1993 meeting in Santa Fe, and that a groundwater monitoring plan would be prepared to detail how long-term groundwater monitoring would be conducted. This plan should be submitted to NMED for approval around November 1994. This plan will be submitted separately from the closure plan and will be submitted to Ron Kern.

V. Other Issues

Although the sludge is not considered a listed waste, the determination of whether the sludge is hazardous due to characteristics needs to be made. To date no TCLP analyses have been performed on the sludge. Kathleen Alsup (Radian) requested the use of the 1:20 rule for TCLP hazardous determination on the sludge. Sandy Frye (Omaha USACE) noted that the 1:20 rule assumes 100% leachability and represents the worst case (most conservative) concentration for leachability calculated from the total analysis results. This is mentioned in 40 CFR 261. Ron Kern said he would read 40 CFR 261 and Method 6311 and check with EPA on their opinion since he believes the regulations require TCLP analysis for determination of hazardous waste.
AGENDA FOR NMED/HOLLOMAN AFB CONFERENCE CALL
1 SEPTEMBER 1994/10:00 AM Mountain Time

I. STATUS OF WASTE CLASSIFICATION
   • Review Stephanie Kruse's conversation with EPA's Lowell Seaton and Barry Feldman concerning "Not Listed Waste" determination for the lagoon sludge.

II. STATUS OF NMED's REVIEW OF CONCEPTUAL PLAN FOR ADDITIONAL SAMPLING
   • What background information is needed to supplement NMED's review?
   • Does NMED want to review QAPP for sampling effort?

III. CONTENTS OF CLOSURE PLAN
   • Discuss NMED's 3 August 1994 letter to Holloman AFB

IV. GROUNDWATER MONITORING PLAN
   • Status of plan submittal to NMED
Semivariogram for Chlordane in Sludge in Pond C

Parameters:

- File: c_sludge.pcf
- Pairs: 15
- Direct.: 0.000
- Tol.: 90.000
- MaxBand: n/a

LM (Chlordane) Limits:

- Minimum: 2.565
- Maximum: 5.347
- Mean: 4.352
- Var.: 0.85717
Semivariogram for 4,4-DDD in Soil in Pond D
Semivariogram for Chlordane in Sludge in Pond E
Semivariogram for Chlordane in Sludge in Pond G
Semivariogram for 4,4-DDD in Sludge in Lake Holloman
CONFIRMATION NOTICE NO. 1

TO: U.S. Army Corps of Engineers
ATTN: CEMRO-MD-H (Tom Zink)
215 North 17th Street
Omaha, NE 68102-4978

CC: Warren Neff, HAFB
Fred Fisher, HAFB
Jim Haggins, HQ ACC
Lowell Seaton, U.S. EPA, Region VI

CONTRACTOR: Radian Corporation

CONTRACT NUMBER: DACW45-93-D-0027

DELIVERY ORDER NUMBER: DO #0020

TITLE: Sewage Lagoons and Lakes Groundwater Monitoring

DATE OF THIS REPORT: 11 November 1994

SUBJECT: Phase II RFI for Lakes Holloman and Stinky

PARTICIPANTS: Warren Neff/HAFB, Tom Zink/USACE-Omaha, Lowell Seaton/EPA Region VI, David Robbins/Radian, and Tom Holcomb/Radian

1 November 1994 Conference Call

A conference call was held between Holloman AFB and EPA, Region VI on 1 November 1994 to discuss the status of the Phase II RCRA Facility Investigation Report for Lakes Holloman and Stinky. Lowell Seaton fundamentally agreed with the conclusions and recommendations of the report: a release of Method 8080 pesticides and metals is probable, but the concentrations are so low that additional downgradient investigation should not be pursued.

Lowell Seaton said that he will provide a letter to Holloman AFB indicating that a long-term groundwater sampling plan be prepared for the lakes. The plan should recommend the required analyses, a monitoring network and frequency, and an alternate concentration limit (ACL). The ACL is recommended because EPA, Region VI, recognizes that the groundwater at Holloman AFB is nonpotable and should not require a corrective measures study given its current use. The
ACL that is established will be protective of human health and the environment and will be used to determine if additional study is required during the course of the long-term monitoring.

**10 November 1994 Conference Call**

A call was held to discuss the specific requirements and outline for long-term monitoring at Lakes Holloman and Stinky. The attached materials were provided to Mr. Seaton and used for discussion purposes. Mr. Seaton agreed with the technical approach outlined in the package and had no serious concerns. He mentioned that he was interested in seeing the EPA Region III action levels for industrial groundwater use. A copy of those materials have been forwarded to the Base to provide to Mr. Seaton.

Lowell Seaton also said that he agreed that the plan and monitoring implementation for the lakes and sewage lagoons should be integrated as appropriate. It was agreed that the lakes should not require as extensive of a monitoring program since they are not regulated units. Lowell Seaton believed that a 10 year period would be sufficient for those lakes as opposed to the 30 years most likely required for the sewage lagoons.
MEETING AGENDA

LONGTERM GROUNDWATER MONITORING PLAN
SEWAGE LAGOONS AND LAKES HOLLOMAN AND STINKY
HOLLOMAN AFB, NEW MEXICO

31 OCTOBER 1994

I. BACKGROUND INFORMATION

• Phase II RCRA Facility Investigation (RFI)
• Assessment Monitoring Program

II. SUMMARY OF APPROACH TO LONGTERM MONITORING

• Technical Overview
• Monitoring Network
• Screening Parameters
• Sample Frequency
• Evaluation of Data

III. OUTLINE OF LONGTERM MONITORING PLAN

IV. SCHEDULE

ATTACHMENTS:

A. Historical Summary of the Groundwater Monitoring Program for the Sewage Lagoons
B. Maps:
   1. Potentiometric Contour Map of Shallow Aquifer
   2. Longterm Monitoring Network
C. Flowchart of Evaluation Process
D. Draft Outline of the Longterm Monitoring Plan
November 29, 1994

Sgt. Lente-Dawson
Congressional Affairs Office
Holloman AFB, NM

Dear Sergeant Dawson:

Please consider this a request to share any thoughts or findings Holloman Air Force Base has on the inquiry of the Mesilla Valley Audubon Society relating to sewage lagoons and a new sewage treatment facility at the Air Force base.

Because of the desire of this office to be responsive to all inquiries and communications, I would appreciate your findings and views at your very earliest convenience.

Please send your response to my Las Cruces office which is located at 148 Loretto Towne Centre, 505 South Main Street, Las Cruces, NM 88001. If you have any questions or need additional information, please call Lee Gemoets at (505) 523-6561.

Thank you for your assistance.

Sincerely,

Jeff Bingaman
United States Senator
MEMORANDUM FOR Catherine Sandell, President
The New Mexico Audubon Council
P.O. Box 3127
Las Cruces, NM 88003

FROM: 49 FW/CC
490 First Street, Suite 1700
Holloman AFB, NM 88330-8277

SUBJECT: Aquatic and Wetland Ecosystem Complex Around Lake Holloman
(ref The New Mexico Audubon Council ltr, 21 Sep 94 (Atch 1)
Senator Jeff Bingaman ltr, 29 Nov 94 (Atch 2))

1. I appreciate your interest in our new waste water treatment facilities at Holloman Air Force Base, and your concerns about potential loss of wetland habitat. Let me assure you that my environmental staff is investigating alternatives to the proposed configuration of evaporative ponds associated with the new waste water treatment plant. Please be aware that we must also investigate the potential for these alternatives to create bird air strike hazards for aircraft.

2. The final Environmental Assessment for the project, which will consider the evaporative ponds issue, is nearing completion and should be available by 16 Dec 1994. A feasibility study began 18 Oct 94 to provide a more detailed investigation of some options, such as turning some of the proposed evaporation ponds into constructed wetlands to replace surface water lost by closing the old lagoon system. We are also continuing to investigate the fate of the largest of the present sewage lagoons, lagoon G, which is a jurisdictional wetland, after it no longer receives waste water. The Air Force is committed to fully complying with laws and regulations governing wetlands, including Section 404 of the Clean Water Act and Executive Order 11990.

3. We must carefully study any actions which may attract birds to Holloman AFB because of the potential for compromising the safety of air crews and the public as a result of bird collisions with aircraft. Accordingly the Bird Air Strike Hazard Team is also investigating wetland alternatives to ensure that flying safety is not compromised.
4. Again, I share your concerns over the issues raised in your letter and from past discussions with the Mesilla Valley Audubon Chapter. I hope these investigations will provide us with the information to minimize impacts to the current aquatic and wetland ecosystem in the Lake Holloman area, and to enhance this ecosystem. "The Air Force is dedicated to protecting our natural and cultural resources. It's the right thing to do, and the American people expect no less of us" (Secretary of the Air Force, Dr. Sheila Widnall, Holloman AFB, Sunburst, 7 Oct 94). Holloman Air Force Base is committed to environmental stewardship.

SIGNED

JOHN F. MILLER, JR.
Brigadier General, USAF
Commander

Attachment:
1. New Mexico Audubon Council Ltr, 21 Sep 94
2. Senator Jeff Bingaman Ltr, 29 Nov 94