DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 1606TH AIR BASE WING (MAC)
KIRTLAND AIR FORCE BASE, NEW MEXICO 87117-5000

Mr Boyd Hamilton
Program Manager
Hazardous Waste Program
HED-EID
1190 St Francis Drive
Santa Fe NM 87503

Dear Mr Hamilton

Enclosed is the base-wide closure plan for Kirtland Air Force Base and the three closure plan supplements for the sewage lagoons, the main golf course pond and the golf course. Any additional units which will require closure plans in the future will also be addressed as supplements to the base-wide plan.

We feel that these documents satisfy the requirement in the compliance agreement signed in February, 1990, for the submittal of closure plans. We would appreciate written acknowledgment of the receipt of these plans so that this portion of the agreement can be resolved.

If you should have any questions, please contact Mr John Gould of my staff at 846-2773.

Sincerely

Edward A. Behling, Colonel, USAF
Director
Environmental Management Division

4 Atch
Base-wide closure plan
Sewage lagoon supplement
Golf course supplement
Golf course pond suppl.

**BASE-WIDE CLOSURE PLAN FOR
UNITS REQUIRING CLOSURE
AT
KIRTLAND AIR FORCE BASE
ALBUQUERQUE, NEW MEXICO**

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BASE-WIDE CLOSURE PLAN FOR
UNITS REQUIRING CLOSURE
AT
KIRTLAND AIR FORCE BASE
ALBUQUERQUE, NEW MEXICO

April 13, 1990

Prepared for:

KIRTLAND AIR FORCE BASE
1606 ABW/EM, Building 20200
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SECTION 1.0

1.0 EXECUTIVE SUMMARY

Kirtland Air Force Base (KAFB), located in southeastern Albuquerque, New Mexico hereby submits a base-wide close plan including Closure and Post-Closure Care Plan Preliminary Information for waste-management units located on the facility, in accordance with the New Mexico Environmental Improvement Division's Compliance Order of (September 1988). The waste management units consist of sites that may have received hazardous and non-hazardous wastes from operations on Kirtland Air Force Base.

This closure plan, as well as reference documents, supplements and previous investigations is organized to address the specific requirements of the 40 CFR Parts 261, 265 and 267 adopted by the State of New Mexico Hazardous Waste Management Regulations (HWMR-5).

This document is written as a baseline plan for conceptual closure design information for all units that may potentially require closure designs in the future, on the Kirtland Air Force Base facility. Specific unit closure design information will be added as supplements for future closure plans. A list of other units that may require closure designs is included in section 4.

KAFB proposes to close the individual units under one of the conceptual designs presented. Six alternative conceptual designs for closure of the units are being considered. Once data is obtained from the site characterization phase, involving a sample and testing program, one of the six designs will be adopted for closure. A closure report on each unit will be submitted as a supplement to this document. The detailed specifications of the closure design will be part of each supplement.

Sections 2.0 and 3.0 provide descriptions of the waste management facility and location, land use and physical and hydrogeological conditions at the site. Sections 4.0 and 5.0 describe the waste disposal practices at each site and the results of (or proposed) sampling plans and contamination investigations. Analytical results are presented in Appendix A. Section 6.0 discusses general the unit closure designs. Appendix B details specific closure information on the unit undergoing closure. Section 7.0 addresses the various specific regulatory requirements related to closure and Section 8.0 describes the post closure care plan.

The supplements rely on baseline information contained in this plan under the same section numbers and headings. Site specific information for each unit is included under the appropriate section when necessary.

Also included for reference is a chemical list and test method, copied from the 40 CFR, Part 261, Appendix IX listing of contaminates that are the tests used for certification of clean closure.

Quality control procedures will be governed by the Quality Assurance Project Plan by USGS, included under separate cover.

The Installation Restoration Program Stage 2 work plan by USGS is included under separate cover. This document will be used for site characterization activity and work plans.

The sampling and analysis plan for the IRP by USGS is currently under development and will address specific sampling activity at each unit.

SECTION 2.0

2.0 SITE DESCRIPTION (267.33(a)(3))

2.1 LOCATION AND SITE HISTORY

Kirtland AFB is located in central New Mexico southeast of and contiguous to the City of Albuquerque (Figures 2-1 and 2-2). The Base is owned and operated by the United States Air Force, it covers over 82,000 acres and contains 742 buildings with 5.6 million square feet of floor space. Present land uses for areas adjacent to the base are as follows:

- North - residential area
- East - mountainous rural area, national forest
- South - Indian reservation
- West - residential and business areas

The most prominent physiographic features of this area are the Rio Grande Valley and the Sandia-Manzano Mountains. A Kirtland Air Force Base General Topography Map is provided for reference (Figure 2-3).

Three areas within the base are owned by the Department of Energy (DOE), not the Air Force. Facilities in these areas (DOE Areas I, II and III) are operated and maintained by Sandia National Laboratories, a research and development contractor for the DOE, and are included in the IRP Phase I study. Because of the classified nature of the research activities of the DOE and Sandia National Laboratories, details of waste generation are less comprehensive than for other sections of the base operated by the Air Force. Waste disposal sites and past waste management practices operated by the DOE and Sandia are not discussed in this report. The disposal sites that are not operated by the Air Force are listed separately in the IRP Phase II Program report.

The initial construction of Albuquerque Army Air Base began in January 1941, almost a year before the United States entered World War II. The name of the base was changed to Kirtland Field in 1942. Four squadrons from the 19th Bombardment Group were assigned to the base as well as the Combat Crew Training School and the Air Forces Advanced Flying

School. Other activities on the base during this period included training of aviation mechanics, maintenance operations for the bombardier air depot, convalescent center and a support division for the Manhattan Project.

Sandia Corporation (now Sandia National Laboratories) was located on Oxnard Field which is now known as Kirtland East. Its primary mission was development of nuclear weapons which continued as a research function even after the war ended.

Manzano Base was constructed in 1947 as an annex to Sandia Base. The area has been used primarily for storage of aerospace resources.

In 1948 Kirtland Field became Kirtland Air Force Base and in 1971 Sandia Base, Manzano Base and Kirtland Air Force Base merged and became known as Kirtland Air Force Base. The base has evolved essentially into a research, development and training center, hosting various military organizations.

A more complete description of Kirtland Air Force Base history is presented in the IRP Phase I records search.

The Basic missions of Kirtland AFB are to support research and development and for training of the pararescue medics, a flying mission. Kirtland provides technical facilities, procurement and logistic support for many research and development programs and aircraft and pilot facilities including ramp space, taxiways and aircraft barrier systems for a flying training mission. The support function for the base is performed by the 1606th Air Base Wing which contains all the administrative, security, maintenance, housekeeping, pay, medical care, housing, fire protection, legal assistance, law enforcement and logistical support for the base. The 1606th Air Base Wing was established 1 July 1977. The total base work force of 16,600 includes tenants and 31 contractors.

2.2 LAND USE - GENERAL (267.33(a)(3))

All units are located on land owned by the Federal Government. Land is utilized as an Air Force Base. Beyond the base boundaries to the north is the Veterans Administration Medical Center and a recreational park facility operated by the City of Albuquerque. Other property in the city to the north is privately owned and used for both commercial enterprises and private residences. To the east are Sandia National Laboratories (SNLA) and the Manzano Mountains beyond. Vacant land owned by KAFB and technical areas in use by both Kirtland and Sandia lie between. The Lovelace Inhalation Toxicology Institute located at the south base boundary. Vacant land owned by the Isleta Indian Reservation borders the entire south side of the base. To the west of the site is the Albuquerque International Airport, and undeveloped land owned by the University of New Mexico.

2.3 POPULATION DISTRIBUTION AND EXPOSURE

The KAFB complex is located in the southeast quadrant of the City of Albuquerque. Located within the perimeter of the base are a wide variety of Air Force and other DoD facilities. An estimated 16,660 people are employed at facilities on KAFB; this number varies considerably due to temporary assignments and transfers of military personnel. The population of the adjacent City of Albuquerque as of January 1988 is approximately 500,000+ (City of Albuquerque, 1990).

Please see the corresponding section in the supplements for specific information on exposure at each unit.

SECTION 3.0

3.0 PHYSICAL ENVIRONMENT

3.1 CLIMATE AND METEOROLOGY (267.33(a)(4), 267.31 a(3))

The KAFB site is located west of the foothills of the Sandia and Manzano Mountains on a high, arid plateau that slopes gently westward toward the Rio Grande. The climate can be characterized as arid continental (U.S. Army Corps of Engineers, 1979). Abundant sunshine, low humidity and precipitation, and a broad seasonal range of temperatures typify climatic conditions at the site. This section provides information concerning local climatology for the years 1978 to present (NOAA, 1988).

TEMPERATURE:

Based on climatological data for Albuquerque from the National Weather Bureau, average annual temperatures range from a high of 81.7° F to a low of 31.7° F (NOAA, 1988). Average daily temperatures commonly range from a high of 91°F to a low of 50°F during the summer months and a high of 60°F to a low of 24°F during the winter.

PRECIPITATION:

Annual averages:

Average annual precipitation is 8.4 inches at the Albuquerque International Airport (U.S. Soil Conservation Service 1972), most of which occurs during the months of July and August. The summer rains are normally related to local convective activity with thunderstorms, often intense, building up during the afternoon hours. The average annual snowfall is 10 inches at Albuquerque International Airport.

Monthly averages:

The average monthly precipitation in the Albuquerque area ranges from less than 1 inch during November through March to more than 1.25 inches in July and August. The winter months are typically dry with monthly snowfalls seldom exceeding 3 inches. Snow rarely lasts longer than 24 hours in the non-mountainous areas. Typically, the summer months receive almost half of the annual moisture in the form of brief but locally heavy thunderstorms. Prolonged periods of continuous precipitation are rare (NOAA, 1981).

Severe thunderstorms which generate large amounts of precipitation commonly occur in the summer months. Storms generating tornados are rare.

EVAPOTRANSPIRATION:

The low annual rainfall and high average temperatures creates an environment exhibiting low humidities and high evaporation rates. Relative humidity varies as much as 40% on a daily basis in Albuquerque. Annual relative humidity highs range from 80% to 40%, lows range from 40% to 15%, with an average of 65% to 30% (NOAA, 1988). Gross annual pond evaporation is approximately 65 inches, which is 6 to 7 times greater than annual precipitation. According to the Corps of Engineers and others (1979), potential evapotranspiration (evaporation occurring when no soil-water deficit exists) for the Albuquerque area is 30.9 inches. Actual evapotranspiration has been determined to be about 95% of precipitation in this climatic regime, and the remaining 5% is divided equally between runoff and recharge (Corps of Engineers and others, 1979).

WINDS:

Winds are generally light to moderate. Average wind speeds range from 7 to 12 mph, with maximum gusts averaging on the order of 40 mph. The prevailing wind direction from May through October is south or southeast and the mean wind speed is 7 to 12 mph. From November through April the prevailing wind direction is north or north-northwest and the mean wind speed is 6 to 12 mph.

3.2 GEOLOGY AND SOILS (267.33(a))

3.2.1 Regional Geology

The KAFB site is located within the Albuquerque Basin of the Rio Grande Rift, a major structural trough of Neogene age that extends from southern Colorado to south-central New Mexico. The rift formed in the last 30 million years as en-echelon series of elongate, north-trending structural basins which contain up to 17,000 feet of sedimentary and volcanic deposits.

Rocks exposed in the Albuquerque Basin area range in age from Precambrian to Holocene. Outcrops of pre-basin Precambrian, Paleozoic, and Mesozoic rocks are almost entirely confined to the Sandia and Manzano mountains that form the bordering structural rims of the basin. Upper Cenozoic volcanics of primarily basaltic composition occurs in the basin, along with contemporaneous basin fill (Kelley, 1977).

A series of coalescing alluvial fans extend along the base of the eastern uplifts that bound the basin, from the Las Piños to the Sandia Mountains. The KAFB site is located on a broad alluvial fan that is derived from the weathering and erosion of rocks in the Sandia and Manzano Mountains to the east.

3.2.2 General Geology and Soils (267.31 (a)(5))

The KAFB site lies on the upper surface of alluvial fan and other deposits associated with the Tijeras Arroyo drainage system. These facies consist of sand, gravels and clays deposited by paleodrainages transporting sediments from the eroding Sandia and Manzano Mountains. Thick channel deposits of sand and gravel are inter-bedded with thinner strata of clays and silts deposited in over-bank and other low-energy environments.

Several soil types are present at the KAFB site. The Latene Series consists of deep, well drained sandy loom that forms in old alluvium and mixed eolian sediments. Permeability is moderate, ranging from 0.6 to 2.0 inches per hour (U.S. Soil Conservation Service, 1977). Runoff is moderate and water erosion and soil blowing hazards are moderate.

Wink Series soils consist of Wink fine sandy loam, and the Wink-Embudo complex. Wink Series soils are deep, well drained soils that form in old unconsolidated alluvium modified by wind on pediment surfaces. Permeabilities range from 2.0 to 6.0 inches per hour (U.S. Soil Conservation Service, 1977). Runoff is medium in the Wink fine sandy loam, water erosion is slight to moderate and hazard of soil blowing is moderate. Potential for flooding and poor compaction exists in soils of the Wink-Embudo complex.

3.2.3 Site Geology and Soils

Please see corresponding section number supplements for unit specific information.

3.3 HYDROGEOLOGY (267.10 (a))

3.3.1 Regional Hydrogeology

The principal ground-water unit underlying the Albuquerque area consists of a thick, extensive water-table aquifer hosted by the unconsolidated sediments of the Santa Fe Group (Tertiary) and younger alluvial and colluvial deposits. These deposits lie in the Albuquerque Basin, a deep structural depression which is part of the Tertiary Rio Grande rift. The Albuquerque Basin fill is known to be at least 10,000 feet deep (Kelley, 1977). Other references discuss the possibility of the basin fill being still deeper. Facies in the Santa Fe Group generally change from coarse sand-and-gravel alluvial fan deposits near the mountain front on the east to finer, more clay-rich units in the axial valley of the Rio Grande.

The potentiometric surface of the aquifer, on a regional scale, slopes eastward and westward from the Rio Grande and southerly along the valley. Because the topographic slope rises and the water table drops, the aquifer's upper surface becomes progressively deeper to the east and west. This regional configuration is complicated by cones of depression formed by withdrawals from Air Force and city wells.

The water table lies within a few feet of the land's surface in the valley near the river, but is several hundred feet below the surface in the eastern part of Albuquerque.

The aquifer is recharged from 3 major sources. Infiltration from the Rio Grande, and subsurface flow along the rift from the north provide the majority of the recharge. Additional recharge is provided by infiltration of runoff from the western front of the Sandia Mountains. Discharge is primarily by withdrawals from city wells, southerly subsurface flow and regional evapotranspiration. Records indicate that the water table under Albuquerque/KAFB is dropping at the rate of several feet per year as the result of these withdrawals.

Much of the Albuquerque aquifer is composed of sand and gravel deposits and is highly transmissive, with transmissivities ranging from 7500 to 600,000 gallons per day per foot (Bjorkland and Maxwell, 1961). By volume, the majority of water rights in the Albuquerque area are owned by the City of Albuquerque, which withdraws several hundred thousand acre-feet per year from the aquifer (United States Army Corps of Engineers, 1979).

3.3.2 Site Hydrogeology - Kirtland General (267.10 (a)(2))

This discussion of site hydrogeology is based on data obtained during the installation of monitor wells adjacent to the sites (USGS, 1989). This document, when available, will contain geologic and geophysical logs, detailed cross-sections and well construction details, this information will appear in Appendix A. Additional information is contained in Installation Restoration Program (IRP) reports Phase I (1981) and Phase II (1985). The IRP documents are used as references to this report.

At the KAFB site ground water lies at a depth of approximately 475 feet below the land's surface, or an elevation of approximately 4,880 feet MSL. Water level data indicates that there is a general northerly gradient at the site, but some local variations are evident. The water gradient is influenced by the pumping of the Kirtland AFB wells in the vicinity and City of Albuquerque water supply wells to the north and northwest of the site. The gradient varies across the site. The aquifer is hosted by sand and gravel deposits. Additional data on the hydrogeologic environmental restoration conditions at KAFB will be developed as part of KAFB's Installation Restoration program by USGS.

SECTION 4.0

4.0 HAZARDOUS WASTE MANAGEMENT UNITS

4.1 SIZES AND TYPES (267.31)

4.1.1 General

The potential units that may require closure are listed below. Please refer to the specific unit closure plan supplement for information on each of these hazardous waste management units.

UNIT CLOSURE PLAN SUPPLEMENT DOCUMENTS
(UNITS THAT MAY REQUIRE CLOSURE PLANS)

UNIT	TYPE
Sewage Lagoons	Surface impoundment
Main Golf Course	Surface impoundment
Golf Course	Land treatment unit
Golf Course Ponds	Surface impoundment
Imhoff Tank System	Sewage Treatment unit
Septic Tanks (unspecified)	SWMU
Leach Fields	Land Treatment
Fire Training Areas (unspecified)	Land Treatment
Land Fills (unspecified)	Landfill
Radioactive Burial Areas (unspecified)	Landfill
Oil Water Separators (unspecified)	Treatment units
Sumps (unspecified)	SWMU
Additional Units (reserved)	(Reserved as Required)

SECTION 5.0

5.0 DOCUMENTED RELEASES

5.1 RELEASE HISTORY

Release history is specific to the unit and is described in the Unit Closure Plan Supplements.

5.2 SAMPLING PROGRAM

5.2.1 General Objectives

To determine the nature and extent of potential contamination, a sampling program for each unit will be developed and described in the Unit Supplement. Chemical analyses of samples collected from the units will be conducted. The sampling program will be designed in order to define the following:

- Evaluate waste characteristics of sludges and near-surface soils
- The lateral and vertical extent of vadose zone contamination in the vicinity of each unit,
- The level of contaminates that may exist in the soil,
- The nature and concentrations of hazardous constituents,
- The possibility of other undocumented waste disposal, and
- The possibility of contaminates affecting ground water.

5.2.2 General Drilling and Sampling Procedures

Auger flights and all tools will be steam cleaned prior to the advancement of each borehole, and the continuous core barrels, end caps, and sampling tools will be steam cleaned following each trip out of the borehole.

Boring and sampling will be accomplished with a hollow-stem auger drilling rig equipped with a continuous core sampling device. As the auger flights are advanced, continuous soil samples will be collected by inserting a continuous core sampling device through the hollow center of the auger and extending it a short distance beyond the cutting head of the auger. As the auger is advanced, an undisturbed soil sample will be collected in a long split core barrel. When the core barrel is filled, auger penetration is stopped and the barrel retrieved to the surface where it was opened and the contents logged by the on-site geologist and samples collected for chemical analysis.

Constituent samples will be taken from each core interval and stored in an ice chest at approximately 4 degrees celsius. Samples to be analyzed for volatile, halogenated and aromatic compounds will be taken from the core center immediately upon opening the core barrel and placed in 500-ml glass jars with teflon seals in the lids. All geochemical samples taken from the cores will be removed using steam cleaned, stainless steel sampling instruments.

Samples will be initially analyzed for contaminates of concern listed in Appendix C. If the samples are not contaminated with the primary contaminates of concern listed in Appendix C, subsequent tests for the contaminates listed in Appendix F will be performed. Sample sizes, containers, preservatives and analytical methods will be determined by the testing laboratory. For general information a summary of test methods is shown in Table 5-1. Proposed container types and preservatives are shown in Table 5-2.

Strict chain-of-custody procedures will be followed during collection, storage and shipping of all samples. The samples will be placed in an ice chest, and shipped to the laboratory for analysis following protocols outlined in EPA SW 846. Quality Assurance/Quality Control (QA/QC) samples will consist of field duplicates and test equipment blanks, collected at the rate of one per borehole.

Quality control procedures will be governed by the Quality Assurance Project Plan prepared by USGS, February 15, 1989 (included under separate cover). The IRP Stage 2 Workplan details the approach and locations of the site characterization efforts (Appendix D). The Sampling and Analysis Plan developed for the IRP by USGS addresses specific sampling activity at each unit (Appendix E currently under development).

5.2.3 Sampling of Sludges

Sludges will be sampled according to the installation restoration program stage 2 work plan, sampling plan referenced in Appendix D. The sampling program will conform to stratified random sampling techniques with composite samples for testing in accordance with CFR 261 and test methods for Evaluating Solid Waste Physical/Chemical Methods (SW846), specifically Part III, Chapter 9. Unit sampling results are presented in Appendix A of the specific unit supplement and are not included as a part of this plan.

5.2.4 Sampling of Subsurface Soils

Location and depth of the holes are discussed in the Work Plan in Appendix D. Boreholes will be drilled and sampled to establish the depth of contaminate migration (if any) in each unit. Samples from boreholes will be collected using a hollow stem auger rig equipped with a continuous core sampling device. Prior to the sampling and boring program at each hole, all equipment will be thoroughly steam cleaned to prevent cross contamination. Rinsate will be saved and tested. If determined to be hazardous, the rinsate will be containerized and disposed of as a hazardous waste.

5.2.5 Sampling of Background Soil Conditions

If data on background soil conditions are necessary, one borehole near each unit will be drilled and sampled to establish a baseline for contaminates of concern listed in Appendix C and chemicals listed in Appendix F. If background levels show slight amounts of natural contamination, accommodations will be made when analyzing samples taken from the units. This will be addressed during review of the testing results.

5.2.6 Sampling of Vadose Zone

If contamination is known or suspected to exist in soils at the unit, a vadose zone investigation will be conducted to determine the lateral and vertical extent of contamination. Data collected during this investigation will be used to determine if the potential for ground water contamination exists. If no potential exists, an application will be made for a ground water monitoring waiver.

5.2.7 Sampling of Ground Water

Ground water wells, when required, will be established and sampled to determine if contaminate migration has affected ground water conditions under each unit. The wells will be established outside the perimeter of the units to prevent potential avenues of downward migration. By locating wells inside the units, an annulus for contaminate migration may be created. Four monitor wells drilled to groundwater will be established at each unit.

5.2.8 Results

When sampling of sludge and soil has been accomplished, the laboratory results will be included as Appendix A in the supplement Closure Plan. The sampling results will be submitted when they become available from the USGS.

5.3 ANALYTICAL RESULTS AND PRIORITY TESTING

Initial sampling and testing will address contaminates of concern listed in Appendix C. These contaminates were identified in previous sampling activity. If contaminates of concern are identified in surface sludges, they will be used as indicating parameters for tracking contaminate migration in near surface and deep vadose zone soil samples. Indicating parameters will also be used to test ground water for contamination migration.

Following testing and removal for contaminates of concern, KAFB will test additional soil samples to show that any Part 261 Appendix IX (listed in Appendix F) constituents that may remain in the unit are lower than established background sample levels for metals only. Other contaminants that may remain will be below levels posing a threat to human health and the environment based by WQCC standards. Application will then be made for clean closure status. Please refer to the decision tree diagram (Figure 6-1) for appropriate testing sequences.

5.4 QUALITY ASSURANCE/QUALITY CONTROL

To assure complete and correct results, the analytical laboratory will perform quality assurance/quality control (QA/QC) analyses of blanks and duplicates for all analytes and/or methods. The QA/QC data and guidelines are provided in Quality Assurance Project Plan for Kirtland AFB prepared by USGS 2/15/89. QA/QC Data will conform to SW 846 guidelines.

SECTION 6.0

6.0 CLOSURE DESIGN

6.1 CLOSURE GOALS (265.112)

The necessity of having to perform a full scale closure of the units will be solely determined by the presence of contaminants in the sludges, subsurface soils, or ground water in excess of acceptable regulatory levels that have originated from the influent. At this time, the presence of contaminants, the levels at which they occur, as well as the possible extent of that contamination, have not been determined. The contamination investigation is outlined in Section 5.2. If contaminant levels in the sludges and subsurface soils and ground water are found to be below acceptable WQCC levels, closure of the units will be unnecessary. If contaminant levels are above acceptable levels and the volume of contaminated materials can be feasibly removed, the units will be clean closed. If the contaminate levels are above acceptable limits and the volume of contaminated materials is too excessive for removal, the unit will be closed as a landfill. There is also a possibility of on-site treatment as a clean closure option. The six possible alternatives are discussed below. Alternative seven is reserved for a combination of other alternatives or an unspecified closure approach.

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6.2 CLOSURE ALTERNATIVES (265.112)

Please refer to the Decision Tree Diagram, Figure 6-1, to determine the effect contamination migration will have on the type of closure alternative used. If closure is found to be necessary, there are currently six alternatives which would satisfy closure criteria. Depending upon the relative amounts of contaminate migration one of the following alternatives can be used for closure of the units:

1. Clean Closure No Contamination No Action

Hazardous constituents do not exist in sludges, surface and subsurface soils or ground water. Clean closure can be achieved by no action. Unit can be put back into service.

2. Clean Closure by Removal of Materials for Off-site Disposal

Hazardous constituents exist in the unit in sludges and near surface soils only. Clean closure can be achieved by removal of contaminated materials and off-site disposal. The unit can possibly be put back into service.

3. Closure With On-site Treatment

Hazardous constituents exist in sludges, soils but not in ground water. Clean closure with on-site treatment methods will be used to reduce contaminate levels and restrict their migration to ground water. Treatment cost of contaminated materials is less than removal. (Closure as a landfill will require 30-year monitoring and post-closure plan.)

5. Closure as Landfill Leave Contaminated Materials in Place

Hazardous constituents exist in sludges, near surface and deep soils but has not contaminated ground water. Cost of removal for clean closure exceeds cost of closure as a landfill. Landfill closure requires post closure and 30-year monitoring plan.

6. Closure as Landfill with Treatment of Contaminated Ground Water

Hazardous constituents have contaminated sludges, soils and ground water. Closure of the unit as a landfill with ground water remediation will be employed. (Closure as a landfill will require 30-year monitoring and post-closure plan.)

7. Combination of Above Alternatives or Unspecified Closure Alternative (Reserved)

Each of the closure method alternatives, and the criteria which would be used to determine what method would be employed, are discussed in the following sections.

6.2.1 Clean Closure

Clean closure will be the method of choice if it is found to be physically and economically feasible to remove and dispose of all contaminated materials. It is anticipated that if the subsurface soils are contaminated to a depth of three feet or less below the unit, clean closure will be initiated.

6.2.2 Clean Closure Goals

The goal of clean closure will be to remove all contaminated materials which would pose an unacceptable risk to the environment or human health. With this goal in mind, the following standards for closure are proposed:

- EP Toxicity levels as listed in 40 CFR Part 261 Sub-part C, Table 1 - Maximum Concentration of Contaminants for Characteristic of EP Toxicity will be used as the guideline for determining metals contamination.

- The Human Health Standards for volatile and semi-volatile organic compounds as listed in Section 3-103.A. of the New Mexico Water Quality Control Commission (WQCC) Regulations will be used as the guideline for determining organic contamination. The listed standard concentrations in mg/l for water on a mass per volume basis will be directly correlated to an equivalent concentration in mg/kg for soil on a mass per mass basis. (This is for other organic contaminates of concern).

- Certification of clean closure will be done following tests to show that no Part 261, Appendix IX constituents remain above locally established background levels. This list is included in Appendix I of this document.

The WQCC standards were chosen as a guideline for contamination because no RCRA standards exist for the volatile and semi-volatile compounds in soil. It is believed that these standards are considered sufficiently stringent so as to protect human health.

Standards for closure were included for metals, volatile organics, and semi-volatile organics, these are the contaminants of concern to environment and human health. For several reasons, inorganic compounds such as nitrates and chloride were intentionally excluded from the proposed closure standards, even though they are included in the WQCC standards:

- Nitrates and chloride are not considered to be hazardous, ignitable, toxic, or corrosive, and are only considered to be "harmful" or undesirable when found in elevated concentrations in drinking water.
- Nitrates and chloride are naturally occurring in the native soils, and elevated concentrations would also be commonly found in soil which had come into contact with domestic waste water.
- Closure of domestic sewage lagoons and removal of soil containing nitrates and chloride is usually not performed, it is not appropriate to remove soil which contains these compounds in excess of the WQCC standard.

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6.2.3 Closure as a Landfill

If the units will be closed as a landfill, with contaminated materials left will be in place, only if it is physically impossible or economically burdensome to remove and dispose of the contaminated materials. As mentioned in Section 6.1, there are two alternatives available for closure as a landfill. If sludge in the units is highly contaminated so that an unnecessary risk is incurred by leaving it in place, it will be removed and disposed. This method will be employed if the sludges present a significant risk to the environment if left in place. Placement of an impermeable cap would be installed over the area of contamination. The preferred method for closure as a landfill would be to leave all contaminated materials in place, and cover the area with an impermeable cap. If contamination has contaminated ground water, treatment methods will be the subject of an amended Closure Plan.

As mentioned above, clean closure will be performed if possible and is the closure method of choice. It is anticipated that site conditions, the level of contamination, and the extent of contamination will allow for clean closure of the site. For this reason, closure of the unit as landfills or waste pile will not be discussed further until required. Sections 5.2 and 5.3 discuss the clean closure goals and the methods which will be used to ensure clean closure. If it is determined that clean closure cannot be achieved, and it will be necessary to close the unit as a landfill, a post closure plan will be submitted to NMEID.

6.3 CLEAN CLOSURE METHODS

6.3.1 General Site Preparation (265.112 (b)(4))

Site preparation will be minimal. The area will be cleared for utilities and a barrier or fence will be erected around the work area to prevent access by unauthorized personnel. Traffic routes for heavy equipment will be provided so that normal traffic patterns will be minimally impacted.

6.3.2 Removal and Disposal of All Inventory (265.112 (b)(4))

Removal is the preferred alternative to achieve clean closure of each unit. The removed material will be disposed of in an appropriate manner consistent with regulations. The removal of materials at each unit will be discussed in the supplements.

6.3.3 Record Keeping

All field activities will be conducted under the direct supervision of an qualified engineer or geologist who will keep detailed field records. Final "as-built" diagrams of closure structures will be prepared and submitted to NMEID in the final closure report.

6.4 HEALTH AND SAFETY DURING CLOSURE (265.16)

All personnel entering the construction site will be required to observe health and safety procedures as required by OSHA and KAFB. These procedures include the following:

- All personnel must be equipped with hard hats meeting ANSI Z89.1-1969 specifications.
- If necessary, personnel are required to wear safety glasses or face shields if their hard hats are so adapted, meeting ANSI Z87.1-1968 specifications.
- When necessary, personnel will be issued ear protection devices capable of providing the permissible noise exposures detailed in 29 CFR, Part 1910.95, Table G-16.
- All personnel are required to wear steel-toed safety footwear meeting the specifications of ANSI 41.1-1969.
- Personnel will be supplied with protective hand wear capable of providing physical as well as chemical protection from hazardous constituents. Since dermal exposure to contaminated soils is expected to be minimal, heavy leather gloves will be used.
- All site personnel will be required to wear protective coveralls for body protection while engaged in site activities.
- If necessary, specific health and safety plans will be developed for the individual units and type of investigation and/or closure operations required.

6.5 COST ESTIMATE (265.142)

The total depth and volume of material to be removed from each unit has not yet been determined, therefore a firm cost estimate cannot be provided at this time. Included for general information is a list of items that will impact the costs of closure for each unit. Each Unit Supplement Closure Plan will address closure costs as they apply to this specific unit.

Clean Closure

- Excavation and removal of sludges
- Transport and disposal of sludges
- Excavation and removal of soils
- Transport and disposal of soils
- Disposal site costs
- Decontamination of structures, equipment and piping
- Site fill and regrading

Landfill Closure

- Excavation and removal of sludges
- Transport and disposal of sludges
- Excavation and removal of soils
- Transport and disposal of soils
- Removal of piping and valve works
- Removal of concrete structures
- Transport and disposal of piping and equipment
- Disposal site costs
- Site fill and regrading
- Monitor well installation and monitoring
- Final cover and cap, erosion protection
- Surface grading
- Re-vegetation

For Landfill Closure With Treatment Include:

- On-site treatment and stabilization methods (unspecified)
- Ground water remediation (if required)

For both types of closure the above costs will vary depending on thickness of contaminated material.

In addition, costs will vary with haul distance, ultimate disposal facility and method.

6.6 EQUIPMENT DECONTAMINATION (265.112 (b)(4), 265.114)

Each piece of earth-moving equipment which may be in contact with hazardous materials during closure activities will be thoroughly decontaminated before it is returned to normal service. Contamination of equipment is expected to be minimal since a small volume of contaminated sludge exists at the site. A limited amount of equipment will be required for closure activity. A sound asphalt, concrete, or lined gravel pad will be used for decontaminating equipment exposed to contaminated soils or materials. The size of the pad will be large enough to accommodate the equipment that is used. It will be bermed with a runoff catchment basin so that the wash water can be collected, removed or treated.

Contaminated equipment will be cleaned using the following procedures:

- Pressurized hot water wash with non-phosphate detergent
- Potable water rinse
- Steam cleaning (if warranted)
- Collection, testing and proper disposal of rinsate

Needs to be expanded

SECTION 7.0

7.0 REGULATORY REQUIREMENTS

7.1 FACILITY CONDITIONS

7.1.1 Maximum Amount of Inventory (265.112 (b)(3))

The estimated maximum inventory of hazardous wastes that may be present in the unit has not been determined. The volume of inventory existing in each unit will be determined after the extent of contamination is defined.

7.1.2 Inventory of Auxiliary Equipment (265.112 (b)(4))

It is expected that equipment related to piping, valves and concrete structures may require decontamination for proper closure if they are contaminated. If the unit is to be clean-closed, and then put back into service, all equipment will be decontaminated as described in Section 6.5. If the unit will be closed as a landfill, then equipment will be disposed of inside the landfill closure.

Equipment and materials for closure operations will be obtained from local sources. The main supply source will be the KAFB Civil Engineering Department.

7.1.3 Schedule For Final Closure (265.112 (b)(6))

Closure is expected to be completed within the year of closure start-up. Closure will be initiated within 180 days of NMEID approval of the final closure plan for each unit. External factors, such as weather and delivery schedules of disposal facilities may affect the actual schedule. All activity will follow 40 CFR 265.112 (6 & &) for time elements, notices, and amendments if significant changes of conditions occur.

7.2 REMOVAL AND DISPOSAL OF INVENTORY (265.112 (b)(4))

KAFB proposes to close the units by one of two methods:

Clean Closure

- Removal or treatment of contaminated materials as required to attain clean closure. This includes decontamination of related equipment.

Landfill Closure

- Leaving contaminated material in place with related equipment to remain as a landfill closure. This includes cover and capping of the unit with a post-closure monitoring plan and possible treatment for contaminates if warranted.

For Both Types of Closures

- KAFB may, if feasible, remove sludges from the units.

7.3 SURVEYING (265.116)

After the unit is closed, the area will be surveyed by a registered land surveyor. The surveyor will prepare a map indicating the location and elevation of the units, and structures.

7.4 NOTICE TO LOCAL LAND AUTHORITY (265.119 (a))

Within 60 days after closure is complete, KAFB will submit a survey plat of the site to NMEID.

7.5 NOTICE IN DEED OF PROPERTY (265.119 (b)(1))

Within 60 days of completion of all closure activities, a notice will be placed in the property deed, indicating that the land has been used to manage wastes and future use may be restricted from activities that will disturb the closed units. Notice will be made to the local land authority and the director of NMEID.

7.6 CERTIFICATION OF CLOSURE (265.115)

After all on-site closure activities are completed, KAFB will submit a certificate of closure to NMEID, signed by the KAFB Commanding Officer and an independent professional engineer who will attest that the closure has been completed in accordance with specifications in the closure plan.

7.7 POST-CLOSURE PERMIT (265.117)

Following the completion of all closure tasks and submission of final specifications to NMEID, KAFB will apply, if necessary, for the appropriate post-closure certifications and permits. If the unit is closed as a landfill, a post-closure care permit will be required. If the unit is clean-closed, and certification of clean-closure is accomplished, these permits may not be required.

7.8 AMENDMENT OF THIS PLAN (265.112 (c))

This plan may be amended as necessary according to provisions outlined in 40CFR 265.112 (c).

7.9 NOTIFICATION (265.112 (d))

KAFB will submit Supplements to this basewide Closure Plan for each unit within 180 days prior to the date in which closure operations will begin. If a closure plan is already approved, notice will be in writing at least 60 days prior to commencement of Final Closure at each unit.

7.10 TIME ALLOWED FOR CLOSURE (265.113)

Allowable time constrains outlined in this section (40CFR part 265.113) will be followed by Kirtland AFB for known units that require closure.

SECTION 8.0

8.0 POST-CLOSURE CARE PLAN FOR LANDFILL CLOSURE (IF REQUIRED)

8.1 FACILITY CONTACT

During the post-closure care period, any information regarding the units site can be obtained by contacting:

Director
Environmental Management Division
1606 ABW/BM
Kirtland AFB, NM 87117-5000
(505) 846-2751

8.2 GROUND WATER MONITORING (265.90)

The level of ground water contamination (if any) will be identified during the sampling and testing phase of the project. This testing will identify one of two conditions that will define post-closure requirements for ground water monitoring.

- If no contaminated ground water is discovered in the test phase, the site will be clean-closed and post-closure care is not required.
- If ground water is contaminated beneath the units, KAFB will characterize ground water quality beneath the KAFB lagoons and monitor changes. Four monitor wells have been installed, at the corners of the sewage lagoons. Monitor wells will be installed at the golf course pond. Specific information regarding the design, installation and development of the KAFB monitor wells are discussed in KAFB's Monitor Well Installation Report (USGS, 1990).

The hydraulic gradient beneath the units is uncertain. Ground water elevations will be monitored and evaluated for the first year to determine seasonal and pumpage effects. If it is determined, after the first year, that additional wells will be required to maintain compliance, a proposal will be submitted to NMEID.

Quarterly sampling will be conducted on the monitor wells for the first year. All sampling and analytical procedures will follow strict protocol as outlined in EPA Technical Enforcement Guidance Document and SW-846. For the first quarter, all monitor wells will be monitored for all RCRA and Appendix IX constituents above established background conditions. Indicator parameters will be monitored for the following 3 quarters then semiannually thereafter until clean closure is certified.

At the end of 2 years, if no contaminants from the units have been detected and confirmed in ground water, KAFB will propose to cease monitoring and submit a certification of clean closure.

If contamination by disposed wastes is detected in any well, an assessment plan will be prepared, submitted to NMEID and implemented.

8.3 SAMPLING AND ANALYSIS (265.92)

If ground water monitoring is required, the parameters of ph, specific conductance total organic carbon, and total organic halogen will be used as indicating parameters after the initial sampling to monitor possible contamination of the ground water.

8.4 EMERGENCY RESPONSE (265.56)

All wastes will be removed or covered. Therefore, no emergency response plan is necessary.

8.5 FINANCIAL REQUIREMENTS (265.140 (c))

KAFB is a Federal Facility. A demonstration of financial plans for post-closure care is not required.

8.6 PERSONNEL TRAINING (265.16)

During closure operations, KAFB and contractor personnel involved with the closure operations will be trained and instructed to observe all health and safety procedures (see Section 7.3). Uninvolved personnel will be instructed not to enter the working areas. Access to the working areas will be restricted by traffic barricades, signs or fences. No further training is needed after the site is closed.

SECTION 9.0

9.0 SECURITY (265.14)

Access to all parts of KAFB is controlled by United States Air Force security personnel. No unauthorized personnel will be allowed into the work area during closure, and access to the site will be restricted.

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SECTION 10.0

10.0 REFERENCES

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National Oceanic and Atmospheric Administration (NOAA), 1988; Local Climatological Data Monthly Summary; Dates 10-88 to 1-78.

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US EPA, 1984, Permit Applicants Guidance Manual for Hazardous Waste Land Treatment, Storage, and Disposal Facilities, Guidance Manual

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N.M. Hazardous Waste Regulations (HWMR-5)

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FIGURES

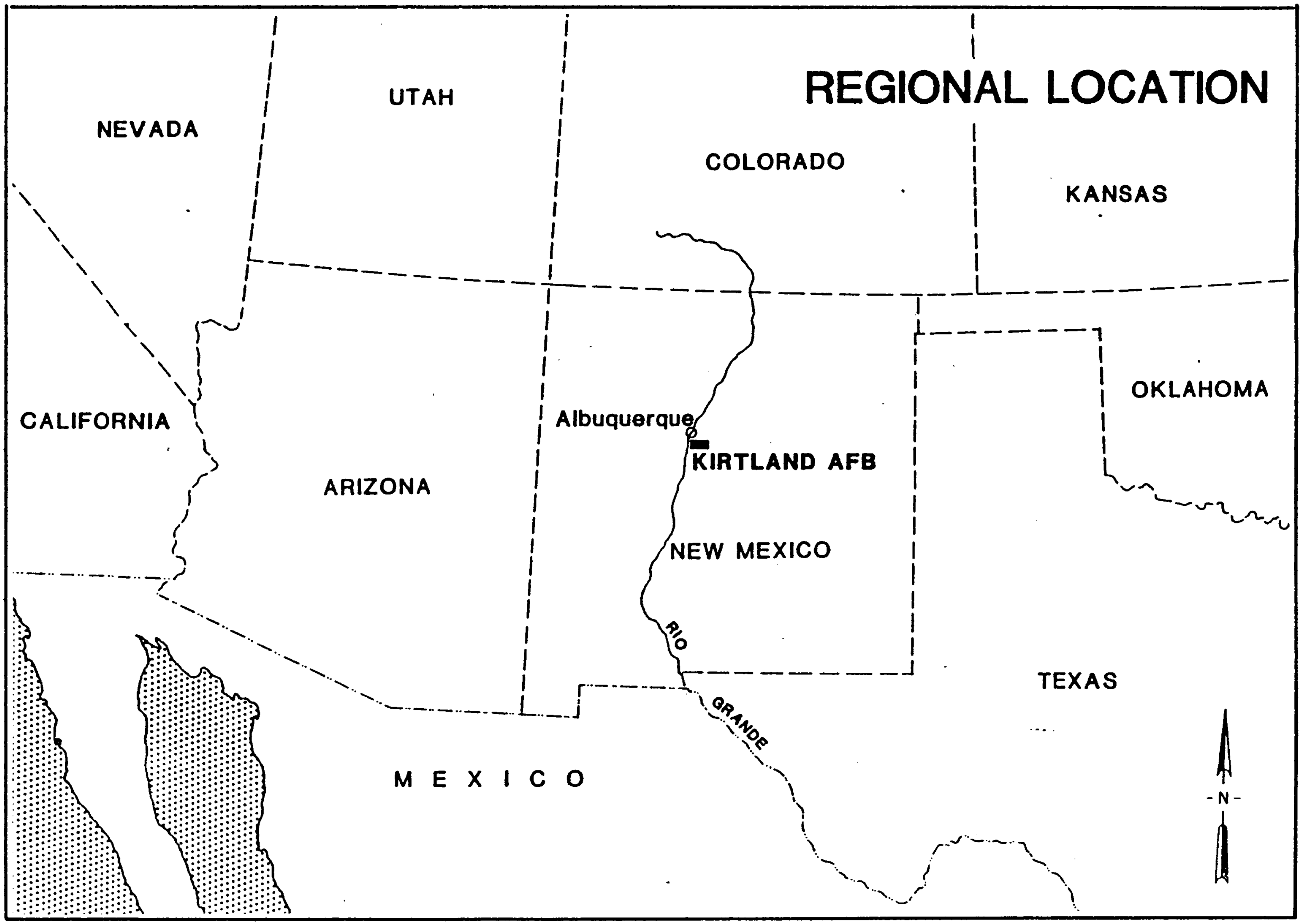

FIGURE 2-1
REGIONAL MAP

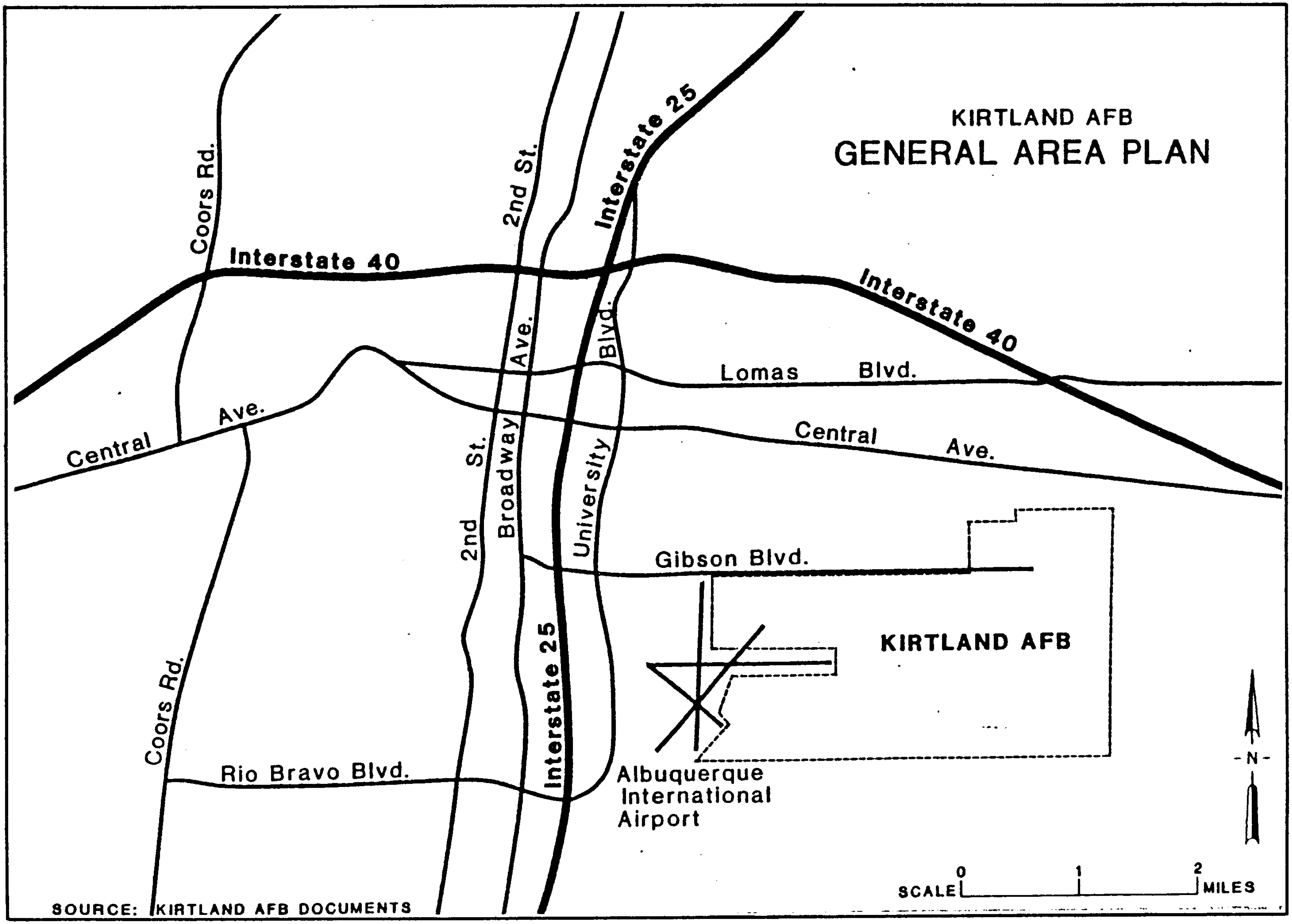

FIGURE 2-2
GENERAL LOCATION MAP OF KIRTLAND AIR FORCE BASE

FIGURE 2-3

KAFB GENERAL TOPOGRAPHY MAP

Please see Plate #1 in the
back cover of this report.

FIGURE 6-1

DECISION TREE DIAGRAM

Please see Plate #2 in the
back cover of this report.

TABLES

TABLE 5-1

SUMMARY OF TEST METHODS

1. SOLID/WASTES

REFERENCE METHOD	PARAMETER
EPA 8240	Volatile Organics
EPA 8270	Semivolatile Extractable Organics
EPA 8010	Halogenated Volatile Organics
EPA 8020	Aromatic Volatile Organics
EPA 8040	Phenols
EPA 8080	Organchlorine Pesticides & PCBs
EPA 8100 or EPA 8310	Polynuclear Aromatic Hydrocarbons
EPA 8120	Chlorinated Hydrocarbons
EPA 6010	Metals: Cd, Cr, Pb, Mn, Ba Si, Fe, Al, Sb, Be, Co, Cu, Mo, Ni, Ag, Tl, V, Zn
EPA 7060	Arsenic
EPA 7740	Selenium
EPA 7471	Mercury
EPA 7421	Lead
EPA 3237	Organic Lead
EPA 9070/9071	Oil and Grease
SM 209F	% Solids
EPA 9045	pH
EPA 1010	Flashpoint
EPA Reactivity	Cyanide/Sulfide
EPA 340.1/340.2	Fluoride

TABLE 5-1 (cont.)

2. WATER SAMPLES

REFERENCE METHOD	PARAMETER
EPA 8240* EPA 624	Volatile Organics
EPA 8270* EPA 625	Semivolatile Extractable Organics
EPA 8280* EPA 613	Polychlorinated dibenzo-dioxins (PCDD), polychlorinated dibenzo-furans PCDF
EPA 8010 EPA 602	Halogenated Volatile Organics
EPA 8040 EPA 604	Phenols
EPA 8080* EPA 608	Organochlorine pesticides and PCBs
EPA 680	PCBs
EPA 8120 (modified	Chlorinated Hydrocarbons
EPA 8140*	Organophosphate pesticides
EPA 8150*	Chlorinated herbicides
EPA 8310	Polynuclear Aromatic Hydrocarbons
EPA 6010* EPA 200.7	Metals
EPA 7060* EPA 206.2	Arsenic
EPA 7740* EPA 270.2	Selenium
EPA 7470* EPA 245.1	Mercury
EPA 7421 EPA 239.2	Lead

TABLE 5-1 (cont)

EPA 7196	Chromium (VI)
ASTM 3237	Organic Lead
EPA 9030* EPA 376.1	Sulfide
EPA 9012* EPA 353.3	Cyanide (CN)
EPA 340.2	Fluoride
EPA 300.0	Chloride, Nitrate, Sulfate
EPA 353.1	Nitrate/Nitrite
EPA 9066 EPA 420.2	Total Phenolics
EPA 415.1	Total Organic Carbon
EPA 418.1	Petroleum Hydrocarbons
EPA 450.1	Total Organic Halogens
EPA 9040 EPA 150.1	pH
EPA 9050 EPA 120.1	Conductance
EPA 410.1	Chemical Oxygen Demand
EPA 413.2	Oil & Grease
EPA 160.1	Total Dissolved Solids
EPA 310.1	Alkalinity

TABLE 5-2
SUMMARY OF
SAMPLING PARAMETERS,
CONTAINERS, PRESERVATIVES AND
ANALYSIS METHODS

WATER SAMPLES

PARAMETER	CONTAINER	PRESERVATIVE	EPA METHOD
Volatile Organic Compounds	(2) 40 ml VOA Vials	1,4	601/602
EP TOX-Metals	(1) 500 ml plastic bottle	2,4	ICP/AA
pH	(1) 500 ml plastic bottle	4	9040

SOIL SAMPLING PARAMETERS,
CONTAINERS, PRESERVATIVES AND
ANALYSIS METHODS

SOIL SAMPLES

PARAMETER	CONTAINER	PRESERVATIVE	EPA METHOD
Volatile Organic Compounds	(1) 250 ml jar	4	8010/8020
Metals	(1) 500 ml glass jar	4	6010
pH	(1) 500 ml glass jar	4	9045
pH	(1) 150 ml plastic jar	---	---

field determined
1 Add HCl until pH<2
2 Add HNO_3 until pH<2
4 Refrigerate to 4°C

APPENDIX A

APPENDIX A

SAMPLING RESULTS

(Reserved)

(TO BE INCLUDED IN THE SPECIFIC UNIT SUPPLEMENTS ONLY)

APPENDIX B

APPENDIX B

DETAILS OF CLOSURE DESIGN

(Reserved)

(TO BE INCLUDED IN THE SPECIFIC UNIT SUPPLEMENTS ONLY)

APPENDIX C

APPENDIX C

CONTAMINATES OF CONCERN

(Reserved)

(TO BE INCLUDED IN THE SPECIFIC UNIT SUPPLEMENTS ONLY)

APPENDIX D

APPENDIX D

INSTALLATION RESTORATION PROGRAM
STAGE 2 WORK PLAN BY USGS

(Included Under Separate Cover)

APPENDIX E

APPENDIX E

SAMPLING AND ANALYSIS PLAN FOR IRP BY USGS

Surface Soils and Sludges

Currently under development by USGS this document will be used as a sampling plan for units undergoing closure. This document will be provided when available.

SAMPLING PRIORITY

For determining extent of contamination, the contaminants of concern will be monitored during the sampling and testing program.

If the contaminants of concern listed in the specific unit closure plan are not detected then the Appendix IX (40 CFR Part 261) constituents shown for reference in Appendix F will be tested for and compared to existing background levels. These will be used for Certification of Clean Closure.

Due to high analytical costs, it is not logical to look for all the Appendix IX constituents in the initial sampling program. The Appendix IX constituents will be investigated only if contaminants of concern are not detected.

APPENDIX F

APPENDIX F

PART 261 APPENDIX IX

Reference Chemical List and Test Methods.
Copied from 40 CFR Part 261 Appendix IX.

PART 261 APPENDIX IX — GROUND-WATER MONITORING LIST[1]

Common name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested methods[5]	PQL (μg/L)[6]
Acenaphthene	83-32-9	Acenaphthylene, 1,2-dihydro-	8100 8270	200 10
Acenaphthylene	208-96-8	Acenaphthylene	8100 8270	200 10
Acetone	67-64-1	2-Propanone	8240	100
Acetophenone	98-86-2	Ethanone, 1-phenyl-	8270	10
Acetonitrile; Methyl cyanide	75-05-8	Acetonitrile	8015	100
2-Acetylaminofluorene; 2-AAF	53-96-3	Acetamide, N-9H-fluoren-2-yl-	8270	10
Acrolein	107-02-8	2-Propenal	8030 8240	5 5
Acrylonitrile	107-13-1	2-Propenenitrile	8030 8240	5 5
Aldrin	309-00-2	1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro- (1α,4α,4aβ,5α,8α,8aβ)-	8080 8270	0.05 10
Allyl chloride	107-05-1	1-Propene, 3-Chloro-	8010 8240	5 5
4-Aminobiphenyl	92-67-1	[1,1'-Biphenyl]-4-amine	8270	10
Aniline	62-53-3	Benzenamine	8270	10
Anthracene	120-12-7	Anthracene	8100 8270	200 10
Antimony	(Total)	Antimony	6010 7040 7041	300 2,000 30
Aramite	140-57-8	Sulfurous acid, 2-chloroethyl 2-[4-(1,1-dimethylethyl)phenoxy]-1-methylethyl ester	8270	10
Arsenic	(Total)	Arsenic	6010 7060 7061	500 10 20
Barium	(Total)	Barium	6010 7080	20 1,000
Benzene	71-43-2	Benzene	8020 8240	2 5
Benzo[a]anthracene; Benzanthracene	56-55-3	Benz[a]anthracene	8100 8270	200 10
Benzo[b]fluoranthene	205-99-2	Benz[e]acephenanthrylene	8100 8270	200 10
Benzo[k]fluoranthene	207-08-9	Benzo[k]fluoranthene	8100 8270	200 10
Benzo[ghi]perylene	191-24-2	Benzo[ghi]perylene	8100 8270	200 10
Benzo[a]pyrene	50-32-8	Benzo[a]pyrene	8100 8270	200 10
Benzyl alcohol	100-51-6	Benzenemethanol	8270	20
Beryllium	(Total)	Beryllium	6010 7090 7091	3 50 2
alpha-BHC	319-84-6	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2α,3β,4α,5β,6β)-	8080 8250	0.05 10
beta-BHC	319-85-7	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2β,3α,4β,5α,6β)-	8080 8250	0.05 40
delta-BHC	319-86-8	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2α,3α,4β,5α,6β)-	8080 8250	0.1 30
gamma-BHC; Lindane	58-89-9	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2α,3β,4α,5α,6β)-	8080 8250	0.05 10
Bis(2-chloroethoxy)methane	111-91-1	Ethane, 1,1'-[methylenebis(oxy)]bis[2-chloro-	8270	10
Bis(2-chloroethyl)ether	111-44-4	Ethane, 1,1'-oxybis[2-chloro-	8270	10
Bis(2-chloro-1-methylethyl) ether; 2,2'-Dichlorodiisopropyl ether	108-60-1	Propane, 2,2'-oxybis[1-chloro-	8010 8270	100 10

HAZARDOUS WASTE MANAGEMENT GUIDE

APPENDIX IX — GROUND-WATER MONITORING LIST[1]

Common name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested methods[5]	PQL (µg/L)[6]
Bis(2-ethylhexyl)phthalate	117-81-7	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl)ester	8060	20
			8270	10
Bromodichloromethane	75-27-4	Methane, bromodichloro-	8010	1
			8240	5
Bromoform; Tribromomethane	75-25-2	Methane, tribromo-	8010	2
			8240	5
4-Bromophenyl phenyl ether	101-55-3	Benzene, 1-bromo-4-phenoxy-	8270	10
Butyl benzyl phthalate, Benzyl butyl phthalate	85-68-7	1,2-Benzenedicarboxylic acid, butyl phenylmethyl ester	8060	5
			8270	10
Cadmium	(Total)	Cadmium	6010	40
			7130	50
			7131	1
Carbon disulfide	75-15-0	Carbon disulfide	8240	5
Carbon tetrachloride	56-23-5	Methane, tetrachloro-	8010	1
			8240	5
Chlordane	57-74-9	4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-	8080	0.1
			8250	10
p-Chloroaniline	106-47-8	Benzenamine, 4-chloro-	8270	20
Chlorobenzene	108-90-7	Benzene, chloro-	8010	2
			8020	2
			8240	5
Chlorobenzilate	510-15-6	Benzeneacetic acid, 4-chloro-α-(4-chlorophenyl)-α-hydroxy-, ethyl ester	8270	10
p-Chloro-m-cresol	59-50-7	Phenol, 4-chloro-3-methyl-	8040	5
			8270	20
Chloroethane; Ethyl chloride	75-00-3	Ethane, chloro-	8010	5
			8240	10
Chloroform	67-66-3	Methane, trichloro-	8010	0.5
			8240	5
2-Chloronaphthalene	91-58-7	Naphthalene, 2-chloro-	8120	10
			8270	10
2-Chlorophenol	95-57-8	Phenol, 2-chloro-	8040	5
			8270	10
4-Chlorophenyl phenyl ether	7005-72-3	Benzene, 1-chloro-4-phenoxy-	8270	10
Chloroprene	126-99-8	1,3-Butadiene, 2-chloro-	8010	50
			8240	5
Chromium	(Total)	Chromium	6010	70
			7190	500
			7191	10
Chrysene	218-01-9	Chrysene	8100	200
			8270	10
Cobalt	(Total)	Cobalt	6010	70
			7200	500
			7201	10
Copper	(Total)	Copper	6010	60
			7210	200
m-Cresol	108-39-4	Phenol, 3-methyl-	8270	10
o-Cresol	95-48-7	Phenol, 2-methyl-	8270	10
p-Cresol	106-44-5	Phenol, 4-methyl-	8270	10
Cyanide	57-12-5	Cyanide	9010	40
2,4-D 2,4-Dichlorophenoxyacetic acid	94-75-7	Acetic acid, (2,4-dichlorophenoxy)-	8150	10
4,4′-DDD	72-54-8	Benzene 1,1′-(2,2-dichloroethylidene)bis[4-chloro-	8080	0.1
			8270	10
4,4′-DDE	72-55-9	Benzene 1,1′-(dichloroethylidene)bis[4-chloro-	8080	0.05
			8270	10
4,4′-DDT	50-29-3	Benzene 1,1′-(2,2,2-trichloroethylidene)bis[4-chloro-	8080	0.1
			8270	10
Diallate	2303-16-4	Carbamothioic acid, bis(1-methylethyl)-, S-(2,3-dichloro-2-propenyl) ester	8270	10
Dibenz[a,h]anthracene	53-70-3	Dibenz[a,h]anthracene	8100	200
			8270	10
Dibenzofuran	132-64-9	Dibenzofuran	8270	10
Dibromochloromethane, Chlorodibromomethane	124-48-1	Methane, dibromochloro-	8010	1
			8240	5

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APPENDIX IX — GROUND-WATER MONITORING LIST[1]

Common name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested methods[5]	PQL ($\mu g/L$)[6]
1,2-Dibromo-3-chloropropane; DBCP	96-12-8	Propane, 1,2-dibromo-3-chloro-	8010	100
			8240	5
			8270	10
1,2-Dibromoethane; Ethylene dibromide	106-93-4	Ethane, 1,2-dibromo-	8010	10
			8240	5
Di-n-butyl phthalate	84-74-2	1,2-Benzenedicarboxylic acid, dibutyl ester	8060	5
			8270	10
o-Dichlorobenzene	95-50-1	Benzene, 1,2-dichloro-	8010	2
			8020	5
			8120	10
			8270	10
m-Dichlorobenzene	541-73-1	Benzene, 1,3-dichloro-	8010	5
			8020	5
			8120	10
			8270	10
p-Dichlorobenzene	106-46-7	Benzene, 1,4-dichloro-	8010	2
			8020	5
			8120	15
			8270	10
3,3′-Dichlorobenzidine	91-94-1	[1,1′-Biphenyl]-4,4′-diamine, 3,3′-dichloro-	8270	20
trans-1,4-Dichloro-2-butene	110-57-6	2-Butene, 1,4-dichloro-, (E)-	8240	5
Dichlorodifluoromethane	75-71-8	Methane, dichlorodifluoro-	8010	10
			8240	5
1,1-Dichloroethane	75-34-3	Ethane, 1,1-dichloro-	8010	1
			8240	5
1,2-Dichloroethane, Ethylene dichloride	107-06-2	Ethane, 1,2-dichloro-	8010	0.5
			8240	5
1,1-Dichloroethylene, Vinylidene chloride	75-35-4	Ethane, 1,1-dichloro-	8010	1
			8240	5
trans-1,2-Dichloroethylene	156-60-5	Ethene, 1,2-dichloro-,(E)-	8010	1
			8240	5
2,4-Dichlorophenol	120-83-2	Phenol, 2,4-dichloro-	8040	5
			8270	10
2,6-Dichlorophenol	87-65-0	Phenol, 2,6-dichloro-	8270	10
1,2-Dichloropropane	78-87-5	Propane, 1,2-dichloro-	8010	0.5
			8240	5
cis-1,3-Dichloropropene	10061-01-5	1-Propene, 1,3-dichloro-(Z)-	8010	20
			8240	5
trans-1,3-Dichloropropene	10061-02-6	1-Propene, 1,3-dichloro-(E)-	8010	5
			8240	5
Dieldrin	60-57-1	2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aα,2β,2aα,3β,6β,6aα,7β,7aα)-	8080	0.05
			8270	10
Diethyl phthalate	84-66-2	1,2-Benzenedicarboxylic acid, diethyl ester	8060	5
			8270	10
O,O-Diethyl O-2-pyrazinyl phosphorothioate; Thionazine	297-97-2	Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester	8270	10
Dimethoate	60-51-5	Phosphorodithioic acid, O,O-dimethyl S-[2-(methylamino)-2-oxoethyl] ester	8270	10
p-(Dimethylamino)azobenzene	60-11-7	Benzenamine, N,N-dimethyl-4-(phenylazo)-	8270	10
7,12-Dimethylbenz[a]anthracene	57-97-6	Benz[a]anthracene, 7,12-dimethyl-	8270	10
3,3′-Dimethylbenzidine	119-93-7	[1,1′-Biphenyl]-4,4′-diamine, 3,3′-dimethyl-	8270	10
alpha, alpha-Dimethylphenethylamine	122-09-8	Benzeneethanamine, α,α-dimethyl-	8270	10
2,4-Dimethylphenol	105-67-9	Phenol, 2,4-dimethyl-	8040	5
			8270	10
Dimethyl phthalate	131-11-3	1,2-Benzenedicarboxylic acid, dimethyl ester	8060	5
			8270	10
m-Dinitrobenzene	99-65-0	Benzene, 1,3-dinitro-	8270	10
4,6-Dinitro-o-cresol	534-52-1	Phenol, 2-methyl-4,6-dinitro-	8040	150
			8270	50
2,4-Dinitrophenol	51-28-5	Phenol, 2,4-dinitro-	8040	150
			8270	50
2,4-Dinitrotoluene	121-14-2	Benzene, 1-methyl-2,4-dinitro-	8090	0.2
			8270	10

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Common name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested methods[5]	PQL (μg/L)[6]
2,6-Dinitrotoluene	606-20-2	Benzene, 2-methyl-1,3-dinitro-	8090	0.1
			8270	10
Dinoseb, DNBP-, 2-sec-Butyl-4,6-dinitrophenol	88-85-7	Phenol, 2-(1-methylpropyl)-4,6-dinitro-	8150	1
			8270	10
Di-n-octyl phthalate	117-84-0	1,2-Benzenedicarboxylic acid, dioctyl ester	8060	30
			8270	10
1,4-Dioxane	123-91-1	1,4-Dioxane	8015	150
Diphenylamine	122-39-4	Benzenamine, N-phenyl-	8270	10
Disulfoton	298-04-4	Phosphorodithioic acid, O,O-diethyl S-[2-(ethylthio)-S-[2-ethyl]ester	8140	2
			8270	10
Endosulfan I	959-98-8	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide, (3α,5aβ,6α,9α,9aβ)-	8080	0.1
			8250	10
Endosulfan II	33213-65-9	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide, (3α,5aα,6β,9β,9aα)-	8080	0.05
Endosulfan sulfate	1031-07-8	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3,3-dioxide	8080	0.5
			8270	10
Endrin	72-20-8	2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aα,2β,2aβ,3α,6α,6aβ,7β,7aα)-	8080	0.1
			8250	10
Endrin aldehyde	7421-93-4	1,2,4-Methenocyclopenta[cd]pentalene-5-carboxaldehyde, 2,2a,3,3,4,7-hexachlorodecahydro-, (1α,2β,2aβ,4β,4aβ,5β,6aβ,6bβ,7R*)-	8080	0.2
			8270	10
Ethylbenzene	100-41-4	Benzene,ethyl-	8020	2
			8240	5
Ethyl methacrylate	97-63-2	2-Propenoic acid, 2-methyl-,ethyl ester	8015	10
			8240	5
			8270	10
Ethyl methanesulfonate	62-50-0	Methanesulfonic acid, ethyl ester	8270	10
Famphur	52-85-7	Phosphorothioic acid, O-[4-[(dimethylamino)sulfonyl]phenyl]-O,O-dimethyl ester	8270	10
Fluoranthene	206-44-0	Fluoranthene	8100	200
			8270	10
Fluorene	86-73-7	9H-Fluorene	8100	200
			8270	10
Heptachlor	76-44-8	4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-	8080	0.05
			8270	10
Heptachlor epoxide	1024-57-3	2,5-Methano-2H-indeno[1,2-b]oxirene, 2,3,4,5,6,7,7-heptachloro-1a,1b,5,5a,6,6a,-hexahydro-, (1aα,1bβ,2α,5α,5aβ,6β,6aα)-	8080	1
			8270	10
Hexachlorobenzene	118-74-1	Benzene, hexachloro-	8120	0.5
			8270	10
Hexachlorobutadiene	87-68-3	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	8120	5
			8270	10
Hexachlorocyclopentadiene	77-47-4	1,3-Cyclopentadiene, 1,2,3,4,5,-5-hexachloro-	8120	5
			8270	10
Hexachloroethane	67-72-1	Ethane, hexachloro-	8120	0.5
			8270	10
Hexachlorophene	70-30-4	Phenol, 2,2′-methylenebis[3,4,6-trichloro-	8270	10
Hexachloropropene	1888-71-7	1-Propene, 1,1,2,3,3,3-hexachloro-	8270	10
2-Hexanone	591-78-6	2-Hexanone	8240	50
Indeno(1,2,3-cd)pyrene	193-39-5	Indeno(1,2,3-cd)pyrene	8100	200
			8270	10
Isobutyl alcohol	78-83-1	1-Propanol, 2-methyl-	8015	50
Isodrin	465-73-6	1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-(1α,4α,4aβ,5β,8β,8aβ)-	8270	10
Isophorone	78-59-1	2-Cyclohexen-1-one, 3,5,5-trimethyl-	8090	60
			8270	10
Isosafrole	120-58-1	1,3-Benzodioxole, 5-(1-propenyl)-	8270	10
Kepone	143-50-0	1,3,4-Metheno-2H-cyclobuta-[cd]pentalen-2-one, 1,1a,3,3a,4,5,5,5a,5b,6-decachlorooctahydro-	8270	10

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Common name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested methods[5]	PQL (µg/L)[6]
Lead	(Total)	Lead	6010	40
			7420	1,000
			7421	10
Mercury	(Total)	Mercury	7470	2
Methacrylonitrile	126-98-7	2-Propenenitrile, 2-methyl-	8015	5
			8240	5
Methapyrilene	91-80-5	1,2-Ethanediamine, N,N-dimethyl-N'-2-pyridinyl-N'-(2-thienylmethyl)-	8270	10
Methoxychlor	72-43-5	Benzene, 1,1'-(2,2,2,trichloroethylidene)bis[4-methoxy-	8080	2
			8270	10
Methyl bromide, Bromomethane	74-83-9	Methane, bromo-	8010	20
			8240	10
Methyl chloride; Chloromethane	74-87-3	Methane, chloro-	8010	1
			8240	10
3-Methylcholanthrene	56-49-5	Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-	8270	10
Methylene bromide, Dibromomethane	74-95-3	Methane, dibromo-	8010	15
			8240	5
Methylene chloride, Dichloromethane	75-09-2	Methane, dichloro-	8010	5
			8240	5
Methyl ethyl ketone, MEK	78-93-3	2-Butanone	8015	10
			8240	100
Methyl iodide; iodomethane	74-88-4	Methane, iodo-	8010	40
			8240	5
Methyl methacrylate	80-62-6	2-Propenoic acid, 2-methyl-, methyl ester	8015	2
			8240	5
Methyl methanesulfonate	66-27-3	Methanesulfonic acid, methyl ester	8270	10
2-Methylnaphthalene	91-57-6	Naphthalene, 2-methyl-	8270	10
Methyl parathion, Parathion methyl	298-00-0	Phosphorothioic acid, O,O-dimethyl O-(4-nitrophenyl) ester	8140	0.5
			8270	10
4-Methyl-2-pentanone, Methyl isobutyl ketone	108-10-1	2-Pentanone, 4-methyl-	8015	5
			8240	50
Naphthalene	91-20-3	Naphthalene	8100	200
			8270	10
1,4-Naphthoquinone	130-15-4	1,4-Naphthalenedione	8270	10
1-Naphthylamine	134-32-7	1-Naphthalenamine	8270	10
2-Naphthylamine	91-59-8	2-Naphthalenamine	8270	10
Nickel	(Total)	Nickel	6010	50
			7520	400
o-Nitroaniline	88-74-4	Benzenamine, 2-nitro-	8270	50
m-Nitroaniline	99-09-2	Benzenamine, 3-nitro-	8270	50
p-Nitroaniline	100-01-6	Benzenamine, 4-nitro-	8270	50
Nitrobenzene	98-95-3	Benzene, nitro-	8090	40
			8270	10
o-Nitrophenol	88-75-5	Phenol, 2-nitro-	8040	5
			8270	10
p-Nitrophenol	100-02-7	Phenol, 4-nitro-	8040	10
			8270	50
4-Nitroquinoline 1-oxide	56-57-5	Quinoline, 4-nitro-, 1-oxide	8270	10
N-Nitrosodi-n-butylamine	924-16-3	1-Butanamine, N-butyl-N-nitroso-	8270	10
N-Nitrosodiethylamine	55-18-5	Ethanamine, N-ethyl-N-nitroso-	8270	10
N-Nitrosodimethylamine	62-75-9	Methanamine, N-methyl-N-nitroso-	8270	10
N-Nitrosodiphenylamine	86-30-6	Benzenamine, N-nitroso-N-phenyl	8270	10
N-Nitrosodipropylamine; Di-n-propylnitrosamine	621-64-7	1-Propanamine, N-nitroso-N-propyl-	8270	10
N-Nitrosomethylethylamine	10595-95-6	Ethanamine, N-methyl-N-nitroso-	8270	10
N-Nitrosomorpholine	59-89-2	Morpholine, 4-nitroso-	8270	10
N-Nitrosopiperidine	100-75-4	Piperidine, 1-nitroso-	8270	10
N-Nitrosopyrrolidine	930-55-2	Pyrrolidine, 1-nitroso-	8270	10
5-Nitro-o-toluidine	99-55-8	Benzeneamine, 2-methyl-5-nitro-	8270	10
Parathion	56-38-2	Phosphorothioic acid, O,O-diethyl-O-(4-nitrophenyl) ester	8270	10
Polychlorinated biphenyls, PCBs	See Note 7	1,1'-Biphenyl, chloro derivatives	8080	50
			8250	100
Polychlorinated dibenzo-p-dioxins; PCDDs	See Note 8	Dibenzo[b,e][1,4]dioxin, chloro derivatives	8280	0.01

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Common name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested methods[5]	PQL (μg/L)[6]
Polychlorinated dibenzofurans, PCDFs	See Note 9	Dibenzofuran, chloro derivatives	8280	0.01
Pentachlorobenzene	608-93-5	Benzene, pentachloro-	8270	10
Pentachloroethane	76-01-7	Ethane, pentachloro-	8240	5
			8270	10
Pentachloronitrobenzene	82-68-8	Benzene, pentachloronitro-	8270	10
Pentachlorophenol	87-86-5	Phenol, pentachloro-	8040	5
			8270	50
Phenacetin	62-44-2	Acetamide, N-(4-ethoxyphenyl)	8270	10
Phenanthrene	85-01-8	Phenanthrene	8100	200
			8270	10
Phenol	108-95-2	Phenol	8040	1
			8270	10
p-Phenylenediamine	106-50-3	1,4-Benzenediamine	8270	10
Phorate	298-02-2	Phosphorodithioic acid, O,O-diethyl S-[(ethylthio)methyl] ester	8140	2
			8270	10
2-Picoline	109-06-8	Pyridine, 2-methyl-	8240	5
			8270	10
Pronamide	23950-58-5	Benzamide, 3,5-dichloro-N-(1,1-dimethyl-2-propynyl)-	8270	10
Propionitrite; Ethyl cyanide	107-12-0	Propanenitrile	8015	60
			8240	5
Pyrene	129-00-0	Pyrene	8100	200
			8270	10
Pyridine	110-86-1	Pyridine	8240	5
			8270	10
Safrole	94-59-7	1,3-Benzodioxole, 5-(2-propenyl)-	8270	10
Selenium	(Total)	Selenium	6010	750
			7740	20
			7741	20
Silver	(Total)	Silver	6010	70
			7760	100
Silvex; 2,4,5-TP	93-72-1	Propanoic acid, 2-(2,4,5-trichlorophenoxy)-	8150	2
Styrene	100-42-5	Benzene, ethenyl-	8020	1
			8240	5
Sulfide	18496-25-8	Sulfide	9030	10,000
2,4,5-T; 2,4,5-Trichlorophenoxyacetic acid	93-76-5	Acetic acid, (2,4,5-trichlorophenoxy)-	8150	2
2,3,7,8-TCDD; 2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6	Dibenzo[b,e][1,4]dioxin, 2,3,7,8-tetrachloro-	8280	0.005
1,2,4,5-Tetrachlorobenzene	95-94-3	Benzene, 1,2,4,5-tetrachloro-	8270	10
1,1,1,2-Tetrachloroethane	630-20-6	Ethane, 1,1,1,2-tetrachloro-	8010	5
			8240	5
1,1,2,2-Tetrachloroethane	79-34-5	Ethane, 1,1,2,2-tetrachloro-	8010	0.5
			8240	5
Tetrachloroethylene; Perchloroethylene; Tetrachloroethene	127-18-4	Ethene, tetrachloro-	8010	0.5
			8240	5
2,3,4,6-Tetrachlorophenol	58-90-2	Phenol, 2,3,4,6-tetrachloro-	8270	10
Tetraethyl dithiopyrophosphate; Sulfotepp	3689-24-5	Thiodiphosphoric acid ([(HO)$_2$P(S)]$_2$O), tetraethyl ester	8270	10
Thallium	(Total)	Thallium	6010	400
			7840	1,000
			7841	10
Tin	(Total)	Tin	7870	8,000
Toluene	108-88-3	Benzene, methyl-	8020	2
			8240	5
o-Toluidine	95-53-4	Benzenamine, 2-methyl-	8270	10
Toxaphene	8001-35-2	Toxaphene	8080	2
			8250	10
1,2,4-Trichlorobenzene	120-82-1	Benzene, 1,2,4-trichloro-	8270	10
1,1,1-Trichloroethane, Methylchloroform	71-55-6	Ethane, 1,1,1-trichloro-	8240	5
1,1,2-Trichloroethane	79-00-5	Ethane, 1,1,2-trichloro-	8010	0.2
			8240	5
Trichloroethylene, Trichloroethene	79-01-6	Ethene, trichloro-	8010	1
			8240	5

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Common name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested methods[5]	PQL ($\mu g/L$)[6]
Trichlorofluoromethane	75-69-4	Methane, trichlorofluoro-	8010	10
			8240	5
2,4,5-Trichlorophenol	95-95-4	Phenol, 2,4,5-trichloro-	8270	10
2,4,6-Trichlorophenol	88-06-2	Phenol, 2,4,6-trichloro-	8040	5
			8270	10
1,2,3-Trichloropropane	96-18-4	Propane, 1,2,3-trichloro-	8010	10
			8240	5
0,0,0-Triethyl phosphorothioate	126-68-1	Phosphorothioic acid, 0,0,0-triethyl ester	8270	10
sym-Trinitrobenzene	99-35-4	Benzene, 1,3,5-trinitro-	8270	10
Vanadium	(Total)	Vanadium	6010	80
			7910	2,000
			7911	40
Vinyl acetate	108-05-4	Acetic acid, ethenyl ester	8240	5
Vinyl chloride	75-01-4	Ethene, chloro-	8010	2
			8240	10
Xylene (total)	1330-20-7	Benzene, dimethyl-	8020	5
			8240	5
Zinc	(Total)	Zinc	6010	20
			7950	50

[1]The regulatory requirements pertain only to the list of substances, the right hand columns (Methods and PQL) are given for informational purposes only. See also footnotes 5 and 6.
[2]Common names are those widely used in government regulations scientific publications, and commerce, synonyms exist for many chemicals.
[3]Chemical Abstracts Service registry number. Where "Total" is entered, all species in the ground water that contain this element are included.
[4]CAS index names are those used in the 9th Cumulative Index
[5]Suggested Methods refer to analytical procedure numbers used in EPA Report SW-846 "Test Methods for Evaluating Solid Waste", third edition, November 1986 Analytical details can be found in SW-846 and in documentation on file at the agency. CAUTION. The methods listed are representative SW-846 procedures and may not always be the most suitable method(s) for monitoring an analyte under the regulations.
[6]Practical Quantitation Limits (PQLs) are the lowest concentrations of analytes in ground waters that can be reliably determined within specified limits of precision and accuracy by the indicated methods under routine laboratory operating conditions. The PQLs listed are generally stated to one significant figure. CAUTION. The PQL values in many cases are based only on a general estimate for the method and not on a determination for individual compounds. PQLs are not a part of the regulation.
[7]Polychlorinated biphenyls (CAS RN 1336-36-3), this category contains congener chemicals, including constituents of Aroclor-1016 (CAS RN 12674-11-2), Aroclor-1221 (CAS RN 11104-28-2), Aroclor-1232 (CAS RN 11141-16-5), Aroclor-1242 (CAS RN 53469-21-9), Aroclor-1248 (CAS RN 12672-29-6), Aroclor-1254 (CAS RN 11097-69-1), and Aroclor-1260 (CAS RN 11096-82-5). The PQL shown is an average value for PCB congeners.
[8]This category contains congener chemicals, including tetrachlorodibenzo-p-dioxins (see also 2,3,7,8-TCDD), pentachlorodibenzo-p-dioxins, and hexachlorodibenzo-p-dioxins. The PQL shown is an average value for PCDD congeners
[9]This category contains congener chemicals, including tetrachlorodibenzofurans, pentachlorodibenzofurans, and hexachlorodibenzofurans. The PQL shown is an average value for PCDF congeners.

GLOSSARY OF TERMINOLOGY AND ABBREVIATIONS

Definition of Terms Used

AF: Air Force

AFB: Air Force Base

Arroyos: A dry gully; a rivulet or stream

Artesian: Ground water contained under hydrostatic pressure

Aquiclude: Poorly permeable formation that impedes ground-water movement and does not yield water to a well or spring

Aquifer: A geologic formation, group of formations, or part of a formation that is capable of yielding water to a well or spring

Bioaccumulate: Tendency of elements or compounds to accumulate or build up in the tissues of living organisms when they are exposed to these elements in their environments, e.g., heavy metals

Closure: The completion of a set of rigidly defined functions for a hazardous waste facility no longer in operation

COD: Chemical Oxygen Demand, a measure of the amount of oxygen required to oxidize organic and oxidizable inorganic compounds in water

COE: Corps of Engineers

Confined Aquifer: An aquifer bounded above and below by impermeable beds or by beds of distinctly lower permeability than that of the aquifer itself

Contaminant: Something that contaminates, chemicals that contaminate

Contaminate: To make unfit for use by the introduction of undesireable chemicals or elements

Contaminates of Concern: Specific contaminates that have been identified in a particular unit, used as indicating parameters for contamination

Contamination: The degradation of natural water quality to the extent that its usefulness is impaired; there is no implication of any specific limits since the degree of permissible contamination depends upon the intended end use or uses of the water, the process of contaminating, a state of being contaminated

Decorative Ponds: See Ponds

Det: Detachment

Disposal Facility: A facility or part of a facility at which hazardous waste is intentionally placed into or on land or water, and at which waste will remain after closure

Disposal of Hazardous Waste: The discharge, deposit, injection, dumping, spilling, or placing of any hazardous waste into or on land or water so that such waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground water

DOD: Department of Defense

DOE: Department of Energy

Downgradient: In the direction of lower hydraulic head; the direction in which ground water flows

DRMO: Defense Reutilization and Marketing Office

Dump: An uncovered land disposal site where solid and/or liquid wastes are deposited with little or no regard for pollution control or aesthetics; dumps are susceptible to open burning and are exposed to the elements, disease vectors and scavengers

Effluent: A liquid waste discharge from a manufacturing or treatment process, in its natural state, or partially or completely treated, that discharges into the environment or into a unit designed to receive the discharge

EM: Environmental management offices in HQ bldg 20200

EPA: Environmental Protection Agency

Erosion: The wearing away of land surface by wind or water

Equipment: Implements used in a specific operation or activity. Can refer to earth moving devices, tools, instruments, etc. May also refer to inplace apparatus such as piping and valve works

FAA: Federal Aviation Administration

Facility: Entire land area of Kirtland Air Force Base

FCDNA: Field Command; Defense Nuclear Agency

Flood Plain: The lowland and relatively flat areas adjoining inland and coastal areas of the mainland and off-shore islands, including, at a minimum, areas subject to a one percent or greater chance of flooding in any given year

Flow Path: The direction or movement of ground water and any contaminants that may be contained therein, as governed principally by the hydraulic gradient

French Drain: An underground, rock lined catch basin

Ground Water: Water beneath the land surface in the saturated zone that is under atmospheric or artesian pressure

Ground Water Reservoir: The subterranean earth materials and the intervening open spaces that contain ground water

Ground Water Mound: A ground water condition where water levels at radial points dip uniformly in all directions from a central point

Golf Course: specifically refers to the Tijeras Arroyo Golf Course located on Kirtland AFB east of the junction of Pennsylvania Ave. and the Eubank extension

Hardfill: Disposal sites receiving construction debris, wood, miscellaneous spoil material

Hazardous Waste: A solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical or infectious characteristics may cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed

Hazardous Waste Generation: The act or process of producing a hazardous waste

Heavy Metals: Metallic elements, including the transition series, which include many elements required for plant and animal nutrition in trace concentrations but which become toxic at higher concentrations

HQ: Headquarters

HWMF: Hazardous Waste Management Facility

Incompatible Waste: A waste unsuitable for commingling with another waste or material because the commingling might result in generation of extreme heat or pressure, explosion or violent reaction, fire, formation of substances which are shock sensitive, friction sensitive, or otherwise have the potential for reacting violently, formation of toxic dusts, mists, fumes, and gases, volatilization of ignitable or toxic chemicals due to heat generation in such a manner that the likelihood of contamination of ground water or escape of the substance into the environment is increased, any other reaction which might result in not meeting the Air, Human Health, and Environmental Standard

Infiltration: The flow of liquid through pores or small openings

IRP: Installation Restoration Program

ITRI: Lovelace Inhalation Toxicology Research Institute

KAFB: Kirtland Air Force Base

KFD: Kirtland Fire Department

Leachate: A solution resulting from the separation or dissolving of soluble or particulate constituents from solid waste or other man-placed medium by percolation of water

Leaching: The process by which soluble materials in the soil, such as nutrients, pesticide chemicals or contaminants, are washed into a lower layer of soil or are dissolved and carried away by water

Liner: A continuous layer of natural or man-made materials beneath or on the sides of a surface impoundment, landfill, or landfill cell which restricts the downward or lateral escape of hazardous waste, hazardous waste constituents or leachate

LWDS: Liquid Waste Disposal System

Lysimeters: A thimble or cup device used for extracting vadose zone moisture or water samples at various depths

MAC: Military Airlift Command

Main Golf Course Pond: Specifically refers to the large pond along the northwest boundary of the Tijeras Arroyo Golf Course

MOA: Military Operating Area

Monitoring Well: A well used to measure ground-water levels and to obtain samples

MSL: Mean Sea Level

Organic: Being, containing or relating to carbon compounds, especially in which hydrogen is attached to carbon

PCB: Polychlorinated Biphenyls are highly toxic to aquatic life; they persist in the environment for long period and are biologically accumulative

Percoloation: Movement of moisture by gravity or hydrostatic pressure through interstices of unsaturated rock or soil

PD-680: Cleaning solvent, safety solvent, Stoddard's solvent

pH: Negative logarithm of hydrogen ion concentration, measurement of acids and bases

PL: Public Law

POL: Petroleum, Oils and Lubricants

Pollutant: Any introduced gas, liquid or solid that makes a resource unfit for a specific purpose

Ponds - (Decorative Ponds): Ponds 1, 2, 3, 4, specifically all other ponds located at the Tijeras Arroyo Golf Course omitting the main pond.

RB: Radioactive burial site

RCRA: Resource Conservation and Recovery Act

Recharge Area: An area in which water is absorbed that eventually reaches the zone of saturation in one or more aquifers

Recharge: The addition of water to the ground-water system by natural or artificial processes

Removal: To move or transfer the location of an item to another point by physically handling the item from its original position to another. When referring to a hazardous waste removal will conform to RCRA regulations

Sanitary Landfill: A land disposal site using an engineered method of disposing solid wastes on land in a way that minimizes environmental hazards

Saturated Zone: That part of the earth's crust in which all voids are filed with water

SGPE Sludge: The solid residue resulting from a manufacturing or wastewater treatment process which also produces a liquid stream

SNLA: Sandia National Laboratories (Albuquerque)

Solid Waste: Any garbage, refuse, or sludge from a waste treatment plant, water supply treatment, or air pollution control facility and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, or agricultural operations and from community activities, but does not include solid or dissolved materials in domestic sewage; solid or dissolved materials in irrigation return flows; industrial discharges which are point source subject to permits under Section 402 of the Federal Water Pollution Control Act, as amended (86 USC 880); or source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954 (68 USC 923)

Spill: Any unplanned release or discharge of a hazardous waste onto or into the air, land, or water

Storage of Hazardous Waste: Containment, either on a temporary basis or for a longer period, in such a manner as not to constitute disposal of such hazardous waste

System: Generally refers to units operating in conjunction with one another to achieve a desired effect. Specifically can apply to the entire operating facilities of the golf course pond and sewage lagoons, and related piping

TAC: Tactical Air Command

Toxicity: The ability of a material to produce injury or disease upon exposure, ingestion, inhalation, or assimilation by a living organism

Transmissivity: The rate at which water is transmitted through a unit width under a unit hydraulic gradient

Treatment of Hazardous Waste: Any method, technique, or process including neutralization designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize the waste or so as to render the waste nonhazardous

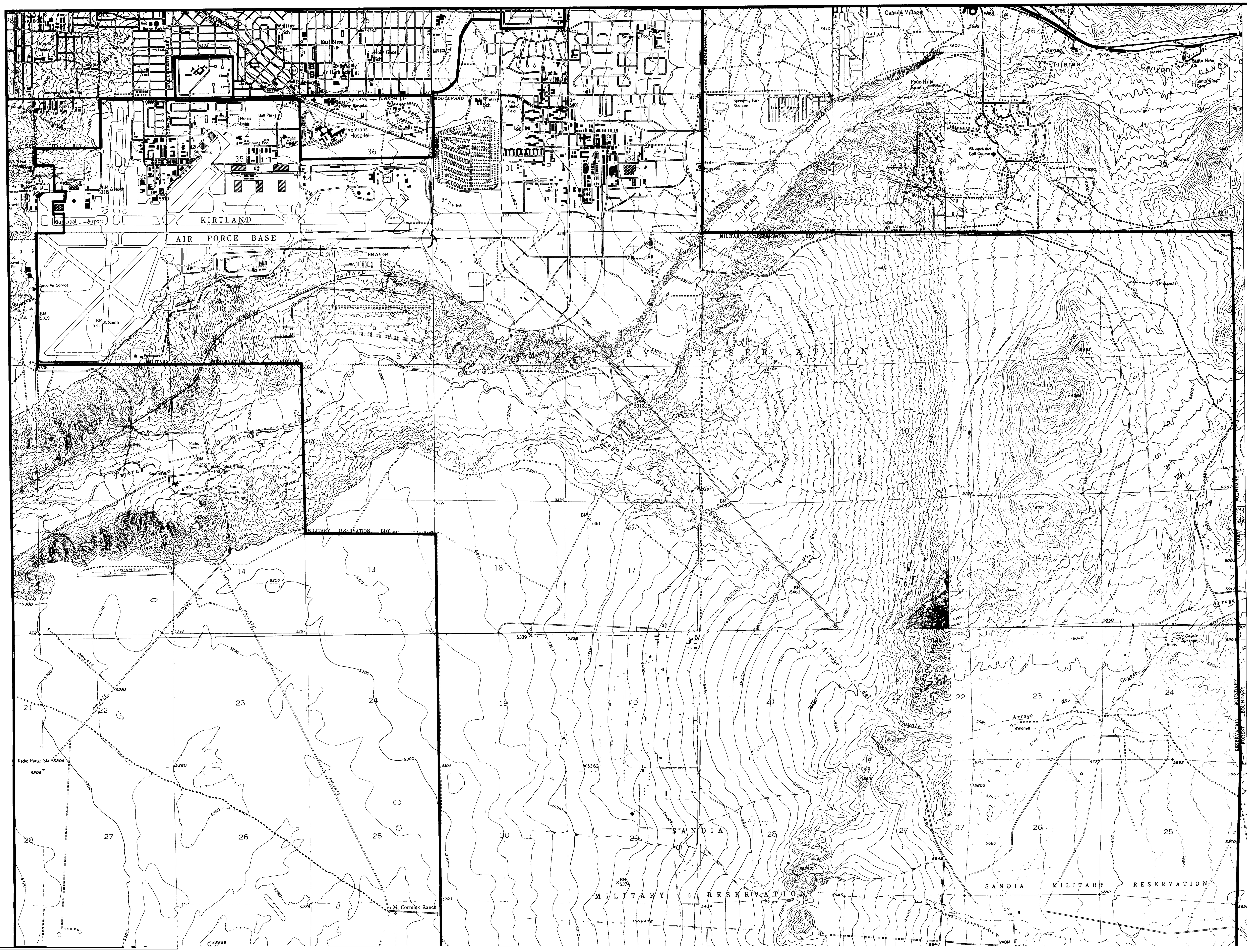
Unit: Any land and appurtenances thereon and thereto used for the treatment, storage and/or disposal of hazardous wastes.

Unit(s): Generally refers to golf course pond, sewage lagoons and can apply to other waste management units as they are addressed in later supplement documents. Technically, a piece of complex apparatus designed to perform a particular function

Upgradient: A location, usually within a soil system, opposite to the prevailing flow direction of ground water

USAF: United States Air Force

Water Table: Surface of a body of unconfined ground water at which the pressure is equal to that of the atmosphere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Municipal Airport
Veterans Hospital
SANDIA MILITARY RESERVATION
Canyon
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Four Hills Ranch
Canada Village
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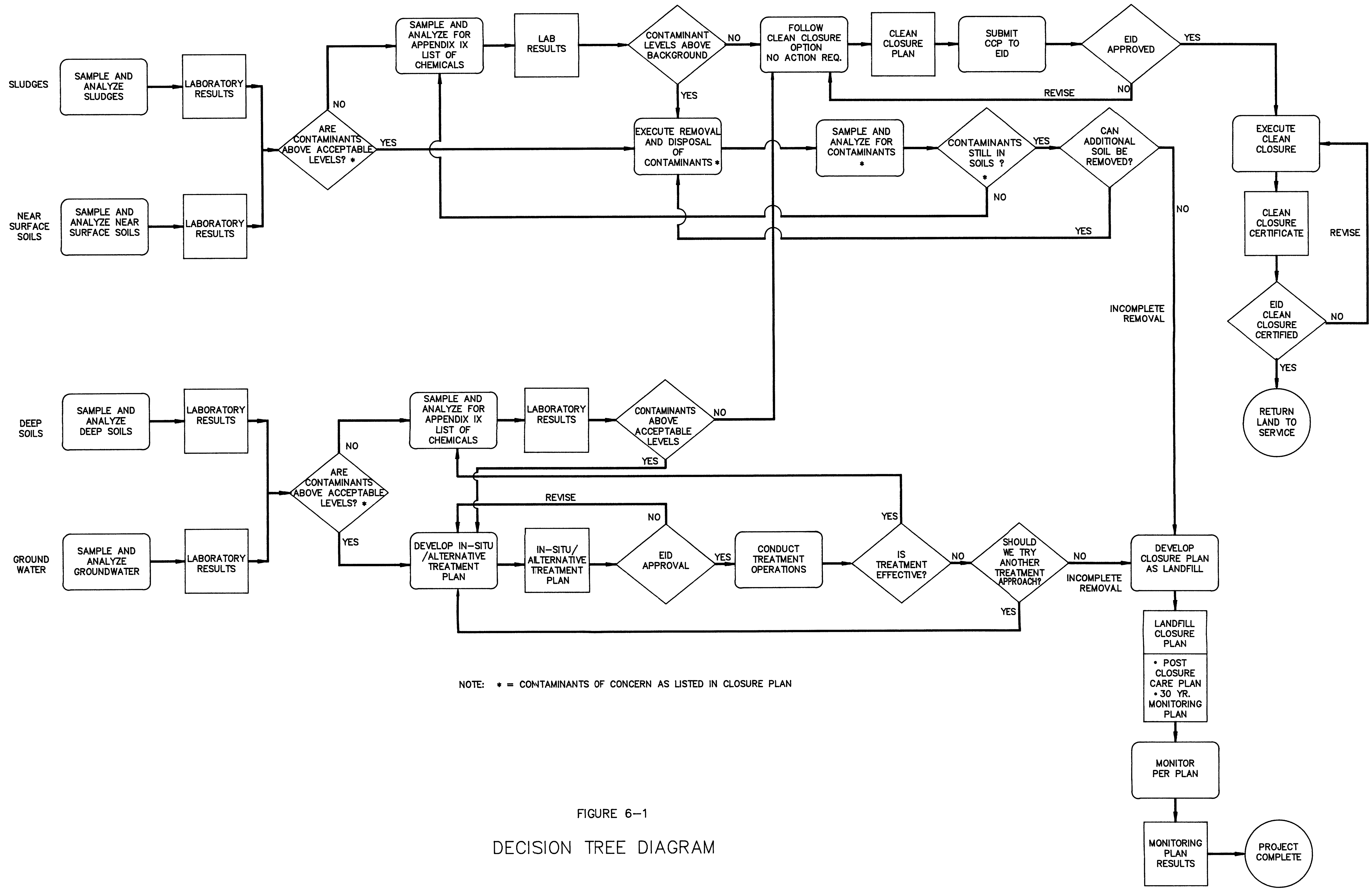

FIGURE 6–1

DECISION TREE DIAGRAM

Apr 1990

AR Doc # 1701

LAGOON

UNIT CLOSURE PLAN FOR SEWAGE LAGOONS
AT
KIRTLAND AIR FORCE BASE
ALBUQUERQUE, NEW MEXICO

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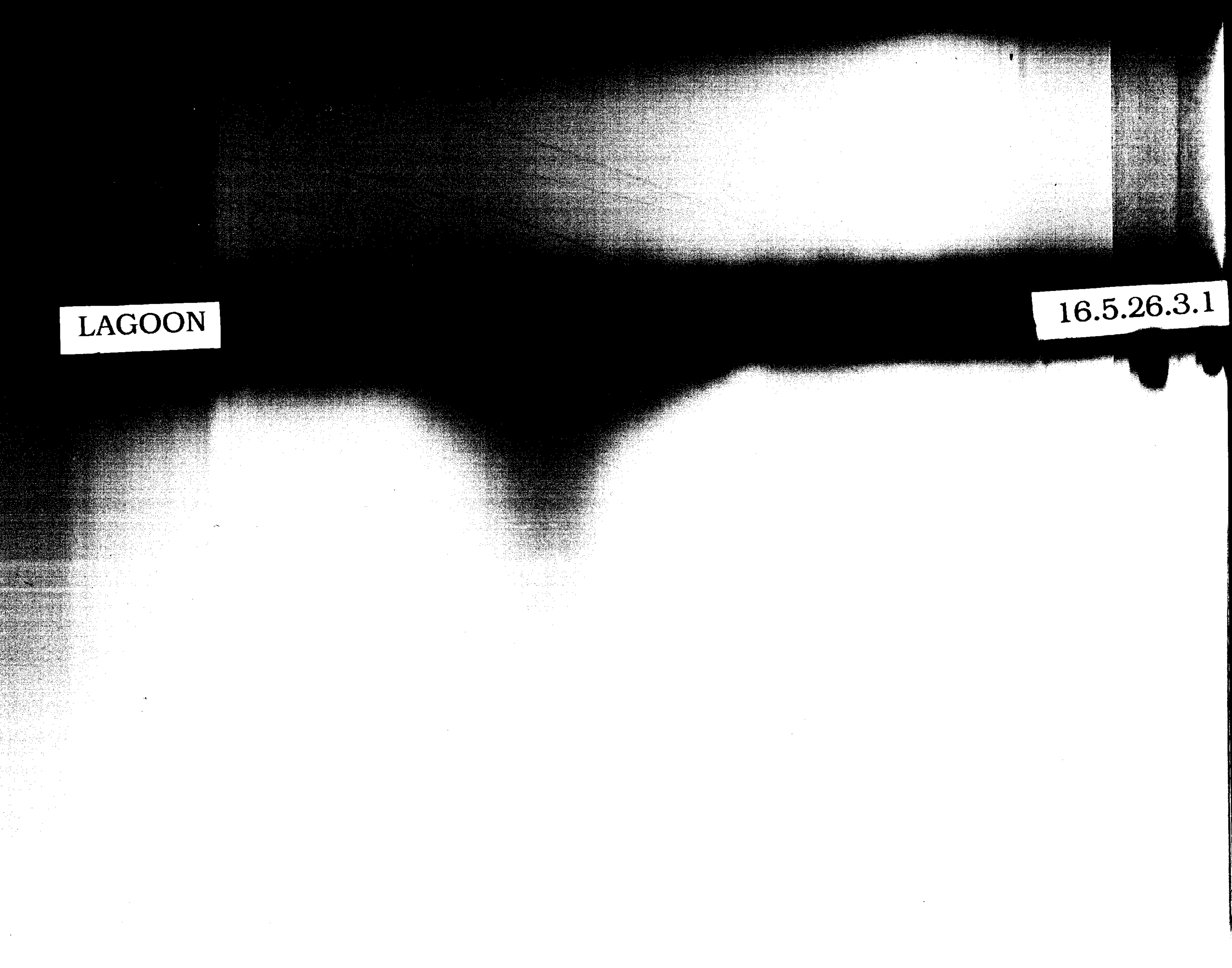
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SUPPLEMENT 1

UNIT CLOSURE PLAN FOR SEWAGE LAGOONS AT KIRTLAND AIR FORCE BASE ALBUQUERQUE, NEW MEXICO

April 13, 1990

Prepared for:

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SECTION 1.0

1.0 EXECUTIVE SUMMARY

Kirtland Air Force Base (KAFB), located in southeastern Albuquerque, New Mexico hereby submits a base-wide close plan including Closure and Post-Closure Care Plan Preliminary Information for waste-management units located on the facility, in accordance with the New Mexico Environmental Improvement Division's Compliance Order of (September 1988). The waste management unit under study consists of the sewage lagoon that may have received hazardous and non-hazardous wastes from operations on Kirtland Air Force Base Facility. There is currently no discharge of known hazardous wastes or substances to the unit.

This plan, as well as reference documents, supplements and previous investigations is organized to address the specific requirements of the 40 CFR Parts 261, 265 and 267 adopted by the State of New Mexico Hazardous Waste Management Regulations (HWMR-5)

This plan is written specifically as a conceptual closure design for the sewage lagoons. The basewide closure plan contains general information on Kirtland Air Force Base and the conceptual closure alternatives under consideration.

USGS recently completed soil boring program for KAFB and installed monitor wells around the sewage lagoons. Soil boring logs are available, however, results of the sampling and test program are preliminary and not yet complete.

Six alternative conceptual designs for closure are presented in the basewide closure plan. Once data is obtained from the site characterization phase involving a sample and testing program, one of the six designs will be adopted for closure. KAFB anticipates using Alternative 2 as the preferred method of clean closure by removal of contaminates.

Sections 2.0 and 3.0 provide descriptions of the waste management facility and location, land use and physical and hydrogeological conditions at the site. Sections 4.0 and 5.0 describe the waste disposal practices at the site and the results of (or proposed) sampling plans and contamination investigations. Analytical results are presented in Appendix A. Section 6.0 details the closure design options with detailed information to be included in Appendix B.

Section 7.0 addresses the various specific regulatory requirements related to closure and Section 8.0 describes the post closure care plan. This supplement relies on baseline information provided in the basewide closure plan. This plan contains specific information when required under the same section numbers and headings used in the basewide plan.

SECTION 2.0

2.0 SITE DESCRIPTION (267.33(a)(3))

2.1 SITE LOCATION AND HISTORY

Kirtland Air Force Base is located in Albuquerque, New Mexico, and is owned and operated by the United States Air Force (Figure 2-1). The sewage lagoons are located 1 mile south of KAFB east operations area and 1/2 mile east of the main runway of the Albuquerque International Airport. Projecting the location onto the United States Geological Survey Albuquerque East 7 1/2 minute quadrangle (Figure 2-2) gives a location of SE 1/4 of NE 1/4, of Section 6, Township 9 N, Range 4 E. Site elevation is 5,355 feet MSL. Geographic coordinates are 35°2'20" north, 106°33'45" west; Universal Transverse Mercator coordinates are Zone 38, 7,800 meters north and 356,750 meters east. This site is specifically located between Pad #5 and the HPD-VPD facility (Figure 2-3).

In 1962, the lagoons and golf course pond system were constructed by the Air Force to create a source of primary treated sewage for irrigation water for the Tijeras golf course. Grey-water effluent from sewage lagoons was used to reduce the demand on ground water resources which would have been required for golf course irrigation. The two lagoons are facultative, with no aeration, and measure 6 feet deep and 7 acres each in surface area. The discharge enters the gravity flow pipe to the golf course from the surface of the southeast side of the southern lagoon. Influent is controlled by a splitter valve into either the north or south lagoon. During the winter from November to March the lagoons and pond were idle and all influent was diverted to the City of Albuquerque Publicly Owned Treatment Works (POTW) by using an upstream diverted value. From April to October, depending upon the irrigation needs, 40 to 100 percent of the influent was routed to the lagoon and subsequently piped to the Tijeras Arroyo golf course. There it flowed into the main golf course pond, a 1-acre pond on the northwest side of the golf course. The influent was diluted with potable fresh water from the KAFB water distribution system in a ratio of approximately 2/3 waste water 1/3 fresh water. The lagoons last received effluent in October, 1987. The KAFB sewage lagoons have not been dredged since use was terminated. The sludge thickness has been measured and chemically analyzed. The data is currently being reviewed by the Air Force Occupational Environmental Health Lab (OEHL) for quality assurance. When available, this data will be submitted in Appendix A.

There are efforts underway by both SNLA and Kirtland Air Force Base to determine the sources that may have contributed to the contaminates identified in samples tested by SNLA, KAFB and NMEID. A summary of analysis that show types and levels of these contaminants are presented in Appendix A.

2.2 LAND USE - GENERAL (267.33(a)(3))

Please see the basewide closure plan for general information in this section. The sewage lagoons are located on land owned by the Federal Government. Land is utilized as an Air Force Base. On the north, the site is bounded by the main base portion of Kirtland Air Force Base. To the east are Sandia National Laboratories (SNLA) and the Manzano Mountains beyond. Land owned by KAFB and technical areas in use by both Kirtland and Sandia lie between the unit and the southern base boundary. To the west of the site is the Albuquerque International Airport, and undeveloped land owned by the University of New Mexico.

2.3 POPULATION DISTRIBUTION AND EXPOSURE

Please see the basewide closure plan for general information in this section. The possibility of human exposure to potentially hazardous materials that may have been disposed of in the sewage lagoons is minimal or non-existent, because:

- Direct contact with the material is prevented by limiting access. The lagoon area is signed in Spanish and English and protected by security fences which prevent access to the site by unauthorized personnel and the facility is completely within the boundaries of KAFB which is a secure military facility.
- Levels of contaminants that may exist in the lagoons are of low concentrations.;
- Ground water lies at a depth of approximately 475 feet below the land's surface, and no contaminates are expected to migrate far enough to reach ground water.
- Currently the lagoons do not contain any liquid material, only a layer of dried sludge.

SECTION 3.0

3.0 PHYSICAL ENVIRONMENT

3.1 CLIMATE AND METEOROLOGY (267.33(a)(4), 267.31 a(3))

Please see the basewide closure plan for specific details on climate and meteorology.

3.2 GEOLOGY AND SOILS (267.33(a))

3.2.1 Regional Geology

Please see the basewide closure plan for general information regional geology on Kirtland Air Force Base.

3.2.2 Site Geology and Soils - Sewage Lagoons (267.31 (a)(5))

Four drillholes with 100' deep adjacent auger holes and two hand-auger holes provide information concerning the subsurface conditions at the sewage lagoons site. The drillholes are located at the northeast (#502), northwest (#503), southeast (#501) and southwest (#504) corners of the sewage lagoons site (Figure 3-1). The drillholes have total depths ranging from 515 feet to 535 feet below ground surface; all have been installed with monitor wells. The drilling and well installation program was performed by the USGS in conjunction with the Army Corp of Engineers. The two hand-auger holes are located within the sewage lagoons (one in each pond) and were drilled to a depth of five feet; this work was performed by GCL to check for existence of liner and moisture zones. Drilling of the deep boreholes was performed in two stages to provide the most accurate subsurface characterization of the soils underlying the pond site. The first 100 feet at each borehole location was drilled with an auger-rig for stratigraphic information; core samples were obtained at regular intervals for detailed geologic descriptions. Core samples were submitted for analysis from the 5, 20, 50 and 100 foot intervals.

The boreholes were then drilled to their total depth using a mud-rotary drilling method. Cuttings were logged and each borehole was logged with a standard geophysical suite (spontaneous potential, caliper, gamma, resistivity, density and neutron).

Borehole lithology is very similar in the four holes, as expected. The Santa Fe Formation underlies the ponds, and consists of inter-bedded clays, silts, sands and gravels. Caliche zones, usually nodular rather than sheet-like in geometry, were common throughout the boreholes.

The boreholes indicate that silts and fine sands are most common between the surface and a depth of approximately 315 feet; gravels, some of which are very coarse, predominate between 315 and 475 feet; and sands predominate below the gravels to the total depth of the boreholes. Root casts and carbonaceous zones were occasionally encountered within the first 120 feet of drilling.

3.3 HYDROGEOLOGY (267.10 (a))

3.3.1 Regional Hydrogeology

Please refer to the basewide closure plan for regional hydrogeologic information on KAFB.

3.3.2 Site Hydrogeology - Sewage Lagoons (267.10 (a)(2))

This discussion of site hydrogeology is based on data obtained during the installation of monitor wells adjacent to the site (USGS, 1989). This document when available will contain geologic and geophysical logs, detailed cross-sections and well construction details. Additional information is contained in Installation Restoration Program (IRP) reports Phase I (1981) and Phase II (1985). IRP documents are used as references to this report.

At the KAFB site ground water lies at a depth of approximately 475 feet below the land's surface, or an elevation of approximately 4,880 feet. Water level data indicates that there is a general northerly gradient at the site, but some local variations are evident. The water gradient is influenced by the pumping of the Kirtland AFB wells in the vicinity and City of Albuquerque water supply wells to the north and northwest of the site. The aquifer is hosted by sand and gravel deposits. Additional data on the hydrogeologic environmental restoration conditions at KAFB will be developed as part of KAFB's installation restoration program by USGS. This information will be included when available as an addition to this plan. Additional information is contained in the IRP reports Phase I 1981 and Phase II (1985).

SECTION 4.0

4.0 HAZARDOUS WASTE MANAGEMENT UNITS

4.1 SIZES AND TYPES (267.31)

4.1.1 General

The sewage lagoon is the main waste management unit addressed in this document.

4.1.2 Sewage Lagoons

The north and south lagoons were constructed on native soils and local fill from on-site grading. Both lagoons are square in shape, as shown in Figure 3-1, and are filled by two discharge pipes that release sewage effluent at the center of each impoundment. Liquid levels in each lagoon are controlled by an elevated perimeter Berm. A shared Berm separates the north lagoon from the south lagoon. The lagoons were in operation from 1962 until November 1987. After construction, the berms were later reinforced in 1970 and 1975 with soil cement on the side slopes and capped with concrete to minimize wave erosion. Each lagoon is measures 600 feet on a side with approximately 7 acres in surface area and is 6 feet deep. The berm separating the two lagoons has a connecting structure. This structure is partially blocked and was originally designed to allow liquids to pass freely in both directions and create a leveling effect.

The southeast corner of the south lagoon has a 20" outlet pipe that allows liquid from the surface of the improvement to gravity flow to the main golf course pond. For approximately 25 years, the system was used for managing base generated sewage. The effluent and fresh water mixture was used for golf course watering the golf course with sprinklers.

4.2 HAZARDOUS WASTE CHARACTERISTICS (267.31 (a)(1)) 267.33 (a)(1)

Efforts were taken by SNLA and KAFB to determine sources of contamination found in the lagoons. The possibility exists that laboratory areas inside of SNLA may have discharged small quantities of chemicals into the sanitary sewer system that flowed into the sewage lagoons. At one time standard practice allowed at SNLA was to discharge small quantities of laboratory chemicals to the sanitary sewer.

All sanitary sewage discharges currently flow to the City of Albuquerque POTW. Discharges are monitored by the IT Corporation under contract to SNL. To assure compliance with a pretreatment arrangement between KAFB and the City of Albuquerque Currently all discharges of hazardous chemicals have been stopped by both SNLA and KAFB. This was achieved by comprehensive waste management programs by both organizations. Monitoring results of annual sampling done by IT Corporation of the sanitary sewage that leaves KAFB are presented in Appendix A.

The lagoons were sampled by NMEID on one occasion and again sampled by NMEID and SNLA, KAFB (samples split in triplicate for analysis by different labs) on another occasion. The laboratory results indicated small amounts of the solvent contamination in addition to some dissolved materials.

4.3 WASTE MANAGEMENT PRACTICES

The lagoon and golf course pond system was constructed for irrigation of a recreational golf course facility. The system was not intended for disposal of hazardous waste. Sewage effluent was used to reduce the requirement of ground water for golf course irrigation. The inadvertent addition of contaminants to the system now requires the system be closed to prevent possible environmental contamination. Residence time of liquids in the units will determine sludge thickness. The extent of contaminate migration depends upon the specific characteristics of the contaminates and the ability of the units to contain waste liquids, sludges and contaminates.

The levels of solvent contamination indicate that a total of approximately 1.4 gallons of 1,1,1 TCE have been disposed into the lagoons via the sanitary sewer system (calculations by SNLA). The lagoon and pond system were taken out of service in November, 1987. Since that time, liquids have evaporated leaving a dry sludge in both the lagoons and pond. A sampling program to define sludge thickness, and contaminate migration is discussed in Section 5.2.

SECTION 5.0

5.0 DOCUMENTED RELEASES

5.1 RELEASE HISTORY

The system was not designed as a surface impoundment for hazardous wastes. However, small amounts of contaminants have entered the lagoon and pond from on-base sources that are connected to this system. Both KAFB and SNLA have assessed waste generators located in these base areas that may have contributed to the contaminants found in lagoons.

The sewage lagoons are not equipped with a liner. Currently, the nature and extent of contaminate migration from the sewage lagoons are unknown, however, preliminary sludge analysis data indicates very low level solvent contamination and no metals above EP TOX levels. Following quality assurance review, this data will be provided as Appendix A. Extent of migration will be defined in the step-by-step process outlined below.

5.2 SAMPLING PROGRAM

5.2.1 General Objectives

Are addressed in the basewide closure plan.

5.2.2 Sampling Procedures

Please refer to the basewide closure plan for specific information in this section.

5.2.3 Sampling of Sludges

Sludges in the lagoons have been sampled according to the referenced sampling plan in Appendix E of the basewide plan. The sampling program will conform to stratified random sampling techniques with composite samples for testing in accordance with CFR 261 and test methods for Evaluating Solid Waste Physical/Chemical Methods (SW846), specifically Part III, Chapter 9. Results are presented in Appendix A.

If sludges are contaminated, the guidelines outlined in the Base-Wide Closure Plan will be followed for the following three sections:

5.2.4 Sampling of Subsurface Soils

5.2.5 Sampling of Background Soil Conditions

5.2.6 Sampling of Vadose Zone

5.2.7 Sampling of Ground Water

5.2.8 Results

Sampling of sludge and soil has been accomplished. Laboratory results will be included as Appendix A when they become available from the USGS.

5.3 ANALYTICAL RESULTS AND PRIORITY TESTING

Initial sampling and testing will address contaminates of concern for the sewage lagoons listed in Appendix C. These contaminates were identified in previous sampling activity. If contaminates of concern are identified in surface sludges, they will be used as indicating parameters for tracking contaminate migration in near surface and deep vadose zone soil samples. Indicating parameters will also be used to test ground water for contamination migration.

Following testing and removal of contaminates of concern, KAFB will test additional soil samples to show that any Part 261 Appendix IX constituents that may remain in the unit are lower than established background sample levels for metals only. Other contaminants that may remain will be below levels posing a threat to human health and the environment based by WQCC standards. Application will then be made for clean closure status.

5.4 QUALITY ASSURANCE/QUALITY CONTROL

Please see the basewide closure plan for specifics on this section.

SECTION 6.0

FOR SECTIONS 6.0 TO 10.0 PLEASE REFER TO THE BASE-WIDE CLOSURE PLAN FOR GENERAL INFORMATION IN THESE SECTIONS. SPECIFIC INFORMATION ON THE SEWAGE LAGOONS WILL BE ADDED TO THE FOLLOWING SECTIONS AS IT BECOMES AVAILABLE.

6.0 CLOSURE DESIGN

6.1 CLOSURE GOALS (265.112)

General closure design information is contained in the basewide closure plan. KAFB anticipates that alternative 2, clean closure by removal of contaminated materials is the closure alternative for the sewage lagoons.

6.2 CLOSURE ALTERNATIVES (265.112)

Each of the closure method alternatives and the criteria which would be used to determine what method would be employed are discussed in the corresponding section in the Base-Wide Closure Plan. KAFB anticipates using closure alternative 2 for the preferred method of clean closure for the sewage lagoons. Specific closure design methods will be discussed in Appendix B when available.

6.3 CLEAN CLOSURE METHODS

6.3.1 Site Preparation (265.112 (b)(4))

Please see the basewide closure plan for this information.

6.3.2 Removal and Disposal of All Inventory (265.228 (a)(1))

At the present time, all standing liquids have evaporated from the units, and bottom sludges are slightly moist to dry. If the sludge is found to contain contaminants in excess of those concentrations listed in Section 6.2.2 of the Basewide Closure Plan, the sludge layer will be removed, placed in a hazardous waste soil hauler, and taken to a disposal facility where it will be disposed of as hazardous waste. If the sludge does not contain contaminants in excess concentrations, it will be removed.

6.3.3 Record Keeping

Refer to basewide closure plan.

6.4 HEALTH AND SAFETY DURING CLOSURE (265.16)

All personnel entering the construction site will be required to observe health and safety procedures as required by OSHA and KAFB.

6.5 COST ESTIMATE (265.142)

The total depth and volume of material to be removed has not been determined, therefore a firm cost estimate cannot be provided at this time. Included for general information is a list of items that will impact the costs of closure for each unit.

Clean Closure

- Excavation and removal of sludges
- Transport and disposal of sludges
- Excavation and removal of soils
- Transport and disposal of soils
- Disposal site costs
- Modified decontamination of structures, equipment and piping as required
- Site fill and regrading

Landfill Closure

- Excavation and removal of sludges
- Transport and disposal of sludges
- Excavation and removal of soils
- Transport and disposal of soils
- Dismantling of piping and valve works
- Removal of concrete structures
- Transport and disposal of piping and equipment

- Disposal site costs
- Site fill and regrading
- Monitor well installation and monitoring
- Final cover and cap, erosion protection
- Surface grading
- Re-vegetation over final soil cover

For Landfill Closure With Treatment Include:

- On-site treatment and stabilization methods (unspecified)
- Ground water remediation (if required)

The above costs will vary depending on thickness of contaminated material.

In addition, costs will vary with haul distance, ultimate disposal facility and method.

6.6 EQUIPMENT DECONTAMINATION (264.114) (265.112 (b)(4)) and (265.114)
See corresponding section in basewide plan.

SECTION 7.0

7.0 REGULATORY REQUIREMENTS

7.1 FACILITY CONDITIONS (265.112 (3))

7.1.1 Maximum Amount of Inventory (265.112 (b)(3))

7.1.2 Inventory of Auxiliary Equipment (265.112 (b)(4))

If the unit will be closed as a landfill, then appropriate piping and related equipment will be disposed of inside the landfill closure.

7.1.3 Schedule For Final Closure (265.112 (b)(6))

7.2 REMOVAL AND DISPOSAL OF INVENTORY (265.228 (a)(1))

KAFB proposes to close the units by one of two methods:

Clean Closure

- Removal or treatment of contaminated materials as required to attain clean closure. This includes decontamination of related equipment.

Landfill Closure

- Leaving contaminated material in place with related equipment to remain as a landfill closure. This includes cover and capping of the unit with a post-closure monitoring plan and possible treatment for contaminates if warranted.

For Both Types of Closures

- KAFB may, if feasible, remove sludges from the units.

THE FOLLOWING SECTIONS ARE ADDRESSED IN THE CORRESPONDING SECTIONS OF THE BASE-WIDE CLOSURE PLAN.

7.3 SURVEYING (265.116)

7.4 NOTICE TO LOCAL LAND AUTHORITY (265.119 (a))

7.5 NOTICE IN DEED OF PROPERTY (265.119 (b)(1))

7.6 CERTIFICATION OF CLOSURE (265.115)

7.7 POST-CLOSURE PERMIT (265.117)

7.8 AMENDMENT OF THIS PLAN (265.112 (c))

This plan may be amended as necessary according to provisions outlined in 40CFR 265.112.

7.9 NOTIFICATION (265.112 (d))

7.10 TIME ALLOWED FOR CLOSURE (265.113)

SECTION 8.0

8.0 POST-CLOSURE CARE PLAN FOR LANDFILL CLOSURE (IF REQUIRED)

8.1 FACILITY CONTACT

8.2 GROUND WATER MONITORING (265.90)

8.3 SAMPLING AND ANALYSIS (265.92)

8.4 EMERGENCY RESPONSE (265.56)

8.5 FINANCIAL REQUIREMENTS (265.140 (c))

8.6 PERSONNEL TRAINING (265.16)

SECTION 9.0

9.0 SECURITY (265.14)

Access to all parts of KAFB is controlled by security personnel. Unauthorized persons will not be allowed into the work area during closure and access to the site will be restricted.

SECTION 10.0

10.0 REFERENCES

FIGURES

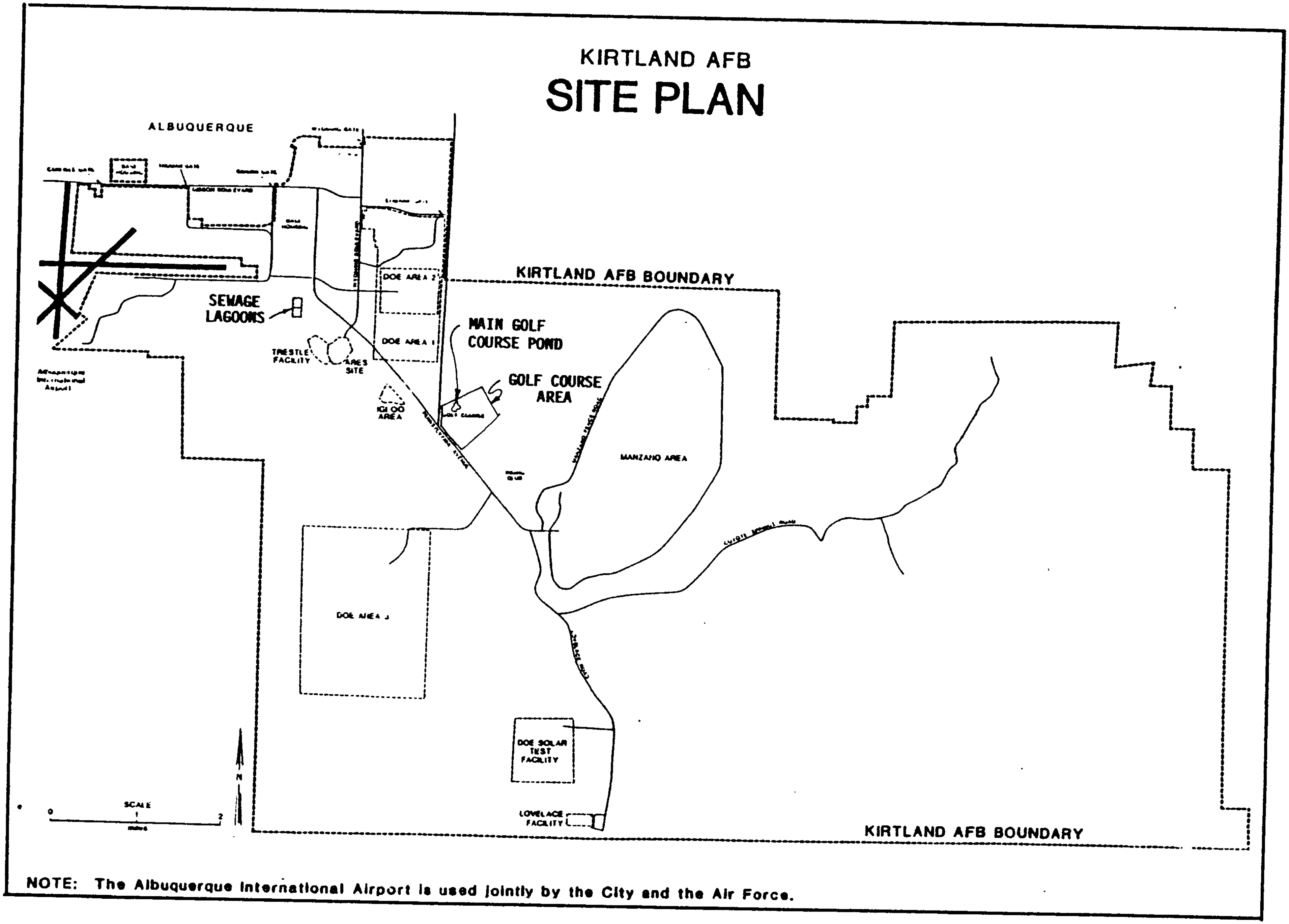

FIGURE 2-1

LOCATION MAP OF UNITS

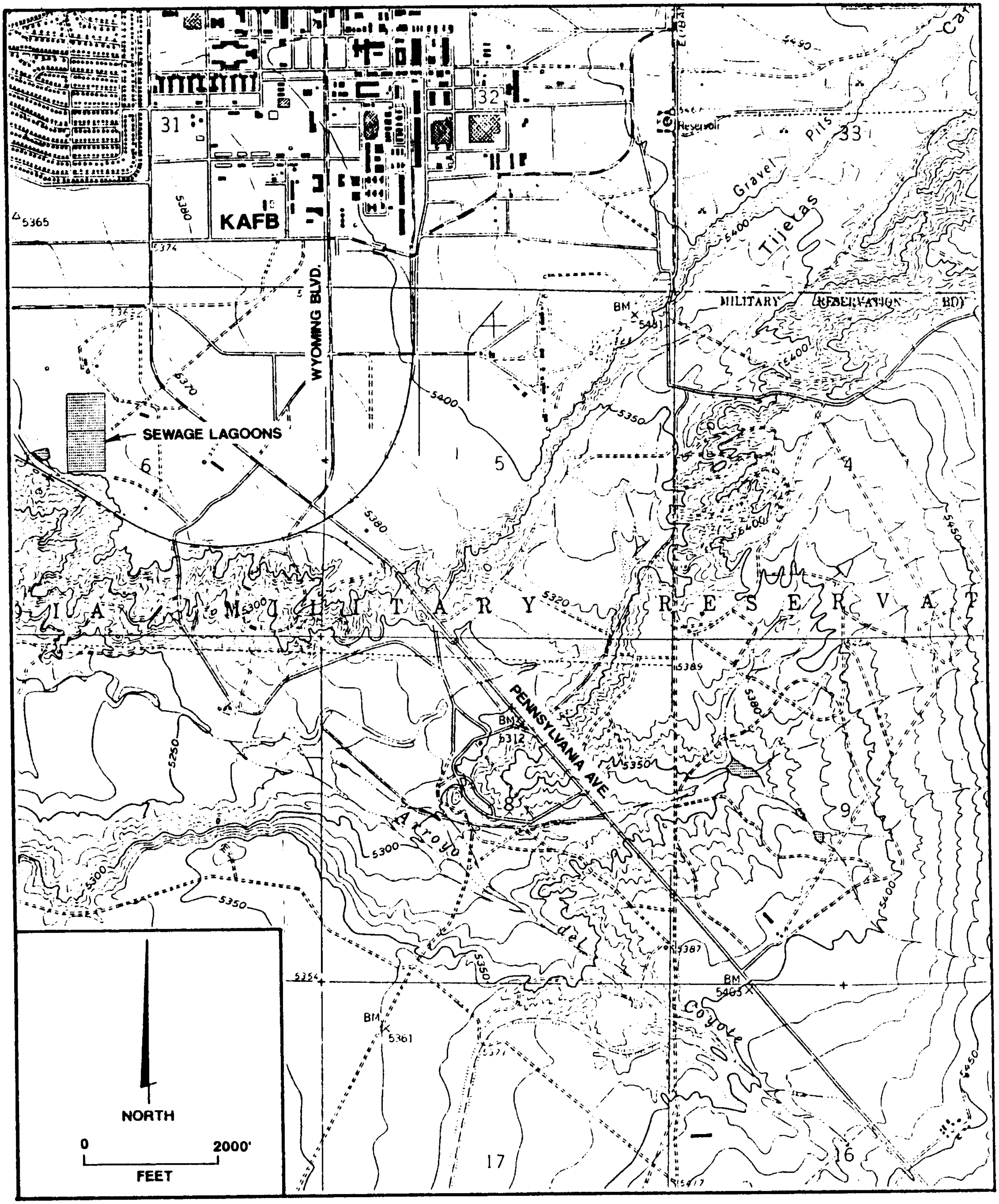

FIGURE 2-2

SITE TOPOGRAPHY MAP-SEWAGE LAGOONS

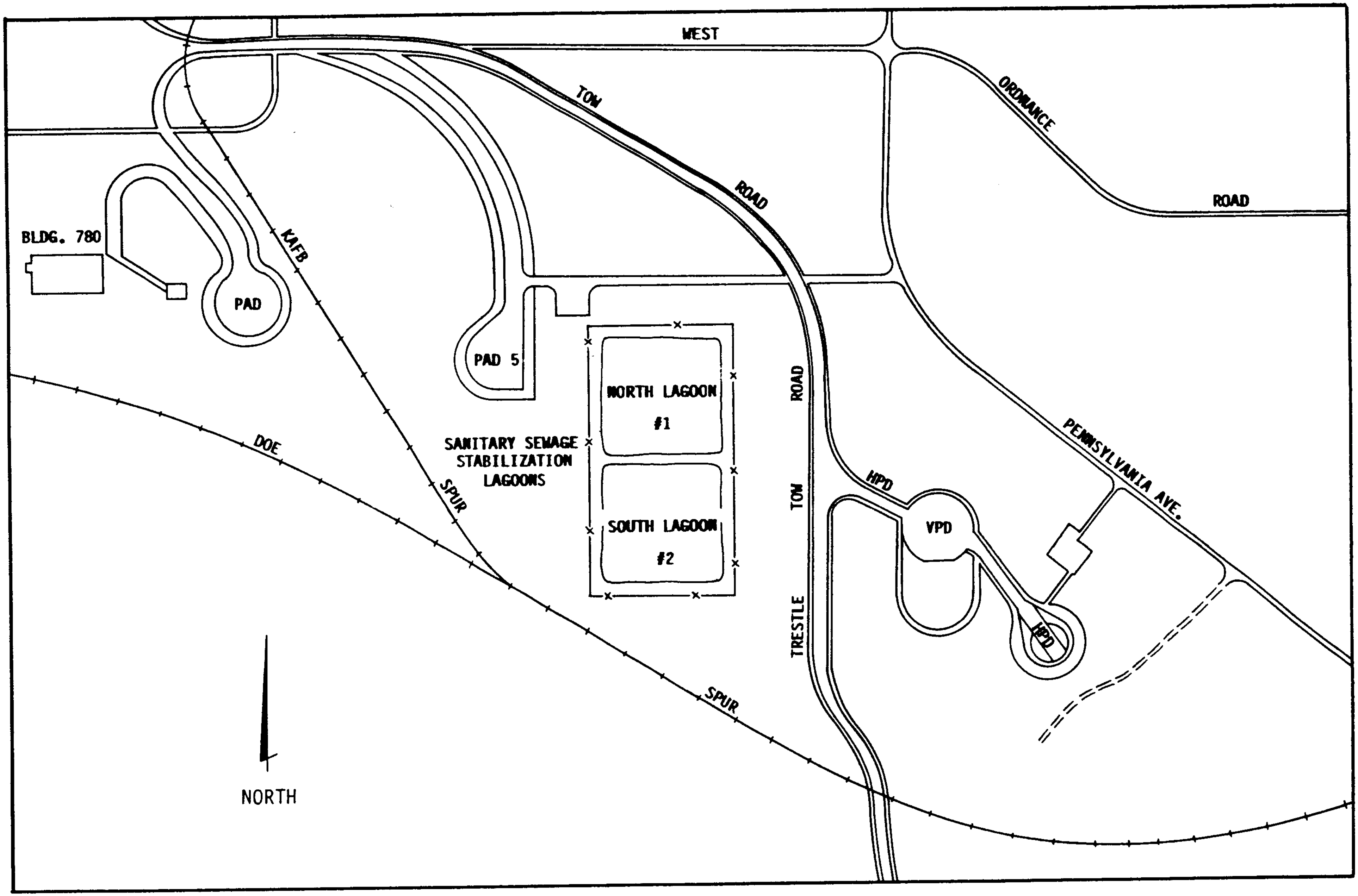

FIGURE 2-3

LOCATION MAP OF SEWAGE LAGOON

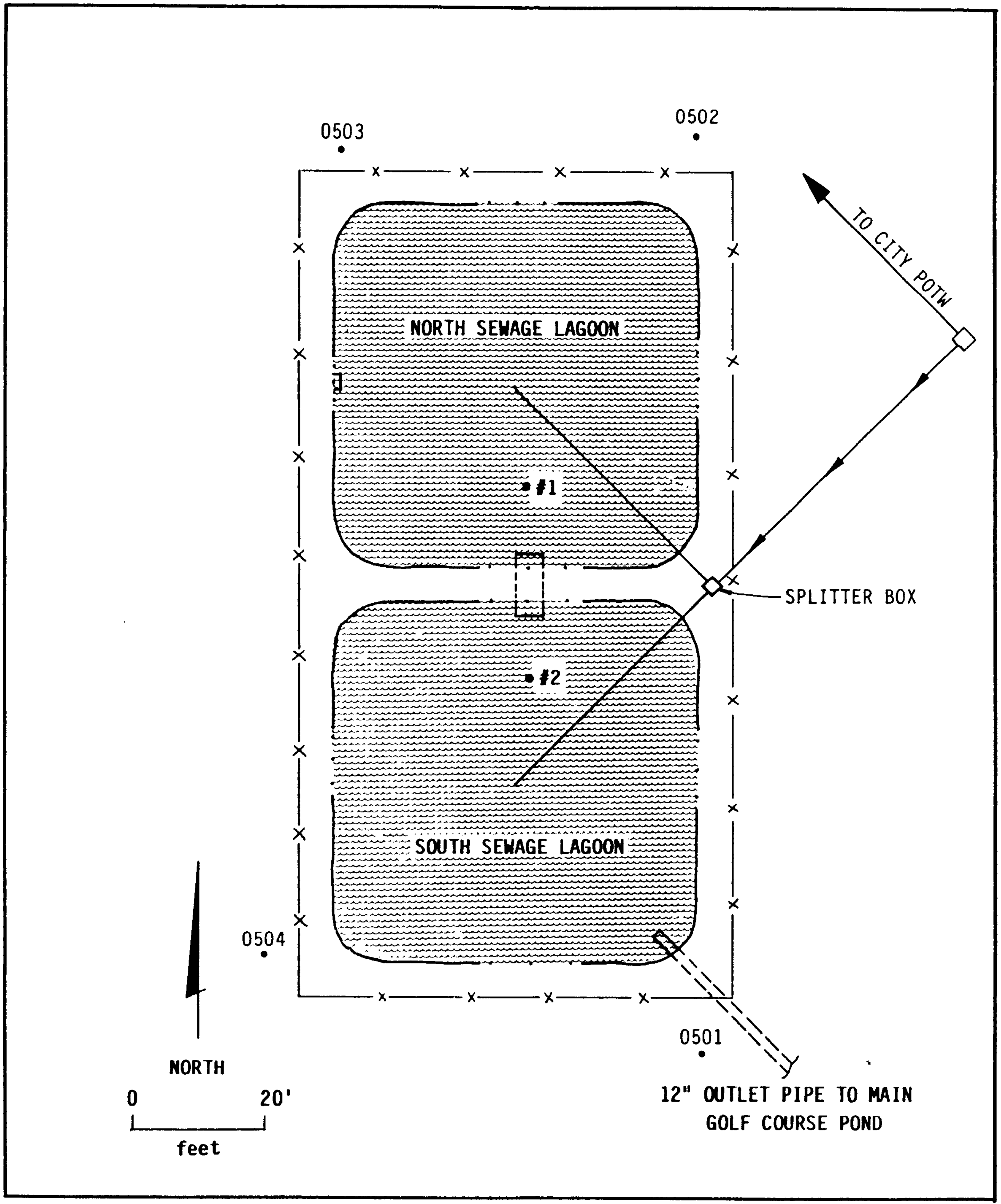

FIGURE 3-1

BORE HOLE LOCATION MAP-SEWAGE LAGOONS

APPENDIX A

APPENDIX A

ANALYTICAL RESULTS

SEWER SAMPLING AT KAFB

ENVIRONMENTAL CONTROL TECHNOLOGY CORPORATION(ENCOTEC)
3985 Research Park Drive * Ann Arbor, MI 48108
313 / 761-1389

ORGANIC ANALYSIS DATA REPORT

(1)

PROJECT NAME: SANDIA
PROJECT NUMBER: 76100
METHOD: 625
REPORT DATE: 08/24/89

ENCOTEC NUMBER: 34485
SAMPLE: SNLA 000351
SAMPLE DATE: 06/22/89
DATE RECEIVED: 06/23/89
DATE ANALYZED: 08/24/89
DATE EXTRACTED: 08/09/89

U = Analyte not detected
B = Analyte present in method blank
J = Analyte present below detection limit

LEVEL: LOW DILUTION FACTOR: 1

HAZARDOUS SUBSTANCE LIST BASE/NEUTRAL EXTRACTABLES	CAS#	UNITS	CONC.	DETECTION LIMITS
Acenaphthene	83-32-9	mg/L	U	0.010
Acenaphthylene	208-96-8	mg/L	U	0.010
Anthracene	120-12-7	mg/L	U	0.010
Benzo(a) anthracene	56-55-3	mg/L	U	0.010
Benzo(b) fluoranthene	205-99-2	mg/L	U	0.010
Benzo(k) fluoranthene	207-08-9	mg/L	U	0.010
Benzo(g,h,i) perylene	191-24-2	mg/L	U	0.010
Benzo(a) pyrene	50-32-8	mg/L	U	0.010
Benzyl alcohol	100-51-6	mg/L	0.002J	0.010
bis(2-Chloroethoxy) methane	111-91-1	mg/L	U	0.010
bis(2-Chloroethyl) ether	111-44-4	mg/L	U	0.010
bis(2-Chloroisopropyl) ether	39638-32-9	mg/L	U	0.010
bis(2-Ethylhexyl) phthalate	117-81-7	mg/L	0.004J	0.010
4-Bromophenyl phenyl ether	101-55-3	mg/L	U	0.010
Butyl benzyl phthalate	85-68-7	mg/L	U	0.010
4-Chloroaniline	106-47-8	mg/L	U	0.010
2-Chloronaphthalene	91-58-7	mg/L	U	0.010
4-Chlorophenyl phenyl ether	7005-72-3	mg/L	U	0.010
Chrysene	218-01-9	mg/L	U	0.010
Dibenz(a,h) anthracene	53-70-3	mg/L	U	0.010
Dibenzofuran	132-64-9	mg/L	U	0.010
1,2-Dichlorobenzene	95-50-1	mg/L	U	0.010
1,3-Dichlorobenzene	541-73-1	mg/L	U	0.010
1,4-Dichlorobenzene	106-46-7	mg/L	0.001J	0.010
3,3'-Dichlorobenzidine	91-94-1	mg/L	U	0.020
Diethyl phthalate	84-66-2	mg/L	U	0.010
Dimethyl phthalate	131-11-3	mg/L	U	0.010
2,4-Dinitrotoluene	121-14-2	mg/L	U	0.010
2,6-Dinitrotoluene	606-20-2	mg/L	U	0.010
di-n-Butyl phthalate	84-74-2	mg/L	0.001J	0.010
di-n-Octyl phthalate	117-84-0	mg/L	0.001JB	0.010
Fluoranthene	206-44-0	mg/L	U	0.010
Fluorene	86-73-7	mg/L	U	0.010
Hexachlorobenzene	118-74-1	mg/L	U	0.010
Hexachlorobutadiene	87-68-3	mg/L	U	0.010
Hexachlorocyclopentadiene	77-47-4	mg/L	U	0.010

ENVIRONMENTAL CONTROL TECHNOLOGY CORPORATION(ENCOTEC)
3985 Research Park Drive * Ann Arbor, MI 48108
313 / 761-1389

ORGANIC ANALYSIS DATA REPORT

(2)

PROJECT NAME: SANDIA
PROJECT NUMBER: 76100
METHOD: 625
REPORT DATE: 08/24/89

ENCOTEC NUMBER: 34485
SAMPLE: SNLA 000351
SAMPLE DATE: 06/22/89
DATE RECEIVED: 06/23/89
DATE ANALYZED: 08/24/89
DATE EXTRACTED: 08/09/89

U = Analyte not detected
B = Analyte present in method blank
J = Analyte present below detection limit

LEVEL: LOW DILUTION FACTOR: 1

HAZARDOUS SUBSTANCE LIST BASE/NEUTRAL EXTRACTABLES	CAS#	UNITS	CONC.	DETECTION LIMITS
Hexachloroethane	67-72-1	mg/L	U	0.010
Indeno(1,2,3-cd) pyrene	193-39-5	mg/L	U	0.010
Isophorone	78-59-1	mg/L	U	0.010
2-Methylnaphthalene	91-57-6	mg/L	U	0.010
Naphthalene	91-20-3	mg/L	U	0.010
2-Nitroaniline	88-74-4	mg/L	U	0.050
3-Nitroaniline	99-09-2	mg/L	U	0.050
4-Nitroaniline	100-01-6	mg/L	U	0.050
Nitrobenzene	98-95-3	mg/L	U	0.010
N-Nitroso-di-n-propylamine	621-64-7	mg/L	U	0.010
N-Nitrosodiphenylamine (1)	86-30-6	mg/L	U	0.010
Phenanthrene	85-01-8	mg/L	U	0.010
Pyrene	129-00-0	mg/L	U	0.010
1,2,4-Trichlorobenzene	120-82-1	mg/L	U	0.010

ACID EXTRACTABLES	CAS#	UNITS	CONC.	DETECTION LIMITS
Benzoic acid	65-85-0	mg/L	U	0.050
4-Chloro-3-methylphenol	59-50-7	mg/L	U	0.010
2-Chlorophenol	95-57-8	mg/L	U	0.010
2,4-Dichlorophenol	120-83-2	mg/L	U	0.010
2,4-Dimethylphenol	105-67-9	mg/L	U	0.050
4,6-Dinitro-2-methylphenol	534-52-1	mg/L	U	0.050
2,4-Dinitrophenol	51-28-5	mg/L	U	0.050
2-Methylphenol	95-48-7	mg/L	U	0.010
4-Methylphenol	106-44-5	mg/L	0.023	0.010
2-Nitrophenol	88-75-5	mg/L	U	0.010
4-Nitrophenol	100-02-7	mg/L	U	0.050
Pentachlorophenol	87-86-5	mg/L	U	0.050
Phenol	108-95-2	mg/L	0.011	0.010
2,4,5-Trichlorophenol	95-95-4	mg/L	U	0.010
2,4,6-Trichlorophenol	88-06-2	mg/L	U	0.010

(1) Compound cannot be separated from Diphenylamine.

COMMENTS: ANALYSIS BY JK. INSTRUMENT 004

ENVIRONMENTAL CONTROL TECHNOLOGY CORPORATION(ENCOTEC)
3985 Research Park Drive * Ann Arbor, MI 48108
313 / 761-1389

ORGANIC ANALYSIS DATA REPORT

(1)

PROJECT NAME: SANDIA
PROJECT NUMBER: 76100
METHOD: 624
REPORT DATE: 08/25/89

ENCOTEC NUMBER: 34484
SAMPLE: SNLA 000350
SAMPLE DATE: 06/22/89
DATE RECEIVED: 06/23/89
DATE ANALYZED: 06/28/89

U = Analyte not detected
B = Analyte present in method blank
J = Analyte present below detection limit

LEVEL: LOW   DILUTION FACTOR: 1

HAZARDOUS SUBSTANCE LIST VOLATILE COMPOUNDS	CAS#	UNITS	CONC.	DETECTION LIMITS
Acetone	67-64-1	mg/L	0.23B	0.010
Benzene	71-43-2	mg/L	U	0.005
Bromodichloromethane	75-27-4	mg/L	U	0.005
Bromoform	75-25-2	mg/L	U	0.005
Bromomethane	74-83-9	mg/L	U	0.010
2-Butanone	78-93-3	mg/L	U	0.010
Carbon disulfide	75-15-0	mg/L	U	0.005
Carbon tetrachloride	56-23-5	mg/L	U	0.005
Chlorobenzene	108-90-7	mg/L	U	0.005
Chloroethane	75-00-3	mg/L	U	0.010
2-Chloroethyl vinyl ether	110-75-8	mg/L	U	0.010
Chloroform	67-66-3	mg/L	U	0.005
Chloromethane	74-87-3	mg/L	U	0.010
Dibromochloromethane	124-48-1	mg/L	U	0.005
1,1-Dichloroethane	75-34-3	mg/L	U	0.005
1,2-Dichloroethane	107-06-2	mg/L	U	0.005
1,1-Dichloroethene	75-35-4	mg/L	U	0.005
1,2-Dichloroethene (Total)	540-59-0	mg/L	U	0.005
1,2-Dichloropropane	78-87-5	mg/L	U	0.005
cis-1,3-Dichloropropene	10061-01-5	mg/L	U	0.005
trans-1,3-Dichloropropene	10061-02-6	mg/L	U	0.005
Ethylbenzene	100-41-4	mg/L	U	0.005
2-Hexanone	591-78-6	mg/L	U	0.010
Methylene chloride	75-09-2	mg/L	0.010B	0.005
4-Methyl-2-pentanone	108-10-1	mg/L	U	0.010
Styrene	100-42-5	mg/L	U	0.005
1,1,2,2-Tetrachloroethane	79-34-5	mg/L	U	0.005
Tetrachloroethene	127-18-4	mg/L	U	0.005
Toluene	108-88-3	mg/L	U	0.005
1,1,1-Trichloroethane	71-55-6	mg/L	U	0.005
1,1,2-Trichloroethane	79-00-5	mg/L	U	0.005
Trichloroethene	79-01-6	mg/L	U	0.005
Vinyl acetate	108-05-4	mg/L	U	0.010
Vinyl chloride	75-01-4	mg/L	U	0.010
Xylene (Total)	1330-20-7	mg/L	U	0.005

COMMENTS: ANALYSIS BY CLT. INSTRUMENT 003

LAGOON SAMPLING RESULTS

TESTS BY SGPG:

Location	Contaminant Detected	Maximum Concentration Found ($\mu g/l$)
Lagoon 1 Inlet, at Splitter Box	Phenol	11.0
	Chloroform	0.6
	Dibromchloromethane	0.8
	1,2-Dichloroethane	6.0
	Methylene Chloride	20.5
	trans-1,2-Dichloroethane	0.4
	Tetrachloroethane	0.9
	1,1,1-Trichloroethane (TCA)	9.0
	Trichloroethylene	2.6
Lagoon 1 North East Corner	Methyl Ethyl Ketone	4.9
	Methyl Isobutyl Ketone	6.5
Lagoon 1 North West Corner	Methylene Chloride	4.7
	TCA	14.6
	Trichloroethylene	1.7
Lagoon 1 South West Corner	Methylene Chloride	4.3
	TCA	14.3
	Trichloroethylene	1.7
Lagoon 1 South East Corner	Methylene Chloride	1.6
Lagoon 2, Exit	Phenol	35.0
	4-Methyphenol	57.0
	Chloroform	0.6
	Methylene Chloride	13.0
	TCA	2.4
	Trichloroethylene	1.0
Lagoon 2 North West Corner	Methylene Chloride	0.8
Lagoon 2 North East Corner	Methylene Chloride	0.6
Lagoon 2 South East Corner	Methylene Chloride	0.8
	TCA	1.0

*All samples taken at the surface.

TESTS BY USGS:

Location	Contaminant Detected	Concentration Found ($\mu g/l$)
Lagoon 1, Subsurface (1A-SUB)	1,1-Dichloroethane	0.47
	Toluene	1.4
	Lead	5800.0 *
	Chromium	11000.0 *
Lagoon 1, Subsurface (1C-SUB)	Toluene	1.8
	Lead	1100.0 *
	Mercury	15.0 *
	Silver	3300.0 *
Lagoon 1, Sediment (1A-SED)	Barium	83.0 mg/kg
	Cadium	6.9 mg/kg
	Chromium	160.0 mg/kg
	Lead	110.0 mg/kg
	Mercury	2400.0 ug/kg
	Silver	96.0 mg/kg
Lagoon 1, Sediment (1C-SED)	Barium	67.0 mg/kg
	Cadium	52.0 mg/kg
	Chromium	140.0 mg/kg
	Lead	70.0 mg/kg
	Mercury	850.0 ug/kg
	Silver	81.0 mg/kg
Lagoon 2, Sediment (2A-SED)	Barium	52.0 mg/kg
	Cadium	1.7 mg/kg
	Chromium	50.0 mg/kg
	Lead	12.0 mg/kg
	Mercury	150.0 ug/kg
	Silver	25.0 mg/kg

APPENDIX B

APPENDIX B

SPECIFIC UNIT CLOSURE INFORMATION FOR
SEWAGE LAGOONS

(Reserved)

APPENDIX C

APPENDIX C

CONTAMINATE LISTING

Contaminates of Concern

(Reserved)

Geoscience Consultants, Ltd. (GCL) is a multidisciplinary firm offering a wide range of environmental, geotechnical and engineering services to clients throughout the United States. GCL is headquartered in Albuquerque, New Mexico and has eastern regional offices in the Washington, D.C. area. The firm's professional staff has expertise in hazardous waste management, hydrogeology, environmental, chemical and civil engineering, permitting and regulatory compliance, and air quality studies.

GCL

For more information, contact:
Geoscience Consultants, Ltd.
500 Copper Avenue, N.W., Suite 200, Albuquerque, New Mexico 87102, (505) 842-0001

Apr 1990
AR Doc # 1702

UNIT CLOSURE PLAN FOR
GOLF COURSE MAIN POND
AT
KIRTLAND AIR FORCE BASE
ALBUQUERQUE, NEW MEXICO

GCL

File 16-34-1

FILE COPY

SUPPLEMENT 2

UNIT CLOSURE PLAN FOR GOLF COURSE MAIN POND AT KIRTLAND AIR FORCE BASE ALBUQUERQUE, NEW MEXICO

April 13, 1990

Prepared for:

KIRTLAND AIR FORCE BASE
1606 ABW/EM, Building 20200
Kirtland Air Force Base, NM 87117-5000

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GCL

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SECTION 1.0

1.0 EXECUTIVE SUMMARY

Kirtland Air Force Base (KAFB), located in southeastern Albuquerque, New Mexico hereby submits a base-wide close plan including Closure and Post-Closure Care Plan Preliminary Information for waste-management units located on the facility, in accordance with the New Mexico Environmental Improvement Division's Compliance Order of (September 1988). The waste management unit understudy consists of the main golf course pond that may have received hazardous and non-hazardous wastes from the sewage lagoons on Kirtland Air Force Base. There is currently no discharge of known hazardous wastes or substances to the unit.

This plan, as well as reference documents, supplements and previous investigations is organized to address the specific requirements of the 40 CFR Parts 261, 265 and 267 adopted by the State of New Mexico Hazardous Waste Management Regulations (HWMR-5).

This plan is written specifically as a conceptual closure design for the golf course main pond. The basewide closure plan contains general information on Kirtland Air Force Base and the conceptual closure alternatives under consideration.

USGS recently completed soil boring program for KAFB and installed monitor wells around the golf course main pond. Soil boring logs are available, however, results of the sampling and test program are not yet completed. This information will be submitted as Appendix A when available.

KAFB proposes to close the golf course main pond under one of the six conceptual designs presented. Once data is obtained from the sampling and testing program, one of the six conceptual designs will be adopted for closure. A report with detailed information on the closure design will be sent to NMEID as Appendix B.

Sections 2.0 and 3.0 provide descriptions of the waste management facility and location, land use and physical and hydrogeological conditions at the site. Sections 4.0 and 5.0 describe the waste disposal practices at the golf course main pond and the results of sampling plans and contamination investigations. Analytical results are presented in Appendix B. Section 6.0

details the waste unit closure design, Section 7.0 addresses the various specific regulatory requirements related to closure and Section 8.0 describes the post closure care plan. This supplement relys on baseline information provided in the basewide closure plan.

This plan contains specific information when required under the same section numbers and headings used in the basewide plan.

SECTION 2.0

2.0 SITE DESCRIPTION (267.33 (a)(3))

2.1 SITE LOCATION AND HISTORY

Kirtland Air Force Base is located in Albuquerque, New Mexico, and is owned and operated by the United States Air Force. (Figure 2-1)

The Tijeras Arroyo Golf Course is located 3 miles south of the main KAFB East. The site is located northwest of the Monzano Base area, north of the riding stables and east of the Pennsylvania Avenue extension. Projecting the location onto the United States Geological Survey Albuquerque East 7 1/2 minute quadrangle (Figure 2-2) gives a location of SW 1/4, of NW 1/4, of Section 9, Township 9 N, Range 4 E. Site elevation is 5,350 feet MSL. Geographic coordinates are 35°1'15" north, 106°32'00" west; Universal Transverse Mercator coordinates are Zone 38, 76,500 meters north and 360,500 meters east. Specifically, the golf course main pond is located on the northwest side of Tijeras Arroyo Golf Course between fairway 3 and 4 (Figure 2-3). The golf course lies east of the intersection of Pennsylvania Avenue and the Eubank extension.

In 1962, the lagoons and golf course pond system were constructed by the Air Force to create a source of primary treated sewage for irrigation water for the Tijeras golf course. Grey-water effluent from sewage lagoons was used to reduce the demand on ground water resources which would have been required for golf course irrigation. The two lagoons are facultative, with no aeration, and measure 6 feet deep and 7 acres each in surface area. The discharge enters the gravity flow pipe to the golf course from the surface of the southeast side of the southern lagoon. During the winter from November to March the lagoons and pond were idle and all influent was diverted to the City of Albuquerque Publicly Owned Treatment Works (POTW) by using an upstream diverter valve. From April to October, depending upon the irrigation needs, 40 to 100 percent of the influent was routed to the lagoon and subsequently piped to the Tijeras Arroyo golf course. There it flowed into the main golf course pond, a 1-acre pond on the northwest side of the golf course. The influent was diluted with potable fresh water from the KAFB water distribution system in a ratio of approximately 2/3 waste water 1/3 fresh water. The golf course ponds last received effluent in October, 1987. The KAFB sewage lagoons have not been dredged since termination of use. The sludge thickness has been measured and chemically analyzed. The data is currently being reviewed by the Air Force Occupational Environmental Health Lab (OEHL) for quality assurance. When available, this data will be submitted in Appendix B. The lagoon effluent was not disinfected except for chlorine treated fresh water added at the golf course pond from the Base water system.

Only the main golf course pond was used for irrigation supply to the golf course sprinkler system. Water in the main pond was pumped to the other four ponds located on the golf course. The four ponds were filled primarily for aesthetic purposes. Currently only fresh water from the hase's water distribution system is available to the sprinkler system.

2.2 LAND USE - GENERAL (267.33 (a)(3))

Please see the Base-Wide Closure Plan for general information in this section.

The area around the main pond is currently in use as a golf course. The perimiter of the golf course is surrounded vacant, undeveloped land with natural vegetation.

2.3 POPULATION DISTRIBUTION AND EXPOSURE

Please see the Base-Wide Closure Plan for general information in this section.

The possibility of human exposure to potentially hazardous materials that may have been disposed of in the main golf course pond is minimal or non-existent because:

- The perimeter of the main pond and pond area is posted on four sides with warning signs in both Spanish and English. Contact is restricted by maintaining the deterrent signs.
- Currently the main pond and ponds do not contain liquid material; only a layer of dried sludges.
- Levels of contaminates that may exist are of low concentrations.
- Ground water lies at a depth of approximately 325 feet below the land's surface, and no contaminates are expected to migrate far enough to reach ground water.

SECTION 3.0

3.0 PHYSICAL ENVIRONMENT

Please see the Base-Wide Closure Plan for information in this section.

3.1 CLIMATE AND METEOROLOGY (267.33 (a)(4), 267.31 a(3))

3.2 GEOLOGY AND SOILS (267.33 (a))

Please refer to the Base-Wide Closure Plan for information in this section.

3.2.1 Regional Geology

Please see the Base-Wide Closure Plan for general information on regional geology of KAFB.

3.2.2 Site Geology and Soils - Golf Course Pond (267.31 (a)(5))

The hand auger hole within the pond indicate that the pond is directly underlain by native fill. The shallow hole penetrated a coarse-grained, poorly graded sand. As borehole information is available it will be added to this closure plan.

3.3 HYDROGEOLOGY (267.10 (a))

Please refer to the Base-Wide Closure Plan for information in this section.

3.3.1 Site Hydrogeology - Golf Course (267.10 (a)(3))

Limited hydrogeologic information is available on the golf course area. This information will be developed as part of KAFB Installation Restoration program and will be included when available as an addition to this plan. Additional information is contained in the installation restoration program reports Phase I (1981) and Phase II (1985).

SECTION 4.0

4.0 HAZARDOUS WASTE MANAGEMENT UNITS

4.1 SIZES AND TYPES (267.31)

4.1.1 General

The golf course main pond is the primary waste management unit addressed in this document.

4.1.2 Golf Course Pond and Ponds

The main golf course pond is gravity fed by an effluent line from the south lagoon, as shown in Figure 4-1. The pond was constructed along the northwestern edge of the Tijeras arroyo golf course in 1962. The pond was constructed by excavating below the surrounding grade and installing a plastic liner. The liner was placed to control seepage losses of liquids in the pond. The integrity of this liner is in question due to holes and lack of seam bonding. A pump house located on the south side of the pond provided irrigation water to the golf course sprinkler system. This pump house could also control the addition of freshwater to either the sprinkler system or the pond. The pumps could also fill the other four ponds located on the golf course. Only the main pond is used for irrigation supply; the other ponds were filled primarily for aesthetic purposes.

4.2 HAZARDOUS WASTE CHARACTERISTICS (267.31 (a)(1)), (267.33 (a)(1))

Efforts were taken by SNLA and KAFB to determine sources of contamination found in the lagoons. The possibility exists that laboratory areas inside of SNLA may have discharged small quantities of chemicals into the sanitary sewer system that flowed into the sewage lagoons and was subsequently piped to the main golf course pond. At one time standard practice allowed at SNLA was to discharge small quantities of laboratory chemicals to the sanitary sewer.

Since contaminants were found at the sewage lagoons which are hydraullically connected to the main pond, it is considered contaminated due to the "mixture rule".

4.3 WASTE MANAGEMENT PRACTICES

The lagoon and golf course pond system was constructed for irrigation of a recreational golf course facility. The system was not intended for disposal of hazardous waste. Sewage effluent was used to reduce the requirement of ground water for golf course irrigation. The inadvertent addition of contaminants to the system now requires the system be closed to prevent further environmental contamination. Residence time of liquids in the units will determine sludge thickness. The extent of contaminate migration depends upon the specific characteristics of the contaminates and the ability of the units to contain waste liquids, sludges and contaminates.

The levels of solvent contamination indicate that a total of approximately 1.4 gallons of 1,1,1 TCE have been disposed into the lagoons via the sanitary sewer system (calculations by SNLA). The lagoon and pond system were taken out of service in November, 1987. Since that time, liquids have evaporated leaving a dry sludge in both the lagoons and pond. A sampling program to define sludge thickness, and contaminate migration is discussed in Section 5.2.

SECTION 5.0

5.0 DOCUMENTED RELEASES

5.1 RELEASE HISTORY

The system was not designed as a surface impoundment for hazardous wastes. However, small amounts of contaminants have entered the lagoon and pond from on-base sources that are connected to this system. Both KAFB and SNLA have assessed waste generators located in these base areas that may have contributed to the contaminants found in lagoons.

The golf course main pond does have a plastic (standard 6 mil black polyethylene) liner but the integrity is uncertain. Leakage may be occurring due to holes, seams, tears and improper installation. Currently, the nature and extent of contaminate migration from the ponds are unknown, however, preliminary sludge analysis data indicates very low level solvent contamination and no metals above EP Tox levels. Following quality assurance review, this data will be provided as Appendix A. Extent of migration will be defined in the step-by-step process outlined below.

5.2 SAMPLING PROGRAM

Please refer to the basewide closure document for general information on this section. The main golf course pond was sampled at 4 locations on its perimeter. The locations of the holes are shown in Borehole Location Map, Figure 5-1.

5.2.1 General Objectives

Are addressed in the Base-Wide Closure Plan.

5.2.2 Sampling Procedures

Please refer to the Base-Wide Closure Plan for specific information in this section.

5.2.3 Sampling of Sludges

Sludges in the main golf course pond have been sampled according to the sampling plan in Appendix E of the basewide plan. The sampling program will conform to stratified random sampling techniques with composite samples for testing in accordance with CFR 261 and test methods for Evaluating Solid Waste Physical/Chemical Methods (SW846), specifically Part III, Chapter 9. Preliminary results are presented in Appendix A.

If sludges are contaminated, the guidelines outlined in the Base-Wide Closure Plan will be followed for the following four sections.

5.2.4 Sampling of Subsurface Soils

5.2.5 Sampling of Background Soil Conditions

5.2.6 Sampling of Vadose Zone

5.2.7 Sampling of Ground Water

5.2.8 Results

Sampling of sludges was accomplished. Laboratory results will be included in Appendix A in this Closure Plan. The sampling results will be submitted when they become available from the USGS.

5.3 ANALYTICAL RESULTS AND PRIORITY TESTING

Initial sampling and testing will address contaminates of concern listed in Appendix C. These contaminates were identified in previous sampling activity. If contaminates of concern are identified in surface sludges, they will be used as indicating parameters for tracking contaminate migration in near surface and deep vadose zone soil samples. Indicating parameters will also be used to test ground water for contamination migration.

Following testing and removal of contaminates of concern, KAFB will test additional soil samples to show that any Part 261 Appendix IX constituents that may remain in the unit are lower than established background sample levels for metals only. Other contaminants that may remain will be below levels posing a threat to human health and the environment based by WQCC standards. Application will then be made for clean closure status.

5.4 QUALITY ASSURANCE/QUALITY CONTROL

Please see the Base-Wide Closure Plan for specifics on this section.

SECTION 6.0

FOR SECTIONS 6.0 TO 10.0, PLEASE REFER TO THE BASE-WIDE CLOSURE PLAN FOR GENERAL INFORMATION IN THE FOLLOWING SECTIONS. SPECIFIC INFORMATION ON THE GOLF COURSE MAIN POND WILL BE ADDED TO EACH SECTION AS IT BECOMES AVAILABLE.

6.0 CLOSURE DESIGN

6.1 CLOSURE GOALS (265.112)

Closure design information is included in the Base-Wide Closure Plan.

6.2 CLOSURE ALTERNATIVES (265.112 (b))

Each of the closure method alternatives, and the criteria which would be used to determine what method would be employed, are discussed in the corresponding section in the Base-Wide Closure Plan. KAFB anticipates that alternative 2, clean closure by removal of contaminated materials, is the most likely closure alternative for the main golf course pond. Specific closure design methods will be discussed in Appendix B when available.

6.3 CLEAN CLOSURE METHODS

6.3.1 Site Preparation (265.112 (b)(4))

Please see the Base-Wide Closure Plan for this information.

6.3.2 Removal and Disposal of All Inventory (265.228 (a)(1))

At the present time, all standing liquids have evaporated from the units, and bottom sludges are slightly moist to dry. If the sludge is found to contain contaminants in excess of those concentrations listed in Section 6.2.2 of the Basewide Closure Plan, the sludge layer will be removed, placed in a hazardous waste soil hauler, and taken to a disposal facility where it will be disposed of as hazardous waste. If the sludge does not contain contaminants in excess concentrations, it will be removed.

6.3.3 Record Keeping

Refer to Base-Wide Plan

6.4 HEALTH AND SAFETY DURING CLOSURE (265.16)

All personnel entering the construction site will be required to observe health and safety procedures as required by OSHA and KAFB.

6.5 COST ESTIMATE (264.142, 265.142)

The total depth and volume of material to be removed has not been determined, therefore a firm cost estimate cannot be provided at this time. Included for general information is a list of items that will impact the costs of closure for each unit.

Clean Closure

- Excavation and removal of sludges
- Transport and disposal of sludges
- Excavation and removal of soils
- Transport and disposal of soils
- Disposal site costs
- Modified decontamination of structures, equipment and piping as required
- Site fill and regrading

Landfill Closure

- Excavation and removal of sludges
- Transport and disposal of sludges
- Excavation and removal of soils
- Transport and disposal of soils
- Dismantling of piping and valve works
- Removal of concrete structures
- Transport and disposal of piping and equipment
- Disposal site costs

- Site fill and regrading
- Monitor well installation and monitoring
- Final cover and cap, erosion protection
- Surface grading
- Re-vegetation over final soil cover

<u>For Landfill Closure With Treatment Include</u>:

- On-site treatment and stabilization methods (unspecified)
- Ground water remediation (if required)

The above costs will vary depending on thickness of contaminated materials. In addition, costs will vary with haul distance, ultimate disposal facility and method

6.6 EQUIPMENT DECONTAMINATION (264.114)(265.112 (b)(4)) and (265.114)
This section is discussed in the Base-Wide Closure Plan

SECTION 7.0

7.0 REGULATORY REQUIREMENTS

7.1 FACILITY CONDITIONS (265.112 (3))

7.1.1 Maximum Amount of Inventory (265.112 (b)(3))

7.1.2 Inventory of Auxiliary Equipment (265.112 (b)(4))

7.1.3 Schedule For Final Closure (265.112 (b)(6))

7.2 REMOVAL AND DISPOSAL OF INVENTORY (265.228 (a)(1))

KAFB proposes to close the units by one of two methods:

Clean Closure

- Removal or treatment of contaminated materials as required to attain clean closure. This includes decontamination of related equipment.
- If the sludge is hazardous it will be removed and treated as a hazardous waste.
- If the sludge is non-hazardous it will be removed and sent to a landfill.

Landfill Closure

- Leaving contaminated material in place with related equipment to remain as a landfill closure. This includes cover and capping of the unit with a post-closure monitoring plan and possible treatment for contaminates if warranted.

For Both Types of Closures

- KAFB may, if feasible, remove sludges from the units.

THE FOLLOWING SECTIONS ARE ADDRESSED IN THE CORRESPONDING SECTIONS OF THE BASE-WIDE CLOSURE PLAN.

7.3 SURVEYING (265.116)

7.4 NOTICE TO LOCAL LAND AUTHORITY (265.119 (a))

7.5 NOTICE IN DEED OF PROPERTY (265.119 (b)(1))

7.6 CERTIFICATION OF CLOSURE (265.115)

7.7 POST-CLOSURE PERMIT (265.117)

7.8 AMMENDMENT OF PLAN (265.112 (c))

This plan may be ammended as necessary according to the provisions outlined in 40 CFR 265.112.

7.9 NOTIFICATION 265.112 (d))

7.10 TIME ALLOWED FOR CLOSURE (265.113)

SECTION 8.0

8.0 POST-CLOSURE CARE PLAN FOR LANDFILL CLOSURE (IF REQUIRED)

8.1 FACILITY CONTACT

8.2 GROUND WATER MONITORING

8.3 SAMPLING AND ANALYSIS (265.92)

8.4 EMERGENCY RESPONSE (265.56)

8.5 FINANCIAL REQUIREMENTS (265.140 (c))

8.6 PERSONNEL TRAINING (265.16)

SECTION 9.0

9.0 SECURITY (265.14)

Access to all parts of KAFB is controlled by United States Air Force security personnel. No unauthorized personnel will be allowed into the work area during closure, and access to the site will be restricted.

SECTION 10.0

10.0 REFERENCES

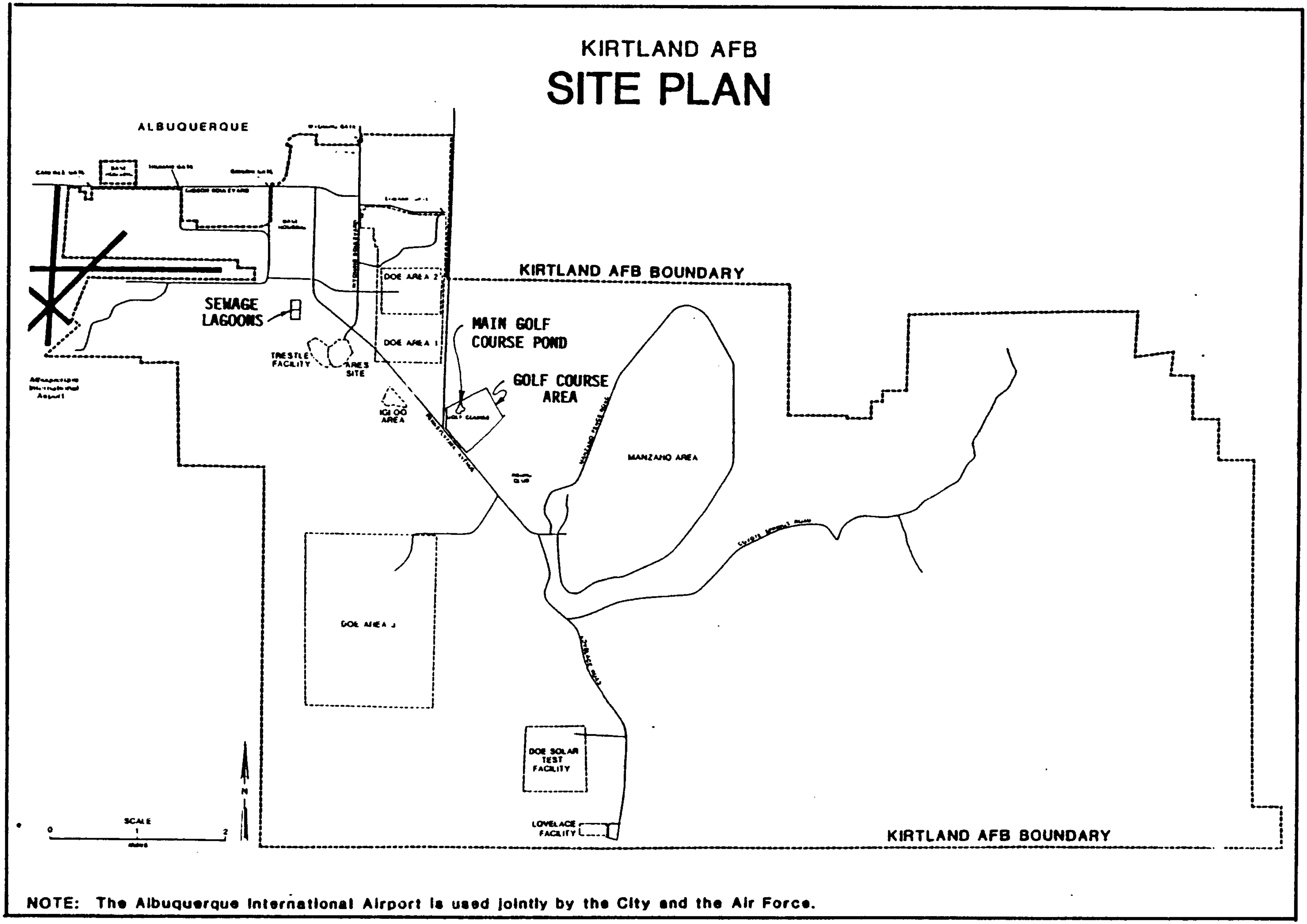

FIGURE 2-1

LOCATION MAP OF UNITS

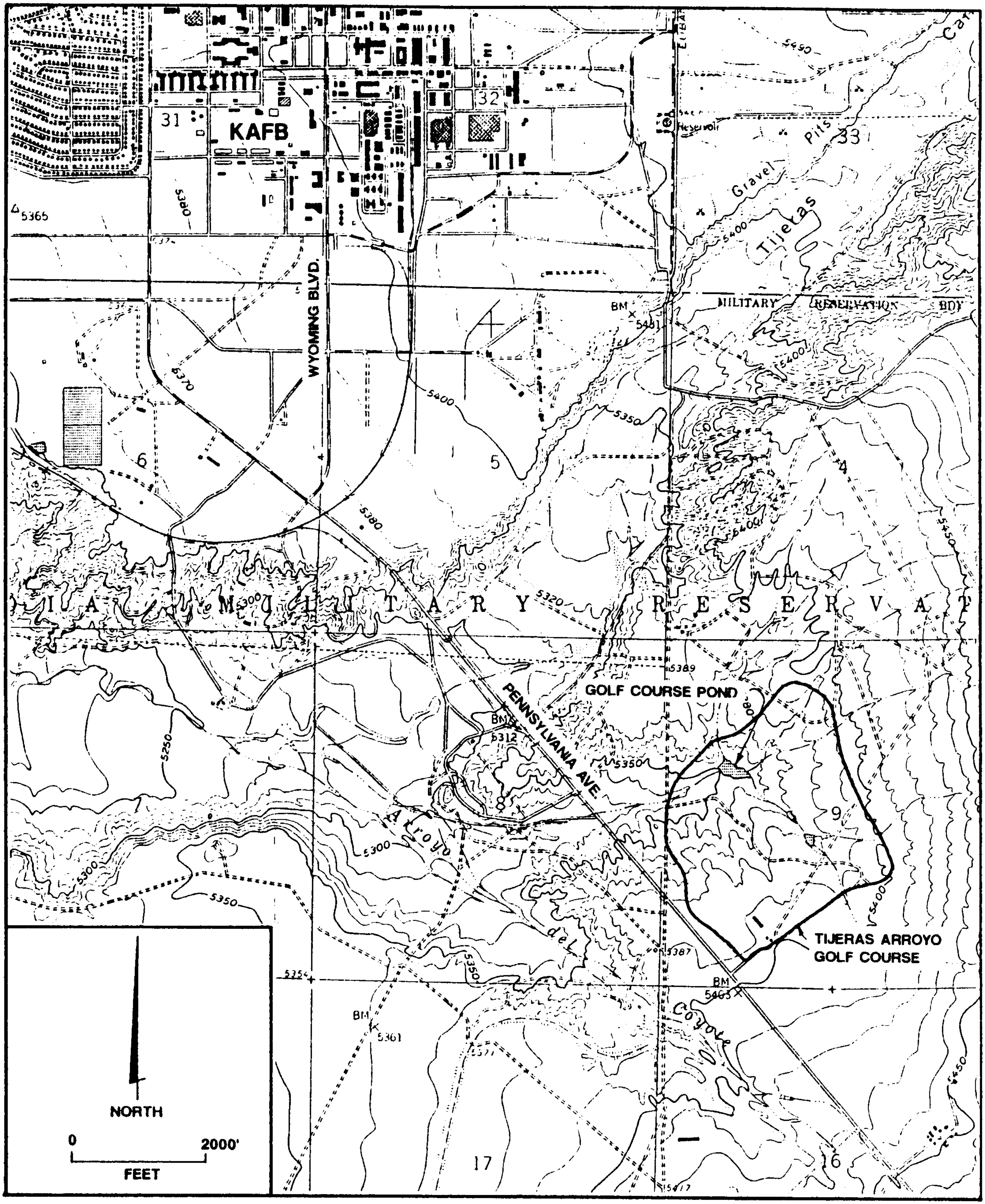

FIGURE 2-2
SITE TOPOGRAPHY MAP

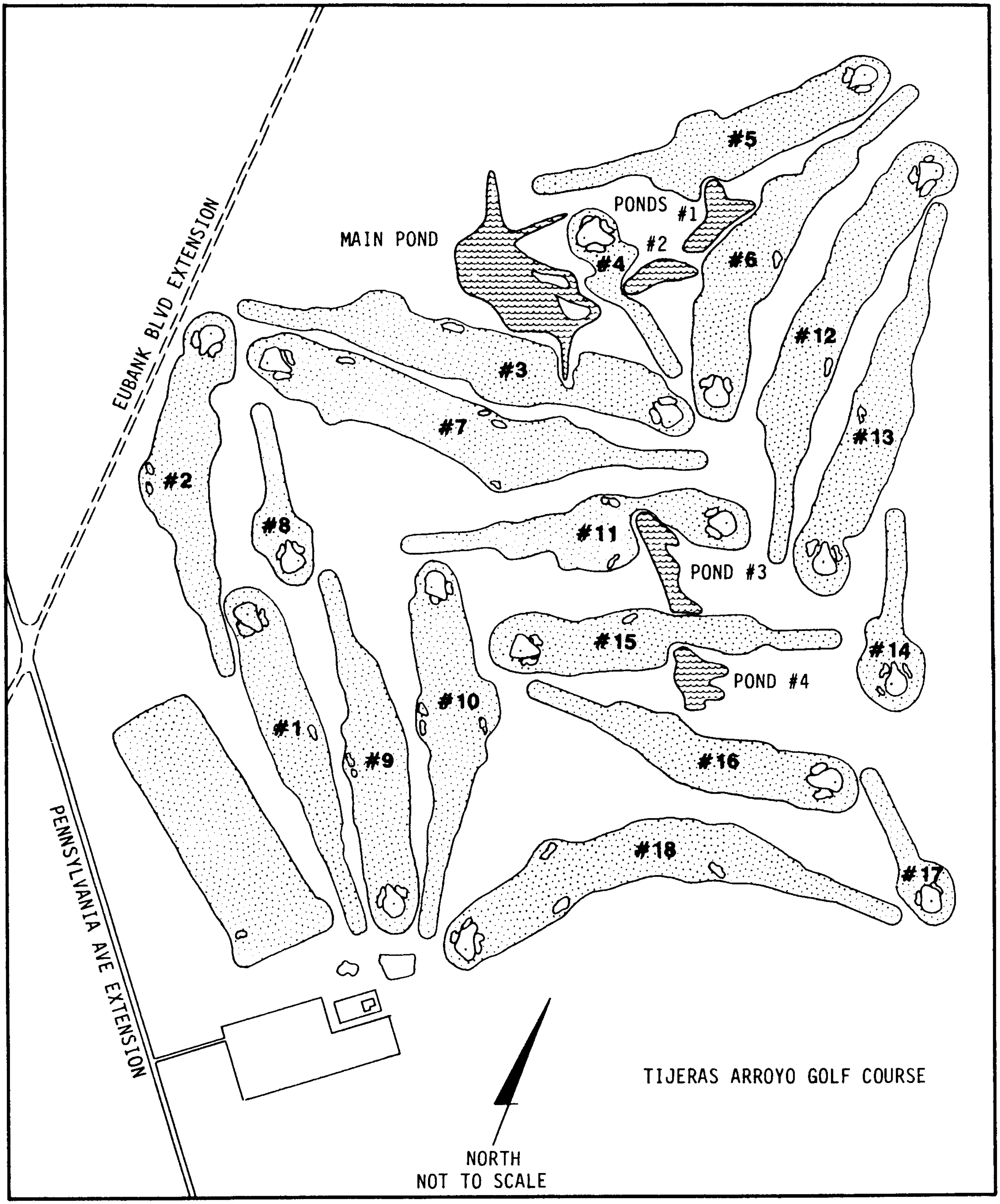

FIGURE 2-3

GOLF COURSE MAIN POND LOCATION

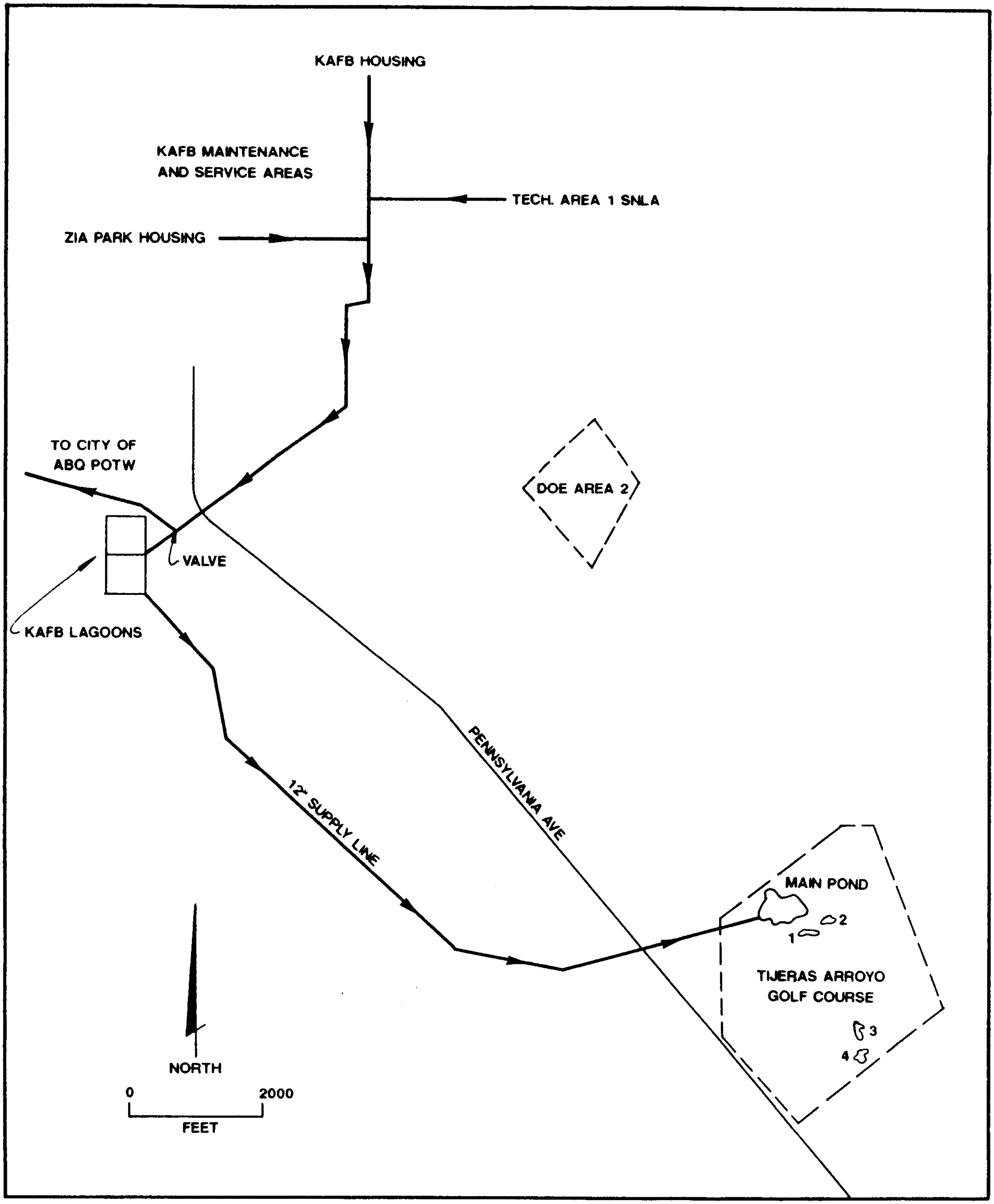

FIGURE 4-1

SCHEMATIC DIAGRAM OF LAGOON AND POND SYSTEM

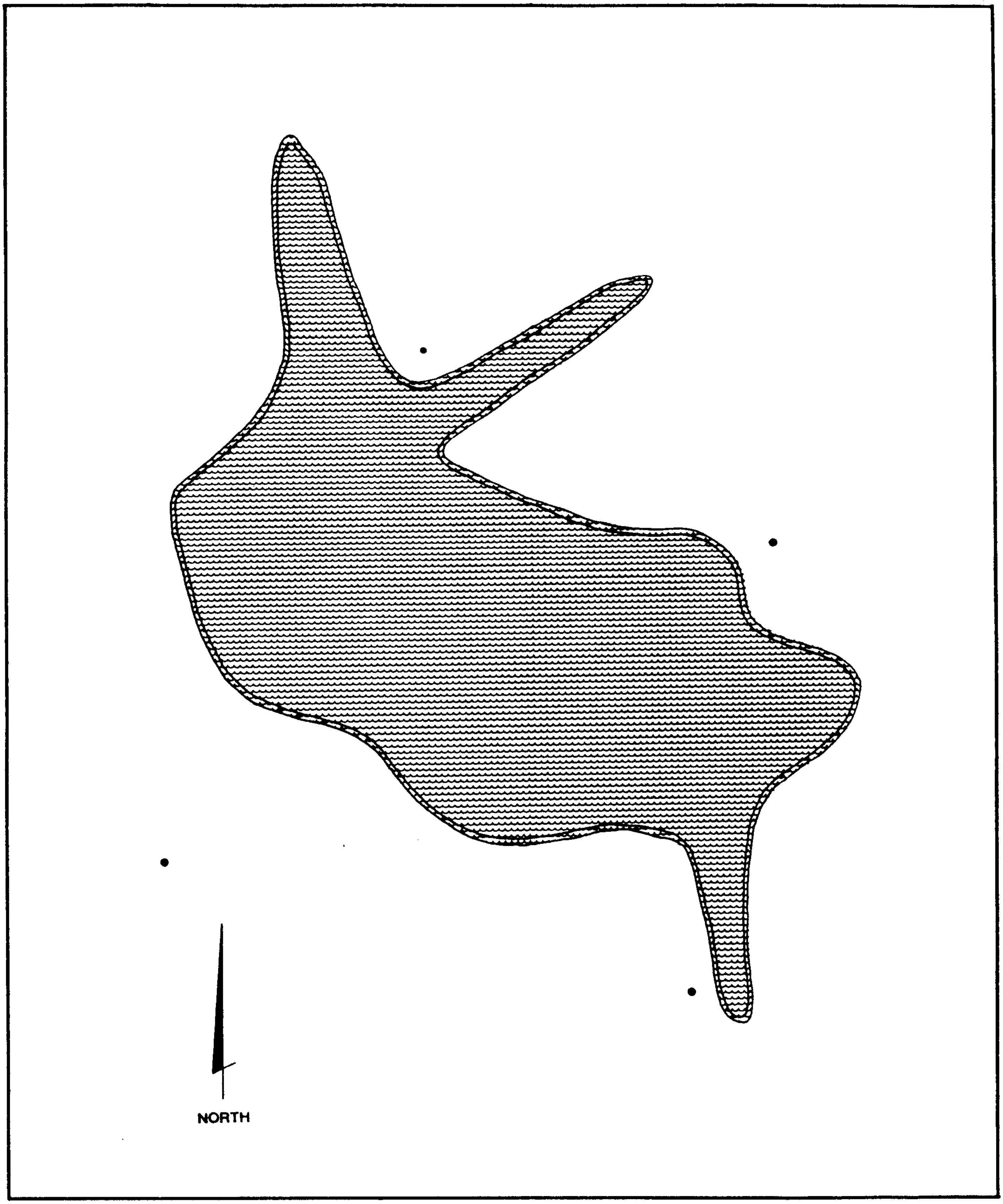

FIGURE 5-1
BORE HOLE LOCATION MAP-GOLF COURSE MAIN POND

APPENDIX A

APPENDIX A

ANALYTICAL RESULTS

(Reserved)

Preliminary information follows this page.
Additional information to be provided.

GOLF COURSE SAMPLING RESULTS

TESTS BY USGS

Location	Contaminant Detected	Concentration Found (μg/l)
Golf Course Pond	Barium	52.0 mg/kg
	Cadium	0.6 mg/kg
	Chromium	16.0 mg/kg
	Lead	7.0 mg/kg
	Mercury	50.0 ug/kg
	Silver	5.2 mg/kg

Sample results exceed Albuquerque's "Sewer Use and Wastewater Control Ordinance "Maximum Allowable Concentration.

TESTS BY SGPG

Location	Contaminant Detected	Maximum Concentration Found (μg/l)
Golf Course Pond	Phenol	4.6
	Chloroform	0.4
	Methylene Chloride	1.8
	TCA	0.9

* All samples taken at the surface.

APPENDIX B

APPENDIX B

SPECIFIC CLOSURE DESIGN INFORMATION

(Reserved)

APPENDIX C

APPENDIX C

CONTAMINATE LISTING

Contaminates of Concern

(Reserved)

Geoscience Consultants, Ltd. (GCL) is a multidisciplinary firm offering a wide range of environmental, geotechnical and engineering services to clients throughout the United States. GCL is headquartered in Albuquerque, New Mexico and has eastern regional offices in the Washington, D.C. area. The firm's professional staff has expertise in hazardous waste management, hydrogeology, environmental, chemical and civil engineering, permitting and regulatory compliance, and air quality studies.

GCL

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16.5.26.3.1

Apr 1990

AR Doc # 1703

CLOSURE PLAN FOR GOLF COURSE AT KIRTLAND AIR FORCE BASE ALBUQUERQUE, NEW MEXICO

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SUPPLEMENT 3

CLOSURE PLAN FOR GOLF COURSE AT KIRTLAND AIR FORCE BASE ALBUQUERQUE, NEW MEXICO

April 13, 1990

Prepared for:

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1.0 EXECUTIVE SUMMARY

Kirtland Air Force Base (KAFB), located in southeastern Albuquerque, New Mexico hereby submits a base-wide close plan including closure and post-closure care plan preliminary information for waste-management units located on the facility, in accordance with the New Mexico Environmental Improvement Division's Compliance Order of (September 1988). The waste management unit under study consists of the Tijeras Arroyo Golf Course that may have received hazardous and non-hazardous wastes from the main golf course pond on Kirtland Air Force Base. There is currently no discharge of known hazardous wastes or substances to the units.

This plan, as well as the Basewide Closure Plan, reference documents and previous investigations is organized to address the specific requirements of the 40 CFR Parts 261, 265 and 267 adopted by the State of New Mexico Hazardous Waste Management Regulations (HWMR-5).

This plan is written specifically as a conceptual closure design for the golf course. The basewide closure plan contains general information on Kirtland Air Force Base and the conceptual closure alternatives under consideration.

Once data is obtained from the sample and testing program, this information will appear in Appendix A. A closure report with detailed specifications on the method selected will be submitted to NMEID as Appendix B. KAFB proposes to close the unit under one of the six conceptual designs presented. KAFB anticipates closure of the golf course under Alternative 1, no contamination and no action required for closure.

In accordance with the Installation Restoration Program Work Plan, KAFB has conducted a soil sampling program to assess the nature and extent of possible soil contamination at the golf course. Results of this investigation are preliminary and details of the closure design have not been developed.

Sections 2.0 and 3.0 provide descriptions of the waste management facility and location, land use and physical and hydrogeological conditions at the site. Sections 4.0 and 5.0 describe the waste disposal practices at the golf course and the results of (or proposed) sampling plans and contamination investigations. Analytical results are presented in Appendix A. Section 6.0 provides general details of the closure design with detailed closure information in Appendix B. Section 7.0 addresses the various specific regulatory requirements related to closure and Section 8.0 describes the post closure care plan.

This supplement relies on general information included in a Basewide Closure Plan document. Specific information is contained in this supplement for the golf course closure under the same section numbers and headings.

2.0 SITE DESCRIPTION

2.1 LOCATION AND SITE HISTORY (265.280 (b)(3))

Kirtland Air Force Base is located in Albuquerque, New Mexico, and is owned and operated by the United States Air Force (Figure 2-1).

The Tijeras Arroyo Golf Course is located 3 miles south of the KAFB Headquarters. The site is located northwest of the Manzano Base area, north of the riding stables and east of the Pennsylvania Avenue extension. Projecting the location onto the United States Geological Survey Albuquerque East 7 1/2 minute quadrangle (Figure 2-2) gives a location of SW 1/4, of NW 1/4, of Section 9, Township 9 N, Range 4 E. Site elevation is 5,350 feet MSL. Geographic coordinates are 35°1'15" north, 106°32'00" west; Universal Transverse Mercator coordinates are Zone 38, 76,500 meters north and 360,500 meters east. Specifically, the golf course is located east of the intersection at Pennsylvania and the Eubank extension. (Figure 2-2).

The golf course was constructed in 1962 by the Air Force as a recreational facility.

2.2 LAND USE - GENERAL (265.280 (b)(3))

2.3 POPULATION DISTRIBUTION AND EXPOSURE

The possibility of human exposure to potentially hazardous materials that may have been disposed of at the golf course is minimal or non-existent because:

- The perimeter of each pond is posted on four sides with warning signs in both Spanish and English. Contact is restricted by maintaining the deterrent signs.
- Currently the ponds do not contain liquid material; only a thin layer of dried sludge.
- Ground water lies at a depth of approximately 475 feet below the land's surface, and no contaminates are expected to migrate far enough to reach ground water.
- Irrigation of the golf course was done at night or during periods when golfers were not using the facility.
- The distance to the nearest water supply well is approximately 2 miles.
- Soil sampling at the golf course indicates no contamination exists.

3.0 PHYSICAL ENVIRONMENT

3.1 CLIMATE AND METEOROLOGY (265.280 (b)(4))

(See Basewide Closure Plan)

3.2 GEOLOGY AND SOILS (265.280 (b)(5))

(See Basewide Closure Plan)

3.2.1 Regional Geology

(See Basewide Closure Plan)

3.2.2 General Geology and Soils

Wink Series soils consist of Wink fine sandy loam, and the Wink-Embudo complex. Wink Series soils are deep, well drained soils that form in old unconsolidated alluvium modified by wind on pediment surfaces. Permeabilities range from 2.0 to 6.0 inches per hour (U.S. Soil Conservation Service, 1977). Runoff is medium in the Wink fine sandy loam, water erosion is slight to moderate and hazard of soil blowing is moderate. Potential for flooding and poor compaction exists in soils of the Wink-Embudo complex.

3.2.3 Site Geology and Soils

(See Basewide Closure Plan)

3.3 HYDROGEOLOGY

(See Basewide Closure Plan)

3.3.1 Regional Hydrogeology

(See Basewide Closure Plan)

3.3.2 Site Hydrogeology - Golf Course

This information will be developed as part of KAFB site characterization program on the main golf course pond.

4.0 HAZARDOUS WASTE MANAGEMENT UNITS

4.1 SIZES AND TYPES

4.1.1 General

The golf course is the waste management unit addressed in this document. This includes the decorative ponds fairways, greens, tees and sand bunkers.

4.1.2 Decorative Ponds

The four decorative ponds were constructed by excavating below the surrounding grade and installing a plastic liner. Liners were placed in the ponds to control seepage losses of liquids. The integrity of the liners are in question due to holes and lack of seam bonding.

A pump house located on the south side of the main pond provides irrigation water to the golf course sprinkler irrigation system. This pump house controls the addition of freshwater to either the sprinkler system or the main pond. The pumps could fill the other four ponds from the main pond. Only the main pond was used for irrigation supply; the decorative ponds are filled primarily for aesthetic purposes. Sampling of the thin layer of sludge in the golf course ponds will be conducted and presented in Appendix A.

This plan covers closure of the golf course and four decorative ponds. Please refer to the specific supplement #2 for closure information on the main pond.

4.1.3 Golf Course

(See Basewide Closure Plan)

Liquid from the main pond was used to irrigate the golf course. Soil sampling of the golf course indicates no contamination. This information is presented in Appendix A.

4.2 HAZARDOUS WASTE CHARACTERISTICS (265.280 (b)(1))

The liquid applied to the golf course originated from the sewage lagoons and was pumped from the main golf course pond. Information on contaminates in the main pond is discussed in Supplement #2. The amount pumped onto the golf course is unknown but was applied for a period of 25 years during the summer months.

4.3 WASTE MANAGEMENT PRACTICES

The lagoon and golf course pond system was constructed for irrigation of a recreational golf course facility. The system was not intended for disposal of hazardous waste. Sewage effluent was used to reduce the requirement of ground water for golf course irrigation. The inadvertent addition of contaminants to the system now requires the golf course to undergo a closure plan to mitigate further possible environmental contamination.

5.0 DOCUMENTED RELEASES

5.1 RELEASE HISTORY

The golf course was not designed as a land treatment unit for hazardous wastes. Small amounts of contaminants may have entered the main pond from the sewage lagoons. KAFB and SNLA assessed generators located on the base that may have contributed to contaminants found in the lagoons. Through effective waste management procedures this practice has been stopped. Use of the lagoons and all ponds have been curtailed and liquids have evaporated.

The golf course ponds do have a plastic (standard 6 mil black polyethylene) liner but the integrity is uncertain. Leakage may have occurred due to holes, seams, tears and improper installation. Currently, the nature and extent of contaminate migration from the golf course is unknown. When available, lab analysis data will be provided as Appendix A. Extent of migration will be defined in the step-by-step process outlined below.

5.2 SAMPLING PROGRAM (265.273(a)(G))

5.2.1 Objectives

To determine the nature and extent of potential contamination, a sampling program for the golf course has been completed and is shown in Appendix A. Sampling locations are shown on Figure 5-1. Additional sampling is planned for the decorative ponds this information will be added to Appendix A. Chemical analyses of samples collected from the units will be conducted. Results will be presented in Appendix A. The sampling program is designed in order to define the following:

- Evaluate waste characteristics of sludges and near-surface soils.
- The lateral and vertical extent of vadose zone contamination in the vicinity of the golf course.
- The level of contaminates that may exist in the soil.
- The nature and concentrations of hazardous constituents.
- The possibility of contaminates affecting ground water.

5.2.2 Sampling Procedures
(See Basewide Closure Plan)

5.2.2.1 Sampling of Golf Course
Surface soils at the golf course were sampled. Preliminary results will be presented in Appendix A when available.

5.2.2.2 Sampling of Decorative Ponds
Currently the decorative ponds do not contain any liquid. A sampling program will be conducted as required by the February 1990 Compliance Agreement. These results when available will be presented in Appendix A.

5.2.3 Sampling of Sludges
Please see Basewide Closure Plan for specific information on the following sections.

5.2.4 Sampling of Subsurface Soils
5.2.5 Sampling of Background Soil Conditions
5.2.6 Sampling of Vadose Zone (If Required)
5.2.7 Sampling of Ground Water

5.2.8 Results
Results will appear in Appendix A.

5.3 ANALYTICAL RESULTS AND PRIORITY TESTING
5.4 QUALITY ASSURANCE/QUALITY CONTROL

6.0 CLOSURE DESIGN (265.280)

(For specific information in the following sections 6.0-10.0 please refer to the Basewide Closure Plan)

6.1 CLOSURE GOALS

6.2 CLOSURE ALTERNATIVES

Please refer to the Basewide Closure Plan decision tree diagram, Figure 6-1, to determine the effect contamination migration will have on the type of closure alternative used. If closure is found to be necessary, there are currently six alternatives which would satisfy closure criteria. Depending upon the relative amounts of contaminate migration one of the alternatives discussed in the Basewide Plan can be used for closure of the units.

Based on currently available information KAFB anticipates limited, if any, contamination and that clean closure under alternative 1 will be suitable for closure of the golf course. This is clean closure with no contamination will enable the golf course to be put back into service. Specific closure design methods will be discussed in Appendix B when available.

For information on the following sections please see the Basewide Closure Plan.

6.2.1 Clean Closure

6.2.2 Clean Closure Goals

6.2.3 Closure as a Landfill

6.3 CLEAN CLOSURE METHODS

6.3.1 Site Preparation

6.3.2 Removal and Disposal of All Inventory (265.112 (b)(4))

6.3.3 Record Keeping

6.4 HEALTH AND SAFETY DURING CLOSURE (265.16)

6.5 COST ESTIMATE (265.142)

6.6 EQUIPMENT DECONTAMINATION (265.112 (b)(4) & 265.114)

7.0 REGULATORY REQUIREMENTS

7.1 FACILITY CONDITIONS

7.1.1 Maximum Amount of Inventory (265.112 (b)(3))

7.1.2 Inventory of Auxiliary Equipment (265.112 (b)(4))

7.1.3 Schedule For Final Closure (265.112 (b)(6))

7.2 REMOVAL AND DISPOSAL OF INVENTORY

7.3 SURVEYING (265.116)

7.4 NOTICE TO LOCAL LAND AUTHORITY (265.119 (a))

7.5 NOTICE IN DEED OF PROPERTY (265.119 (b)(1))

7.6 CERTIFICATION OF CLOSURE (265.115)

7.7 POST-CLOSURE PERMIT (265.117)

7.8 AMENDMENT OF PLAN (265.112 (c))

This plan may be amended as necessary according to the provisions outlined in 40 CFR 265.112.

7.9 NOTIFICATION (265.112 (d))

7.10 TIME ALLOWED FOR CLOSURE (265.113)

8.0 POST-CLOSURE CARE PLAN FOR LANDFILL CLOSURE (IF REQUIRED)

8.1 FACILITY CONTACT

8.2 GROUND WATER MONITORING

8.3 SAMPLING AND ANALYSIS (265.92)

8.4 EMERGENCY RESPONSE

8.5 FINANCIAL REQUIREMENTS (265.140 (c))

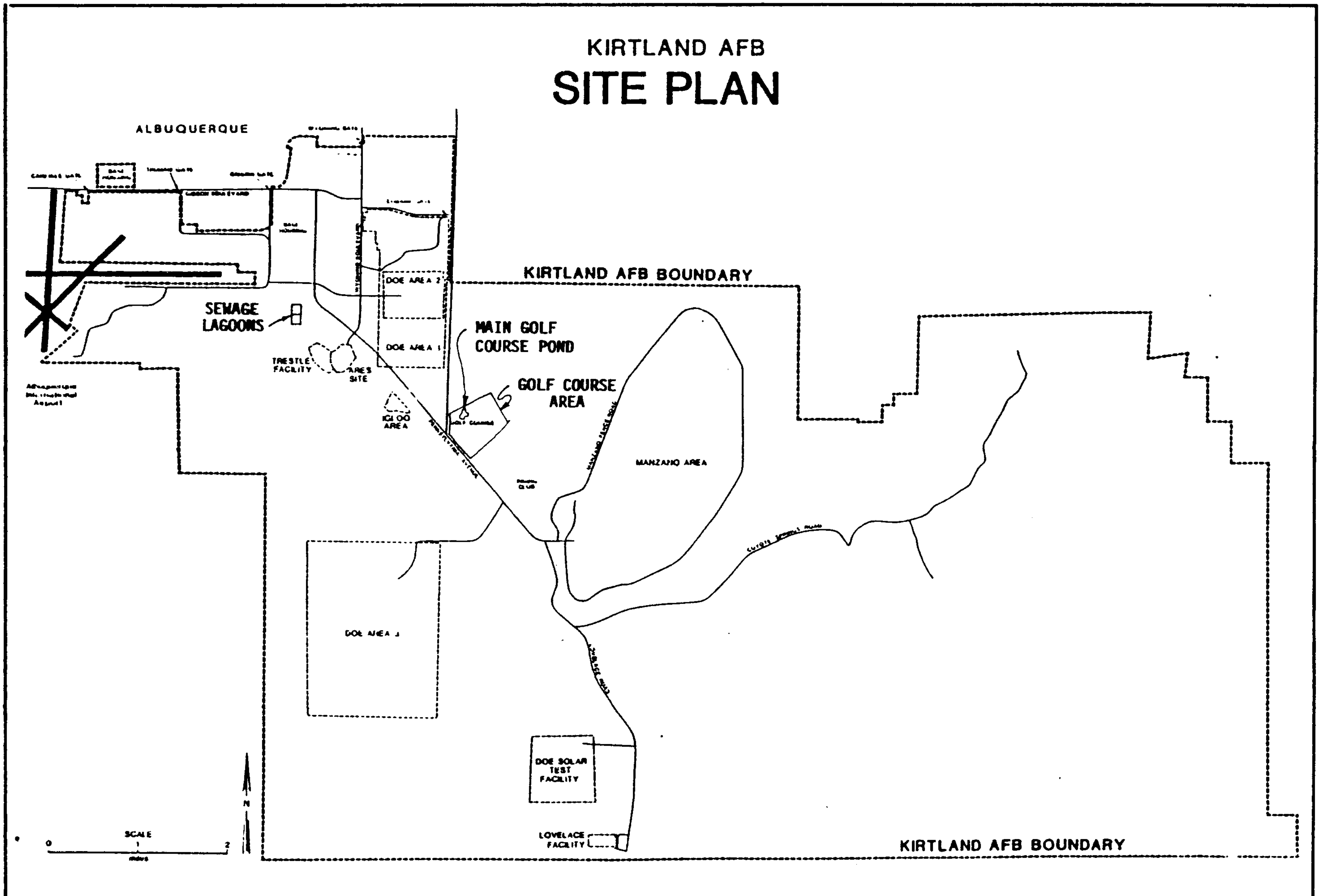
8.6 PERSONNEL TRAINING (265.16)

9.0 SECURITY (265.14)

Access to all parts of KAFB is controlled by United States Air Force security personnel. No unauthorized personnel will be allowed into the work area during closure, and access to the site will be restricted.

10.0 REFERENCES

FIGURES



NOTE: The Albuquerque International Airport is used jointly by the City and the Air Force.

FIGURE 2-1

LOCATION MAP OF UNITS

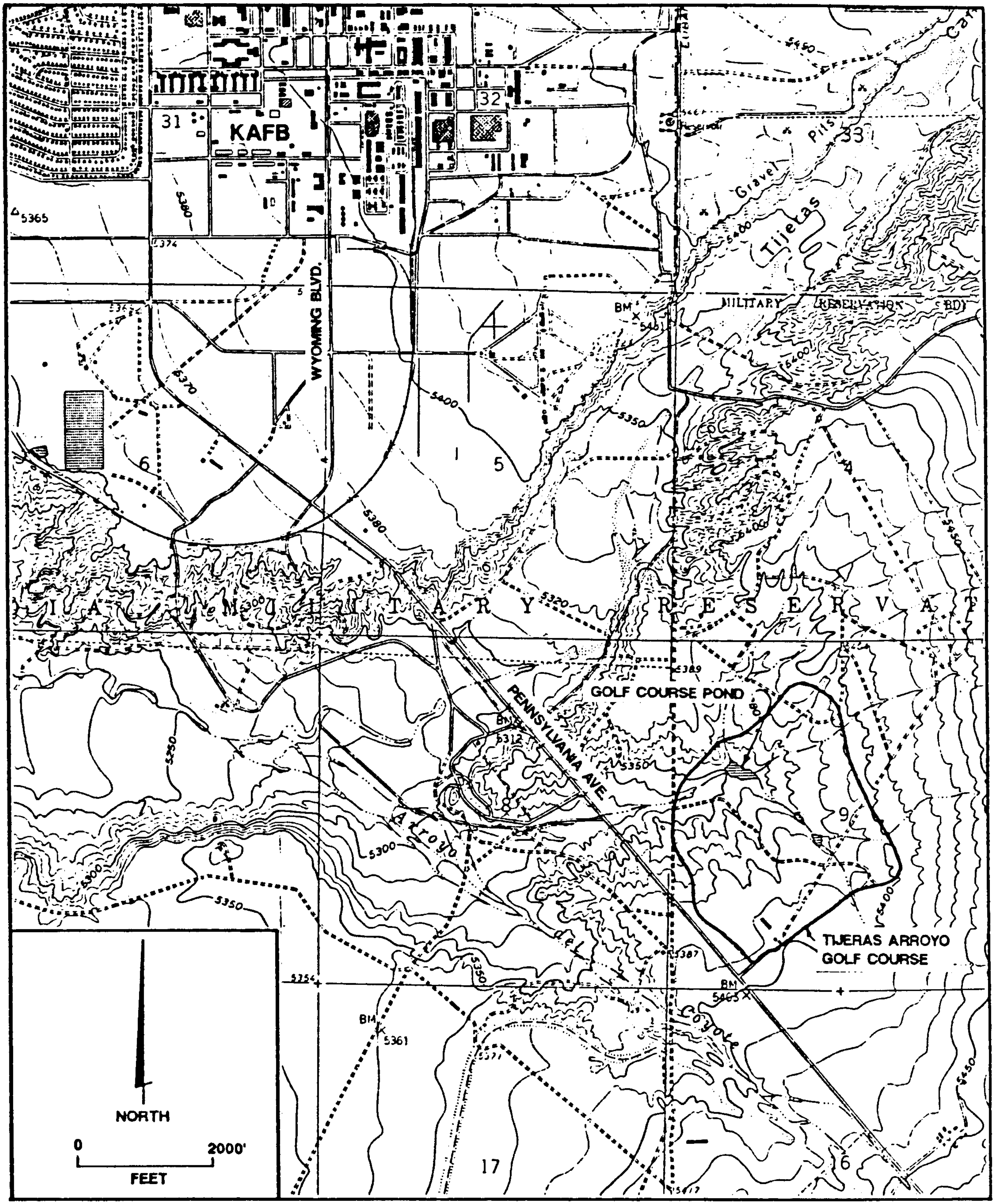


FIGURE 2-2
SITE TOPOGRAPHY MAP

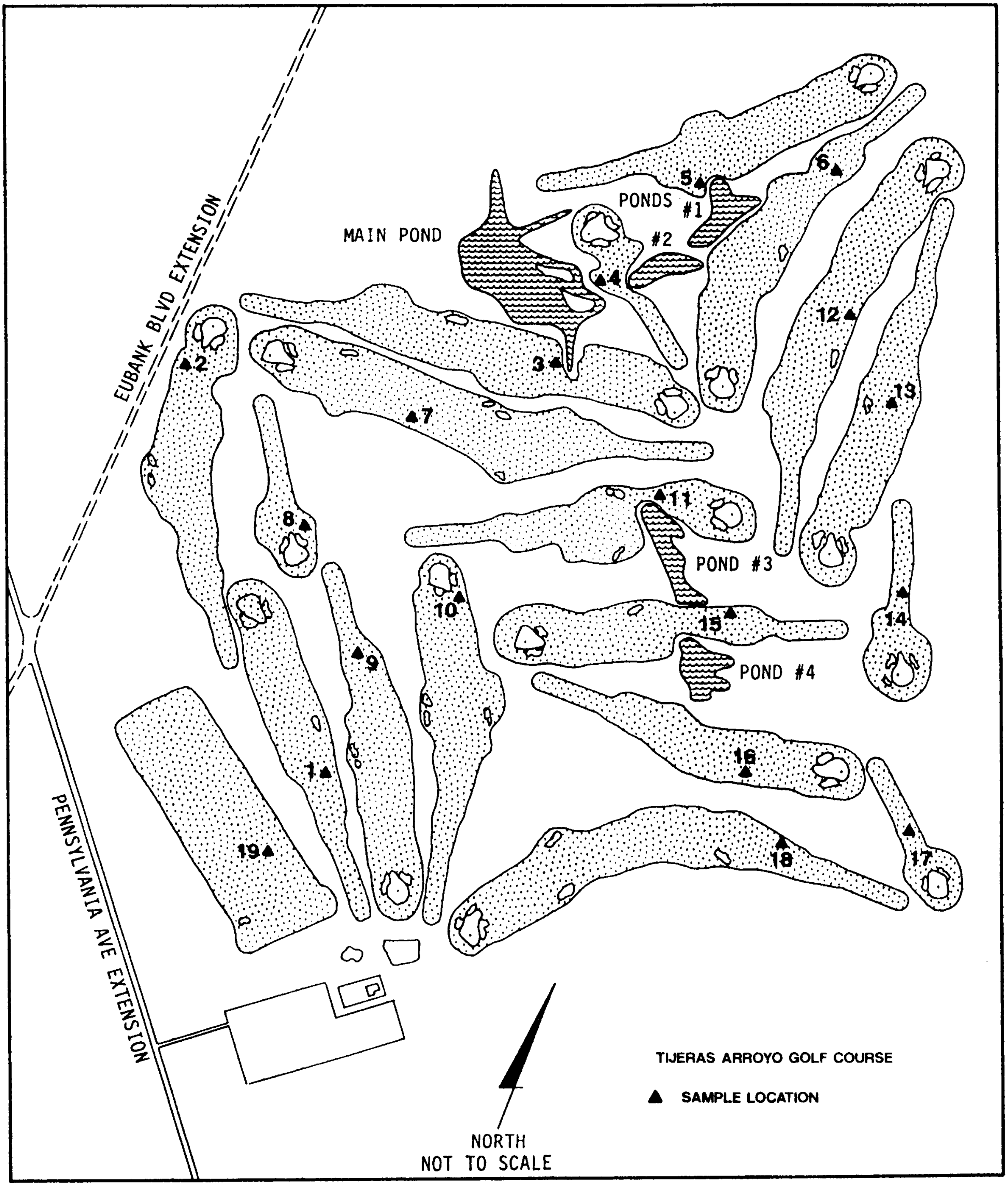


FIGURE 5-1
SAMPLING LOCATION MAP-GOLF COURSE AREA

APPENDIX A

APPENDIX A

ANALYTICAL RESULTS

HEALTH AND ENVIRONMENT DEPARTMENT

Post Office Box 968
Santa Fe, New Mexico 87504-0968

ENVIRONMENTAL IMPROVEMENT DIVISION

Michael J. Burkhart
Director

GARREY CARRUTHERS
Governor

LARRY GORDON
Secretary

CARLA L. MUTH
Deputy Secretary

September 15, 1988

Col. Peter Warn
1606 ABW/RMX
Kirtland Air Force Base
Albuquerque, NM 87117

Dear Colonel Warn:

The golf course at Kirtland Air Force Base (KAFB) was identified as a hazardous waste treatment area in November 1987 due to the use of irrigation water there which originated from KAFB's sewage lagoons. The sewage lagoons were found to contain both 1,1,1 Trichloromethane (TCA) and dichloromethane by EID's Scientific Laboratory Division in June 1987. Sludge samples from the lagoons also contained high levels of toxic metals, chromium being present in the highest concentration. Chromium was also found in sludge samples taken from the golf course pond.

EID has suggested that KAFB undertake sampling and make arrangements for chemical analyses of soil at the golf course to determine the concentration of hazardous wastes there. EID has determined that the most appropriate sampling method, as a minimum, is as follows. KAFB should collect a 6 inch core sample of the soil not more than one foot from one sprinkler emitter from each fairway (18 samples) and the driving range (1 sample). The sprinkler emitter chosen should be that emitter at the lowest elevation on the fairway or on the driving range. A background sample should be taken from a similarly irrigated location which has never had sewage lagoon or golf course pond water applied to it.

These 20 samples should be tested according to the SW-846 methods for TCA, dichloromethane, and total chromium.

If you have any questions, please contact Mr. Bruce Swanton at 827-2935.

Sincerely,

Boyd Hamilton
Program Manager
Hazardous Waste Section

BH/BS/bs

LABORATORY ANALYSIS REPORT AND RECORD

DATE 12 DEC 1988

FROM: Brooks Air Force Base

[SAMP]LE IDENTITY
[S]IL

DATE RECEIVED November 29, 1988

[SAMP]LE FROM

V088 12.2

[REQUES]T FOR
[...]/HALL

AF-4525

[Ana]lyte(s)	Base Number: GT880550 OEHL Number: 73199	GT880551 73200	GT880552 73201	GT880553 73202
[M]ethylene Chloride	ND*	ND*	ND*	ND*
[1,]1,1-Trichloroethane	ND*	ND*	ND*	ND*

Results in ug/gram

*ND = None Detected. Less than the Limit of Detection.
T[r]ace = Present, but quantity less than Limit of Quantitation.

R[E]QUESTING AGENCY (Mailing Address)
USAF Hospital/SGPB
Kirtland AFB, NM 87117-5300

Date(s) Analyzed by DataChem
Date Reported by DataChem: December 8, 1988 [initials]
Date Analyzed by DataChem: December 05, 1988

AFSC Form 3511, DEC 85 REPLACES AMD FORM 641, SEP 82, WHICH IS OBSOLETE.

LABORATORY ANALYSIS REPORT AND RECORD

DATE: 12 DEC 1988

:

FROM: Brooks Air Force Base

SAMPLE IDENTITY: OIL

DATE RECEIVED: November 29, 1988

SAMPLE FROM: 1088122

REQUEST FOR: C/HALL

AF-4525

Base Number:	GT880554	GT880555	GT880556	GT880557
OEHL Number:	73203	73204	73205	73206
Analyte(s)				
Methylene Chloride	ND*	ND*	ND*	ND*
1,1,1-Trichloroethane	ND*	ND*	ND*	ND*

Results in ug/gram

*ND = None Detected. Less than the Limit of Detection.
Trace = Present, but quantity less than Limit of Quantitation.

REQUESTING AGENCY (Mailing Address)
USAF Hospital/SGPB
Kirtland AFB, NM 87117-5300

Date(s) Analyzed by DataChem
Date Reported by DataChem: December 8, 1988
Date Analyzed by DataChem: December 05, 1988

AFSC Form 3511, DEC 85 REPLACES AMD FORM 641, SEP 82, WHICH IS OBSOLETE.

LABORATORY ANALYSIS REPORT AND RECORD

DATE
12 DEC 1988

FROM:
Brooks Air Force Base

SAMPLE IDENTITY
SOIL

DATE RECEIVED
November 29, 1988

SAMPLE FROM

1088122

REPORT FOR
SG/HALL

AF-4525

Analyte(s)	Base Number: GT880558 OEHL Number: 73207	GT880559 73208	GT880560 73209	GT880561 73210
Methylene Chloride	ND*	ND*	ND*	ND*
1,1,1-Trichloroethane	ND*	ND*	ND*	ND*

Results in ug/gram

*ND = None Detected. Less than the Limit of Detection.
Trace = Present, but quantity less than Limit of Quantitation.

REQUESTING AGENCY (Mailing Address)
USAF Hospital/SGPB
Kirtland AFB, NM 87117-5300

Date(s) Analyzed by DataChem
Date Reported by DataChem: December 8, 1988
Date Analyzed by DataChem: December 05, 1988

AFSC Form 3511, DEC 85 REPLACES AMD FORM 641, SEP 82, WHICH IS OBSOLETE.

LABORATORY ANALYSIS REPORT AND RECORD

DATE 12 DEC 1988

FROM: Brooks Air Force Base

PLE IDENTITY: IL

DATE RECEIVED: November 29, 198[illegible]

MPLE FROM:

VC88122

T FOR: /HALL

AF-4525

Base Number:	GT880562	GT880563	GT880564	GT880565
OEHL Number:	73211	73212	73213	73214
nalyte(s)				
thylene Chloride	ND*	ND*	ND*	ND*
1,1-Trichloroethane	ND*	ND*	ND*	ND*

Results in ug/gram

*ND = None Detected. Less than the Limit of Detection.

Trace = Present, but quantity less than Limit of Quantitation.

QUESTING AGENCY (Mailing Address)

USAF Hospital/SGPB
Kirtland AFB, NM 87117-5300

Date(s) Analyzed by DataChem

Date Reported by DataChem: December 8, 1988
Date Analyzed by DataChem: December 05, 1988

LABORATORY ANALYSIS REPORT AND RECORD

DATE: 12 DEC 1988

FROM: Brooks Air Force Base

SAMPLE IDENTITY: SOIL

DATE RECEIVED: November 29, 1988

SAMPLE FROM

K088122

ANALYSIS FOR: GC/HALL

AF-4525

Analyte(s)	Base Number: GT880566	GT880567	GT880568	GT880569
	OEHL Number: 73215	73216	73217	73218
Methylene Chloride	ND*	ND*	ND*	ND*
1,1,1-Trichloroethane	ND*	ND*	ND*	ND*

Results in ug/gram

*ND = None Detected. Less than the Limit of Detection.

Trace = Present, but quantity less than Limit of Quantitation.

REQUESTING AGENCY (Mailing Address)

USAF Hospital/SGPB
Kirtland AFB, NM 87117-5300

Date(s) Analyzed by DataChem

Date Reported by DataChem: December 8, 1988

Date Analyzed by DataChem: December 05, 1988

AFSC Form 3511, DEC 85 REPLACES AND FORM 641, SEP 82, WHICH IS OBSOLETE.

LABORATORY ANALYSIS REPORT AND RECORD

DATE: 12 DEC 1988

FROM: Brooks Air Force Base

SAMPLE IDENTITY: OIL

DATE RECEIVED: November 29, 1988

SAMPLE FROM

U088122

TEST FOR: C/HALL

AF-4525

Analyte(s)	Base Number: OEHL Number: *Limit of Detection
Methylene Chloride	0.2
1,1,1-Trichloroethane	0.2

Results in ug/gram

*ND = None Detected. Less than the Limit of Detection.
Trace = Present, but quantity less than Limit of Quantitation.

REQUESTING AGENCY (Mailing Address)
USAF Hospital/SGPB
Kirtland AFB, NM 87117-5300

Date(s) Analyzed by DataChem
Date Reported by DataChem: December 8, 1988
Date Analyzed by DataChem: December 05, 1988

LABORATOF ANALYSIS REPORT AND RECOF | DATE 4 JAN 89

I. SAMPLE IDENTITY: SOIL FROM GOLF COURSE

FROM: USAFOEHL/SA
BROOKS AFB TX 78235-5501

DATE RECEIVED: 25 NOV 88

OEHL #

METALS ANALYSIS (UNITS = µg/g)

BASE #	GT880530	GT880531	GT880532	GT880533	GT880534
OEHL #	73174	73175	73176	73177	73178
Chromium	<20	<20	<20	<20	<20
Iron					
Manganese					
Nickel					
Zinc					
Copper					
Cadmium					
Lead					
Silver					
Antimony					
Tin					
Mercury					
Aluminum					
Beryllium					
Cobalt					
Molybdenum					
Titaninum					

SAMPLE ANALYZED BY CONTRACT LABORATORY

Requesting Agency:
USAF HOSP/SGPB
KIRTLAND AFB, NM 87117

p1 of 4

LEO J. JEHL Jr., GS-12
Chief, Metals Analysis Section

LABORATORY ANALYSIS REPORT AND RECORD | DATE 4 JAN 89

SAMPLE IDENTITY: SOIL FROM GOLF COURSE

FROM: USAFOEHL/SA
BROOKS AFB TX 78235-5501

DATE RECEIVED: 25 NOV 88

OEHL #

METALS ANALYSIS (UNITS = µg/g)

BASE #	GT880535	GT880536	GT880537	GT880538	GT880539
OEHL #	73179	73180	73181	73182	73183
Chromium	<20	<20	<20	<20	<20
Iron					
Manganese					
Nickel					
Zinc					
Copper					
Cadmium					
Lead					
Silver					
Antimony					
Tin					
Mercury					
Aluminum					
Beryllium					
Cobalt					
Molybdenum					
Titaninum					

SAMPLE ANALYZED BY CONTRACT LABORATORY

Requesting Agency:

KIRTLAND AFB, NM

LEO J. JEHL Jr., GS-12
Chief, Metals Analysis Section

LABORATORY ANALYSIS REPORT AND RECORD

DATE 4 JAN 89

SAMPLE IDENTITY: SOIL FROM GOLF COURSE

FROM: USAFOEHL/SA
BROOKS AFB TX 78235-5501

DATE RECEIVED: 25 NOV 88

OEHL #

METALS ANALYSIS (UNITS = ug/g)

BASE #	GT880540	GT880541	GT880542	GT880543	GT880544
OEHL #	73184	73185	73186	73187	73188
Chromium	<20	<20	<20	<20	<20
Iron					
Manganese					
Nickel					
Zinc					
Copper					
Cadmium					
Lead					
Silver					
Antimony					
Tin					
Mercury					
Aluminum					
Beryllium					
Cobalt					
Molybdenum					
Titaninum					
				SAMPLE ANALYZED BY CONTRACT LABORATORY	

Requesting Agency:

KIRTLAND AFB, NM

P344

Leo J. Jehl

LEO J. JEHL Jr., GS-12
Chief, Metals Analysis Section

LABORATORY ANALYSIS REPORT AND RECORD	DATE 4 JAN 89
SAMPLE IDENTITY: SOIL FROM GOLF COURSE	FROM: USAFOEHL/SA BROOKS AFB TX 78235-5501
DATE RECEIVED: 25 NOV 88	OEHL #

METALS ANALYSIS (UNITS = µg/g)

BASE #	GT880545	GT880546	GT880547	GT880548	GT880549
OEHL #	73189	73190	73191	73192	73193
Chromium	<20	<20	<20	<20	<20
Iron					
Manganese					
Nickel					
Zinc					
Copper					
Cadmium					
Lead					
Silver					
Antimony					
Tin					
Mercury					
Aluminum					
Beryllium					
Cobalt					
Molybdenum					
Titaninum				SAMPLE ANALYZED BY CONTRACT LABORATORY	

Requesting Agency:

KIRTLAND AFB, NM

p4 of 4

LEO J. JEHL Jr., GS-12
Chief, Metals Analysis Section

UNITED STATES GOVERNMENT

2-Way Memo

Subject: Golf Course Soil Sample Results

INSTRUCTIONS
Use routing symbols whenever possible.
SENDER: *(Originator of message)*:
Use brief, informal language.
Conserve space.
Forward original and one copy.
RECEIVER *(Replier to message)*:
Reply below the message, keep one copy, return one copy.

To : 1606 CES/DEEV, Mr Davidson

DATE OF MESSAGE: 16 Feb 88

ROUTING SYMBOL: 1606 CES/DEEV

SIGNATURE OF ORIGINATOR:

TITLE OF ORIGINATOR: OIC, Bioenvironmental Engr

FOLD

MESSAGE

Attached are the Golf Course Soil Sample Results. All samples were taken at a depth of 6" in the vicinity of the first sprinkler head that is fed from the golf course pond. Also note a control sample was taken away from the watering area. Results indicate no problem exist with the soil. We will conduct more sampling if you feel it is necessary.

REPLY

From :

DATE OF REPLY

ROUTING SYMBOL

SIGNATURE OF REPLIER

TITLE OF REPLIER

1. RETAINED BY ADDRESSEE

5027-107

OPTIONAL FORM 27 (Rev. 7-81)
GSA FPMR (41 CFR) 101-11.6
NSN 7540-00-082-2447

ENVIRONMENTAL SA... LING DATA
(TRACE ORGANICS)

(Use this space for mechanical imprint)

OEHL USE ONLY

SAMPLING SITE IDENTIFIER (AFR 19-7): ΦΦ97 XXXX XXX

BASE WHERE SAMPLE COLLECTED: KIRTLAND AFB NM

SAMPLING SITE DESCRIPTION: Golf Course Fairway #1 North

DATE COLLECTION BEGAN (YYMMDD): 871Φ1Φ18

TIME COLLECTION BEGAN (24 hour clock): Φ83Φ

COLLECTION METHOD: ☒ GRAB ☐ COMPOSITE ____ HOURS

MAIL REPORTS TO (circle if changed):
- ORIGINAL: ΦΦ97 USAF HOSP KIRTLAND/SGPB, KAFB NM 87117-53ΦΦ
- COPY 1:
- COPY 2:

SAMPLE COLLECTED BY (Name, Grade, AFSC): CRAIG L. MITCHELL, SGT, 9Φ75Φ

SIGNATURE: Craig L Mitchell

AUTOVON: 244-9781

REASON FOR SUBMISSION: ER

A-ACCIDENT/INCIDENT R-ROUTINE/PERIODIC C-COMPLAINT N-NPDES F-FOLLOWUP/CLEANUP O-OTHER (specify) ____

BASE SAMPLE NUMBER: 6S 87 Φ558

OEHL PID

ANALYSES REQUESTED (check appropriate blocks)

VOLATILE HALOCARBONS (VOH)	(10860)
PRES GROUP T1	
Volatile Halocarbon Screen	1001460PH
Bromodichloromethane	32101
Bromoform	32104
Bromomethane	34413
Carbon Tetrachloride	32102
Chlorobenzene	34301
Chloroethane	34311
2 Chloroethylvinyl ether	34576
Chloroform	32106
Chloromethane	34418
Dibromochloromethane	32105
1, 2-dichlorobenzene	34536
1, 3-dichlorobenzene	34566
1, 4-dichlorobenzene	34571
Dichlorodifluoromethane	34668
1, 1-dichloroethane	34496
1, 2-dichloroethane	34531
1, 1-dichloroethene	34501
trans-1, 2-dichloroethene	34546
1, 2-dichloropropane	34541
cis-1, 3-dichloropropene	34704
trans-1, 3-dichloropropene	34699
Methylene Chloride	34423
1, 1, 2, 2-tetrachloroethane	34516
Tetrachloroethylene	34475
1, 1, 1-trichloroethane	34506
1, 1, 2-trichloroethane	34511
Trichloroethylene	39180

Trichlorofluoromethane	34488
Vinyl Chloride	39175
TRIHALOMETHANES (THM)	(10860)
PRES GROUP T1	
Trihalomethane Potential	1001465MT
Total Trihalomethanes	82080
VOLATILE AROMATICS (VOA)	(10850)
PRES GROUP T1	
Volatile Aromatic Screen	1001461PA
Benzene	34030
Chlorobenzene	34301
1, 2-dichlorobenzene	34536
1, 3-dichlorobenzene	34566
1, 4-dichlorobenzene	34571
Ethylbenzene	34371
Toluene	34010

MISCELLANEOUS	
VOLATILES	
PRES GROUP T1	
Xylene	81710
Methylethyl ketone	81595
Methylisobutyl ketone	81596
Total organic halides	1002106OH
MISCELLANEOUS	
EXTRACTABLES	
PRES GROUP T4	
PCB's	39516
Phthalate Esters Screen	1000069PH
bis (2-ethylhexyl) phthalate	39100
Butyl Benzyl phthalate	34292
Di-n-butyl phthalate	39110
Diethyl phthalate	34336
Dimethyl phthalate	34341
Di-n-octyl phthalate	34596

REMARKS: METHOD SW 8Φ1Φ PER TELECON WITH Mr. RODRIGUEZ ON 2SEP87 WITH Lt MUSZYNSKI

LABORATORY ANALYSIS REPORT AND RECORD *(General)*

DATE: November 4, 1987

TO: Brooks Air Force Base

FROM:

SAMPLE IDENTITY: 11

DATE RECEIVED: October 26, 1987

SAMPLE FROM: Kirtland AFB

LAB CONTROL NR: TO 13 IT NA

TEST FOR: Methodology: EPA 8010

AF-3728

					DET LIMIT
OEHL No.		69733	69734	69735	
BASE No.		GS870558	GS870559	GS870560	
Bromodichloromethane	32101	ND	ND	ND	0.2
Bromoform	32104	ND	ND	ND	0.2
Bromomethane	34413	ND	ND	ND	0.2
Carbon Tetrachloride	32102	ND	ND	ND	0.2
Chlorobenzene	34301	ND	ND	ND	0.2
Chloroethane	34311	ND	ND	ND	0.2
2-Chloroethylvinyl ether	34576	ND	ND	ND	0.2
Chloroform	32106	ND	ND	ND	0.2
Chloromethane	34418	ND	ND	ND	0.2
Dibromochloromethane	32105	ND	ND	ND	0.2
1,2-Dichlorobenzene	34536	ND	ND	ND	0.2
1,3-Dichlorobenzene	34566	ND	ND	ND	0.2
1,4-Dichlorobenzene	34571	ND	ND	ND	0.2
Dichlorofluoromethane	34668	ND	ND	ND	0.2
1,1-Dichloroethane	34496	ND	ND	ND	0.2
1,2-Dichloroethane	34531	ND	ND	ND	0.2
1,1-Dichloroethene	34501	ND	ND	ND	0.2
trans-1,2-Dichloroethene	34546	ND	ND	ND	0.2
1,2-Dichloropropane	34541	ND	ND	ND	0.2
cis-1,3-Dichloropropene	34704	ND	ND	ND	0.2
trans-1,3-Dichloropropene	34699	ND	ND	ND	0.2
Methylene Chloride	34423	ND	ND	ND	0.2
1,1,2,2-Tetrachloroethane	34516	ND	ND	ND	0.2
Tetrachloroethylene	34475	ND	ND	ND	0.2
1,1,1-Trichloroethane	34506	ND	ND	ND	0.2
1,1,2-Trichloroethane	34511	ND	ND	ND	0.2
Trichloroethylene	39180	ND	ND	ND	0.2
Trichlorofluoromethane	34488	ND	ND	ND	0.2
Vinyl Chloride	39175	ND	ND	ND	0.2

Results in micrograms per gram

ND = None Detected. Less than the detection limit
Trace = Present, but quantitiy less than quantitative limit

REQUESTING AGENCY *(Mailing Address)*

USAF HOSP /SGPB
Kirtland AFB NM
87117-5300

Date Analyzed by UBTL: November 2, 1987

BC Harrison

AMD FORM SEP 82 641 REPLACES OEHL FORM 7, DEC 78, WHICH IS OBSOLETE.

ENVIRONMENTAL SAMPLING DATA
(TRACE ORGANICS)

(Use this space for mechanical imprint)

OEHL USE ONLY

SAMPLING SITE IDENTIFIER (AFR 19-7): ØØ97 X X X X X X X

BASE WHERE SAMPLE COLLECTED: KIRTLAND AFB NM

SAMPLING SITE DESCRIPTION: GOLF COURSE FAIRWAY #1 SOUTH

DATE COLLECTION BEGAN (YYMMDD): 871110Ø18

TIME COLLECTION BEGAN (24 hour clock): Ø83Ø

COLLECTION METHOD: [X] GRAB [ ] COMPOSITE _______ HOURS

MAIL REPORTS TO (circle if changed)

ORIGINAL	ØØ97	USAF HOSPITAL KIRTLAND/SGPB KAFB NM 87117-53ØØ
COPY 1		
COPY 2		

SAMPLE COLLECTED BY (Name, Grade, AFSC): CRAIG L. MITCHELL SGT 9Ø75Ø

SIGNATURE: Craig L. Mitchell

AUTOVON: 244-9786

REASON FOR SUBMISSION: E R

A-ACCIDENT/INCIDENT R-ROUTINE/PERIODIC C-COMPLAINT N-NPDES F-FOLLOWUP/CLEANUP O-OTHER (specify) ____________

BASE SAMPLE NUMBER: GS 87 Ø559

OEHL PID

ANALYSES REQUESTED (check appropriate blocks)

VOLATILE HALOCARBONS (VOH) (10860)

PRES GROUP T1

Volatile Halocarbon Screen	1001460PH
Bromodichloromethane	32101
Bromoform	32104
Bromomethane	34413
Carbon Tetrachloride	32102
Chlorobenzene	34301
Chloroethane	34311
2-Chloroethylvinyl ether	34576
Chloroform	32106
Chloromethane	34418
Dibromochloromethane	32105
1, 2-dichlorobenzene	34536
1, 3-dichlorobenzene	34566
1, 4-dichlorobenzene	34571
Dichlorodifluoromethane	34668
1, 1-dichloroethane	34496
1, 2-dichloroethane	34531
1, 1-dichloroethene	34501
trans-1, 2-dichloroethene	34546
1, 2-dichloropropane	34541
cis-1, 3-dichloropropene	34704
trans-1, 3-dichloropropene	34699
Methylene Chloride	34423
1, 1, 2, 2-tetrachloroethane	34516
Tetrachloroethylene	34475
1, 1, 1-trichloroethane	34506
1, 1, 2-trichloroethane	34511
Trichloroethylene	39180
Trichlorofluoromethane	34488
Vinyl Chloride	39175

TRIHALOMETHANES (THM) (10860)

PRES GROUP T1

Trihalomethane Potential	1001465MT
Total Trihalomethanes	82080

VOLATILE AROMATICS (VOA) (10850)

PRES GROUP T1

Volatile Aromatic Screen	1001461PA
Benzene	34030
Chlorobenzene	34301
1, 2-dichlorobenzene	34536
1, 3-dichlorobenzene	34566
1, 4-dichlorobenzene	34571
Ethylbenzene	34371
Toluene	34010

MISCELLANEOUS

VOLATILES

PRES GROUP T1

Xylene	81710
Methylethyl ketone	81595
Methylisobutyl ketone	81596
Total organic halides	1002106OH

MISCELLANOUS

EXTRACTABLES

PRES GROUP T4

PCB's	39516
Phthalate Esters Screen	1000069PH
bis (2-ethylhexyl) phthalate	39100
Butyl Benzyl phthalate	34292
Di-n-butyl phthalate	39110
Diethyl phthalate	34336
Dimethyl phthalate	34341
Di-n-octyl phthalate	34596

REMARKS: METHOD SW 8Ø1Ø PER TELECON WITH MR. RODIGUEZ ON 2 SEP 87 WITH LT MUSZYNSKI

LABORATORY ANALYSIS REPORT AND RECORD (General)

DATE: November 4, 1987

FROM:

...s Air Force Base

...LE IDENTITY

...il

DATE RECEIVED: October 26, 1987

...MPLE FROM

Kirtland AFB

LAB CONTROL NR: TO 13 IT NA

TEST FOR

Methodology: EPA 8010

AF-3728

OEHL No.		69733	69734	69735	DET. LIMIT
BASE No.		GS870558	GS870559	GS870560	
Bromodichloromethane	32101	ND	ND	ND	0.2
Bromoform	32104	ND	ND	ND	0.2
Bromomethane	34413	ND	ND	ND	0.2
Carbon Tetrachloride	32102	ND	ND	ND	0.2
Chlorobenzene	34301	ND	ND	ND	0.2
Chloroethane	34311	ND	ND	ND	0.2
2-Chloroethylvinyl ether	34576	ND	ND	ND	0.2
Chloroform	32106	ND	ND	ND	0.2
Chloromethane	34418	ND	ND	ND	0.2
Dibromochloromethane	32105	ND	ND	ND	0.2
1,2-Dichlorobenzene	34536	ND	ND	ND	0.2
1,3-Dichlorobenzene	34566	ND	ND	ND	0.2
1,4-Dichlorobenzene	34571	ND	ND	ND	0.2
Dichlorofluoromethane	34668	ND	ND	ND	0.2
1,1-Dichloroethane	34496	ND	ND	ND	0.2
1,2-Dichloroethane	34531	ND	ND	ND	0.2
1,1-Dichloroethene	34501	ND	ND	ND	0.2
trans-1,2-Dichloroethene	34546	ND	ND	ND	0.2
1,2-Dichloropropane	34541	ND	ND	ND	0.2
cis-1,3-Dichloropropene	34704	ND	ND	ND	0.2
trans-1,3-Dichloropropene	34699	ND	ND	ND	0.2
Methylene Chloride	34423	ND	ND	ND	0.2
1,1,2,2-Tetrachloroethane	34516	ND	ND	ND	0.2
Tetrachloroethylene	34475	ND	ND	ND	0.2
1,1,1-Trichloroethane	34506	ND	ND	ND	0.2
1,1,2-Trichloroethane	34511	ND	ND	ND	0.2
Trichloroethylene	39180	ND	ND	ND	0.2
Trichlorofluoromethane	34488	ND	ND	ND	0.2
Vinyl Chloride	39175	ND	ND	ND	0.2

Results in micrograms per gram

ND = None Detected. Less than the detection limit
Trace = Present, but quantitiy less than quantitative limit.

REQUESTING AGENCY (Mailing Address)

USAF HOSP /SGPB
Kirtland AFB NM
87117-5300

Date Analyzed by UBTL: November 2, 1987

BC Harrison

AMD FORM SEP 82 641 REPLACES OEHL FORM 7, DEC 78, WHICH IS OBSOLETE.

ENVIRONMENTAL SAMPLING DATA (TRACE ORGANICS)

OEHL USE ONLY

(Use this space for mechanical imprint)

SAMPLING SITE IDENTIFIER (AFR 19-7): ØØ97 XXXX XXX

BASE WHERE SAMPLE COLLECTED: KIRTLAND AFB NM

SAMPLING SITE DESCRIPTION: GOLF COURSE FAIRWAY #1 EAST

DATE COLLECTION BEGAN (YYMMDD): 87 Ø Ø 1Ø 18

TIME COLLECTION BEGAN (24 hour clock): Ø83Ø

COLLECTION METHOD: [X] GRAB [ ] COMPOSITE ______ HOURS

MAIL REPORTS TO (circle if changed):

ORIGINAL	ØØ97	USAF HOSPITAL KIRTLAND / SGPB, KAFB NM 87117-53ØØ
COPY 1		
COPY 2		

SAMPLE COLLECTED BY (Name, Grade, AFSC): CRAIG L. MITCHELL, SGT, 9Ø75Ø

SIGNATURE: Craig L. Mitchell

AUTOVON: 244-9786

REASON FOR SUBMISSION: EK

A-ACCIDENT/INCIDENT C-COMPLAINT F-FOLLOWUP/CLEANUP
R-ROUTINE/PERIODIC N-NPDES O-OTHER (specify) ______

BASE SAMPLE NUMBER: GS 87 Ø56Ø

OEHL PID

ANALYSES REQUESTED *(check appropriate blocks)*

VOLATILE HALOCARBONS (VOH) (10860) — PRES GROUP T1

	Volatile Halocarbon Screen	1001460PH
	Bromodichloromethane	32101
	Bromoform	32104
	Bromomethane	34413
	Carbon Tetrachloride	32102
	Chlorobenzene	34301
	Chloroethane	34311
	2-Chloroethylvinyl ether	34576
	Chloroform	32106
	Chloromethane	34418
	Dibromochloromethane	32105
	1, 2-dichlorobenzene	34536
	1, 3-dichlorobenzene	34566
	1, 4-dichlorobenzene	34571
	Dichlorodifluoromethane	34668
	1, 1-dichloroethane	34496
	1, 2-dichloroethane	34531
	1, 1-dichloroethene	34501
	trans-1, 2-dichloroethene	34546
	1, 2-dichloropropane	34541
	cis-1, 3-dichloropropene	34704
	trans-1, 3-dichloropropene	34699
	Methylene Chloride	34423
	1, 1, 2, 2-tetrachloroethane	34516
	Tetrachloroethylene	34475
	1, 1, 1-trichloroethane	34506
	1, 1, 2-trichloroethane	34511
	Trichloroethylene	39180
	Trichlorofluoromethane	34488
	Vinyl Chloride	39175

TRIHALOMETHANES (THM) (10860) — PRES GROUP T1

	Trihalomethane Potential	1001465MT
	Total Trihalomethanes	82080

VOLATILE AROMATICS (VOA) (10850) — PRES GROUP T1

	Volatile Aromatic Screen	1001461PA
	Benzene	34030
	Chlorobenzene	34301
	1, 2-dichlorobenzene	34536
	1, 3-dichlorobenzene	34566
	1, 4-dichlorobenzene	34571
	Ethylbenzene	34371
	Toluene	34010

MISCELLANEOUS — VOLATILES — PRES GROUP T1

	Xylene	81710
	Methylethyl ketone	81595
	Methylisobutyl ketone	81596
	Total organic halides	100210608

MISCELLANEOUS — EXTRACTABLES — PRES GROUP T4

	PCB's	3951[illegible]
	Phthalate Esters Screen	1000069PH
	bis (2-ethylhexyl) phthalate	3910[illegible]
	Butyl Benzyl phthalate	3429[illegible]
	Di-n-butyl phthalate	3911[illegible]
	Diethyl phthalate	3433[illegible]
	Dimethyl phthalate	3434[illegible]
	Di-n-octyl phthalate	3459[illegible]

REMARKS: METHOD SW 8Ø1Ø PER TELECON WITH MR. RODRIGUEZ ON 2 SEP 87 WITH LT MUSZYNSKI.

LABORATORY ANALYSIS REPORT AND RECORD (General)

DATE: November 4, 1987

TO: rooks Air Force Base

FROM:

SAMPLE IDENTITY: 11

DATE RECEIVED: October 26, 1987

SAMPLE FROM: irtland AFB

LAB CONTROL NR: TO 13 IT NA

TEST FOR: ethodology: EPA 8010

AF-3728

OEHL No.		69733	69734	69735	DET LIMIT
BASE No.		GS870558	GS870559	GS870560	
Bromodichloromethane	32101	ND	ND	ND	0.2
Bromoform	32104	ND	ND	ND	0.2
Bromomethane	34413	ND	ND	ND	0.2
Carbon Tetrachloride	32102	ND	ND	ND	0.2
Chlorobenzene	34301	ND	ND	ND	0.2
Chloroethane	34311	ND	ND	ND	0.2
2-Chloroethylvinyl ether	34576	ND	ND	ND	0.2
Chloroform	32106	ND	ND	ND	0.2
Chloromethane	34418	ND	ND	ND	0.2
Dibromochloromethane	32105	ND	ND	ND	0.2
1,2-Dichlorobenzene	34536	ND	ND	ND	0.2
1,3-Dichlorobenzene	34566	ND	ND	ND	0.2
1,4-Dichlorobenzene	34571	ND	ND	ND	0.2
Dichlorofluoromethane	34668	ND	ND	ND	0.2
1,1-Dichloroethane	34496	ND	ND	ND	0.2
1,2-Dichloroethane	34531	ND	ND	ND	0.2
1,1-Dichloroethene	34501	ND	ND	ND	0.2
trans-1,2-Dichloroethene	34546	ND	ND	ND	0.2
1,2-Dichloropropane	34541	ND	ND	ND	0.2
cis-1,3-Dichloropropene	34704	ND	ND	ND	0.2
trans-1,3-Dichloropropene	34699	ND	ND	ND	0.2
Methylene Chloride	34423	ND	ND	ND	0.2
1,1,2,2-Tetrachloroethane	34516	ND	ND	ND	0.2
Tetrachloroethylene	34475	ND	ND	ND	0.2
1,1,1-Trichloroethane	34506	ND	ND	ND	0.2
1,1,2-Trichloroethane	34511	ND	ND	ND	0.2
Trichloroethylene	39180	ND	ND	ND	0.2
Trichlorofluoromethane	34488	ND	ND	ND	0.2
Vinyl Chloride	39175	ND	ND	ND	0.2

Results in micrograms per gram

ND = None Detected. Less than the detection limit
Trace = Present, but quantitiy less than quantitative limit

REQUESTING AGENCY (Mailing Address)

USAF HOSP /SGPB
Kirtland AFB NM
87117-5300

Date Analyzed by UBTL: November 2,1987

BCHarrison

AMD FORM SEP 82 641 REPLACES OEHL FORM 7, DEC 78, WHICH IS OBSOLETE.

ENVIRONMENTAL SAMPLING DATA
(TRACE ORGANICS)

(Use this space for mechanical imprint)

OEHL USE ONLY

SAMPLING SITE IDENTIFIER (AFR 19-7): ØØ97 XXXXXXX

BASE WHERE SAMPLE COLLECTED: KIRTLAND AFB NM

SAMPLING SITE DESCRIPTION: GOLF COURSE FAIRWAY #1 WES

DATE COLLECTION BEGAN (YYMMDD): 87 ØØ Ø8

TIME COLLECTION BEGAN (24 hour clock): Ø83Ø

COLLECTION METHOD: [X] GRAB [ ] COMPOSITE ____ HOURS

MAIL REPORTS TO (circle if changed):
ORIGINAL: ØØ97 USAF HOSP KIRTLAND/SGPB, KAFB NM 87117-53ØØ
COPY 1:
COPY 2:

SAMPLE COLLECTED BY (Name, Grade, AFSC): CRAIG L. MITCHELL, SGT, 9Ø75Ø

SIGNATURE: Craig L. Mitchell

AUTOVON: 244-978

REASON FOR SUBMISSION: ER
A-ACCIDENT/INCIDENT R-ROUTINE/PERIODIC C-COMPLAINT N-NPDES F-FOLLOWUP/CLEANUP O-OTHER (specify) ____

BASE SAMPLE NUMBER: 6S 87 Ø561

OEHL PID

ANALYSES REQUESTED (check appropriate blocks)

VOLATILE HALOCARBONS (VOH) (10860)				MISCELLANEOUS	
PRES GROUP T1		Trichlorofluoromethane	34488	VOLATILES	
Volatile Halocarbon Screen	1001460PH	Vinyl Chloride	39175	PRES GROUP T1	
Bromodichloromethane	32101			Xylene	817
Bromoform	32104			Methylethyl ketone	815
Bromomethane	34413	TRIHALOMETHANES (THM)	(10860)	Methylisobutyl ketone	815
Carbon Tetrachloride	32102	PRES GROUP T1		Total organic halides	1002106
Chlorobenzene	34301	Trihalomethane Potential	1001465MT		
Chloroethane	34311	Total Trihalomethanes	82080		
2-Chloroethylvinyl ether	34576				
Chloroform	32106	VOLATILE AROMATICS (VOA)	(10850)		
Chloromethane	34418	PRES GROUP T1			
Dibromochloromethane	32105	Volatile Aromatic Screen	1001461PA		
1, 2-dichlorobenzene	34536	Benzene	34030	MISCELLANEOUS	
1, 3-dichlorobenzene	34566	Chlorobenzene	34301	EXTRACTABLES	
1, 4-dichlorobenzene	34571	1, 2-dichlorobenzene	34536	PRES GROUP T4	
Dichlorodifluoromethane	34668	1, 3-dichlorobenzene	34566	PCB's	39
1, 1-dichloroethane	34496	1, 4-dichlorobenzene	34571	Phthalate Esters Screen	1000069
1, 2-dichloroethane	34531	Ethylbenzene	34371	bis (2-ethylhexyl) phthalate	39
1, 1-dichloroethene	34501	Toluene	34010	Butyl Benzyl phthalate	34
trans-1, 2-dichloroethene	34546			Di-n-butyl phthalate	39
1, 2-dichloropropane	34541			Diethyl phthalate	34
cis-1, 3-dichloropropene	34704			Dimethyl phthalate	34
trans-1, 3-dichloropropene	34699			Di-n-octyl phthalate	34
Methylene Chloride	34423				
1, 1, 2, 2-tetrachloroethane	34516				
Tetrachloroethylene	34475				
1, 1, 1-trichloroethane	34506				
1, 1, 2-trichloroethane	34511				
Trichloroethylene	39180				

REMARKS: METHOD SW 8Ø1Ø PER TELECON WITH MR. RODRIGUEZ ON 2 S 87 WITH LT MUSZYNSKI.

OEHL FORM 2752? AF FORMS 2752A AND AF 2752B, FEB 85, REPLACE AF FORM 2752, JAN 81, WHICH WILL BE USED.

LABORATORY ANALYSIS REPORT AND RECORD (General)

TO: Brooks Air Force Base	FROM:
DATE	November 4, 1987
SAMPLE IDENTITY: Soil	DATE RECEIVED: October 26, 1987
SAMPLE FROM: Kirtland AFB	LAB CONTROL NR: TO 13 IT NA
TEST FOR: Methodology: EPA 8010	

AF-3728

OEHL No.		69736	69737	DET LIMIT
BASE No.		GS870561	GS870562	
Bromodichloromethane	32101	ND	ND	0.2
Bromoform	32104	ND	ND	0.2
Bromomethane	34413	ND	ND	0.2
Carbon Tetrachloride	32102	ND	ND	0.2
Chlorobenzene	34301	ND	ND	0.2
Chloroethane	34311	ND	ND	0.2
2-Chloroethylvinyl ether	34576	ND	ND	0.2
Chloroform	32106	ND	ND	0.2
Chloromethane	34418	ND	ND	0.2
Dibromochloromethane	32105	ND	ND	0.2
1,2-Dichlorobenzene	34536	ND	ND	0.2
1,3-Dichlorobenzene	34566	ND	ND	0.2
1,4-Dichlorobenzene	34571	ND	ND	0.2
Dichlorofluoromethane	34668	ND	ND	0.2
1,1-Dichloroethane	34496	ND	ND	0.2
1,2-Dichloroethane	34531	ND	ND	0.2
1,1-Dichloroethene	34501	ND	ND	0.2
trans-1,2-Dichloroethene	34546	ND	ND	0.2
1,2-Dichloropropane	34541	ND	ND	0.2
cis-1,3-Dichloropropene	34704	ND	ND	0.2
trans-1,3-Dichloropropene	34699	ND	ND	0.2
Methylene Chloride	34423	ND	ND	0.2
1,1,2,2-Tetrachloroethane	34516	ND	ND	0.2
Tetrachloroethylene	34475	ND	ND	0.2
1,1,1-Trichloroethane	34506	ND	ND	0.2
1,1,2-Trichloroethane	34511	ND	ND	0.2
Trichloroethylene	39180	ND	ND	0.2
Trichlorofluoromethane	34488	ND	ND	0.2
Vinyl Chloride	39175	ND	ND	0.2

Results in micrograms per gram

ND = None Detected. Less than the detection limit
Trace = Present, but quantitiy less than quantitative limit

REQUESTING AGENCY (Mailing Address)

Date Analyzed by UBTL: November 2, 1987

BC Harrison

AMD FORM SEP 82 641 REPLACES OEHL FORM 7, DEC 78, WHICH IS OBSOLETE.

ENVIRONMENTAL SA[illegible]LIN[illegible] DATA (TRACE ORGANICS)

(Use this space for mechanical imprint)

OEHL USE ONLY

SAMPLING SITE IDENTIFIER (AFR 19-7): ΦΦ97 [illegible] XXXX [illegible] XXX

BASE WHERE SAMPLE COLLECTED: KIRTLAND AFB. NM

SAMPLING SITE DESCRIPTION: Golf COURSE - Across ROAD CONTROL

DATE COLLECTION BEGAN (YYMMDD): 87 11 Φ1Φ18

TIME COLLECTION BEGAN (24 hour clock): Φ830

COLLECTION METHOD: [X] GRAB [ ] COMPOSITE ______ HOURS

MAIL REPORTS TO (circle if changed)

- ORIGINAL: ΦΦ97 USAF HOSPITAL KIRTLAND / SGPB, KAFB NM 87117-53ΦΦ
- COPY 1
- COPY 2

SAMPLE COLLECTED BY (Name, Grade, AFSC): CRAIG L. MITCHELL, SGT, Φ75Φ

SIGNATURE: Craig L. Mitchell

AUTOVON: 244-9786

REASON FOR SUBMISSION: R

A-ACCIDENT/INCIDENT C-COMPLAINT F-FOLLOWUP/CLEANUP
R-ROUTINE/PERIODIC N-NPDES O-OTHER (specify) ______

BASE SAMPLE NUMBER: GS [illegible] 87 [illegible] Φ562

OEHL PID

ANALYSES REQUESTED (check appropriate blocks)

VOLATILE HALOCARBONS (VOH) (10860)	
PRES GROUP T1	
Volatile Halocarbon Screen	1001460PH
Bromodichloromethane	32101
Bromoform	32104
Bromomethane	34413
Carbon Tetrachloride	32102
Chlorobenzene	34301
Chloroethane	34311
2-Chloroethylvinyl ether	34576
Chloroform	32106
Chloromethane	34418
Dibromochloromethane	32105
1, 2-dichlorobenzene	34536
1, 3-dichlorobenzene	34566
1, 4-dichlorobenzene	34571
Dichlorodifluoromethane	34668
1, 1-dichloroethane	34496
1, 2-dichloroethane	34531
1, 1-dichloroethene	34501
trans-1, 2-dichloroethene	34546
1, 2-dichloropropane	34541
cis-1, 3-dichloropropene	34704
trans-1, 3-dichloropropene	34699
Methylene Chloride	34423
1, 1, 2, 2-tetrachloroethane	34516
Tetrachloroethylene	34475
1, 1, 1-trichloroethane	34506
1, 1, 2-trichloroethane	34511
Trichloroethylene	39180
Trichlorofluoromethane	34488
Vinyl Chloride	39175

TRIHALOMETHANES (THM) (10860)	
PRES GROUP T1	
Trihalomethane Potential	1001465MT
Total Trihalomethanes	82080

VOLATILE AROMATICS (VOA) (10850)	
PRES GROUP T1	
Volatile Aromatic Screen	1001461PA
Benzene	34030
Chlorobenzene	34301
1, 2-dichlorobenzene	34536
1, 3-dichlorobenzene	34566
1, 4-dichlorobenzene	34571
Ethylbenzene	34371
Toluene	34010

MISCELLANEOUS VOLATILES	
PRES GROUP T1	
Xylene	81710
Methylethyl ketone	81595
Methylisobutyl ketone	81596
Total organic halides	1002106OH

MISCELLANEOUS EXTRACTABLES	
PRES GROUP T4	
PCB's	3951
Phthalate Esters Screen	1000069PI
bis (2-ethylhexyl) phthalate	3910
Butyl Benzyl phthalate	3429
Di-n-butyl phthalate	3911
Diethyl phthalate	3433
Dimethyl phthalate	3434
Di-n-octyl phthalate	3459

REMARKS: SW 8Φ1Φ PER TELECON WITH Mr. RODRIGUEZ ON 2 SEP 87 WITH LT MUSZYNSKI.

AF FORM 2752D AF FORMS 2752A AND AF 2752... FEB 85 REPLACE AF FORM 2752 [illegible]

LABORATORY ANALYSIS REPORT AND RECORD (General)

DATE: ~~November 4, 1987~~

TO: Brooks Air Force Base

FROM:

SAMPLE IDENTITY: Soil

DATE RECEIVED: October 26, 1987

SAMPLE FROM: Kirtland AFB

LAB CONTROL NR: TO 13 IT NA

TEST FOR: Methodology: EPA 8010

Ar-3728

				DET LIMIT
OEHL No.		69736	69737	
BASE No.		GS870561	GS870562	
Bromodichloromethane	32101	ND	ND	0.2
Bromoform	32104	ND	ND	0.2
Bromomethane	34413	ND	ND	0.2
Carbon Tetrachloride	32102	ND	ND	0.2
Chlorobenzene	34301	ND	ND	0.2
Chloroethane	34311	ND	ND	0.2
2-Chloroethylvinyl ether	34576	ND	ND	0.2
Chloroform	32106	ND	ND	0.2
Chloromethane	34418	ND	ND	0.2
Dibromochloromethane	32105	ND	ND	0.2
1,2-Dichlorobenzene	34536	ND	ND	0.2
1,3-Dichlorobenzene	34566	ND	ND	0.2
1,4-Dichlorobenzene	34571	ND	ND	0.2
Dichlorofluoromethane	34668	ND	ND	0.2
1,1-Dichloroethane	34496	ND	ND	0.2
1,2-Dichloroethane	34531	ND	ND	0.2
1,1-Dichloroethene	34501	ND	ND	0.2
trans-1,2-Dichloroethene	34546	ND	ND	0.2
1,2-Dichloropropane	34541	ND	ND	0.2
cis-1,3-Dichloropropene	34704	ND	ND	0.2
trans-1,3-Dichloropropene	34699	ND	ND	0.2
Methylene Chloride	34423	ND	ND	0.2
1,1,2,2-Tetrachloroethane	34516	ND	ND	0.2
Tetrachloroethylene	34475	ND	ND	0.2
1,1,1-Trichloroethane	34506	ND	ND	0.2
1,1,2-Trichloroethane	34511	ND	ND	0.2
Trichloroethylene	39180	ND	ND	0.2
Trichlorofluoromethane	34488	ND	ND	0.2
Vinyl Chloride	39175	ND	ND	0.2

Results in micrograms per gram

ND = None Detected. Less than the detection limit
Trace = Present, but quantitiy less than quantitative limit

REQUESTING AGENCY (Mailing Address)

Date Analyzed by UBTL: November 2,1987

B C Harrison

(1.1)

AMD FORM SEP 82 641 REPLACES OEHL FORM 7, DEC 78, WHICH IS OBSOLETE.

APPENDIX B

APPENDIX B

DETAILS OF CLOSURE DESIGN

(Reserved)

APPENDIX C

APPENDIX C

CONTAMINATES OF CONCERN
(Reserved)

Geoscience Consultants, Ltd. (GCL) is a multidisciplinary firm offering a wide range of environmental, geotechnical and engineering services to clients throughout the United States. GCL is headquartered in Albuquerque, New Mexico and has eastern regional offices in the Washington, D.C. area. The firm's professional staff has expertise in hazardous waste management, hydrogeology, environmental, chemical and civil engineering, permitting and regulatory compliance, and air quality studies.

GCL

For more information, contact:
Geoscience Consultants, Ltd.
500 Copper Avenue, N.W., Suite 200, Albuquerque, New Mexico 87102, (505) 842-0001