



DEPARTMENT OF THE AIR FORCE  
HEADQUARTERS 542D CREW TRAINING WING (MAC)  
KIRTLAND AIR FORCE BASE, NEW MEXICO 87117 - 5000

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22 Sep 92

Mr Edward Horst  
Program Manager  
Hazardous and Radioactive Materials Bureau  
PO Box 26110  
525 Camino de los Marquez  
Santa Fe NM 87502

Dear Mr Horst

Attached is a copy of a No Further Action Document for the Kirtland AFB golf course. This document is based on the no action closure alternative listed in the approved closure plan and constitutes our certification of clean closure for the unit.

If you have any questions, please contact John Gould at 846-2773.

Sincerely

THOMAS A. NORRIS, Colonel, USAF  
Director  
Environmental Management Division

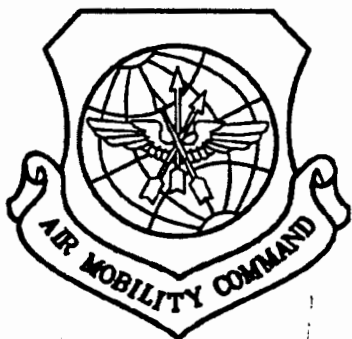
1 Atch  
No Further Action Document

cc: NMED (Dave Morgan) wo Atch  
NMED (Stephanie Stoddard) wo Atch



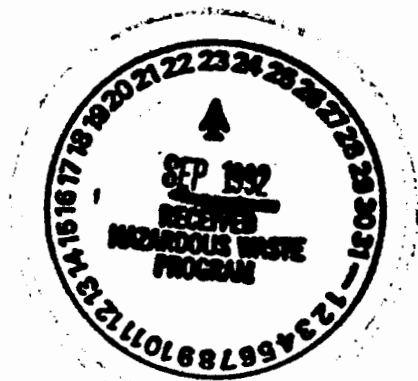
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**NO FURTHER ACTION DOCUMENT**

SITE SD-27  
TIJERAS ARROYO GOLF COURSE  
KIRTLAND AIR FORCE BASE, NEW MEXICO



Prepared For:

AIR MOBILITY COMMAND  
ENVIRONMENTAL MANAGEMENT  
SCOTT AIR FORCE BASE, ILLINOIS

September 1992

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KIRTLAND AFB, NEW MEXICO

Prepared For:

AIR MOBILITY COMMAND  
ENVIRONMENTAL MANAGEMENT  
SCOTT AIR FORCE BASE, ILLINOIS

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Bellevue, Nebraska 68005

September 1992

DOCUMENT TO SUPPORT NO FURTHER ACTION

SITE NAME AND LOCATION

Installation Restoration Program  
Tijeras Arroyo Golf Course  
Site SD-27  
Kirtland Air Force Base, New Mexico

STATEMENT OF BASIS

This decision is based on the results of the Installation Restoration Program (IRP) Phase I Records Search and the supplement to the Base-Wide Closure Plan for the Tijeras Arroyo Golf Course at Kirtland AFB, with reports dated 1981 and 1991, respectively.

DESCRIPTION OF THE SELECTED REMEDY

Based on the current conditions at the Tijeras Arroyo Golf Course, no significant risk to public health or the environment has been determined to exist. Therefore, site closeout is in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). Site closure is under the authority of the Resource Conservation and Recovery Act (RCRA), a Compliance Order, dated 30 September 1988, issued by the New Mexico Environment Department, and the subsequent Federal Facility Compliance Agreement of 28 February 1990.

DECLARATION

This decision document represents the selected action for this site developed in accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and under authority of the approved Closure Plan dated 10 September 1991. It has been determined that site closeout is protective of human health and the environment, attains federal and state requirements that are applicable or relevant and appropriate, and is cost-effective. No contaminant levels were detected at the site; therefore, no risk to human health or the environment exists. No treatment is necessary.

\_\_\_\_\_  
JAMES L. HIGHAM  
Brigadier General, USAF  
Commander, 542nd Crew Training Wing  
Chairman, Environmental Protection Committee

Original signed by Gen. Higham  
on 21 Sept 92 and is on file  
with KAFB/Envir. Mgmt

*JL*

\_\_\_\_\_  
Date

DOCUMENT TO SUPPORT NO FURTHER ACTION

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Installation Restoration Program  
Tijeras Arroyo Golf Course  
Site SD-27  
Kirtland Air Force Base, New Mexico

STATEMENT OF BASIS

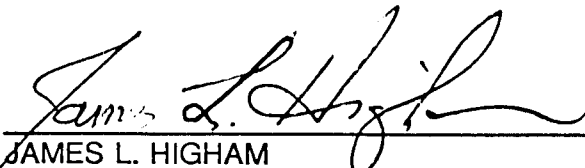
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Commander, 542nd Crew Training Wing  
Chairman, Environmental Protection Committee

21 Sep 92  
Date

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## ACRONYMS

AFB	Air Force Base
DOE	Department of Energy
NMED	New Mexico Environment Department
POTW	Publicly Owned Treatment Works
ppb	Parts Per Billion
ppm	Parts Per Million
TCA	1,1,1-Trichloroethane
TCLP	Toxicity Characteristic Leaching Procedure
USAF	U.S. Air Force

## 1.0 INSTALLATION

Kirtland Air Force Base (AFB) is located in central New Mexico southeast of and contiguous to the city of Albuquerque. The base encompasses 82,000 acres and contains 742 buildings totaling 5.6 million square feet of floor space. Three areas within the base are owned by the Department of Energy (DOE). Facilities in these areas are operated and maintained by Sandia National Laboratories, a research and development contractor for the DOE. The basic mission of Kirtland AFB is to provide research and development for Air Force programs, and training for pararescue medics.

## 2.0 SITE IDENTIFICATION

The Tijeras Arroyo Golf Course at Kirtland AFB is numbered SD-27 according to the Installation Restoration Program numbering protocol. The site has been investigated due to a suspected release from the Kirtland AFB wastewater lagoons. The lagoons were identified in the Kirtland AFB Phase I Records Search (Engineering Science, 1981) as a potential source of contamination. They were later sampled and found to contain 1,1,1-trichloroethane (TCA). The golf course is located in the northwest portion of the base (northwest of the Manzano Base area, north of the riding stables, and east of the Pennsylvania Avenue extension) and consists of an 18-hole course and a driving range. Refer to Figure 1.

The entire golf course is covered with grass. There are four decorative ponds on the course and another pond called the Golf Course Main Pond. The perimeter of the golf course is surrounded by vacant undeveloped land covered with natural vegetation. The water table is at a depth of approximately 380 feet below the ground surface.

## 3.0 BACKGROUND

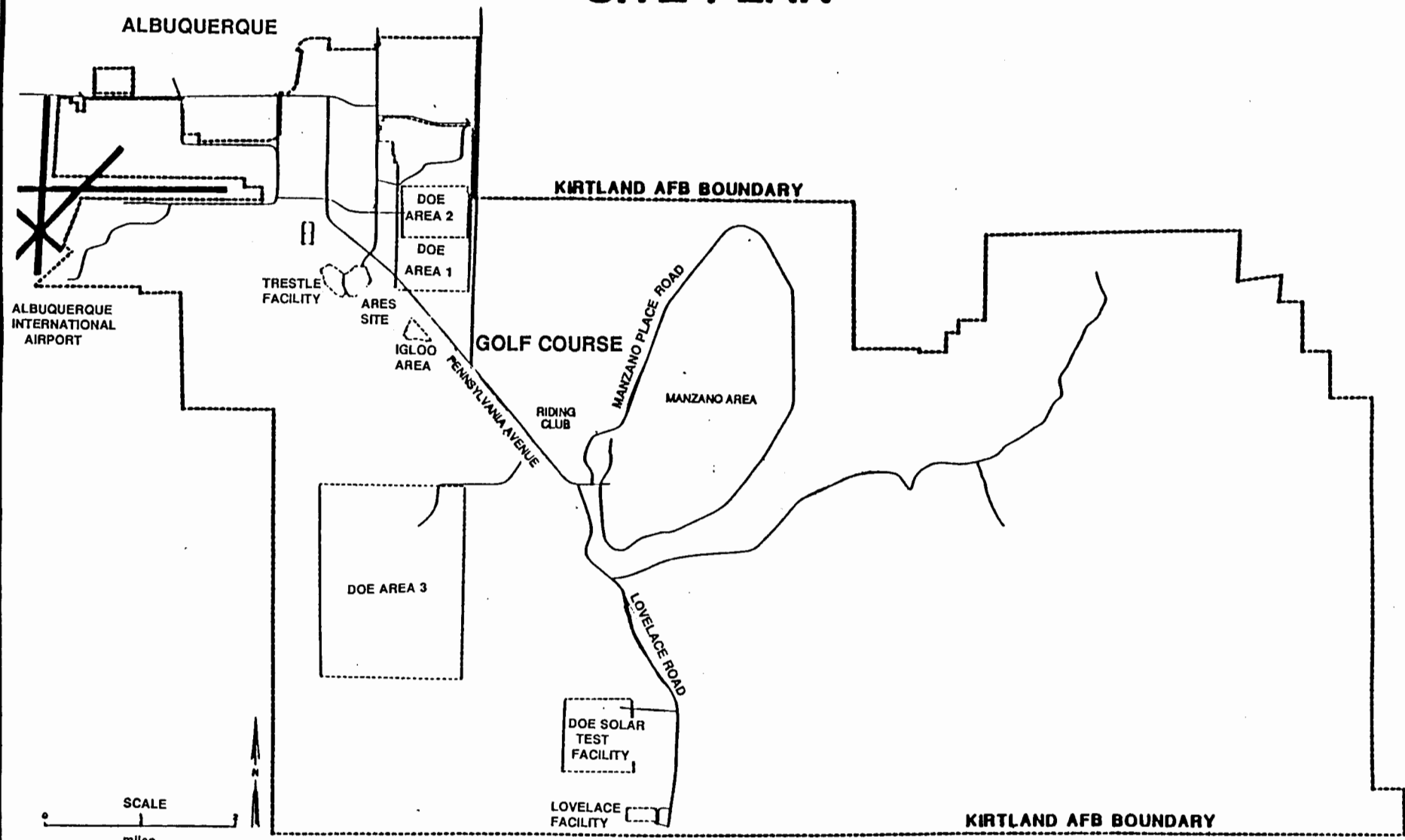
### 3.1 Nature of the Site

In 1962, a lagoon and golf course pond system was constructed by the Air Force to create a source of primary treated sewage to be used for irrigation water at the golf course. Two lagoons were constructed approximately 1.8 miles northwest of the Golf Course Main Pond and a pipeline was constructed to join the lagoons and pond (see Figure 2). Effluent from the sewage lagoons would flow to the Golf Course Main Pond by gravity. Water from the Golf Course Main Pond was pumped to the golf course sprinkler system. Water in the main pond and was occasionally pumped to the four other decorative ponds located on the golf course. The decorative ponds also received excess sprinkler irrigation water and rain runoff from nearby areas on the golf course. Currently, only fresh water from Kirtland AFB's water distribution system is used in the sprinkler system.

By using the lagoon water for irrigating the golf course, the demand on groundwater resources was reduced. From November to March of each year, the lagoons and pond were bypassed and all sewage influent was sent directly to the City of Albuquerque, Publicly Owned Treatment Works (POTW). From April to October of each year, depending upon irrigation needs, 40 to 100 percent of the sewage influent was routed to the lagoons and subsequently piped to the golf course. From there, it flowed into the Main Golf Course Pond. The influent to the Main Golf Course Pond was diluted with potable water from the Kirtland AFB water distribution system at a ratio of approximately  $\frac{2}{3}$  waste water to  $\frac{1}{3}$  potable water. The Main Golf Course Pond last received



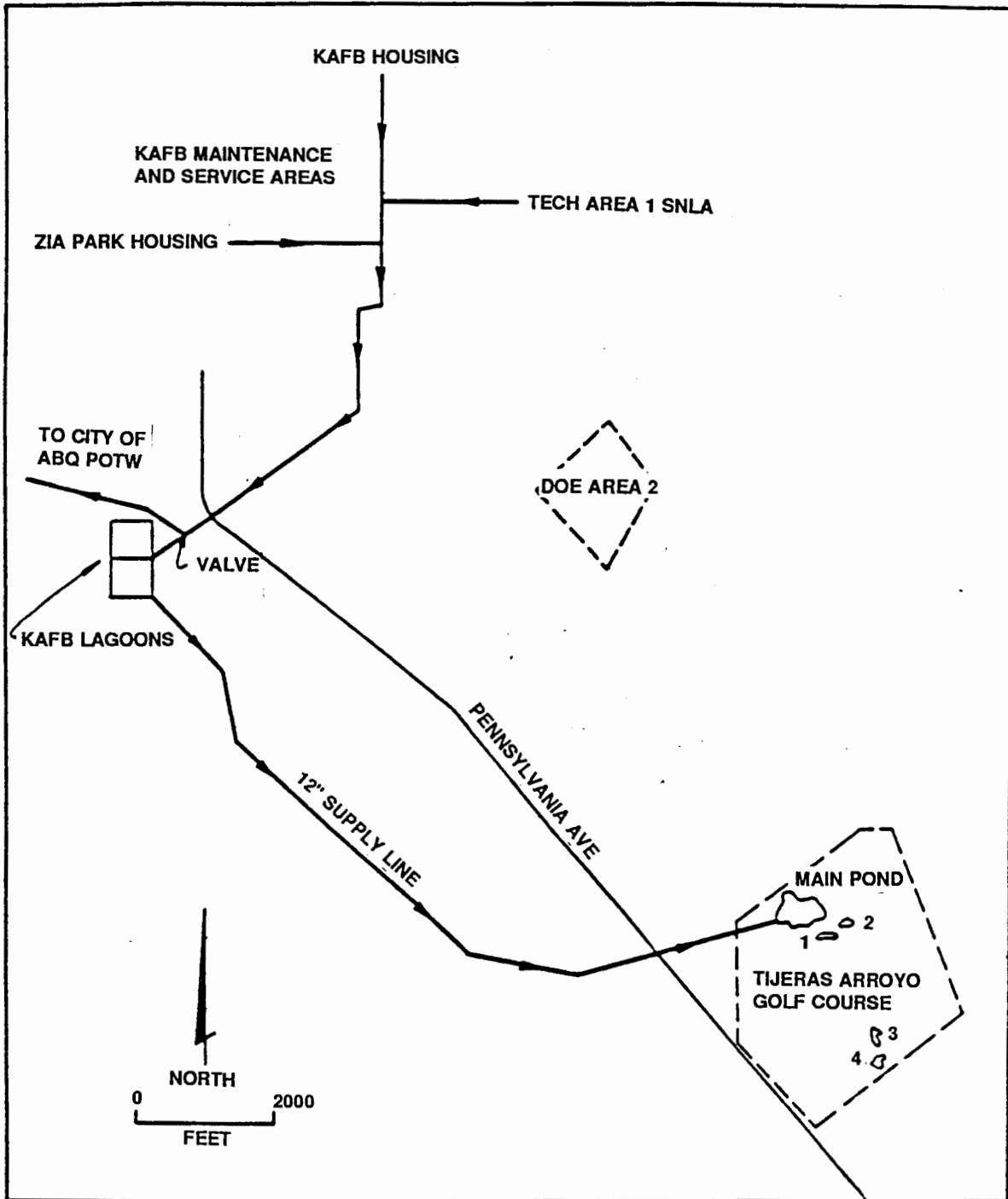
FIGURE 1  
KIRTLAND AFB  
SITE PLAN



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

FIGURE 2  
KIRTLAND AFB

SCHEMATIC DIAGRAM OF LAGOON AND POND SYSTEM



effluent from the sewage lagoons in October 1987. The water in the lagoons, main pond, and the decorative ponds has since evaporated.

During the operating life of the sewage lagoons, TCA was routed to the sewage lagoons from an unknown upstream source. This was confirmed by lagoon water sampling. An estimated 1.4 gallons of TCA was present in the lagoons, as determined by multiplying the concentration of TCA detected by the estimated volume of liquid in the lagoons (Geosciences, 1991). Since the lagoons, Golf Course Main Pond, and the golf course are hydraulically connected, the presence of TCA at the golf course was suspect.

### 3.2 Historical Factors Contributing to Identification of the Site

After TCA was detected in the lagoons, the golf course, Main Golf Course Pond, and sewage lagoons became the subject of compliance orders issued by the New Mexico Environment Department (NMED). Since the golf course received irrigation waters from the lagoon (via the Main Golf Course Pond), it was considered a hazardous waste land application site until proven clean.

### 3.3 Results of Site Studies and Investigations

Sampling was performed to determine the nature and extent of potential contamination at the golf course. The sampling program was designed to evaluate the following: waste characteristics of sediments in the decorative ponds and near-surface soils along the fairways; the level of contaminants that may exist in the soil; and the nature of the hazardous constituents.

Surface soils at the golf course were sampled by the Bioenvironmental Engineering Service, USAF Hospital, Kirtland AFB. One sample was taken from the low area near the sprinklers along each fairway. Sampling locations are shown on Figure 3. Background soil was also sampled but the sample locations are not shown on Figure 3. Samples were analyzed for EP Toxicity Pesticides and Metals (Method 8080) and Halogenated Volatile Organics (Method 8010). Chromium was detected at concentrations less than 100.0 ppb in background and other samples. No other constituents were detected above quantitation limits. The current regulatory criterion established for chromium under the toxicity characteristic leaching procedure (TCLP) is 5,000 ppb. Although the acceptable methodology for testing metals has recently changed from the EP Toxicity test to the TCLP, the magnitude of difference between the earlier test results and the current regulatory criterion implies that current analysis of the chromium levels using the TCLP method would not likely produce results significantly different from the previous sampling analyses. Chromium is believed to be naturally occurring and not the result of site contamination.

Composite samples were collected by the United States Geological Survey from the low spot in each of the four decorative ponds. The following analyses were performed: Purgeable Volatile Organics (Method 8240), Semivolatile Organics (Method 8270) and EP Toxicity Pesticides and Metals (Method 8080). Results are summarized in Table 1. Analytical results indicate some naturally occurring metals exist in pond sediments. However, when analyzed using EP Toxicity methods, only barium and cadmium were detected. The detected values were well below the TCLP regulatory limits. The amounts detected are significantly lower than the TCLP criteria; the recent change in test methodology would not change the determination of no significant contamination.

FIGURE 3  
KIRTLAND AFB  
SAMPLING LOCATIONS

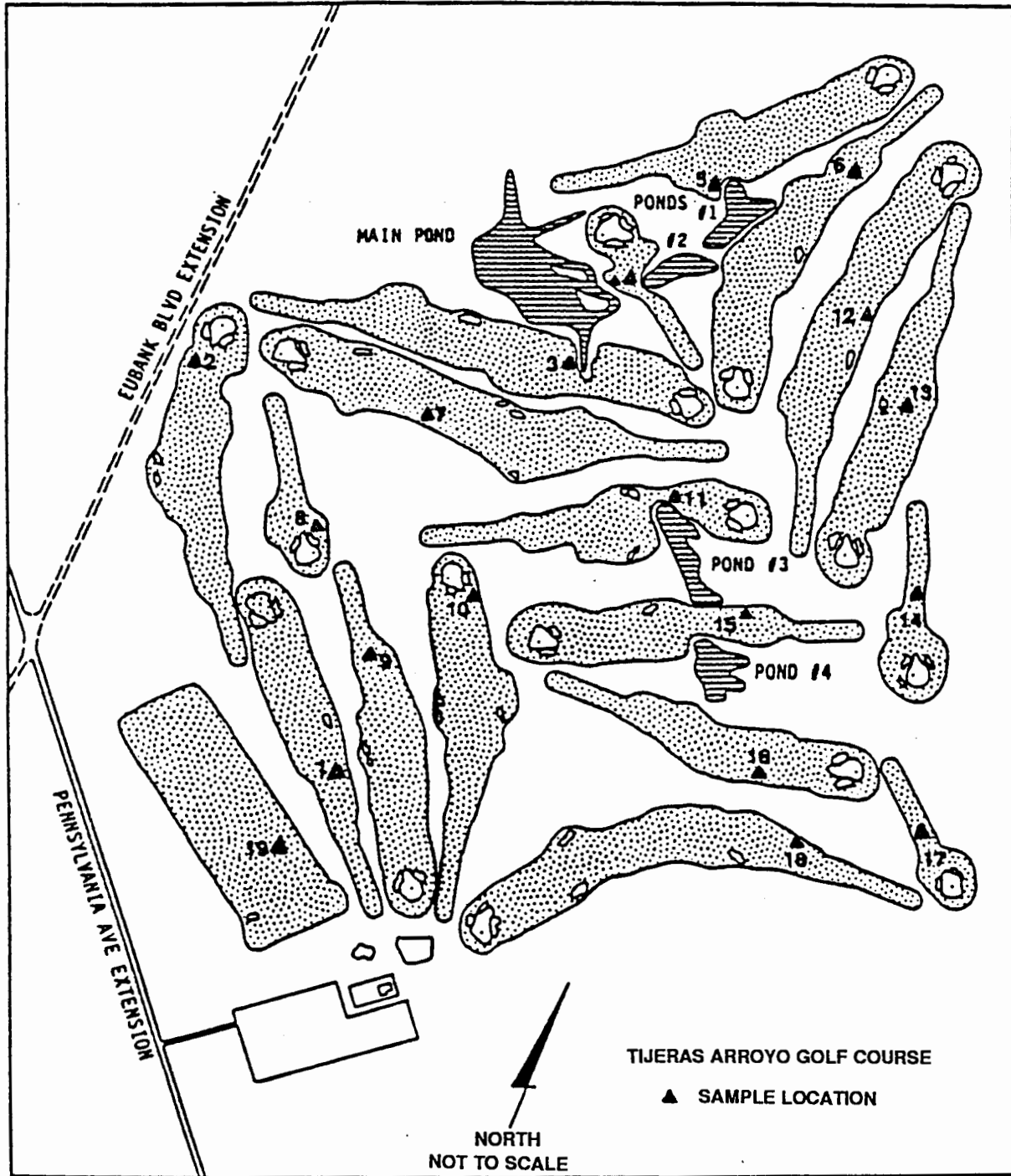


TABLE 1 EP Toxicity Leachate—Dry Sediment Analysis Kirtland AFB Golf Course Decorative Ponds		
COMPOUND	HIGH VALUE <sup>1</sup> (ppm)	TCLP (ppm)
Barium	2.30	100
Cadmium	0.026	1.0
Chromium	0	5.0
<sup>1</sup> Highest value of samples taken.		

### 3.4 Study Findings and Recommendations

Analytical results for soil samples collected along the golf course fairways indicated no contamination exists due to sprinkler application of water from the Main Golf Course Pond. Only some naturally occurring metals were detected.

Analytical results of samples collected from the decorative ponds indicated some naturally occurring metals, but at levels below TCLP regulatory limits.

Based upon the analytical findings, it was recommended that no further action be performed at the golf course (excluding the Main Golf Course Pond). Clean closure can be achieved by documentation of analytical data.

### 3.5 Significant Concerns Associated with Protection of Human Health and Environment

No constituents were detected at the golf course as a result of a TCA release to the lagoons. Therefore, exposure to humans and the environment to hazardous materials is non-existent. As instructed by the NMED, a risk assessment was performed on contaminants of concern in both the golf course soils and the decorative pond sediment. Detected values were compared to regulatory levels. No detected values exceeded regulatory levels.

### 3.6 Coordination with Regulatory Agencies and the Public

Kirtland AFB has maintained coordination with the NMED throughout the investigation of the golf course. The investigation was prompted by the Compliance Order dated 30 September 1988 issued by NMED. Sampling locations, number of samples to be collected and analytical requirements were specified by the NMED. Findings of the investigation have been reported to the NMED and in accordance with their guidance, a formal closure plan recommending no further action has been written.

#### 4.0 ALTERNATIVES EVALUATED

The Kirtland AFB Base-Wide Closure Plan contains six closure alternatives for closure of base impoundments. Alternatives include clean closure scenarios as well as in-place closures. Alternative 1 of the six alternatives included in the Base-Wide Closure Plan has been chosen as the appropriate method for clean closure of the golf course. Alternative 1 involves documentation which demonstrates that no contaminants exist in the unit and clean closure can be achieved by presentation of this data. The Closure Plan for the Golf Course at Kirtland AFB (Supplement 3 of the Base-Wide Closure Plan) contains this data.

#### 5.0 CONCLUSIONS

Detection of TCA at the sewage lagoons prompted an investigation of the hydraulically connected golf course. Samples of surface soils along fairways and sediments remaining in decorative ponds were collected. No constituents relating to a TCA release to the sewage lagoons were detected. A Risk Assessment was performed using concentrations of constituents which were detected and no unacceptable risks were found. Therefore, it was recommended in a Unit Closure Plan for the golf course that the site proceed with clean closure and no further action be performed. This independent review of documentation on the previous investigations performed at the golf course, concurs with the recommendations that no further action be performed. Upon base approval of this decision document, copies will be forwarded to the United States Environmental Protection Agency and NMED for their review and concurrence.

## REFERENCES

1. Engineering-Science, Inc. 1981. Installation Restoration Program, Phase I - Records Search, Hazardous Materials Disposal Sites, for Kirtland AFB, New Mexico. Prepared for United States Air Force, AFESC/DEV, Tyndall AFB, Florida. November.
2. Geoscience Consultants, Ltd. 1991. Supplement 3, Unit Closure Plan for Kirtland Air Force Base, Albuquerque, New Mexico. Prepared for Kirtland Air Force Base, 1606 ABW-EM, Building 20200, Kirtland Air Force Base, New Mexico. September.