

**DRAFT FINAL ORDNANCE AND EXPLOSIVES
ENGINEERING EVALUATION/COST ANALYSIS
FIVE POINTS OUTLYING FIELD
ARLINGTON, TEXAS**

**Contract DACA87-00-D-0034
Task Order 0008
USACE Project Number K06TX002801**



Prepared for:

**US Army Engineering and Support Center,
Huntsville
and
US Army Corps of Engineers,
Fort Worth District**

by:

**ZAPATAENGINEERING, P.A.
1100 Kenilworth Avenue
Charlotte, NC 28204**

April 2003

ZAPATAENGINEERING, P.A.

CONSULTING ENGINEERS

ENGINEERING CERTIFICATE

The attached Engineering Evaluation/Cost Analysis for the former Five Points Outlying Field, Arlington, Tarrant County, Texas was prepared for the US Army Engineering and Support Center, Huntsville under my direction and supervision. I hereby certify that, within the scope of work and limitations stated herein, all data contained in this report are true and correct to the best of my knowledge and belief as of the date of this report.

ZAPATAENGINEERING, P.A.

By: _____
Neil J. Gilbert, PE, PG

This certificate will be signed, stamped, and submitted with the final EE/CA document.

Suzanne Cantor-McKinney
Program Manager

John A. Soyak, CIH
Industrial Hygienist

Clifford M. Walden
UXO Quality Control/Safety Officer

Fred E. Tolen, PG
Project Manager

DRAFT FINAL

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USAESCH Project No. K06TX002801

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Prepared for:

US ARMY ENGINEERING AND SUPPORT CENTER,
4820 University Square
Huntsville, Alabama 35816-1822

AND

US ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT
819 Taylor Street
Fort Worth, TX 76102-0300

by:

ZAPATAENGINEERING, P.A.
1100 KENILWORTH AVENUE
CHARLOTTE, NORTH CAROLINA 28204
PHONE (704) 358-8240

EXECUTIVE SUMMARY

ES-1.0 INTRODUCTION

This document presents the Engineering Evaluation/Cost Analysis (EE/CA) of Five Points Outlying Field (OLF), US Army Corps of Engineers (USACE) Project Number K06TX002801. ZAPATAENGINEERING, under contract to US Army Engineering and Support Center (USAESCH), is tasked to prepare an EE/CA under Contract Number DACA87-00-D-0034, Task Order 0008.

ES-2.0 PURPOSE

The purpose of the EE/CA is to determine the most appropriate response action to address any ordnance and explosives (OE) risk at the site. The following tasks were completed to achieve this purpose:

- implemented the TPP process;
- prepared EE/CA Work Plan;
- prepared EE/CA Report;
- characterized the site by using existing data (no field investigation);
- performed a qualitative risk evaluation of OE hazards present;
- completed an institutional analysis;
- identified, developed, assessed, and compared response action alternatives;
- and
- recommended a risk reduction alternative.

ES-2.1 MILITARY USE

The Five Points OLF was established during World War II and initially used as pilot training airfield associated with the Dallas Naval Air Station (NAS), eleven miles northeast of the site. At an unknown later time during the war, it was converted into a practice bombing range. Records show that Mk 23 Mod 1 practice bombs, M38A2 practice bombs, and a practice version of the M47 chemical bomb were used. There are no records indicating the use of chemical warfare material (CWM), incendiary, or white phosphorus (WP). According to Major Dallas R. Lynch (US Army Ret.) who conducted the clearance at the Five Points OLF, all the M47 chemical bombs he found were of the blue practice variety. In a 2002 interview conducted by the USACE (see Record of Communication in Appendix D), Major Lynch stated that he found no evidence that any white phosphorus or any other chemical filler was ever used in one of these devices. He noted that the casings would have been OD green had these fillers been used, and the items he found were all blue. By indications that he observed, these devices were filled with water when dropped. Mr. Lynch described the four-foot long central tube which, when filled with water, would burst, splitting the item.

ES-2.2 ORDNANCE FOUND ON-SITE POST MILITARY USE

Over 3,000 Mk 23 Mod 1 practice bombs have been located since cessation of military activities on the site. Many OE finds were a result of a developer-sponsored subsurface removal action. No other ordnance types have reportedly been found on-site, since the close of Five Points OLF.

ES-2.3 CURRENT AND FUTURE USE

The 162.06-acre Five Points OLF consists of a 35-acre parcel developed as a mobile home park, known as Twin Park Estates, and nearly 127 acres under development as a single-family

community, known as Southridge Hills. A portion to the south of the site along Bowman Branch is dedicated to the City of Arlington as a city park. Another small portion along Matlock Road is being held for light commercial development. Refer to Appendix B-1 Site Location Map and Appendix B-2 Five Points OLF Site Map.

ES-3.0 CONCLUSION

The US Navy practiced aerial bombing at Five Points OLF, and the subsequent construction of residential, commercial, and recreational facilities may expose the public to potential OE hazards.

ES-4.0 RISK EVALUATION

Based on the site conditions, historical information, OE risk impact assessment, and institutional analysis, four alternatives were defined and assessed as to determine the recommended response action. These alternatives include:

- Alternative 1, No DOD Action Indicated (NDAI);
- Alternative 2, Institutional Controls;
- Alternative 3, Comprehensive OE Surface Clearance with Institutional Controls; and
- Alternative 4, OE Subsurface Clearance with Institutional Controls.

ES-5.0 RECOMMENDATION

ES-5.1 The risk-reduction alternatives recommended for with the Five Points OLF in this EE/CA represent conclusions based on the results of previous investigations. Under the Task Order for this EE/CA, there were no fieldwork requirements (detection, location, and mapping of OE) associated with the current evaluation and analysis. As such, ZAPATAENGINEERING based its investigation on assessment of archival data and information gathered during the Technical Project Planning (TPP) Process. ZAPATAENGINEERING then prepared qualitative OE risk evaluations based on the following criteria.

- Effectiveness;
- Implementability; and
- Cost.

ES-5.2 Based on an evaluation of the risk-reduction alternatives, an overview of reported site conditions, and an understanding of the projected land use, the recommended alternative is an OE Subsurface Clearance with Institutional Controls (Alternative 4). The depth of clearance will be dictated by the depth of OE detection that is technically feasible at the time of removal. The estimated cost to implement Alternative 4 is in Appendix C.

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Acronyms and Abbreviations

A/E	Architect/Engineering
AR	Army Regulation
ARARs	Applicable or Relevant and Appropriate Requirements
ASR	Archives Search Report
CESWF	United States Army Corps of Engineers, Southwest Division, Fort Worth District
CESWT	United States Army Corps of Engineers, Southwest Division, Tulsa District
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CoC	Contamination of Concern
CWM	Chemical Warfare Materiel
DA	Department of the Army
DERP	Defense Environmental Restoration Program
DID	Data Item Description
DOD	Department of Defense
EE/CA	Engineering Evaluation/Cost Analysis
EM	Engineering Manual
FS	Sulfur Trioxide in Chlorosulfonic Acid (used as a practice bomb signal)
FUDS	Formerly Used Defense Site
H	Mustard
IAW	In Accordance With
IGD	Interim Guidance Document
INPR	Inventory Project Report
MISD	Mansfield Independent School District
Mk	Mark
mm	Millimeter
MOA	Memorandum of Agreement
Mod	Modification
MPM	Most Probable Munition
MSD	Minimum Separation Distance
NAS	Naval Air Station
NCP	National Contingency Plan
NDAI	No DOD Action Indicated
NRCS	Natural Resource Conservation Service
NWS	National Weather Service
ODC	Other Direct Costs
OE	Ordnance and Explosives
OERIA	Ordnance and Explosives Risk Impact Assessment
OLF	Outlying Field
ORS	Ordnance Related Scrap
PC	Personal Computer
PE	Professional Engineer
PG	Professional Geologist
PM	Project Manager
PWP	Plasticized White Phosphorus
QA	Quality Assurance
QC	Quality Control
RAB	Restoration Advisory Board
RAC	Risk Assessment Code
RCRA	Resource Conservation and Recovery Act

ROE	Rights of Entry
SAP	Sampling and Analysis Plan
SOW	Scope of Work
TCRA	Time Critical Removal Actions
TM	Technical Manual
TCEQ	Texas Commission on Environmental Quality
TPP	Technical Project Planning
US	United States
US EPA	United States Environmental Protection Agency
USACE	United States Army Corps of Engineers
USAESCH	United States Army Engineering and Support Center, Huntsville
USN	United States Navy
UXO	Unexploded Ordnance
WP	White Phosphorus

REVISED PAGES

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1.0 INTRODUCTION

This chapter describes the basis for this Engineering Evaluation/Cost Analysis (EE/CA) and the purpose and scope of the project.

1.1 BACKGROUND

Five Points OLF is a Defense Environmental Restoration Program/Formerly Used Defense Site (DERP/FUDS). The Five Points OLF was established during World War II and was initially used as a pilot training airfield associated with the Dallas Naval Air Station (NAS). The Dallas NAS is located eleven miles northeast of the site. At an unknown time during the war, it was converted into a practice bombing range that became known as the Five Points OLF Bombing Range. The site is currently residential and recreational, including a mobile home park known as Twin Parks Estates, a subdivision known as Southridge Hills that remains under construction, and a park dedicated to the City of Arlington.

1.2 PROJECT AUTHORIZATION

1.2.1 Authorization

The US Army Corps of Engineers (USACE) identified Five Points OLF as Project Number K06TX002801. ZAPATAENGINEERING, under contract to the US Army Engineering and Support Center, Huntsville (USAESCH), is tasked to prepare an EE/CA under Contract Number DACA87-00-D-0034, Task Order 0008. The work required under the Statement of Work (SOW; Appendix A) falls under the DERP/FUDS Program. This action was performed consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Sections 104 and 121; Executive Order 12580; and the National Contingency Plan (NCP), Section 300.400. All activities involving work in areas potentially containing unexploded ordnance hazards were conducted in full compliance with USAESCH, USACE, Department of Army (DA), and Department of Defense (DOD) requirements regarding personnel, equipment, and procedures. The Code of Federal Regulations 29 CFR 1910.120 applies to all actions taken at this site.

1.2.2 Technical Guidance

ZAPATAENGINEERING worked in close coordination with the USAESCH and the US Army Corps of Engineers, Fort Worth District (CESWF) while developing the project scope, Work Plan, and technical directives. The Task Order SOW (Appendix A) outlines the USAESCH guidance for the overall project, including the EE/CA requirements. ZAPATAENGINEERING completed the work in accordance with the SOW and the approved project Work Plan entitled *Work Plan, Ordnance and Explosives Engineering Evaluation/Cost Analysis, Arlington, Texas, September 2002*. This report was generated based on USAESCH EE/CA guidance document DID OE-010, USACE EP1110-1-18, *Ordnance and Explosives Response*, and USACE EP1110-1-24, *Establishing and Maintaining Institutional Controls for Ordnance and Explosives (OE) Projects*.

1.3 PURPOSE AND SCOPE

The purpose of the EE/CA is to evaluate potential risks from any ordnance that may remain on the site from military activities and develop alternative actions to reduce those risks. Under the requirements of the current Scope of Work, there were no fieldwork requirements (detection, location, and mapping of OE). As such, ZAPATAENGINEERING based its investigation on evaluation of archival data and information gathered during the Technical Project Planning

(TPP) Process. ZAPATAENGINEERING prepared a qualitative ordnance and explosives (OE) risk evaluation based on this available information.

1.4 PROJECT TEAM

1.4.1 US Army Engineering and Support Center, Huntsville (USAESCH)

USAESCH is the implementing agency and has approval authority for project execution. The USAESCH responsibilities include procurement of Architect/Engineer (A/E) services, direction of the A/E contractor (ZAPATAENGINEERING), control of the budget and schedule, and coordination of document reviews and project deliverables. Mr. Bill Sargent is the USAESCH Project Manager.

1.4.2 US Army Engineering District, Fort Worth (CESWF)

The CESWF is the sponsor of the EE/CA. CESWF responsibilities include review of budget, schedule, project work plans and documents, communication with the news media and public, and coordination with state and local regulatory agencies. CESWF-PER-D is in charge of field sampling, laboratory testing, and reporting analytical results of soil samples. Mr. Brian Condikey is the CESWF Life Cycle Project Manager.

1.4.3 US Army Engineering District, Tulsa (CESWT)

The CESWT provides technical assistance in support of the CESWF concerning possible environmental contamination at the site related to its documented former defense use. Tulsa Corps' responsibilities include preparation of a Sampling and Analysis Plan (SAP), and coordination with state and local regulatory agencies regarding the sampling program.

1.4.4 ZAPATAENGINEERING Project Team

ZAPATAENGINEERING is the prime contractor to the USAESCH and provided all engineering support and services for the project. ZAPATAENGINEERING was responsible for performance of the activities detailed in the SOW in Appendix A.

1.4.4.1 Project Manager (ZAPATAENGINEERING)

Mr. Fred Tolen was responsible for ensuring execution of the project in a timely and cost-effective manner. He was responsible for communicating with the USAESCH and CESWF Project Managers and oversight of overall performance of the project team. Daily duties included technical review and scheduling.

1.4.4.2 Project Professional (ZAPATAENGINEERING)

Mr. Clifford Walden assisted in preparing the Work Plan and the EE/CA Report.

1.5 PROJECT OBJECTIVES

The following points effectively summarize the objectives of this project, as stated in the Scope of Work.

- Describe OE-related limitations on use of the site(s);
- Evaluate reasonable risk-management alternatives; and
- Provide for the Administrative Record.

2.0 SITE DESCRIPTION AND HISTORY

This chapter provides a description of the location, history, current and future land uses, natural features, and previous investigations.

2.1 LOCATION

The Five Points OLF is approximately eight miles south of the center of Arlington, and three miles north-northeast of Mansfield, Texas, at the southwest corner of the intersection of Matlock Road (to the east) and West Harris Road (to the north). Refer to Appendix B-1, Site Location Map and Appendix B-2, Five Points OLF Site Map. The intermittent Bowman Branch of Walnut Creek lies to the south, and properties along Commercial Boulevard East are adjacent to the west. Currently, private individuals and businesses and the city of Arlington own the site.

2.2 TOPOGRAPHY

The site is nearly flat with a gentle slope to the southeast. Historic aerial photos indicate the former presence of a small drainage depression in the southeastern part of the site, extending south to Bowman Branch. Grading activities associated with development of the site have leveled this part of the property. All of the Five Points OLF has been improved, with the exception of the area immediately adjoining Bowman Branch. Improvements include roadways, site built homes, mobile home lots, a cleared area held for light commercial development, and required utilities. A portion of the site located to the south along Bowman Branch is dedicated to the City of Arlington as a city park.

2.2.1 Geology

2.2.1.1 The Five Points OLF site is located in the Osage Plains section of the Central Lowland province. Rocks of this section range from Cretaceous to Recent. The oldest strata are exposed in the western part of Tarrant County. Younger bedrock units are exposed toward the east. Alluvium and terrace deposits overlap the bedrock along streams and rivers (USACE, 2002a).

2.2.1.2 The outstanding geologic event in the region was the encroachment of the Comanchean Sea. This early Cretaceous sea expanded slowly from the Gulf of Mexico to cover all of Texas. It extended northward to cover the Arbuckle Uplift (in Oklahoma) and then receded. After a period of erosion, the less extensive sea of the Gulfian Epoch covered the Cretaceous sediments (USACE, 2002a).

2.2.1.3 Comanchean series rocks of the Cretaceous System are divided into three major divisions, from oldest to youngest: the Trinity Group, Fredericksburg Group, and Washita Group. The Cretaceous System forms a southeastward-thickening wedge extending across the area into a structural feature known as the East Texas Basin. Regional dip is to the east and southeast at about 15 to 40 feet/mile (modified from USACE, 2002a).

2.2.1.4 Along the contacts between geologic formations, a mixing of sediment by erosion has occurred. It is most evident where the formations have widely different characteristics. In the area between formations of the Fredericksburg and Trinity Groups, calcareous materials of the overlying Fredericksburg Group have moved down slope to cover the non-calcareous Trinity Group. Further movement down slope has mixed these sediments into a material that differs from what was in the original formations. In these areas of mixed parent materials, dissimilar soil types occur in close association. Small areas of calcareous soils with grass cover occur in intricate patterns with acid soils and oak forest cover (quoted from USACE, 2002a).

2.2.2 Hydrology

2.2.2.1 Ground Water

The Trinity Group of Cretaceous age is the largest and most prolific aquifer in the study area. The aquifer consists of the Antlers, Paluxy, and Twin Mountains Formations. The Antlers is a coalescence of the Paluxy and Twin Mountains. The Trinity Group aquifer ranges in thickness from 100 feet in the outcrop area to about 1,200 feet near the down dip limit of fresh to slightly saline water. Artesian storage coefficients range from 0.00001 to 0.00025, and specific yields range from 15 to 25 percent in the outcrop (USACE, 2002a).

2.2.2.2 Surface Water

There are no major rivers or streams at this site. Runoff from this location drains to the southeast portion of the site into an intermittent section of the Bowman Branch. This branch flows to the east, becoming perennial, and eventually emptying into Walnut Creek, approximately 3.5 miles east-southeast of the site. From this point, the flow is directed to the east-northeast for approximately 3 miles before draining into Mountain Creek, 1,800 ft downstream of the John Penn Branch confluence. The flow then travels approximately five miles to the north-northeast before draining into Mountain Creek Lake.

2.2.3 Ecology

The US Fish and Wildlife Service (USFWS) and the Texas Parks and Wildlife Department provided information on the endangered and threatened species for this site.

2.2.3.1 The USFWS reported the presence of the following federally listed species occur in Tarrant County, Texas: whooping crane (*Grus Americana*), endangered; bald eagle (*Haliaeetus leucocephalus*), threatened; least tern (*Sterna antillarum*), endangered. No site-specific information on rare or endangered species or natural communities is known at this time. This does not mean that other state or federally listed species may not be present within the areas of interest.

2.2.3.2 Vegetation on-site consists mostly of residential lawns and gardens. The area near Bowman Branch has tall grasses, scrub, and trees.

2.2.4 Meteorology

2.2.4.1 The nearest source of long record climatological data for this site is the Dallas-Fort Worth National Weather Service (NWS) office, located approximately 15 miles north-northeast of Five Points OLF. Climatological data recorded at this location during the period 1948–1995 is given in TABLE 2-1. The Dallas-Fort Worth climate is humid subtropical with hot summers. It is also continental, characterized by a wide annual temperature range. Annual precipitation also varies considerably, ranging from less than 20 inches to more than 50 inches.

2.2.4.2 Throughout the year, rainfall occurs most frequently during the night. Usually, periods of rainy weather last for only a day or two, followed by several days of fair skies. A large part of the annual precipitation results from thunderstorm activity, with occasional heavy rainfall over brief periods. Thunderstorms occur throughout the year, but are most frequent in the spring. Hail falls about two or three days a year, ordinarily with only slight and scattered damage. Windstorms occurring during thunderstorms are sometimes destructive. Although wind gusts have reached a maximum of 72 knots, the average maximum wind speed is 61 knots (USACE, 2002a).

2.2.4.3 The highest temperatures of summer are associated with fair skies, westerly winds, and low humidity. Characteristically, hot spells in summer are broken into three-to-five day periods by thunderstorm activity. Summer daytime high temperatures frequently exceed 100° F, but nighttime temperatures rarely exceed 80° F. Winters are mild, but northers occur about three times each month and are often short lived, so that even in January, mild weather occurs frequently. Snowfall averages 18 inches annual precipitation occurring mainly during the months of January and February. The average length of the warm season (freeze-free period) is about 249 days. The average last occurrence of below-freezing temperatures is in mid-March, while the average first occurrence is in late November. During the period 1948–1995, temperature extremes ranged from a minimum of –1° F (Dec 1989) to a maximum of 113° F (June 1980).

TABLE 2-1 CLIMATOLOGICAL DATA RECORD FOR DALLAS-FORT WORTH NWS*

MONTH	TEMPERATURE		PRECIPITATION	WIND	
	AVERAGE MINIMUM (°F)	AVERAGE MAXIMUM (°F)	AVERAGE (INCHES)	AVERAGE SPEED (KNOTS)	AVERAGE DIRECTION
January	34	54	1.9	11	S
February	38	60	2.2	11	S
March	45	68	2.6	13	S
April	55	76	3.8	13	S
May	63	83	5.0	12	S
June	71	92	2.9	11	S
July	75	96	2.2	10	S
August	74	96	2.0	9	S
September	67	88	3.0	10	S
October	56	79	3.5	10	S
November	45	66	2.2	11	S
December	37	58	1.9	10	S
Average	55	76	2.8	11	S

From USACE, 2002a

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2.3 HISTORY

2.3.1 Military Property Ownership

In 1940, the government acquired 162.06 acres as an OLF for the Dallas NAS at Grand Prairie, Texas. The date(s) the US Navy declared the site surplus and transferred ownership to the General Services Administration (GSA) is (are) unknown.

2.3.2 Military Activity

The US Government used this site for military training activities during World War II. The property was designated Five Points OLF and developed for practice landings and takeoffs by aircraft from the Dallas NAS. The site was later used as a practice bombing range. Improvements constructed at the field included practice runways of unknown composition, a target bull's-eye ring, and a boundary fence.

2.3.3 Post-Military Ownership

The GSA conveyed the former range to Gordon and Pope Supply Company on July 19, 1956. Ownership has changed several times since 1956. On October 31, 1977, the 8.8 Corporation conveyed the former range to the James Knapp Estate. The Knapp Estate conveyed 74.49 fee acres to the Twin Parks Estate Partnership on March 25, 1983. On September 13, 1996, ownership of the Twin Parks Estates Addition was conveyed to Arlington Twin Parks, Inc.

2.3.4 Post DoD Ownership Activities Involving Ordnance

2.3.4.1 On November 16, 1983, construction on the Twin Parks Estates property was halted when a subsurface “practice bomb” was found by a city inspection. Twin Parks Estates partnership hired Jet Research Center to clear the park site of ordnance, and approximately 3,000 practice bombs were removed from the 35 acres. Ordnance was found as deep as six feet, which may indicate that ordnance found during previous sweeps was buried in place. The 47th Ordnance Detachment from Fort Hood took possession of the ordnance found by Jet Research Center.

2.3.4.2 On April 9, 1984, a backhoe operator found several “practice bombs” in the same area previously cleared by Jet Research Center, at a depth of approximately three feet.

2.3.4.3 It has been reported that children have found Mk 23 practice bombs on the property and that they removed the black powder, lit it, and watched it burn. (The MK-23 practice bomb contains a four-gram black powder expelling charge and a signaling mixture.) During a visit by USAESCH personnel on February 17, 1998, a landowner revealed that these incidents with children took place throughout the 1940s and reportedly as late as the 1970s (USACE, 2002a).

2.3.4.4 USAESCH personnel visited the site in 1998 to address concerns relating to the remaining 127 acres of the former bombing range. The acreage at the time was undeveloped, containing mesquite trees, tall weeds, and grass. The District conducted a visual and a magnetometer survey of the area without any intrusive operations. Metal surface scrap was found but not determined to be OE. Numerous subsurface anomalies were detected, the majority of which were near the former location of the bombing range target center. A decreasing number of anomalies were reported as the team moved away from target center. It was concluded that a potential still exists for subsurface practice bombs (USACE, 1998).

2.3.4.5 During a Technical Project Planning (TPP) workshop addressing the Five Points OLF on June 4 and 5, 2002, Mr. Victor Toledo of KB Home stated that his subcontractors had found 26 Mk 23 practice bombs. Mr. Marcel Weiner, an attorney representing approximately 80 homeowners in Southridge Hills, stated that he had nine Mk 23 practice bombs in his possession. Both men were cautioned that the proper authorities should inspect and take control of these items.

2.4 DEMOGRAPHIC PROFILE

The following demographic information was obtained from the Final ASR, dated February 2002.

2.4.1 Businesses

Based on a total of business establishments in Tarrant County, the breakdown of businesses is as follows:

- Manufacturing 6.5%
- Construction 8.3%
- Services 37.3%
- Trade and Finance 4 0.7%
- Other 7.2%

2.4.2 Employment

Based on types of establishments, the breakdown of employment is as follows:

- Manufacturing 18.1%
- Services 33.0%
- Trade and Finance 34.5%
- Other 14.4%

2.4.3 Housing

Housing in Arlington is composed of single and multi-family dwellings. The median value of owner-occupied housing units is \$82,800.

2.4.4 Population

Refer to TABLE 2-2 for population and racial cross section.

TABLE 2-2 SITE POPULATION DEMOGRAPHICS (2000 CENSUS)

CITY/COUNTY	COUNTY: TARRANT	CITY: ARLINGTON
Land Area (sq. mi.)	898	93
Population	1,446,219	332,695
Population Density (sq. mile)	1610.5	3580.3
Race: White	71.2%	67.8%
Race: Black	12.6%	13.4%
Race: American Indian/Alaska Native	0.6%	0.5%
Race: Asian	3.6%	5.8%
Race: Pacific Islander	0.2%	<0.1%
Race: Mixed	2.5%	3.2%
Race: Other	9.1%	9.1%

Reference: <http://www.census.gov>

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2.5 CURRENT AND FUTURE SITE USE

2.5.1 Current

The former Five Points OLF is partially occupied by the 35-acre Twin Parks Estates mobile home park, with the remainder of the site encompassing Southridge Hills, a residential subdivision being built by KB Home.

2.5.1.1 The following information regarding Southridge Hills was obtained from the informational website, www.southridgeinfo.com. According to a representative of KB Home, the website was developed and is maintained by KB Home (Toledo, 2002).

2.5.1.2 Grason Land Company (Grason) developed Southridge for KB Home. Grason initially started to purchase the Southridge tract in 1997. Physical land development began in 1999; the first phase was completed in 2000. KB Home began purchasing fully developed lots from Grason in Southridge in 2000 (KB Home, 2002a). Model homes opened in April 2000 with sizes ranging from 1,400 to 3,300 square feet (KB Home, 2002b).

2.5.2 Future

2.5.2.1 According to the Final ASR dated February 2002, most of the subdivision homes have been sold to individual owners, with the unsold lots remaining in control of KB Home. As discussed in the TPP Workshop by KB Home, Grason currently holds a portion of the 127-acre tract for development as light-commercial property.

2.6 ANALYSIS OF HISTORICAL RECORDS

During World War II, the property was designated Five Points OLF and developed for practice landings and takeoffs by aircraft from the Dallas NAS. The site was later used as a practice bombing range. Improvements constructed at the field included practice runways of unknown composition, a target bull's-eye ring, and a boundary fence. A Report of Clearance, October 7, 1954 stated that all duds found on the range were recovered from the range. The 25.6-acre impact area was recommended against subsurface use. The document referred to finding M-47 (unknown practice version) chemical bombs, Mk 23 Mod 1 Navy bombs, and M38 practice bombs. The site has a history of Mk 23 Navy bombs being discovered by farmers, contractors, and homeowners. This demonstrates the site's former military use and the potential for discovery of subsurface practice bombs.

2.7 PREVIOUS INVESTIGATIONS AND REMOVAL ACTIONS

2.7.1 Report of Clearance, 7 October 1954

Major Dallas H. Lynch signed the report of clearance, which stated that all duds found on the range were recovered from the range. (See Appendix D for Record of Communication documenting an interview with Major Lynch, conducted in 2002.) Of these, 22 contained explosives and were destroyed. The 25.6-acre impact area was recommended against subsurface use (9800 TSU-CE, 1954). The document referred to finding the following ordnance items:

- M-47 Chemical Bombs 75 each
- Mk 23 Mod 1 Practice Bombs 27 each
- M38 Practice Bombs 23 each

2.7.2 Certificate of Clearance, 26 January 1956

The certificate states that the impact area, reduced from 25.6 acres to 17.5 acres, is recommended for any above-surface use to which the land is suited. In addition, Tech Escort personnel recommended the remainder of the field for any use to which the land is suited. This certificate supersedes the certificate dated October 7, 1954 (9800 TSU-CE, 1956).

2.7.3 OE Removal Action, Jet Research Center, 16 Dec 1983

Jet Research Center was contracted by the mobile home park developers to remove ordnance from the 35-acre development site. Work was completed after 10 days, and approximately 3,000 Mk 23 practice bombs were located, some as deep as six feet, and removed from the initial 35 acres under development. The 47th Ordnance Detachment at Fort Hood took possession of the items.

2.7.4 Site Visit, Fort Worth District, 28 – 29 June 1984

Mr. Herman Boswell, a partner in the mobile home park development group, met with the USACE representatives to inform them of the cleanup work he personally initiated. Mr. Boswell had been to the Naval Explosive Ordnance Disposal Technology Center in Indian Head, Maryland, seeking support in his cleanup efforts. There, he was referred to the Institut Dr. Förster GmbH and Co., KG, with offices in Pittsburgh, Pennsylvania. After the company loaned him a Ferex 4.021 metal detector, workers using the device recovered additional bombs at depths of up to 6 feet. None of the 1,600 “bombs” to date exploded or burned because of Mr. Boswell’s activities. The 47th EOD Team from Fort Hood periodically picked up and disposed of the bombs. The trip report from the site visit states, “a telephone conversation with Sgt. Noble of the 47th EOD Team indicated that some of the bombs were hazardous.”

2.7.5 Site Visit, Fort Worth District, 17 February 1998

No OE was found during the previously mentioned 1998 site visit. It was concluded, however, “a potential still exists for subsurface practice bombs” (USACE, 1998).

2.7.6 Site Inspection, St Louis, 11 January 2000

Tom Murrell and Gregg Kocher of the USACE St Louis District conducted an ordnance site visit. Construction workers on-site were able to point out locations where ordnance had been discovered. Two expended miniature practice bombs were found and inspected. Construction workers stated that occasionally they unearthed practice bombs. Much of the area had been graded for a new subdivision. No surface indications of ordnance burial sites were found.

3.0 SITE CHARACTERIZATION

This chapter provides information on the characteristics of OE known to have been used at Five Points OLF.

3.1 SITE INVESTIGATIONS

Under the Task Order for this EE/CA, there were no OE-related fieldwork requirements (detection, location, and mapping of OE) associated with the current evaluation and analysis. Because of the extent of existing archival data, fieldwork in this EE/CA was limited to sampling and analysis of soil potentially impacted by Chemicals of Concern (COCs) related to known DOD use of the site and munitions potentially used at the site (see Appendix E). Refer to Section 2.7, for a full description of previous OE removal actions and site investigations.

3.2 SOURCE, NATURE, AND EXTENT OF OE

The source, nature, and extent of OE are based on findings and conclusions of the Final ASR, historical records, and the TPP process.

3.2.1 Source of OE

The source of the OE was US Navy aerial bombing practice, most likely from Dallas NAS from 1940 to the mid 1950's.

3.2.2 Nature of OE

The OE consists of practice bombs, most of which have an MK-4 cartridge with a four-gram black powder expelling charge and a signaling or "marker" mixture to indicate the point of impact. There are no historic documents, anecdotal references, or other indications that chemical warfare materiel (CWM) was used at Five Points OLF.

3.2.3 Extent of OE

The presence of OE may not be limited to the former "impact area" noted on existing maps. This is due to the nature of practice bombing, the limited accuracy of the bombsites and systems of the day, and the construction processes used when cutting roads and preparing building sites. OE types located to date on site are described in Section 3.3. The only OE found on site since the close of Five Points OLF has been the Mk 23 Mod 1 Practice Bomb.

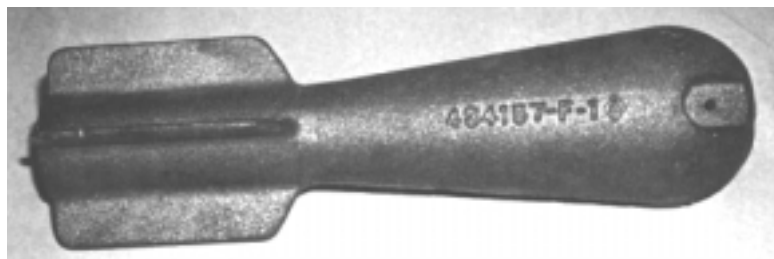
3.3 DESCRIPTION OF HAZARDS OF SPECIFIC OE ENCOUNTERED

Chemical warfare material (CWM) is not suspected to exist within the areas of investigation. The following ordnance was used at Five Points OLF. Features and hazards listed below are based on configurations for selected ordnance listed in TM 9-1904, *Ammunition Inspection Guide*, March 1944.

3.3.1 Mk 23 Mod 1 Practice Bomb (3 lb), Features and Hazards

The bomb body is cast iron, galvanized steel, or lead, depending on its series. The bomb is 8.3 inches long and 2.3 inches wide across the fins. Refer to FIGURE 3-1 for an illustration of the item.

Figure 3-1 MK 23 MOD 1 PRACTICE BOMB



(Photograph from ORDATA II Version 1.0)

3.3.1.1 The following signals/markers were used:

3.3.1.1.1 The AN-Mk 4 Signal Cartridge is a signal-generating cartridge and spotting charge used in various size practice bombs to provide visual observance of target impact in the bombing of surface and water targets. The Mk 4-series signaling cartridges are unpainted with black-stenciled markings depicting nomenclature, NSN, production date, DOD No., Lot No., and manufacturer's identification data. The Mk 4 Mod 0, 1, and 2 are cardboard with a metal base, while the Mk 4 Mod 3 and 4 are aluminum. Refer to Figure 3-2 and Figure 3-3 for illustrations of the Mk 4 Signal Cartridges.

Figure 3-2 Mk 4 Signal Cartridge Full View

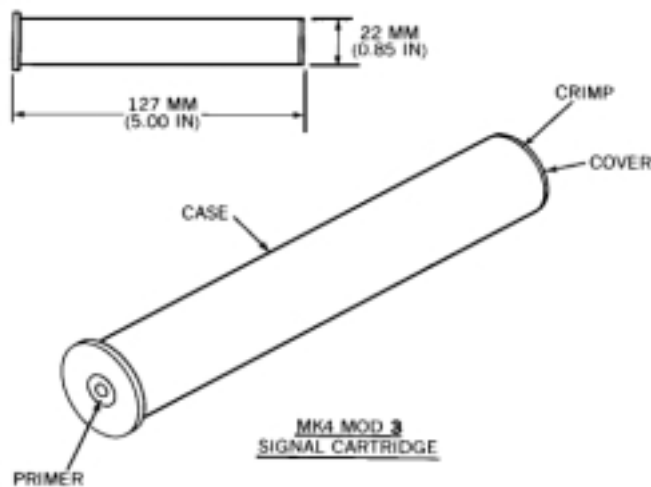


Illustration from ORDATA II Version 1.0

Figure 3-3 Mk 4 Signal Cartridge Cutaway

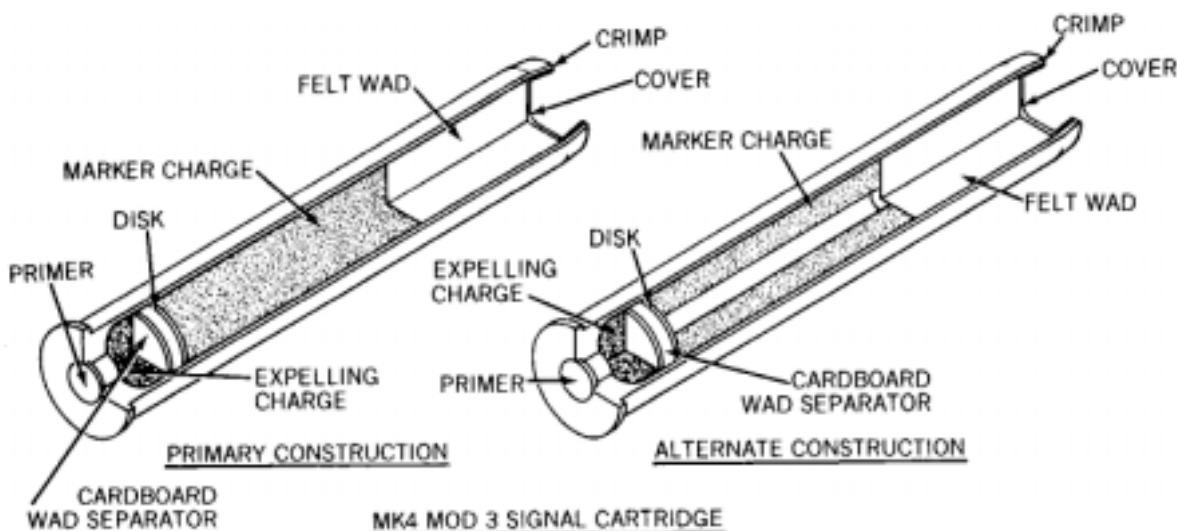


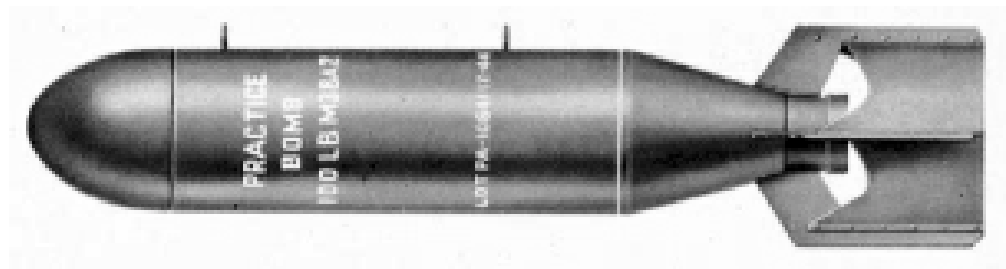
Illustration from ORDATA II Version 1.0

3.3.1.1.2 The MK 5 Dye Marker is a non-hazardous fluorescent dye marker without explosives.

3.3.2 M38A2 Practice Bomb (100 lb), Features and Hazards

The body of the M38A2 bomb was thin, rolled, and lap welded sheet metal. FIGURE 3-4 provides an illustration of the item. While the M1A1 and M3 Spotting Charge are almost identical, the M3 is slightly longer than the M1A1.

FIGURE 3-4 M38A2 PRACTICE BOMB



Photograph from ORDATA II Version 1.0

3.3.2.1 M1A1 Spotting Charge. This type of spotting charge fits in the aft end of the 100-pound Practice Bomb M38A2, producing a flash of flame and white smoke for observation of bombing accuracy. When assembled in the bomb, the can of the charge protrudes two to three inches out of the bomb body. The fuze is an integral part of the spotting charge assembly. When the arming wire is pulled, the spring-loaded arming pin jumps out, leaving the inertia weight supported only by the combination firing pin and creep spring. On impact, the inertia weight drives this firing pin into the shotgun-type primer, which, in turn, ignites the black powder. The case is made of metal. According to Major Dallas R. Lynch (US Army Ret.), who conducted the clearance at the Five Points OLF, he knew that the M-38 had a four-pound black powder spotting charge, and said that this was similar to the M-47 in many respects. (See Appendix D, Record of Communication.) Refer to FIGURE 3-5 for an illustration of the M1A1 or M3 Spotting Charge.

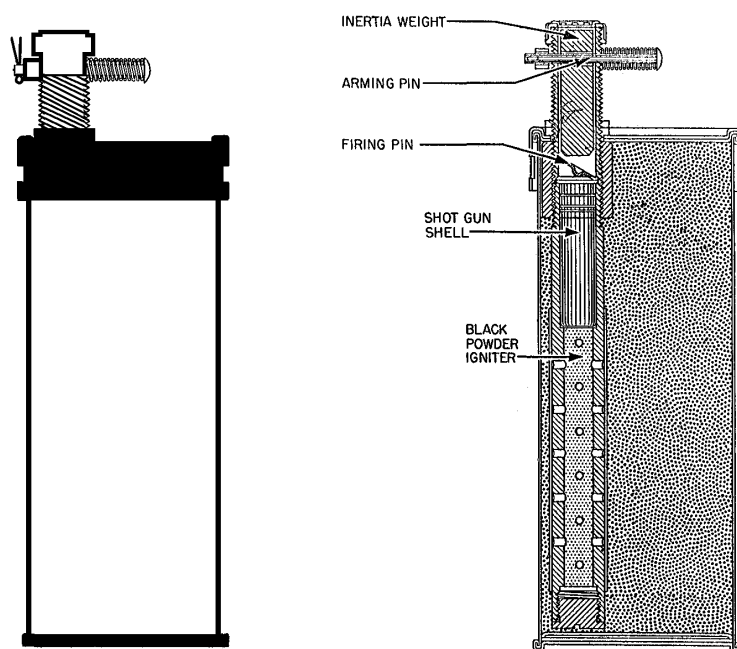


Illustration from ORDATA II Version 1.0

FIGURE 3-5 M1A1/M3 SPOTTING CHARGE

3.3.2.2 M3 Spotting Charge. This type of spotting charge fits in the after end of the 100-pound Practice Bomb M38A2. It also produces a flash of flame and white smoke for observation of bombing accuracy. When assembled in the bomb, the can of the charge protrudes two to three inches out of the bomb body. The Spotting Charge M3 has a 2 1/3-pound dark smoke filling, and a black-powder igniter. Although it is 5/8-inch longer than the Spotting Charge M1A1, it is otherwise similar to the M1A1. The M3, with its dark smoke filler, is well adapted for bombing practice over snow-covered terrain. The black-powder igniter charge contains approximately 425 grains. The fuse is an integral part of the spotting charge assembly. When the arming wire is pulled, the spring-loaded arming pin jumps out, leaving the inertia weight supported only by the combination firing pin and creep spring. On impact, the inertia weight drives this firing pin into the shotgun-type primer, which, in turn, ignites the black powder. The case is made of metal.

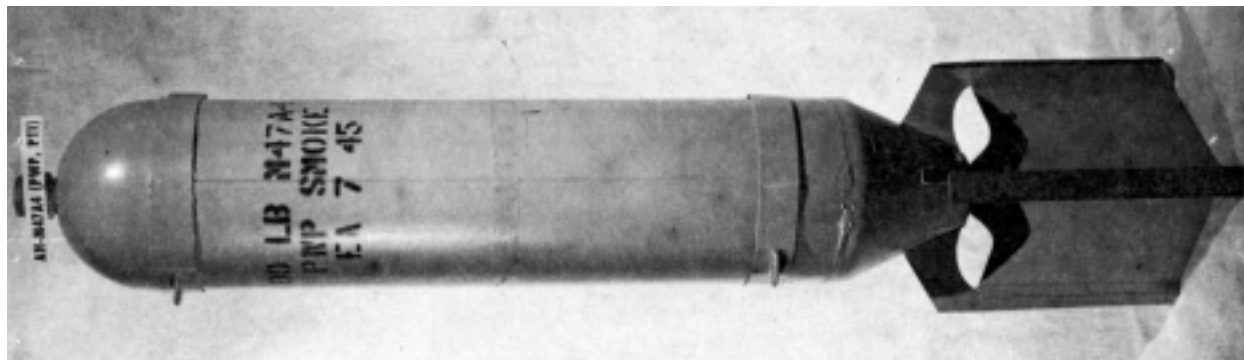
3.3.2.3 M5 Spotting Charge. The Spotting Charge M5 consists of a glass bottle filled with FS smoke mixture. An ordinary bottle cap seals the mixture. The bottle is held to the Practice Bomb M38A2 by a wire twisted around the neck of the bottle and attached to the tail vanes. The charge assembly is made of glass and weighs 2.54 pounds. FS consists of sulfur trioxide (SO_3) in chlorosulfonic acid (ClSO_3H). The standard solution of FS consists of approximately 55% sulfur trioxide dissolved in 45% chlorosulfonic acid, by weight (ClSO_3H).

3.3.3 M47 Series Bomb, Features and Hazards

3.3.3.1 The body of the M47 bomb (see FIGURE 3-6) was a thin 1/32-inch rolled and lap welded sheet metal. The M47A1 was essentially the same but 1/16-inch sheet metal was used, and the

inside of the bomb was coated to prevent corrosion and leaks. The M47A2 was identical to the M47A1 with the exception that a better inner coating was used for leak prevention. The M47A3 is identical to the M47A2 with minor changes. The M47A4 is used with White Phosphorus (WP) and Plasticized White Phosphorus (PWP) and is the same as the M47A3 with a heavier duty burster and lugs.

FIGURE 3-6 TYPICAL M47 SERIES BOMB



Photograph from ORDATA II Version 1.0

3.3.3.2 The M108, M126, or M159 nose fuze was used in conjunction with various high explosive bursters. While it is unknown which version of the M47 chemical bomb was used at the Five Points OLF, there are no indications that Mustard (H) was used at the site. According to an Army Technical Manual (TM 9-1904), dated March 1944, “*The H filler has been found to leak when loaded into this bomb. At the date of publication, the M47 and M47A1 were not allowed to be loaded.*”

3.3.3.3 According to Major Dallas R. Lynch (US Army Ret.), who conducted the clearance at the Five Points OLF, all the M47 chemical bombs he found were of the blue practice variety. In a 2002 interview conducted by the USACE (see Record of Communication in Appendix D), Major Lynch stated that he found no evidence that any white phosphorus or any other chemical filler was ever used in one of these devices. He noted that the casings would have been OD green had these fillers been used, and the items he found were all blue. By indications that he observed, these devices were filled with water when dropped. Mr. Lynch described the four-foot long central tube which, when filled with water, would burst, splitting the item.

3.4 UPDATE OF ARCHIVES SEARCH REPORT (ASR) FINDINGS

No update to the Final ASR has been issued.

4.0 RISK EVALUATION

This chapter presents and discusses the methodology, approach, and results of the risk evaluation.

4.1 INTRODUCTION

ZAPATAENGINEERING conducted an Ordnance and Explosives Risk Impact Assessment (OERIA) to provide a qualitative risk assessment for Five Points OLF. The assessment involved direct analysis of site conditions and human activities that create OE risk. As explained in the Interim Guidance Document (IGD) 01-01 dated 27 March 2001, the OERIA is used in lieu of a statistically based risk assessment to allow more effective and clear risk communication among stakeholders. The three steps in the OERIA process, as outlined in the IGD, include:

- Establishing base site factors;
- Evaluating the baseline risk assessment; and
- Evaluating potential response action alternatives.

This EE/CA Report is a “desk-top” analysis and as such, no field investigation was performed. The data used to support the following analysis are based on existing information. This information supports the analysis of response alternatives in Chapters 7.0 and 8.0.

4.2 BASE SITE FACTORS

The following sections will discuss the OE factors, site characteristics, and human factors as applicable to the baseline risk.

4.2.1 Ordnance and Explosives Factors

4.2.1.1 Type

The type of ordnance and explosives items anticipated at a site directly relates to the likelihood and severity of potential injury caused by a functioning OE item when encountered by individuals using the site. TABLE 4-1 lists the four levels of risk (highest to lowest) associated with potential ordnance items.

TABLE 4-1 **ORDNANCE TYPE**

CATEGORY	DESCRIPTION
3	OE that may kill an individual if detonated by an individual's activities.
2	OE that may cause major injury to an individual if detonated by an individual's activities.
1	OE that may cause minor injury to an individual if detonated by an individual's activities.
0	Inert OE or scrap. Will cause no injury.

Adapted from USAESCH, 2001

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4.2.1.2 Sensitivity

Understanding the sensitivity of potential OE items is crucial when determining the likelihood that the potential OE item will function as designed when encountered. It is assumed that over

time, unexploded ordnance items may become more unstable, but not necessarily more likely to detonate. TABLE 4-2 lists the four levels of risk (highest to lowest) associated with potential ordnance item sensitivity.

TABLE 4-2 ORDNANCE SENSITIVITY

CATEGORY	OE SENSITIVITY
3	OE that is very sensitive.
2	OE that is less sensitive.
1	OE that may have functioned correctly or is unfuzed but has a residual risk.
0	Inert OE or scrap. Will cause no injury.

Adapted from USAESCH, 2001

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4.2.1.3 Quantity or Density

The relationship between OE item quantity or density and the likelihood that an individual will encounter an OE item is extremely important. The greater the quantity or density of OE items, the more likely an item may be encountered.

4.2.1.4 Depth

The depth of OE items should be considered when determining the risk associated with encountering an OE item. In general, the deeper the OE item, the less likely the item will be encountered.

4.2.2 Site Characteristic Factors

4.2.2.1 Accessibility

Likelihood of site access is an important factor to review when attempting to determine whether individuals might encounter ordnance items. Man-made barriers, terrain, vegetation, or water can limit access. All restrictions must be thoroughly evaluated to determine access level. TABLE 4-3 lists the three levels of risk (highest to lowest) associated with site access.

TABLE 4-3 SITE ACCESSIBILITY

ACCESS LEVEL	ACCESS DESCRIPTION
No Restriction to Site	No man-made barriers; gentle sloping terrain; no vegetation that restricts access; and no water that restricts access.
Limited Restriction to Access	Man-made barriers, vegetation that restricts access, water, snow or ice cover and/or terrain restricts access.
Complete Restriction to Access	All points of site entry are controlled.

Adapted from USAESCH, 2001

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4.2.2.2 Stability

Environmental events, both recurring (i.e., erosion and frost heave) and extreme (i.e., tornados and hurricanes), can change site conditions over time, exposing previously buried ordnance items or burying surface ordnance items. It is important to understand how local environmental events may affect the possibility of an individual encountering an OE item. TABLE 4-4 lists the three levels of risk (lowest to highest) associated with site stability.

TABLE 4-4 SITE STABILITY

Stability Level	STABILITY DESCRIPTION
Site Stable	OE should not be exposed by natural events.
Moderately Stable Site	OE may be exposed by natural events.
Site Unstable	OE most likely will be exposed by natural events.

Adapted from USAESCH, 2001

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4.2.3 Human Factors

4.2.3.1 Activities

4.2.3.1.1 Potential activities conducted at a site and the depth to which the activities are conducted have a great influence on whether or not an individual might encounter an OE item. Site use can vary between low impact uses such as cattle grazing, or high impact uses such as heavy construction. TABLE 4-5 lists the three levels of risk (lowest to highest) associated with site activities and the associated level of potential impact (contact).

4.2.3.1.2 The levels “Low,” “Moderate,” and “Significant” criteria in TABLE 4-5 refer to the probability that performing an activity may result in an individual encountering OE. The relative likelihood for different activities in TABLE 4-5 is associated generally with the depth of intrusive actions caused by given activities compared to the actual depth at which OE is found at the site. Because practice bombs have been found on the ground surface, any surface activity is considered “Significant.”

TABLE 4-5 SITE ACTIVITY

EXAMPLES OF ACTIVITIES	ACTUAL DEPTH OF OE	CONTACT LEVEL
Non-intrusive, recreational: Child Play, Short Cuts, Hiking, and Jogging	0-6"	Significant
	6"-12"	Low
	>12"	Low
Intrusive Recreational: Child Play, Picnicking, Biking, Metal Detecting, Gardening, and Landscaping	0-6"	Significant
	6"-12"	Significant
	>12"	Moderate
Intrusive Occupational: Construction, Maintenance and Landscaping	0-6"	Significant
	6"-12"	Significant
	>12"	Significant

Adapted from USAESCH, 2001

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4.2.3.2 Population

The number of people using the site and the frequency of use are important factors to consider when determining risk associated with OE encounters. The fewer people using the site and the less frequently a site is used, the less dangerous the site is to the public.

4.3 BASELINE RISK ASSESSMENT

4.3.1 Ordnance and Explosives Factors

4.3.1.1 OE Type – Category 3, OE that will kill an individual if detonated

Based on the Final ASR results, the Five Points OLF is found to contain Mk 23 Navy practice bombs and may contain M38A2 practice bombs and a practice version of the M47-series chemical bomb. According to Major Dallas R. Lynch (US Army Ret.) who conducted clearance of the Five Points OLF, all the M47 chemical bombs he found were of the blue practice variety. Major Lynch found no evidence that any white phosphorus or any other chemical filler was ever used in one of these devices. He noted that the casings would have been OD green had these fillers been used, and the items he found were all blue. All the indications he observed was that these devices were filled with water when dropped. Mr. Lynch described the four-foot long central tube which, when filled with water, would burst, splitting the item. He knew that the M-38 had a four-pound black powder spotting charge, and said that this was similar to the M-47 in many respects. Records since the close of Five Points OLF document only Mk 23 practice bombs located on site (more than 3,000).

- The Mk 23 and M38A2 can cause major injuries to an individual if detonated.
- The M47 with fuse and burster can kill an individual if detonated by an individual's activities.

4.3.1.2 Sensitivity – Category 3, OE that is very sensitive

Remnants of Mk 23 3-lb. and M38A2 100-lb. practice bombs have been found on site. Before use, these bombs contained a black powder expelling charge and a signaling mixture. It is not known whether all OE items found on-site had functioned as designed. Black powder is sensitive and retains its sensitivity over time. The likelihood that any possible remaining bombs would function if encountered, but left undisturbed, is small. However, unstable black powder could detonate when exposed to heat, shock, or friction.

- The Mk 23 Mod 0 and M38A2 are considered Category 2 – OE that is less sensitive
- The M47 is considered Category 3 – OE that is very sensitive. This is due to the fuze that may be installed.

4.3.1.3 Quantity or Density –Not Quantified

USAESCH personnel visited the site in 1998 to address concerns relating to the (then) remaining 127 acres of the former bombing range. The acreage at the time was undeveloped with mesquite trees, tall weeds, and grass. The District conducted a visual and a magnetometer survey of the area without intrusive operations. Metal surface scrap was found but not determined to be OE. Numerous subsurface anomalies were detected, the majority of which were near the former location of the bombing range target center. A decreasing number of anomalies were reported as the team moved away from target center. It was concluded that a potential still exists for subsurface practice bombs (USACE, 1998).

4.3.1.4 Depth –Not Quantified

Residents report locating Mk 23 practice bombs on or near the surface, usually after rain. Most of the site has been developed, and the earth has been disturbed to depths of two to three feet and more in some areas. Although OE depths are unknown and cannot be predicted absent geophysical surveying, based on the history of the site, there is a reasonable expectation that OE will be found there.

4.3.2 Site Characteristic Factors

4.3.2.1 Site Accessibility – No Restriction to Site

Most of the site is developed residential property with no man-made barriers. The terrain is gently sloping with no vegetation or water to restrict access.

4.3.2.2 Site Stability

The bulk of the site is comprised of developed residential lots with lawns that serve to stabilize the soil. A portion of the site, however, is still under development and the earth is exposed. The soils are subject to the shrinking and swelling, which may cause buried solid objects such as OE to migrate to shallower depths.

4.3.3 Human Factors

4.3.3.1 Site Activity

4.3.3.1.1 Five Points OLF is primarily a single-family residential area with an undeveloped recreational park to the south, and a small, light-commercial area set aside for future development. The area is generally flat, with roadbeds cut below the pre-existing grade. The resulting fill material was used to elevate lots for drainage enhancement.

4.3.3.1.2 The types of recreational activities that may place the public at risk are:

- Children playing;
- Gardening;
- Landscaping;
- Picnicking;
- Metal Detecting; and
- Short Cuts.

4.3.3.1.3 In addition to recreational usage, several occupational activities are likely. The following scenarios are known, or considered plausible:

- Construction;
- Maintenance of utilities and foundations; and
- Landscaping.

4.3.3.1.4 In general, land disturbance has, and continues to occur at the site in association with new construction. As a result of this extensive surface and subsurface disturbance throughout the area, the potential for encountering OE on the site is high.

4.3.3.2 Population

4.3.3.2.1 A conservative estimate of the number of individuals within the Five Points OLF community is 1,400 people per day. This figure includes those living in or entering the community, many of whom are children. The estimated number of people was derived from the number of homes currently on site multiplied by the average number of people per home based on the 2000 census. This number is likely to increase as more homes are completed, commercial businesses are opened, and the public park is improved.

4.3.3.2.2 Construction activities will continue at the site regardless of the time of year. Conservatively, 20 workers per day are assumed to engage in on-site construction activities.

4.4 RESPONSE ALTERNATIVES ASSESSMENT

4.4.1 Overview

In this section, response alternatives are introduced and briefly evaluated with respect to the requisite criteria. Available alternatives to address OE occurrence may be categorized as non-removal and removal alternatives. Non-removal alternatives include no DOD action indicated (NDAI) and implementation of institutional controls. Removal alternatives include comprehensive surface clearance and clearance to detectable depth (surface and subsurface) for intended land use. ZAPATAENGINEERING has identified several risk-reduction alternatives for discussion in this report, based on the nature, extent, and analysis of OE occurrence, intended land uses, and, ultimately, risk-reduction goals.

4.4.2 No DOD Action Indicated (NDAI)

4.4.2.1 This no-action alternative is included to provide a baseline comparison with other risk-reduction alternatives. No technology is associated with this alternative. No risk-reduction measure resulting in the treatment, containment, removal of or limited exposure to OE will be implemented. Therefore, potential OE will not be removed and no restriction will be placed on access to the site. The No DOD Action Indicated alternative is appropriate for sites where no OE has been found, where there is no documented evidence of OE usage, or where the nature and extent of the OE occurrence (e.g., small-arms ammunition) poses minimal threat to those who may encounter it.

4.4.3 Institutional Controls (IC)

4.4.3.1 Institutional controls utilize education and land-use restrictions to minimize exposure of site users to OE. Institutional controls rely on behavior modification and site-access control strategies to eliminate or minimize risk. Institutional-control strategies, including education and/or physical site-access controls, are appropriate where risk to the public has been documented as low and can be managed without the removal of OE. With the exception of digging for sign and/or fencepost installation, intrusive activity is not typically associated with this alternative. Such controls can be implemented with low capital cost and low subsequent annual operating costs.

4.4.4 Comprehensive Surface Clearance with Institutional Controls

4.4.4.1 Complete surface clearance with institutional controls involves utilizing UXO technicians, who are trained to recognize, handle, and dispose of ordnance, to perform a visual inspection of the entire surface of the site and to remove OE from the ground surface, in combination with education and land-use restrictions. The UXO technicians are responsible to ensure proper disposal of the recovered material. This alternative is effective in minimizing the risk of incidental contact with OE in areas where non-intrusive activities are not likely. Initial capital costs are expected to be moderate and subsequent annual operating costs are expected to be low.

4.4.5 Clearance to Detectable Depth with Institutional Controls

4.4.5.1 This alternative involves all activities necessary to fully locate, excavate and remove OE to a depth conducive with the expected land use, public access, and overall health and safety of the affected community, as dictated by the depth of OE detection that is technically feasible at the time of removal. Activities may potentially include limited vegetation clearance as necessary to conduct geophysical surveys, completion of geophysical investigations, excavation of anomalies, and destruction of OE. Technologies that may be used for this alternative include magnetic and/or electromagnetic geophysical investigative methods and management/disposal of OE (including detonation of UXO). This alternative includes surface clearance over the entire site and excavation and clearance in suspected impact areas.

4.4.5.2 Because of the densely populated nature of the project area and the history of OE finds in the associated neighborhood, this alternative will require evacuation of all residences and businesses within the exclusion zone during working hours. Road closures and evacuation of local residents will occur in areas falling within the minimum separation distance (MSD) for the Most Probable Munition (MPM), which is an Mk23 Mod 01 practice bomb. Initial capital costs are expected to be high, but subsequent annual operating costs would be minimal. This alternative is most effective in minimizing the risk of incidental contact with OE.

4.4.6 Evaluation

4.4.6.1 Each response action alternative is assigned an impact evaluation score using an alphabetical rank from “A” to “D”, with “A” representing the relative impact of the response action alternative having the highest relative impact. The comparisons, Table 4-6, provide a qualitative indication of the change in the potential for harm and level of protectiveness at the site for each response action alternative that could be implemented and is independent of costs associated with each alternative.

4.4.6.2 Based on the OERIA, the Clearance to Detectable Depth in Limited Areas response action alternative would likely provide the largest risk-reduction impact, followed by (in order from most risk-reduction capability to least risk-reduction capability) Comprehensive Surface Clearance with Institutional Controls, Surface Clearance in Limited Areas with Institutional Controls, Institutional Controls, and No DOD Action Indicated.

TABLE 4-6 OE RISK IMPACT ASSESSMENT FOR FIVE POINTS OLF

ALTERNATIVES	ORDNANCE AND EXPLOSIVES FACTORS				SITE CHARACTERISTICS		HUMAN FACTORS		RANK
	TYPE	SENSITIVITY	DENSITY	DEPTH	ACCESS TO OE	STABILITY	ACTIVITY	POPULATION	
Baseline Risk Assessment (Existing Conditions)	Category 0 (scrap) to Category 3 (M47 practice bomb)	Category 0 (inert) to Category 3 (very sensitive blow in place)	Unknown	Unknown	Unrestricted	Unstable (new construction areas) to Stable (lawns)	Significant (OE at ground surface and known human activities)	<1400 day	
No DOD Action Indicated	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
Institutional Controls	No Impact	No Impact	No Impact	No Impact	D	D	C	C	D
OE Surface Clearance with Institutional Controls	No Impact	No Impact	B	B	B	B	B	B	B
OE Subsurface Clearance with Institutional Controls	A	A	A	A	A	A	A	A	A

The analysis presented in this table considers each response alternative with respect to each OE factor. The evaluation either determines “no impact”, or ranks an alternative using a scale that ranges from “A” (most effective) to “D” (least effective). Ranges of scores for each variable are used to describe baseline risk. Additional information about each score and the rationale behind each score is presented in paragraph 4.2 through 4.5. BGS = Below Ground Surface.

5.0 INSTITUTIONAL ANALYSIS

This chapter demonstrates what opportunities exist to implement an institutional control program at a specific site. The institutional analysis also identifies any local, state, federal, or private agencies available to assist in the implementation or maintenance of the Institutional Controls program. This information supports the development of institutional control options for the alternatives addressed in Chapter 7.0.

5.1 INTRODUCTION

Institutional controls are a component of OE removal actions intended to mitigate or reduce potential residual risk remaining in lieu of or in addition to OE removal actions. Institutional controls include legal mechanisms, physical controls, and educational programs.

5.1.1 Legal Mechanisms

Legal mechanisms to implement institutional controls include restrictive covenants, negative easements, equitable servitude, and deed notices. Administrative mechanisms are related to legal mechanisms and include notices, adopted local land use plans and ordinances, construction permitting, or other land use management systems that ensure compliance with use restrictions.

5.1.2 Physical Controls

Physical controls include fences, barriers and signs. Fences and barriers reduce, limit, or restrict access and possible exposure to OE, while signs alert individuals to the former use and attendant dangers at the site.

5.1.3 Education and Notification Programs

Educational and notification programs are designed normally as an integral part of the institutional controls. Educational programs are intended to inform the public about the controls, how to identify hazards, and what to do if hazards are discovered.

5.2 INSTITUTIONAL SUMMARIES

5.2.1 Background

Basic information is needed to determine the jurisdiction, authority, mission, capability, and desire of institutions (i.e., government and private agencies) to implement, maintain, monitor, and enforce institutional controls. The following discussion presents the major elements needed to analyze the institutions needed to implement, maintain, monitor, and enforce institutional controls at the Five Points OLF. The first major element considered in the analysis is the jurisdiction, or territorial range of authority, of the institution.

5.2.2 Agency Authority

The second major element is the authority of the agencies with jurisdiction. The following questions are considered in determining authority (USACE, 2000b):

- What are the limits of the agency's authority?
- What is the origin of the agency's authority?
- How much control is exercised by the agency?
- Does the agency have enforcement authority?

5.2.3 Agency Mission

The third major element of the analysis of institutions is determining if, and how, the mission of the agency applies to institutional controls. The specific mission of the agency is critical to its ability to implement, enforce, or maintain an institutional control program. The two most critical missions for institutional controls are public safety and land use control. If USACE identifies agencies with these missions, there is reasonable potential that a cooperative institutional control program can be implemented.

5.2.4 Geographic Jurisdiction

The geographic jurisdiction refers to the area within the site that an institution has legal authority, or jurisdiction, based on political boundaries or ownership.

5.2.5 Local Institution Participation

Support and action by local institutions are critical; therefore, federal institutions must encourage local agencies to participate. If local officials are convinced that participation in an institutional control program is in their best interests, USACE will have little difficulty in obtaining participation. Resources in the form of funding for the agency's implementation costs can overcome the initial hesitancy of an organization to become involved.

5.2.6 Ability to Partner With Other Agencies

The ability of an organization to work within existing or potential relationships with other government agencies can influence its effectiveness in implementing institutional controls.

5.2.7 Agency Implementation

Finally, an institution cannot be an effective member of an institutional control program if the organization does not have the capability or desire to implement the program. Funding augmentation will be needed to enhance the capability of some local institutions.

5.3 SELECTION OF INSTITUTIONS

ZAPATAENGINEERING selected institutions for consideration without imposition of limits or bias. The selection process reflected inclusion of landowners, local, county, and state agencies. The following institutions were identified for evaluation:

- US Army Corps of Engineers (USACE), see TABLE 5-1
- US Environmental Protection Agency (US EPA), see TABLE 5-2
- Texas Commission on Environmental Quality (TCEQ), see TABLE 5-3
- City of Arlington Parks and Recreation Department, see TABLE 5-4
- City of Arlington Planning and Development Services Department / Building Inspections, see TABLE 5-5
- Mansfield Independent School District (MISD), see TABLE 5-6

TABLE 5-1 USACE INSTITUTIONAL ANALYSIS

Origin of Institution	The US Army Corps of Engineers (USACE) was established in 1775 under the Continental Congress for military and civil works missions.
Basis of Authority	Defense Environmental Restoration Program (DERP) [USC. Section 2701 et seq.] Executive Order 12580
Authority Limits	Implementing response actions for releases of hazardous substances from each facility that is, or was, under the jurisdiction of the US Department of Defense (DOD) in accordance with DERP and consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)
How Much Control is Exercised?	USACE has minimal control relative to implementing, maintaining, monitoring, or enforcing institutional controls on privately owned property
Enforcement Authority	Not related to institutional controls at the Five Points OLF
Sunset Provisions	Not applicable
Geographic Jurisdiction	The Corps is organized geographically into 8 divisions in the US and 41 subordinate districts throughout the US, Asia and Europe. The districts oversee project offices throughout the world. Divisions and districts are defined by watershed boundaries, not by states. The Five Points OLF falls within the jurisdiction of the Fort Worth District of the USACE.
Public Safety Function	Mission statement of OE Mandatory Center of Expertise (MCX) and Design Center: "To safely eliminate or reduce risks from ordnance, explosives and recovered chemical warfare materiel at current or FUDS."
Land Use Controls	Not an agency mission for private property, although they can perform real estate services for the military and civil works activities of the Army and Air Force, and for other federal agencies as requested
Financial Capability	Defense Environmental Restoration Account (DERA) for environmental restoration activities at non-National Priorities List (NPL) sites, such as Five Points OLF. DOD and State Memorandum of Agreement (DSMOA) to fund states in identifying, prioritizing, investigating, and remediating FUDS in their states
Mission	USACE is a major Army command that provides engineering, design, and construction management services to Formerly Used Defense Sites (FUDS)
Desire to Participate in Institutional Control Program	USACE has the resolve to implement institutional controls as evidenced by this Engineering Evaluation/Cost Analysis (EE/CA) and related activities
Constraints to Institutional Effectiveness	Has responsibility, but not local authority, for implementing, maintaining, monitoring, and enforcing institutional controls.

Sources of information: <http://www.usace.army.mil/>, <http://www.hnd.usace.army.mil/oew/index.asp>

Created By: F. Tolen	Reviewed By: C. Walden	Approved By: F. Tolen
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TABLE 5-2 US EPA INSTITUTIONAL ANALYSIS

Origin of Institution	The US Environmental Protection Agency (EPA) was established in 1970 by the White House and Congress to protect human health and the environment.
Basis of Authority	Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) <i>Code of Federal Regulations</i> , Title 40: "Protection of the Environment," Chapter I, Parts 1–799 – Environmental Protection Agency
Authority Limits	Protection of human health and the environment
How Much Control is Exercised?	Control is a function of the Administrative Orders issued
Enforcement Authority	Yes, under four Administrative Orders issued by EPA to the National Guard Bureau and Texas Army National Guard
Sunset Provisions	Not applicable
Geographic Jurisdiction	EPA Region 6 with oversight jurisdiction. Texas State Program Unit in EPA's office leads and supports environmental and human health activities and projects in Texas
Public Safety Function	EPA regulates other federal agencies, state and local governments, and Indian tribes. It develops and enforces regulations to protect human health and the environment under existing environmental laws.
Land Use Controls	Provides regulatory oversight of the cleanup of ordnance and explosives (OE)
Financial Capability	Defense Environmental Restoration Account (DERA) for environmental restoration activities at non-National Priorities List (NPL) sites, such as the Five Points OLF.
Mission	To protect human health and the environment by administering federal laws and regulations
Desire to Participate in Institutional Control Program	The US EPA has delegated its oversight authority to the TCEQ (formerly TNRCC).
Constraints to Institutional Effectiveness	Has responsibility, but not local authority, for implementing, maintaining, monitoring, and enforcing institutional controls at Five Points OLF.

Sources of information: www.epa.gov, www.epa.gov/region1/

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TABLE 5-3 TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) INSTITUTIONAL ANALYSIS

Origin of Institution	State of Texas
Basis of Authority	Texas Administrative Code (30 TAC 350)
Authority Limits	Dictated by individual Rules and Reg Limits under TX Risk Reduction Program (30 TAC, Chapter 335)
How Much Control is Exercised?	State Equivalent of EPA
Enforcement Authority	Administers EPA RCRA/non-RCRA programs in Texas. Enforcement arm can issue binding orders/judgments.
Sunset Provisions	Not applicable
Geographic Jurisdiction	State of Texas
Public Safety Function	N/A. Site Inspectors and Emergency Response capability only.
Land Use Controls	Not applicable
Financial Capability	Yes, funded for project.
Mission	"The Texas Commission on Environmental Quality strives to protect our state's human and natural resources consistent with sustainable economic development. Its goal is clean air, clean water, and the safe management of waste."
Desire to Participate in Institutional Control Program	Participation will be dependant on sample confirmation of OE-related release of Contaminants of Concern.
Ability to Partner With Other Agencies	Participation will be dependant on confirmation of OE-related release of CoCs at site.
Constraints to Institutional Effectiveness	Participation will be dependant on sample confirmation of OE-related release of CoCs.
POC	Michael Nelson (817) 588-5815
Date & Time of Contact	September 12, 2002, 3:00 PM EST

Created By: F. Tolen	Reviewed By: C. Walden	Approved By: F. Tolen
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TABLE 5-4 CITY OF ARLINGTON PARKS AND RECREATION DEPARTMENT INSTITUTIONAL ANALYSIS

Origin of Institution	City of Arlington Departmental Agency
Basis of Authority	City of Arlington
Authority Limits	Within dedicated park properties.
How Much Control is Exercised?	Direction of development and maintenance.
Enforcement Authority	Very limited law enforcement capabilities within managed areas, with volunteer law enforcement officers. Supplemented by City of Arlington Police Department.
Sunset Provisions	Not Applicable
Geographic Jurisdiction	City of Arlington
Public Safety Function	Very limited law enforcement capabilities within managed areas, with volunteer law enforcement officers. Supplemented by City of Arlington Police Department.
Land Use Controls	Ultimate control over land owned by the City of Arlington and administered by the Parks and Recreation Department. Land use control functions include decisions regarding development efforts within dedicated park properties.
Financial Capability	No.
Mission	"The mission of the Arlington Parks and recreation department is to provide quality facilities and services that are responsive to a diverse community and sustained with a focus on partnerships, innovation, and environmental leadership."
Desire to Participate in Institutional Control Program	Yes.
Ability to Partner With Other Agencies	Yes.
Constraints to Institutional Effectiveness	Influence limited to park property. Actions require approval of Parks and Recreation Board.
POC	John Fain (817) 459-5474
Date & Time of Contact	August 27, 2002, 1:30 PM EST

Created By: F. Tolen	Reviewed By: C. Walden	Approved By: F. Tolen
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TABLE 5-5 CITY OF ARLINGTON BUILDING INSPECTIONS OFFICE INSTITUTIONAL ANALYSIS

Origin of Institution	City of Arlington
Basis of Authority	Planning and Development Services Department
Authority Limits	Zoning revisions, Building Permits and Building Code Enforcement.
How Much Control is Exercised?	Control over existing code regulations.
Enforcement Authority	Yes.
Sunset Provisions	Not applicable
Geographic Jurisdiction	City of Arlington
Public Safety Function	Not applicable
Land Use Controls	Yes, control over issuance of Building Permits within City of Arlington, and enforcement of Zoning and Building Codes.
Financial Capability	No
Mission	<p>The Planning and Development Services Department strives to enhance Arlington's quality of life by guiding its physical, social, and economic development. To this end, the Department will:</p> <ul style="list-style-type: none"> • Ensure an accessible development review process that is fair, efficient, timely, and supportive of adopted City goals; • Conduct a long-range planning process, through comprehensive and special area plans to build a sound strategic framework for Arlington's growth and stability; • Acknowledge the diverse interests within the city and through the use of broad public input and community partnerships, seek to build consensus and balance competing demands; • Provide accurate, relevant information and analysis needed to guide decision-making of the public and private sectors; • Foster continued economic vitality, revitalization and efficient infill development by coordinating use of the City's economic development tools; • Provide education and outreach to our citizens through varied media including the Internet; and • Maintain an outstanding planning staff through aggressive professional development and effective teamwork that stresses accountability and meaningful contributions.
Desire to Participate in Institutional Control Program	The department is supportive of proposed institutional controls, and would be willing to include Fact Sheets with Building Permit Materials, if funding were available.
Ability to Partner With Other Agencies	Yes, all public agencies.
Constraints to Institutional Effectiveness	Participation would require approval of printed materials by City of Arlington Legal Department.
POC	<p>George Patterson, Asst. Dir. Planning and Development Services/ Building Inspections (817) 459-6501 101 West Abram Street City Hall, 2nd Floor Arlington, TX 76010</p>
Date & Time of Contact	August 27, 2002, 1:30 PM EST

Created By: F. Tolen	Reviewed By: C. Walden	Approved By: F. Tolen
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TABLE 5-6 MANSFIELD INDEPENDENT SCHOOL DISTRICT (MISD) INSTITUTIONAL ANALYSIS

Origin of Institution	State of Texas Education Agency
Basis of Authority	Texas Education Code. The MISD operates a system of public schools in southeast Tarrant County, Texas. An elected school board directs the MISD.
Authority Limits	Within school district.
How Much Control is Exercised?	Not applicable.
Enforcement Authority?	Not applicable.
Sunset Provisions	Not applicable.
Geographic Jurisdiction	Within school district.
Public Safety Function	Limited to dissemination of materials.
Land Use Controls	Limited to its own facilities.
Financial Capability	No.
Mission	The District will provide all students an equal opportunity to fulfill their potential through an instructional program of the highest quality that maintains accountability for demonstrated results and continuous improvement. In achieving its mission, the District will use sound, cost-effective financial management and solicit maximum community communication and participation.
Desire to Participate in Institutional Control Program	The MISD is supportive of proposed institutional controls, and would be willing to make educational and informational materials available in the schools.
Ability to Partner With Other Agencies	Yes, all public agencies.
Constraints to Institutional Effectiveness	Participation would require prior approval of individual printed materials by the MISD Curriculum Office.
POC	Dr. Charles Cunningham, Asst. Superintendent of Curriculum and Instruction (817) 473-5600/5787 605 East Broad Street Mansfield, TX 76063-1794
Date & Time of Contact	September 5, 2002, 10:40 AM EST

Created By: F. Tolen	Reviewed By: C. Walden	Approved By: F. Tolen
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5.4 INSTITUTIONAL CONTROL ALTERNATIVES SELECTION

5.4.1 Purpose of Study

5.4.1.1 Institutional Control Goals

5.4.1.1.1 The goal for Five Points OLF is to reduce and/or remove the OE that creates an imminent and substantial endangerment to the human health and environment.

5.4.1.1.2 The institutional control goal is to augment the effectiveness of removal actions by preventing accidental exposure to OE or any related hazards that might remain following OE removal actions.

5.4.1.2 Institutional Control Objectives

Institutional control objectives defined for this site include:

5.4.1.2.1 Notify people, who plan to disturb the surface of the land or conduct excavation activities, of the potential presence of residual OE before any disturbance occurs.

5.4.1.2.2 Discourage inappropriate subsurface excavation.

5.4.1.2.3 Discourage any change in land use until the current owner/operator or other person using the land is informed adequately of the potential presence of OE.

5.4.1.2.4 Ensure occupational and public safety and environmental integrity by providing an acceptable contingency plan in the event that residual ordnance is discovered. The contingency plan should ensure that proper OE clearance procedures are followed and the USACE will assist with appropriate expertise.

5.4.1.2.5 Develop a mutually acceptable Memorandum of Agreement (MOA) between federal government and entities with the responsibility, resolve, and authority to ensure that the institutional controls are implemented, maintained, monitored, and enforced.

5.4.2 Methodologies

5.4.2.1 Institutional Control Strategies

5.4.2.1.1 When deciding which institutional controls to implement, a few practices can be implemented to ensure effectiveness. One practice that can greatly enhance the endurance and effectiveness of institutional controls is that of layering, or using different types of institutional controls rather than just a single control. This concept will be integrated into institutional controls at Five Points OLF to the degree that layering is feasible.

5.4.2.1.2 The federal government is responsible for the institutional controls, as it is responsible for addressing the OE. Therefore, either USACE or US EPA must ensure that institutional controls are effective for the time that the risk of OE exposure remains at the Five Points OLF. To that end, if USACE or US EPA does not have the authority, they will enter into MOAs with whichever entities have the authority for establishing, implementing, maintaining, monitoring, and enforcing institutional controls.

5.4.2.1.3 The TCEQ is a state authority implementing, monitoring, and enforcing institutional controls with regard to any confirmed release of OE-related Contaminants of Concern. In the event that a release of Chemicals of Concern related to OE is confirmed, the TCEQ will provide

regulatory oversight and any potential ensuing removal actions. Depending upon the nature of the controls that are actually implemented, the TCEQ could have a significant role.

5.4.2.1.4 When deciding whether to use institutional controls as a component of a response, and which institutional controls to use, three basic factors are important to consider:

- Type of institutional control to be used;
- Existence of an authority to implement the institutional control; and
- Appropriate entity's resolve and ability to implement the institutional control.

5.4.2.1.5 In addition to these considerations, when responses are performed to be consistent with CERCLA, responses should consider the following nine criteria as part of the remedial alternative selection process:

- Overall protection of human health and the environment;
- Compliance with applicable legal requirements;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, and volume;
- Short-term effectiveness;
- Implementability;
- Cost;
- Regulatory acceptance; and
- Stakeholder acceptance.

5.4.2.1.6 Each alternative in the detailed analysis of Chapter 7.0 is evaluated against these criteria. The most important criteria for institutional controls at Five Points OLF are overall protection of human health and the environment, long-term effectiveness and permanence, short-term effectiveness, and implementability. However, with institutional controls, state and community acceptance are significant components of the overall feasibility of the alternative. These latter evaluation criteria are evaluated formally following the public comment and review period.

5.4.2.2 Stakeholder Involvement and Selecting Institutional Controls

5.4.2.2.1 USACE intends to drive cleanups to completion with remedies that have regulator concurrence and public acceptance. Stakeholder involvement is needed to achieve these goals. The *National Policy Dialogue on Military Munitions, Final Report* (Keystone Center, 2000) describes communication and stakeholder involvement in munitions decision-making as "...the right thing to do...the smart thing to do...the fiscally responsible thing to do..." The report lists six basic steps, referred to as the "6 I's" to assist stakeholder involvement:

- Identify potential stakeholders;
- Invite stakeholders to participate;

- Inform stakeholders of potential actions and decisions;
- Involve stakeholder input in decision-making;
- Incorporate stakeholder concerns in decision-making; and
- Implement decisions that incorporate stakeholder concerns.

5.4.2.2.2 Five Points OLF is a FUDS administered by the Department of the Army. FUDS establishes public participation requirements that must be observed when deciding components of environmental response actions at the site. In addition, it is not possible to implement proprietary controls without current landowner consent, cooperation, and action. Furthermore, other entities with the responsibility, authority, and resolve must ensure that effective institutional controls are implemented, maintained, monitored, and enforced. For these reasons, public participation is not only required, but is a way of establishing the agreements needed for effective institutional controls.

5.4.3 Institutional Control Options

5.4.3.1 Institutional control actions include any type of physical, legal, or administrative mechanism that restricts the use of, or limits access to, real property to prevent, or reduce, risks to human health and the environment. The evaluation of institutional control options begins with a determination of the existence of any current deed restrictions, or other types of institutional controls placed on Five Points OLF because of some other activity. If such restrictions exist, it will be easier to modify the existing restrictions to address the OE risk than to implement an entirely new institutional control.

5.4.3.2 Individual descriptions of the properties comprising the Five Points OLF site are available for review at the Internet website: <http://app.ci.arlington.tx.us/tax/>. The 1956 GSA Five Points OLF deed did recommend that 17.5 acres of the former range be restricted to surface use only and stated that ordnance may be present anywhere on the property. The deed also contained a statement absolving the US Government of all liability, claims, or suits arising from Navy use of the property” (USACE, 2002a). At this time, however, no OE-related deed restrictions pertaining to individual properties at the site are known to exist.

5.4.3.3 The following sections present legal, administrative, and engineering control options, as well as some educational/notification programs that could augment the effectiveness of these controls. The different types of institutional controls are presented in FIGURE 5-1 and described in the following sections.

5.4.4 Legal Controls

Several legal mechanisms for limiting or restricting access to property are established generally as proprietary controls and governmental controls. Proprietary controls are those established by a private property owner, and governmental controls are those established by local, state, or federal government.

5.4.4.1 Proprietary Controls

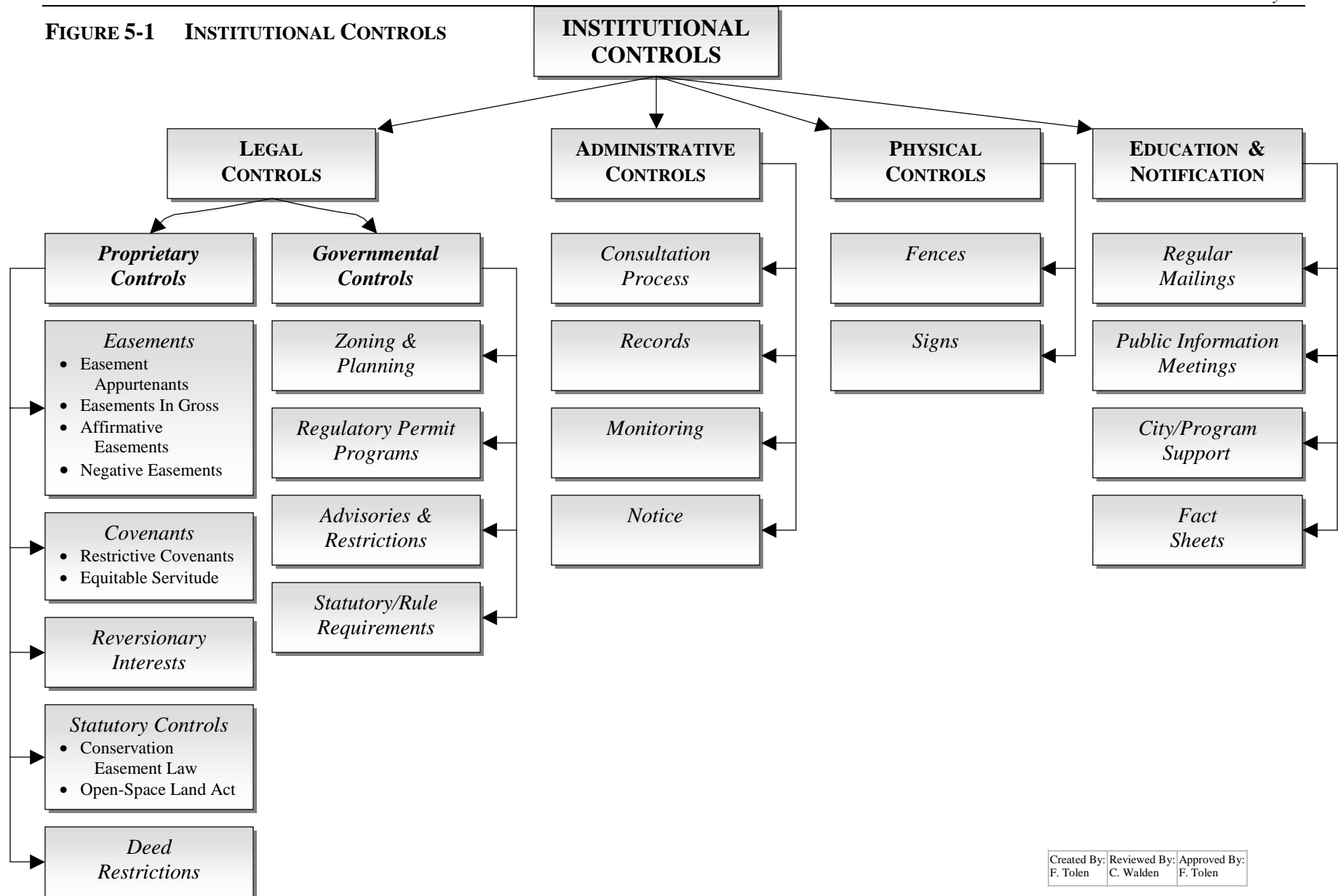
A proprietary control consists of a right or obligation imposed on a piece of land by the owner of the land. The most common types of proprietary controls are easements, covenants, and reversionary interests.

5.4.4.1.1 A proprietary control consists of a right or obligation imposed on a piece of land by the owner of the land. The most common types of proprietary controls are easements, covenants, and reversionary interests.

5.4.4.1.2 Proprietary controls are established usually in the form of a private contractual mechanism contained in a deed or other document transferring the property.

5.4.4.1.3 The only person who can impose an easement, covenant, or reversionary interest on a piece of land is the owner of that land. In order to implement a proprietary control, then, a private landowner must be willing to burden his/her land with the control. In addition, proprietary controls must be implemented in accordance with state law. However, a proprietary control can be implemented without federal, state, or local governmental involvement. The types of proprietary controls listed on Figure 5-1 include easements, covenants, reversionary interests, statutory controls, and deed restrictions.

FIGURE 5-1 INSTITUTIONAL CONTROLS



Created By: F. Tolen	Reviewed By: C. Walden	Approved By: F. Tolen
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5.4.5 Government Controls

5.4.5.1 Institutional controls can be established by federal, state, and local governmental authorities, as well as by private individuals and landowners. State and local governments, in particular, have a legitimate interest in institutional control. Traditionally, governments have carried out this function over lands within their jurisdictions using their police power.

5.4.5.2 Benefits of governmental controls are that these controls can be placed on land without going through the parcel-by-parcel negotiation and recording required with proprietary controls. Other legal constraints on proprietary controls, such as whether the control runs with the land or whether the control can be transferred, are not encountered with governmental controls. Government controls remain effective until repealed.

5.4.5.3 Usually, local or state governments impose governmental controls, so the state or local government must be willing to implement and enforce the controls. The state or local governments also would bear the costs of implementing and enforcing the controls. Other authorization for governmental controls by the federal or state governments can be found in laws and rules authorizing the government to establish institutional controls. Methods for federal, state, and local governments to establish institutional controls are described briefly in the following paragraphs. These methods include zoning and planning, regulatory permit programs, advisories and restrictions, and statutory or rule requirements.

5.4.5.4 Planning and zoning are the most common forms of local institutional control. With this type of institutional control, use restrictions are imposed through the local zoning or land use planning authority. Examples of use restrictions are those that limit access and prohibit disturbance of the remedy. Zoning authority does not exist in every jurisdiction. Zoning is governed by state law but implemented at the local level. There is no federal involvement in zoning. Regulation of building construction is a function of zoning. Building restrictions can be imposed by municipal ordinance or by a program that requires approval or requires acquiring a permit for building.

5.4.5.4.1 Advisories and Restrictions

Often, a state authority or a local authority, such as a municipal health department, will issue an advisory on water and well use. In the case of the Five Points OLF, the City of Arlington Building Inspections Office could provide an advisory on the site, in response to all building permit applications within the project area. The advisory would include a brief history of the Five Points OLF with respect to its former use and the presence of OE at the site and procedures to follow if a suspect item is found.

5.4.5.4.2 Statutory or Rule Requirements

Sometimes a statute will establish a requirement that amounts to an institutional control, such as the five-year review requirement of CERCLA or the deed notice requirements of the RCRA closure rules. Congress passed CERCLA in 1980 to guide EPA's cleanup of releases of hazardous substances. Congress further authorized DOD to use the CERCLA process to conduct those cleanups for which it is responsible.

5.4.5.4.2.1 Resource Conservation and Recovery Act—Portions of RCRA could be considered an applicable or relevant and appropriate requirement (ARAR).

5.4.6 Administrative Controls

Administrative activities include the following elements:

5.4.6.1 Consultation Process Among Local Governments or Between Government Agencies

An example of this control includes establishing agreements that 911 operators notify USACE, or one of several alternative local Explosive Ordnance Disposal (EOD) support units, when called upon to address OE encounters at Five Points OLF.

5.4.6.2 Records

This administrative activity refers to maintaining legal records related to implementation of proprietary controls and other project-related information in centrally accessible repositories, such as a library or Geographic Information System (GIS).

5.4.6.3 Notice

Notice can take many different forms, such as including a statement describing the nature of the hazards and removals that occurred at the site in the property deed. These notices could include proprietary controls already discussed earlier.

5.4.7 Physical Controls

5.4.7.1 Fences and signs can reduce the potential for contact with OE by limiting access to the property and by alerting individuals to a site's former use and potential dangers. However, the Five Points OLF is now mostly residential and it is not possible to fence in the site. The Bowman Branch Linear Park, located at the south end of the site, is considered a good location for signs alerting the public to the history of the Five Points OLF with respect to its former use and the presence of OE at the site. If signs were placed in the park or around as yet undeveloped areas, maintenance and monitoring would be needed.

5.4.8 Education and Notification Programs

5.4.8.1 Educational and notification programs are designed to be an integral component of engineering, access, and institutional controls. These programs are intended to inform people about the institutional controls, how to identify hazards that might remain at the site, and what to do if hazards are discovered. Therefore, educational and notification programs at Five Points OLF will include ensuring that land users are aware of the steps to take once OE is encountered, as well as steps to take during routine activities to minimize the chance of having an accident. These could include the following activities:

5.4.9 Regular Mailings

A notification pamphlet can be published and distributed on a regular basis to owners/occupants of affected properties until OE removals are complete.

5.4.9.1 Response to Inquiries

The Fort Worth District Public Affairs Office will serve as the contact point for direct calls from citizens seeking information on the project. The Fort Worth District Public Affairs Office, working in conjunction with the District Project Manager, and with assistance from the US Army Engineering and Support Center, Huntsville, Public Affairs Office, will be responsible for coordinating and directing responses to community inquiries.

5.4.9.2 Special Briefings

When deemed appropriate by the CESWF Public Affairs Office, special project briefings will be given by the Corps of Engineers to local officials to review the project goals and accomplishments. Such meetings may be held at a local public meeting site at a time mutually acceptable to the Corps of Engineers representatives and local officials. If more practicable, the Corps may provide a briefing at Mansfield High School, employing a “town meeting” style gathering. These briefings, which provide an informational pool for elected leaders to answer constituent inquiries, will be coordinated through the Fort Worth District Public Affairs Office, with technical support provided by the US Army Engineering and Support Center, Huntsville, as needed.

5.4.9.3 Public Information Meetings

Public information meetings can be held to educate the public about the dangers of the OE that is potentially present at Five Points OLF.

5.4.9.4 Age-Appropriate Material for Youth

Several local public schools serving the Five Points OLF attendance area are located in proximity to the site. One of the best ways to disseminate information about a project like Five Points OLF is through direct presentation to elementary, middle and high school groups. A number of options exist for packaging this information, depending on the age of the target audience. Materials such as coloring books for elementary-age students, puzzles and magnets for middle school students, and fact sheets for older students all have worked well with similar projects in establishing an awareness of OE safety, and the project specifics.

5.4.9.4.1 Posters

A key element in reaching out to middle and high school-age children is a graphic presentation of the dangers inherent in OE. Posters will be developed to present an understandable history of the site near the school (Five Points OLF), keys to recognizing OE, and important steps to be taken in the event OE is encountered. This type of visual can supplement a classroom visit by USACE personnel, and remain on display throughout the school year providing a constant reminder of the former use of the neighborhood, and the real danger posed by OE.

5.4.9.5 City/Program Participation

Broadcast radio public service announcements and published newspaper ads and articles will be used to inform the entire community several times a year about Restoration Advisory Board (RAB) meetings, or other public events, and about work progress.

5.4.9.6 Fact Sheets and Brochures

5.4.9.6.1 Contractor Fact Sheet

As the project site is under development, a Contractor Fact Sheet was developed for distribution through the City of Arlington Building Inspections Office (817-275-3271). This fact sheet provides a brief site history and procedures to follow if a suspect item is found. Concurrence must be received from the City Building Inspections Office prior to distribution of the Fact Sheet.

5.4.9.6.2 Homeowner Fact Sheet

The project site is being developed as a residential neighborhood. As current and future occupants of the community improve landscaping, install irrigation systems, or perform other site activities involving excavation below ground surface, they might unknowingly expose

themselves to OE-related hazards. It is imperative that prior to such activities, each homeowner has an awareness of the former use of the Five Points OLF site, the potential safety hazards associated with OE possibly located on-site, and the recognition and reporting of suspected OE. Informational Fact Sheets describing the former use as a defense training site and a discussion of Ordnance Awareness and Safety

5.5 SELECTED INSTITUTIONAL CONTROL ALTERNATIVES

5.5.1.1 Institutional control alternatives for Five Points OLF will include informational signs, augmented by education and notification programs. These institutional controls are intended to prevent or reduce risk to human health and the environment. (See Appendix F, Institutional Control Plan.) Chapter 7.0 includes a detailed analysis of response alternatives, some of which will consist of, or include, institutional controls. This section presents recommendations for institutional control alternatives that will be evaluated in Chapter 7.0 against evaluation criteria of effectiveness, implementability, and cost.

5.5.1.2 Certain agencies will have larger roles and responsibilities than others and will have different authorities in implementing, maintaining, monitoring, and enforcing institutional controls at the Five Points OLF. Roles define the purpose of the organization, responsibilities are those activities for which the organization is held accountable, and authorities are actions the organization can control (e.g., approve/disapprove, issue, arrest). For example, USACE is responsible for implementing effective and enforceable institutional controls, but does not have enforcement authority over most controls, such as zoning. In this example, USACE must rely on the City of Arlington, which is responsible and has the authority to enforce zoning.

5.5.1.3 Normally, institutional controls are implemented at the local level because the federal government does not have the authority to enforce many of them. In addition, responsibilities required for institutional controls, while within the authority of local agencies, are not required of them. Consequently, MOAs will be needed to ensure that effective and enforceable institutional controls are implemented. If services required by the MOAs are already provided for under state or local funding, then the federal government usually is not obligated to fund these services.

5.5.1.4 A description of the roles, responsibilities, and authorities that each organization will have in implementing, maintaining, monitoring, and enforcing institutional controls at Five Points OLF is provided in TABLES 5-1 through 5-6. Each of these organizations would have a role in institutional control alternatives that might be implemented. Legal Controls will be limited to advisories only, because of the absence of existing mechanisms for Proprietary Controls, and the difficulty in establishing Governmental Controls over private property.

5.5.1.5 A combination of signage, educational materials and public notification will be implemented as the institutional control option. Chapter 7.0, Identification and Analysis of Response Action Alternatives, reflects the most viable institutional control alternatives given the site conditions and hazards, institutional framework, and potential stakeholder acceptability. During the alternative identification process, both components of these institutional controls and the alternative in its entirety were considered in terms of their relevance and appropriateness to the response action objectives.

5.6 RESIDUAL RISK

5.6.1.1 The primary type of institutional control would be a combination of signs and educational programs (see FIGURE 5-1). Common concerns throughout the evaluation were the

economic burden of imposing institutional controls on property, including the effect on property value if the property is sold, the aversion to certain controls by stakeholders, and the continuation of institutional controls when the property is subdivided and transferred, or otherwise conveyed, to another party.

5.6.1.2 Any of several combinations of institutional controls could be used to provide adequate notice to protect human health and the environment while USACE is conducting OE removals at known and suspected OE sites.

6.0 IDENTIFICATION OF RESPONSE ACTION OBJECTIVES

This chapter defines the response action objectives that provide the basis for defining and assessing the response action alternatives identified in Chapter 7.0.

6.1 OBJECTIVES

This section describes the response action goal and objectives for minimizing the potential OE threat that exists at Five Points OLF. The response action goal is the reduction and/or mitigation of the potential risk of OE exposure to the public. To meet the DERP objective of “the correction of other environmental damage (such as detection and disposal of unexploded ordnance), which creates an imminent and substantial endangerment to public health or welfare or to the environment,” the following objectives for preliminary risk reduction are listed:

- Minimize the potential public exposure to OE, considering current and potential future land and water use, and technical and administrative feasibility; and
- Remove and dispose of or destroy OE, as necessary, in a safe and effective manner.

These response action objectives should meet acceptable levels of protection, work within statutory limits, and attain ARARs to the extent practicable. Furthermore, the objectives must be effective, implementable, and economical. To support determination that a given response action achieves the desired goal and objectives, the following tasks must be completed for each alternative:

- Determine the nature and extent of OE residual;
- Assess the risks associated with the OE hazards;
- Evaluate the effectiveness of the response action alternative;
- Determine the implementability of the response action alternative;
- Identify the costs associated with implementing the response; and
- Implement action alternative.

6.2 STATUTORY LIMITS

The response action under evaluation in this EE/CA is identified as non-time critical, without statutory limitations on the time required to complete the response action. Although there is no site-specific statutory funding limitation for the response action, the funding for the project is limited by the overall budget available in the DERP for OE sites.

6.3 SCHEDULE

6.3.1.1 The proposed removal action for the Five Points OLF is projected to take place during fiscal year 2003. This projection is subject to change based on stakeholder and regulator review and comment on the recommended response action alternative.

7.0 IDENTIFICATION AND ANALYSIS OF RESPONSE ACTION ALTERNATIVES

This chapter assesses each response action alternative, with reference to the evaluation criteria (effectiveness, implementability, and cost).

7.1 INTRODUCTION

ZAPATAENGINEERING identified four risk-reduction alternatives for assessment, based on the nature, extent, and analysis of OE occurrence, intended future land uses, and ultimately, risk-reduction goals. In this section, each alternative is discussed in detail and evaluated with respect to the requisite evaluation criteria. Available approaches addressing OE occurrence may be categorized as non-removal and removal alternatives. Non-removal alternatives include No DOD Action Indicated (NDAI) and Institutional Controls. Removal alternatives include Comprehensive OE Surface Clearance with Institutional Controls and OE Subsurface Clearance with Institutional Controls.

7.2 ANALYSIS OF ALTERNATIVES

This section provides an analysis of risk-reduction alternatives for areas potentially containing ordnance and explosives. Effectiveness, implementation capability, community acceptance, regulatory and governmental acceptance and cost represent the primary criteria the analysis considers for each alternative. Each criterion is further divided into specific factors for a complete analysis of the alternatives, as discussed in the following paragraphs.

7.2.1 Effectiveness

7.2.1.1 This criterion refers to the ability of an alternative to reduce risk to the public and the environment. The following factors are considered during the effectiveness analysis:

7.2.1.2 Overall Protection to Human Health and the Environment

7.2.1.2.1 This evaluation criterion assesses the effectiveness of an alternative and its ability to meet the objective within the scope of the proposed alternative. It is discussed in terms of protectiveness of human health and the environment.

7.2.1.3 Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

7.2.1.3.1 This evaluation criterion serves as a final check to assess whether each alternative meets all the potential federal and state ARARs as identified in the EE/CA process. ARARs are “those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site” as defined in 40 CFR 300.5.

7.2.1.3.2 Selection of an ARAR is dependent upon the hazardous substances present at the site, site characteristics and location, and action selected for remediation. Chemical-specific ARARs are health- or risk-based concentration limits for specific hazardous substances. Location-specific ARARs address circumstances such as the presence of endangered species on the site or location of the site relative to a 100-year floodplain. Action-specific ARARs control or restrict specific types of actions selected as alternatives for site cleanup.

7.2.1.3.3 No chemical-specific ARARs exist for remediation of sites containing chemical warfare materiel or ordnance and explosives.

7.2.1.4 Long-Term Effectiveness

7.2.1.4.1 This evaluation criterion addresses the effectiveness of an alternative in terms of the risk remaining at the site after the risk-reduction objectives have been met. The magnitude of risk remaining due to untreated waste or treatment residuals following the completion of the alternative and the adequacy and reliability of the controls that are used to manage untreated wastes or residuals remaining at the site are considered for each alternative.

7.2.1.5 Short-Term Effectiveness

7.2.1.5.1 This evaluation criterion addresses the effects of the risk-reduction alternative during implementation, with respect to the effects on human health and the environment following implementation. The potential risk to the community and site visitors, the potential risk to workers implementing the risk-reduction alternatives, the potential for adverse impacts to the environment and the time required to meet risk-reduction alternatives are addressed, as appropriate, for each alternative.

7.2.2 Implementability

7.2.2.1 This criterion refers to the technical and administrative feasibility of implementing the alternative and the availability of materials and services required for implementation. Stakeholder acceptance must be considered during the implementation analysis.

7.2.2.2 Technical Feasibility

7.2.2.2.1 The ability to construct and operate the alternative, the reliability or ability of a technology to meet specified performance goals, the ability to undertake possible future risk-reduction actions and the ability to monitor the effectiveness of the alternative should be considered relative to the practicality of completing the alternative considering physical constraints and the previous use of established technologies.

7.2.2.3 Administrative Feasibility

7.2.2.3.1 This factor evaluates the activities required to coordinate with multiple offices and agencies (e.g., obtaining permits for off-site activities, right-of-way or alignment agreements, compliance with statutory limits) and private property owners.

7.2.2.4 Availability of Services and Materials

7.2.2.4.1 This factor evaluates the availability of technologies (materials and services) required to implement the alternative. The availability and capacity of off-site treatment, storage and disposal, the availability of personnel and technology to implement the alternative, the availability of prospective technologies and the availability of services and materials should be considered.

7.2.3 Community Acceptance

This criterion evaluates the concerns and issues that the homeowners and residents in the Five Points OLF site and the general public may have regarding the alternative. Community acceptance will be a factor in the final selection of the alternative(s) presented in the Action Memorandum.

7.2.3.1 Health and Safety

This factor evaluates the perceived level of protection afforded to residents and the general public by an alternative.

7.2.3.2 Long-Term Benefit

This factor evaluates the likely perception of residents and the general public of the future benefit offered by an alternative.

7.2.4 Regulatory and Governmental Acceptance

This criterion evaluates the concerns and issues that the US Environmental Protection Agency, the TCEQ, and local government agencies may have regarding the alternative. Regulatory/governmental acceptance will be a factor in the final selection of the alternative(s) presented in the Action Memorandum.

7.2.4.1 Long-Term Effort

This factor evaluates the expected future level of regulatory and governmental effort likely to be associated with the alternative.

7.2.4.2 Protection of Human Health and the Environment

This factor evaluates the comparative level of reduced risk to human health and the environment afforded by the alternative.

7.3 ALTERNATIVE 1, NO DOD ACTION INDICATED

The No DOD Action Indicated (NDAI) is included to provide a baseline for comparison of other risk-reduction alternatives. No alternative technology is associated with this alternative, and no risk-reduction measure resulting in the treatment, containment, removal of, or limited exposure to OE will take place. Potential OE will therefore not be removed and no restriction will be placed on access to the site. The NDAI alternative is appropriate for sites where no OE has been found, where there is no documented evidence of OE usage, or where the nature and extent of its occurrence (e.g., small arms ammunition) poses minimal threat to those who may encounter the OE.

7.3.1 Effectiveness

7.3.1.1 Overall Protection to Human Health and the Environment

This alternative implements no risk-reduction action. As the potential OE will remain in place, there will be no reduction of risk to the public from exposure to ordnance.

7.3.1.2 Compliance with ARARs

Because no action will be implemented, no location-specific, action-specific, or chemical-specific ARAR is applicable. No ARAR is identified for ordnance-related activities.

7.3.1.3 Long-Term Effectiveness

With this alternative, OE will remain in place and no long-term change to site conditions will occur. The magnitude of the risk will remain undiminished and will contribute nothing towards future remedial objectives.

7.3.1.4 Short-Term Effectiveness

Implementing the no-action alternative will result in no short-term risk to the surrounding community. No adverse environmental impacts from implementing this alternative will occur.

7.3.2 Implementability

7.3.2.1 Technical Feasibility

This alternative involves no action; therefore, technical feasibility is not applicable.

7.3.2.2 Administrative Feasibility

This alternative involves no action; therefore, administrative feasibility is not applicable.

7.3.2.3 Availability of Services and Materials

This alternative requires no service or material for implementation.

7.3.3 Community Acceptance

7.3.3.1 Health and Safety

The community and the general public may express concerns regarding the no-action alternative because evidence of OE exists at the Five Points OLF, and will remain with this alternative.

7.3.3.2 Long-Term Benefit

The no-action alternative would not offer a benefit, because it does not address OE potentially remaining at the site.

7.3.4 Regulatory and Governmental Acceptance

The need for state or local permits is not anticipated. Likewise, the need for US EPA, TCEQ, and local government concurrence is not anticipated.

7.3.4.1 Long-Term Effort

Because OE will remain in place with this alternative and no long-term change to site conditions would occur, it is likely that this alternative will require a greater level of future effort and oversight by regulatory and governmental agencies.

7.3.4.2 Protection of Human Health and the Environment

This alternative affords no reduction of the risk to human health and the environment, and will contribute nothing towards site remediation.

7.3.5 Cost

There is no cost associated with this alternative.

7.4 ALTERNATIVE 2, INSTITUTIONAL CONTROLS

A combination of signage, educational materials and public notification will be implemented as the institutional control option. Although Institutional Controls addressing physical site access are appropriate where risk to the public has been documented as low and manageable without the removal of OE, such access limitations to the Five Points Site are not feasible, as the site is already developed and removal of OE is a component of the preferred-action alternative. With the exception of digging for signpost installation, no intrusive activity will be associated with this alternative. Eight 7" x 10" custom warning signs will be posted in selected locations throughout the Bowman Branch Linear Park, at the southern boundary of the Five Points OLF. Signage will alert the public to the former use of the area and the possible presence of ordnance

and explosives, discourage intrusive activities within the area, and provide information on the appropriate response if a suspect item is found. In addition, educational and public notification materials will be distributed to the public by means of homeowner and contractor fact sheets, age-appropriate educational materials for youth, and press releases. Appendix F, the Institutional Control Plan, further describes the recommended controls.

7.4.1 Effectiveness

7.4.1.1 Overall Protection to Human Health and the Environment

Institutional Controls will not remove or destroy OE and, therefore, cannot be seen as providing absolute protection to human health and the environment. However, to the extent that the controls are effective, the threat to human health and the environment will be reduced. The level of protection will be greater than provided by Alternative 1, No DOD Action Indicated, because informing the public of the dangers related to ordnance and restricting access into areas containing OE will reduce the likelihood of accidental exposure to OE. However, the OE will remain in place, and, therefore, pose a threat to the environment and a potential risk to the public.

7.4.1.2 Compliance with ARARs

No chemical-specific ARAR is associated with OE. Action-specific ARARs potentially applicable to this alternative include excavation and worker safety.

7.4.1.3 Long-Term Effectiveness

Institutional Controls may influence future construction activities and reduce the possibility of exposure to OE. The opportunity for accidental exposure will increase, if the signs are removed or deteriorated or if persons are allowed to enter the restricted areas. Public education will require follow-up to achieve long-term effectiveness. Signs, as permanent structures, should require minimal maintenance.

7.4.1.4 Short-Term Effectiveness

Safety concerns during the implementation period relate to the potential for worker exposure to OE during sign installation. OE avoidance procedures will be employed and minimal soil excavation will be required to install the signs. There should be no risk to the affected community and no adverse environmental impacts from implementing this alternative.

7.4.2 Implementability

7.4.2.1 Technical Feasibility

The technology associated with implementing this alternative (i.e., sign posting and advertising) is reliable, readily accessible, and easily implemented. It is common and has been used at similar sites. The services of UXO-qualified personnel are not required except to clear sign locations.

7.4.2.2 Administrative Feasibility

Because of the residential nature of most of the site, posting of signs is not considered administratively feasible in most areas. While signs are anticipated for the Bowman Branch Linear Park at the south end of the site, they would require coordination with the US Army Corps of Engineers and the City of Arlington. No permit or waiver is anticipated to implement this alternative.

7.4.2.3 Availability of Services and Materials

Public education will not require special materials or equipment. Required services are readily available. The sign posting installation alternative is easy to implement, requiring no special equipment and/or operators. While conventional construction equipment and techniques are usually adequate, UXO-trained personnel must clear the area prior to installation and ensure that proper safety precautions are implemented to prevent untrained personnel from handling OE.

7.4.3 Community Acceptance

It is expected that the local community will not accept education and sign posting alternatives as a stand-alone response action. The community may express concerns because this alternative does not remove the OE and, therefore, may not be viewed as a permanent solution.

7.4.3.1 Health and Safety

Although Institutional Controls alone may influence future construction activities and reduce the possibility of exposure to OE, they will not remove and destroy OE, and will not eliminate the possibility of human exposure to OE. The opportunity for accidental exposure will increase, if the signs are removed or deteriorated or if persons are allowed to enter the restricted areas.

7.4.3.2 Long-Term Benefit

This alternative, although an improvement over no-action, does not provide for removal of OE and the benefit of “peace of mind” afforded the community and the general public by an alternative involving removal of OE.

7.4.4 Regulatory and Governmental Acceptance

No state or local permit requirement is anticipated. US EPA, TCEQ, and local government acceptance is not anticipated, because this alternative does not eliminate the possible need to address the problem in the future.

7.4.4.1 Long-Term Effort

Because this alternative does not remove OE from the site, it does not reduce the future level of effort that would be necessary by regulatory and governmental agencies to address OE impacts to the site.

7.4.4.2 Protection of Human Health and the Environment

This alternative will not remove and destroy OE, and will not eliminate the possibility of human exposure to OE. Although it may reduce the possibility of exposure to OE, the risk of continued potential presence of OE would remain.

7.4.5 Cost

The estimated cost for this alternative is \$21,439, as presented in Appendix C. The estimated cost is dependent upon several factors including the location and number of signs and the effort involved to educate the public and local government personnel. (This cost also includes reprinting up to 2,000 copies of the educational materials.)

7.5 ALTERNATIVE 3, COMPREHENSIVE OE SURFACE CLEARANCE WITH INSTITUTIONAL CONTROLS

Comprehensive OE Surface Clearance involves UXO specialists, trained to recognize, handle, and dispose of ordnance, performing visual inspection of the entire surface of the Five Points OLF, and removing OE from the ground surface to a depth no greater than six inches. The UXO

specialists will then ensure proper disposal of the recovered material. This alternative is effective in minimizing the risk of incidental contact with OE in areas where intrusive activities are not likely. Site preparation activities may be required in some areas including the removal of brush, shrubs, and surface debris, in order to perform a visual survey. Geophysical investigation is usually conducted using a magnetometer. Probing of the near-surface soils to a depth of approximately six inches may be performed to investigate magnetic anomalies and identify near-surface metallic debris. The efforts associated with this alternative will vary, depending upon topography and ground cover (vegetative and pavement). Comprehensive OE Surface Clearance is appropriate where surface OE is confirmed, or where surface inspections have not been performed. Section 7.4 describes, in detail, the Institutional Controls to supplement this alternative.

7.5.1 Effectiveness

7.5.1.1 Overall Protection to Human Health and the Environment

7.5.1.1.1 OE surface clearance is effective in removal of OE items most likely to be encountered by the public and will greatly reduce the risk of an accidental encounter with ordnance. Surface clearance will not remove all OE, particularly that present in the subsurface (i.e., deeper than six inches), thereby providing only limited protection for intrusive activities.

7.5.1.1.2 The extent to which surface clearance increases overall protection to the public is strongly related to the quantity of OE that is on or near the surface. In areas where surface OE is present, implementation of this alternative can greatly reduce the level of risk.

7.5.1.2 Compliance with ARARs

No chemical-specific ARAR is associated with OE. Action-specific ARARs potentially applicable to this alternative include excavation and worker safety. Location-specific actions that jeopardize critical habitats or threatened or endangered species will be avoided during site activities.

7.5.1.3 Long-Term Effectiveness

Surface clearance is a reliable means of reducing exposure to individuals who are engaged in non-intrusive activities and will reduce direct contact with ordnance and explosives at the surface. The possibility of exposure during intrusive activities remains; therefore, removal of risk associated with OE (surface and subsurface) will not be fully achieved. Erosion, wetting and drying, and/or frost heave may potentially allow buried items to migrate to the surface. Implementing this alternative may not ensure complete removal of OE items; therefore, there will continue to be a potential risk of OE exposure to the public.

7.5.1.4 Short-Term Effectiveness

Safety concerns during the implementation period are associated with the potential for UXO workers to be exposed to OE during the surface clearance. Adherence to the requisite safety procedures and associated Site Safety and Health Plans will significantly limit the risk to site workers.

7.5.2 Implementability

7.5.2.1 Technical Feasibility

Surface clearance is technically feasible. Efforts associated with implementing this alternative will vary based on the topography, terrain, and ground cover in each area. UXO-qualified personnel must be involved during implementation of all aspects of this alternative.

7.5.2.2 Administrative Feasibility

Surface clearance activities should be administratively feasible. Activities associated with this alternative will need to be coordinated with the USACE and TCEQ. No required permitting or waiver process is anticipated to implement this alternative. Permits and/or approvals may be required if it becomes necessary to transport OE off-site for disposal.

7.5.2.3 Availability of Services and Materials

The special equipment, skills, personnel, and technologies associated with this alternative include geophysical investigation, potential land clearing, and UXO training. Proper safety precautions must be implemented to prevent untrained individuals from handling OE.

7.5.3 Community Acceptance

This alternative will be viewed as preferable to Alternatives 1 and 2, No DOD Action Indicated and Institutional Controls (only), respectively. It is expected, however, that anything less than subsurface removal of OE would be a “hard sell”, given the tenor of community concerns expressed during the TPP process.

7.5.3.1 Health and Safety

Although an action to remove surface OE at the Five Points OLF site would provide a much greater level of risk reduction for the community, area residents and the general public may express concerns that this alternative does not remove all OE items. Therefore, it may not be viewed as a permanent solution, and the public may expect a more complete subsurface clearance.

7.5.3.2 Long-Term Benefit

This alternative would benefit the community through surface removal of OE, and the increased future satisfaction in knowing that OE has been removed and destroyed. Although preferable to the alternatives that remove none of the OE at the site, this alternative would probably be viewed by the community as a less than complete solution to their problem.

7.5.4 Regulatory and Governmental Acceptance

No required state or local permitting is anticipated with this alternative. While this approach reduces the potential surface OE on-site, US EPA, TCEQ, and local government acceptance is not anticipated, because this alternative stops short of providing the maximum level of protection to the public.

7.5.4.1 Long-Term Effort

Because this alternative only addresses OE found on the surface of the site, the possibility of some future impacts to human health and the environment would remain. The associated future regulatory and governmental administrative efforts, therefore, would probably be greater than those associated with Alternative 4, OE Subsurface Clearance with Institutional Controls.

7.5.4.2 Protection of Human Health and the Environment

This approach would reduce the risk of potential contact with surface OE on-site. This alternative, however, stops short of providing the maximum level of protection to the public. While US EPA, TCEQ, and local government acceptance of this alternative is a possibility, acceptance is not anticipated, because this alternative stops short of providing the maximum level of protection to the public.

7.5.5 Cost

The estimated cost to perform a Comprehensive OE Surface Clearance at Five Points OLF is \$298,142, as presented in Appendix C. The cost varies with topography, vegetative cover, and site access. The items included in the cost estimate (Appendix C) are mobilization, posting signs, visual inspection of cleared areas, limited geophysical investigation, removal and disposal of OE, quality control, and demobilization. The signs will advise the public that there is a potential for encountering OE in the area, particularly if they engage in intrusive activities. The cost to implement the surface removal alternative is based on an estimated density of surface OE and the size of the area. While the density is not known because no field investigations have been conducted as part of this EE/CA, for purposes of the cost estimate an assumed density of ten anomalies per acre was used. The estimated costs are based on ZAPATAENGINEERING's experience in completing similar projects, discussions with UXO-trained personnel and knowledge of the site. As the surface cover varies across the site, the unit costs are assigned based on average conditions across the entire site. The Institutional Controls described in Alternative 2 are also applicable to this alternative. These costs are in addition to costs developed for implementing the removal portion of this alternative (see Appendix C). The cost indicated above includes Institutional Controls.

7.6 ALTERNATIVE 4, OE SUBSURFACE CLEARANCE WITH INSTITUTIONAL CONTROLS

This alternative involves all activities necessary to fully locate, excavate, and remove OE to a depth conducive to the expected land use, public access and overall health and safety of the affected community, as dictated by the depth of OE detection that is technically feasible at the time of removal. Activities potentially include vegetation clearance as necessary to conduct geophysical surveys, completion of geophysical investigations, excavation of anomalies and destruction of OE. Technologies that may be used for this alternative include magnetic and/or electromagnetic geophysical investigative methods and management/disposal of OE (including detonation of UXO). This alternative includes surface clearance over the entire site, excavation, and clearance in impacted areas. The effort associated with implementing this alternative will vary, depending upon vegetation and site access. Department of Defense Explosives Safety Board (DDESB) guidelines state that the depth of UXO clearance depends upon the projected end use of the land and the extent of possible OE exposure to humans. For planning purposes, the DDESB suggests different clearance depths for different land uses such as undefined use, invasive use, unrestricted use, and construction use. Actual clearance depths may be modified based on actual depths at which ordnance is consistently found. Section 7.4 describes, in detail, the Institutional Controls portion of this alternative.

7.6.1 Effectiveness

7.6.1.1 Overall Protection to Human Health and the Environment

Implementing this alternative will significantly reduce the potential for direct contact with OE. This alternative will provide a more effective overall protection of human health and the environment than Alternatives 1, 2, or 3.

7.6.1.2 Compliance with ARARs

No chemical-specific ARAR is associated with OE. Action-specific ARARs potentially applicable to this alternative include excavation and worker safety.

7.6.1.3 Long-Term Effectiveness

The potential for exposure to OE will be greatly reduced through implementation of this alternative, which is an effective and permanent solution for reducing risk of exposure at specified depths. This alternative will not require that annual operation and maintenance be considered; that issue would be addressed only if additional intrusive activities were to be initiated below the depth cleared.

7.6.1.4 Short-Term Effectiveness

The potential for OE exposure to UXO workers during clearance and removal activities may be significant. Strict adherence to the USAESCH safety procedure manuals and the Site Safety and Health Plan is required. The anticipated risk to the public resulting from implementation of this alternative is considered minimal. In the event that OE is discovered and detonation is the preferred disposal option, the area may be affected by noise and ground shock. Environmental impacts from clearance for use should be minimal.

7.6.2 Implementability

7.6.2.1 Technical Feasibility

This alternative is technically feasible for Five Points OLF. Efforts associated with implementing this alternative will vary based on terrain, ground cover, and access in each area. UXO-qualified personnel must be involved during implementation of all aspects of this alternative.

7.6.2.2 Administrative Feasibility

Subsurface clearance activities should be administratively feasible at Five Points OLF. Activities associated with this alternative will need to be coordinated with the USACE, TCEQ, local governments, and local public safety officials. No requirement for permitting or waivers is anticipated to implement this alternative. Permits and/or approvals may be required if it becomes necessary to transport OE offsite for disposal.

7.6.2.3 Availability of Services and Materials

The special equipment, skills, personnel, and technologies associated with the clearance to detectable depth alternative include geophysical investigation, land clearing, and UXO training. Proper safety precautions must be implemented to prevent untrained individuals from handling OE.

7.6.3 Community Acceptance

7.6.3.1 Health and Safety

Subsurface clearance with Institutional Controls alternative should be well received by the community, as it represents the highest level of OE removal, resulting in the greatest overall protection to the public.

7.6.3.2 Long-Term Benefit

This alternative would provide the greatest benefit to homeowners and the community. The knowledge that a comprehensive effort had been made using up-to-date technology to find, remove and destroy OE at the site would positively impact the quality of life for those living in and around the Five Points OLF community.

7.6.4 Regulatory and Governmental Acceptance

7.6.4.1 Long-Term Effort

This alternative would locate, remove and dispose of site OE to the technically feasible detectable depth at the time of the removal. The possibility of some future impacts to human health and the environment would be minimized, in comparison to the other alternatives. The likely future level of effort required would, therefore, be minimal.

7.6.4.2 Protection of Human Health and the Environment

This approach would significantly reduce the risk of potential contact with OE on-site. Because this alternative provides the maximum level of protection to the public, regulatory and governmental acceptance of this alternative is expected.

7.6.5 Cost

The estimated cost to perform subsurface clearance with Institutional Controls on Five Points OLF is \$537,734, as presented in Appendix C. This cost varies with topography, vegetative cover, and site access. The items included in the cost estimate (Appendix C) are mobilization, geophysical investigation, removal, and disposal of OE, visual inspection of cleared areas, quality control, and demobilization. While the density of OE is not known because no field investigations have been conducted as part of this EE/CA, for purposes of the cost estimate an assumed density of twenty anomalies per acre was used. The estimated costs are based on ZAPATAENGINEERING's experience in completing similar projects, discussions with UXO-trained personnel and knowledge of the site. The unit costs are assigned as the average costs across the entire site. The institutional controls described in Alternative 2 are also applicable to this alternative. These costs are in addition to those developed for implementing the removal portion of this alternative, and are included in the total cost, above.

8.0 COMPARATIVE ANALYSIS OF RESPONSE ACTION ALTERNATIVES

The comparative analysis in this chapter evaluates the relative performance of each alternative with respect to the other alternatives.

8.1 INTRODUCTION

This chapter presents a comparative analysis of the response action alternatives by evaluating the performance of each alternative. This analysis differs from the analysis in Chapter 7.0 in which each alternative was analyzed independently without consideration of the other alternatives. The purpose of this analysis is to identify the advantages and disadvantages of each alternative relative to one another. The alternatives are:

- Alternative 1, No DOD Action Indicated (NDAI)
- Alternative 2, Institutional Controls
- Alternative 3, Comprehensive OE Surface Clearance with Institutional Controls
- Alternative 4, OE Subsurface Clearance with Institutional Controls

Each alternative is compared with all of the other alternatives for effectiveness, implementability, community acceptance, regulatory and governmental acceptance, and cost. Alternative 1, however, is considered an unacceptable OE response action alternative because it does not meet the minimum threshold criterion for the protection of human safety; therefore, this alternative is not evaluated further as an acceptable OE response action. A scoring system is used to categorize the alternatives and select the recommended response action alternative that makes effective use of resources while providing maximum protection to the human health, welfare, and the environment.

8.2 EFFECTIVENESS

8.2.1 Introduction

8.2.1.1 Four criteria were considered for the effectiveness category. Each alternative is assigned a score of 1, 2, or 3, with 1 being most desirable and 3 least desirable. For each alternative, the score under each criterion is added, and the alternative with the lowest combined score is selected as the preferred alternative under the effectiveness category.

8.2.1.2 TABLE 8-1 summarizes the scoring of alternatives for effectiveness. Alternative 4, Subsurface Clearance, has the most favorable overall scoring. Each of the evaluation criteria is addressed below with respect to the alternatives.

TABLE 8-1 SCORING OF ALTERNATIVES FOR EFFECTIVENESS

Effectiveness	No DOD Action Indicated (Alternative 1)	Institutional Controls (Alternative 2)	Comprehensive OE Surface Clearance with Institutional Controls (Alternative 3)	OE Subsurface Clearance with Institutional Controls (Alternative 4)
Overall Protection of Human Health and Environment	NA	3	2	1
Compliance with ARARs	NC	1	1	1
Long-term Effectiveness	NC	3	2	1
Short-term Effectiveness	NC	1	2	3
Total	NC	8	7	6
Rank	NC	3	2	1

Note: Scoring is from most (1) to least desirable (3).

NA = not applicable

NC = not considered

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8.2.2 Evaluation Criteria

8.2.2.1 Overall Protection of Human Health and the Environment

- Alternative 4, OE Subsurface Clearance with Institutional Controls is scored 1, because it is expected to provide the maximum removal of OE items and result in the least residual risk for public exposure to OE hazards.
- Alternative 3, Comprehensive OE Surface Clearance with Institutional Controls is scored 2, because the OE items potentially remain in the subsurface.
- Alternative 2, Institutional Controls as a stand-alone option is scored 3, because this alternative does not remove any OE item from the site and, therefore, does not reduce risk for public exposure to OE hazards.
- Alternative 1, No DOD Action Indicated, is considered an unacceptable OE response action alternative because it does not meet the minimum threshold criterion for the protection of human safety; therefore, this alternative is not evaluated further as an acceptable OE response action.

8.2.2.2 Compliance with ARARs

Compliance with ARARs would be addressed for any activity that would require brush clearance, construction/installation, or intrusive activities at the site.

- Alternatives 2, 3, and 4 would require some level of ARAR compliance, so the alternatives share a score of 1 for compliance with ARARs.

8.2.2.3 Long-Term Effectiveness and Permanence

- Alternative 4 is expected to provide better long-term effectiveness and permanence compared with the other two alternatives (Alternatives 2 and 3); therefore, it is scored 1.
- Alternative 3 is scored 2 because OE potentially would remain in the subsurface.
- Alternative 2 as a stand-alone alternative is scored 3.

8.2.2.4 Short-term Effectiveness

- Alternative 2 provides the most immediate effect. Therefore, Institutional Controls are scored 1 for short-term effectiveness.
- Alternatives 3 and 4, because of their required time for implementation, scored 2 and 3, respectively.

8.3 IMPLEMENTABILITY

8.3.1 Introduction

8.3.1.1 Four criteria were considered in the implementability category. Each alternative was given a score of 1, 2, or 3, with 1 representing the most desirable alternative and 3 representing the least desirable. For each alternative, the score under each criterion is added, and the alternative with the lowest combined score is selected as the preferred alternative under the implementability category.

8.3.2 Evaluation Criteria

8.3.2.1 TABLE 8-2 summarizes the scoring of alternatives for implementability. Alternatives 2 and 3 are equally desirable, as seen in the overall scoring. Each evaluation criterion is addressed below with respect to the alternatives.

TABLE 8-2 SCORING OF ALTERNATIVES FOR IMPLEMENTABILITY

Implementability	Institutional Controls (Alternative 2)	Comprehensive OE Surface Clearance with Institutional Controls (Alternative 3)	OE Subsurface Clearance with Institutional Controls (Alternative 4)
Technical Feasibility	1	2	3
Administrative Feasibility	3	1	2
Availability of Services and Materials	1	2	3
Total	5	5	8
Rank	1	1	2

Note: Scoring is from most (1) to least desirable (3).

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8.3.2.2 Technical Feasibility

- Alternative 2 is scored 1 based on the technical ease of implementing this alternative.
- Alternative 3 is scored 2, because clearance activities are technically more difficult to implement than institutional approaches.
- Alternative 4 is scored 3, because subsurface clearance activities are somewhat more technically difficult than surface clearance, and clearly more difficult than Institutional Controls alone (Alternative 2).

8.3.2.3 Administrative Feasibility

- Alternative 2 depends in large part on public and local agency support, involvement, willingness, and long-term commitment of the agencies or entities to exercise control. This alternative requires coordination among multiple agencies and would be difficult to implement and to obtain approvals because OE would not be removed. Institutional Controls, therefore, are assigned a score of 3.
- Alternatives 3 and 4, with respective scores of 1 and 2, would both require somewhat similar levels of effort for their implementation with respect to administrative feasibility. Alternative 3, however, owing to its lower relative complexity is scored 2 (better).

8.3.2.4 Availability of Services and Materials

- Alternative 2 requires the least amount of materials and services for implementation and is scored 1.
- Alternatives 3 and 4, the two alternatives involving clearance, are scored 2 and 3, respectively. This is because the amount of required services and materials for Surface Clearance is greater than that required for the implementation of Institutional Controls alone. Although readily available, the complexity and quantity of required materials for Alternative 4, Subsurface Clearance, are even greater than for the other two alternatives.

8.4 COMMUNITY ACCEPTANCE

8.4.1 Introduction

Table 8-3 summarizes the scoring of alternatives for community acceptance. Alternative 4 has the most desirable overall scoring. Each of the evaluation criteria is addressed below with respect to the alternatives.

8.4.2 Evaluation Criteria

8.4.2.1 Health and Safety

- Alternative 4 is scored 1, because an OE Subsurface Clearance with Institutional Controls would, to the greatest extent, meet the requirements expressed by the public during the TPP process.
- Alternative 3 is scored 2, because OE potentially would remain in the subsurface and would be a safety concern to the public.
- Alternative 2 is scored 3, because it would not remove any OE from the site or address the stated concerns of the public.

8.4.2.2 Long-Term Benefit

- Alternative 4 is scored 1, because an OE Subsurface Clearance with Institutional Controls would provide the greatest comparative “peace of mind” to residents and the general public.
- Alternative 3 is scored 2, because OE potentially would remain in the subsurface and would likely be perceived as a “less than optimum” solution by the public.
- Alternative 2 is scored 3, because it would not remove any OE from the site, and is not likely to be seen as providing a future benefit to the public.

Table 8-3 Scoring of Alternatives for Community Acceptance

Community Acceptance	Institutional Controls (Alternative 2)	Comprehensive OE Surface Clearance with Institutional Controls (Alternative 3)	OE Subsurface Clearance with Institutional Controls (Alternative 4)
Health and Safety	3	2	1
Long-Term Benefit	3	2	1
Total	6	4	2
Rank	3	2	1

Note: Scoring is from most (1) to least desirable (3).

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8.5 REGULATORY AND GOVERNMENTAL ACCEPTANCE

8.5.1 Introduction

Table 8-4 summarizes the scoring of alternatives for regulatory and governmental acceptance. Alternative 4 has the most desirable overall scoring. Each of the evaluation criteria is addressed below with respect to the alternatives.

8.5.1.1 Long-Term Effort

- Alternative 4 is scored 1, because an OE Subsurface Clearance with Institutional Controls would not require ongoing administration efforts by regulatory or governmental agencies.

- Alternative 3 is scored 2 because OE would remain potentially in the subsurface requiring possible future action by regulatory and/or government agencies.
- Alternative 2 is scored 3, because it would not remove any OE from the site or address stated concerns, requiring probable future efforts by regulatory and/or government agencies.

8.5.1.2 Protection of Human Health and the Environment

- Alternative 4 is scored 1, because an OE Subsurface Clearance with Institutional Controls would provide the greatest comparative protection to both human health and the environment.
- Alternative 3 is scored 2 because OE would remain potentially in the subsurface with a potential ongoing risk to human health and the environment.
- Alternative 2 is scored 3, because it would not remove any OE from the site or address stated concerns, requiring probable future efforts by regulatory and municipal agencies.

Table 8-4 SCORING OF ALTERNATIVES FOR REGULATORY AND GOVERNMENTAL ACCEPTANCE

Regulatory and Governmental Acceptance	Institutional Controls (Alternative 2)	Comprehensive OE Surface Clearance with Institutional Controls (Alternative 3)	OE Subsurface Clearance with Institutional Controls (Alternative 4)
Long-term Effort	3	2	1
Protection of Human Health and Environment	3	2	1
Total	6	4	2
Rank	3	2	1

Note: Scoring is from most (1) to least desirable (3).

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8.6 COST

8.6.1 Introduction

OE Subsurface Clearance with Institutional Controls was the most expensive alternative, while Alternative 1; No DOD Action Indicated was the least expensive. Table 8-5 summarizes the scoring of alternatives for costs. Detailed cost estimates including the assumptions used in deriving the costs for each alternative are presented in Appendix C.

TABLE 8-5 SCORING OF ALTERNATIVES FOR TOTAL COST (PRESENT VALUE)

Cost	Institutional Controls (Alternative 2)	Comprehensive OE Surface Clearance with Institutional Controls (Alternative 3)	OE Subsurface Clearance with Institutional Controls (Alternative 4)
Institutional Controls	\$21,439	\$21,439	\$21,439
OE Clearance, etc.	-	\$276,703	\$516,295
Total	\$21,439	\$298,142	\$537,734
Rank	1	2	3

Note: Scoring is from most (1) to least desirable (3).

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8.7 SUMMARY

The results of the comparative analysis of alternatives for effectiveness, implementability, homeowner acceptance, regulatory and governmental acceptance, and cost were combined to determine the alternative with the lowest (most desirable) overall score. TABLE 8-6 presents the overall scoring of alternatives. Based on this scoring approach, the alternatives were ranked in order of most to least favorable. OE subsurface clearance with institutional controls (Alternative 4) ranked highest, followed by Alternative 3, comprehensive surface clearance (Alternative 3), and Alternative 2, institutional controls.

TABLE 8-6 SUMMARY SCORING OF ALTERNATIVES

Criterion	Institutional Controls (Alternative 2)	Comprehensive OE Surface Clearance with Institutional Controls (Alternative 3)	OE Subsurface Clearance with Institutional Controls (Alternative 4)
Effectiveness	3	2	1
Implementability	1	1	2
Homeowner Acceptance	3	2	1
Regulatory and Governmental Acceptance	3	2	1
Costs	1	2	3
Total	11	9	8
Rank	3	2	1

Note: Scoring is from most (1) to least desirable (3).

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TABLE 8-7 RESPONSE ACTION ALTERNATIVE COMPARISON

Sector 1	Risk Reduction Component	Alternative 1 <i>No DOD Action Indicated</i>	Alternative 2 <i>Institutional Controls</i>	Alternative 3 <i>Comprehensive Surface Clearance with Institutional Controls</i>	Alternative 4 <i>Clearance to Detectable Depth with Institutional Controls</i>
Effectiveness	Overall Protection of Public Health and the Environment	Provides no risk reduction to the public from exposure to ordnance.	Provides a greater level of protection by reducing the likelihood of accidental exposure to OE.	Provides a greater level of protection by reducing the potential of an accidental encounter with ordnance in inhabited areas or areas frequently used by the public.	Provides the greatest level of protection by reducing the potential of an accidental encounter with ordnance in inhabited areas or areas frequently used by the public.
	Compliance with ARARs	No chemical-specific, action-specific or location-specific ARAR is associated with OE and this alternative.	No chemical-specific ARAR is associated with OE. Action-specific ARARs potentially applicable include excavation and worker safety.		
	Long-Term Effectiveness and Permanence	No long-term change to site conditions and the magnitude of the risk will remain undiminished.	Reduces the long-term possibility of exposure to OE by using signs to inform the public of potential site risk.	Reduces exposure to individuals who are engaged in non-intrusive activities in areas where the surface clearances are conducted.	Greatly reduces exposure to individuals who are engaged in activities in areas where the clearances are conducted.
	Short-Term Effect During Implementation	No short-term risk reduction to the surrounding community.	Provides an initial level of protection to the public as users learn new site controls and site safety.	Provides a high level of protection to the public, as institutional controls will be combined with OE removal.	Provides the highest level of protection to the public in high-traffic areas, as OE removal will be conducted to depth.
Implementability	Technical Feasibility	Technical feasibility is not applicable to this alternative.	Relies on readily accessible and easily implemented technology and tools.	Technically feasible; however, more extensive planning efforts will vary based on the topography, terrain and ground cover.	
	Administrative Feasibility	Administrative feasibility is not applicable to this alternative.	Will require limited coordination with the US Army Corps of Engineers, the City of Arlington Building Inspections Office, and the City of Arlington Parks and Recreation Department.	Will require coordination between the US Army Corps of Engineers, the City of Arlington Police and Fire Departments, the City of Arlington Planning Department, and the local news media.	
	Availability of Services and Materials	No services or materials required.	Requires the limited services of UXO-qualified personnel and readily available conventional hand tools.	Requires the extensive services of UXO-qualified personnel and readily available conventional hand tools.	
Community Acceptance	Health and Safety	Not likely to be accepted by community stakeholders.	May be accepted by regulatory and community stakeholders. However, this alternative will not be viewed as a permanent solution.	Will probably be accepted by regulatory and community stakeholders as it will likely be viewed as a more complete solution to reducing risk. Unlikely acceptance as a stand-alone remedy, however, since this alternative may not be viewed as a permanent solution.	Provides the greatest level of protection by reducing the potential of an accidental encounter with ordnance in inhabited areas or areas frequently used by the public.
	Long-Term Benefit	No benefit.	Not likely to be seen as providing a future benefit to residents and the general public.	Would likely be perceived as a less than optimum, less beneficial solution by residents and the general public.	Would provide the greatest comparative “peace of mind” and future benefit to residents and the general public.
Regulatory and Governmental Acceptance	Long-Term Effort	Most likely need to address situation in future.	Will likely need to be addressed in the future.	Possibly need to address situation in future.	Unlikely to require future effort.
	Protection of Human Health and the Environment	Provides no risk reduction to the public from exposure to ordnance.	Provides a greater level of protection by reducing the likelihood of accidental exposure to OE.	Provides a greater level of protection by reducing the potential of an accidental encounter with ordnance in inhabited areas or areas frequently used by the public.	Will likely be preferred by regulatory and community stakeholders as it will likely be viewed as the most complete solution to reducing risk to the public.
Cost		\$0.00	\$21,439	\$298,142	\$537,734

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9.0 RECOMMENDED RESPONSE ACTION ALTERNATIVES

This chapter recommends a risk reduction alternative based on existing site conditions, historic use of site, the existing or proposed land use, and historical information on the extent and depth of OE. The selected alternative provides the most effective use of resources, while providing maximum return to the public.

9.1 BACKGROUND

The recommended alternative for reducing the potential risk of OE exposure to the public at Five Points OLF in this EE/CA represents interpretations and conclusions based on results of the TPP and Final ASR. The recommendation is based on the description and evaluation of risk-reduction alternatives; an overview of the site and site conditions; projected land use; perceived public and regulatory sentiment; and review of the hazards associated with the types of OE used and found at the site.

9.2 GOAL

The goal of the recommended alternative is to provide a plan for managing risk associated with exposure to, and contact with OE at Five Points OLF.

9.3 RECURRING REVIEW

The USACE will monitor the area and will assess periodically the effectiveness of the implemented alternative. Refer to Chapter 10.0, Recurring Reviews.

9.4 RECOMMENDED ALTERNATIVE

The recommendation for Five Points OLF is Alternative 4, OE Subsurface Clearance with Institutional Controls. This alternative includes surface and subsurface clearance of OE items to the technically feasible detectable depth at the time of the removal along with establishing Institutional Controls to further reduce potential OE exposure. This alternative is the preferred and recommended response-action because it results in the maximum removal of OE items and significantly reduces residual risk associated with OE. This alternative is the most effective for achieving the following objectives:

- Minimizes potential public exposure to OE
- Minimizes environmental impact from OE and OE-breakdown products
- Can safely and economically be performed by qualified individuals.

This alternative is capable of implementation for the following reasons:

- Is technically and administratively feasible
- Services and materials are available
- Stakeholders and regulators are likely to accept it.

9.4.1 Costs

The total cost for this Alternative 4: OE Subsurface Clearance with Institutional Controls is \$537,734, as presented in Appendix C. This includes the costs for OE clearance to depth, OE removal work plan and report, Institutional Controls, and one site review at five years.

10.0 RECURRING REVIEWS

This chapter describes the basis for, and scope of, recurring reviews. These reviews evaluate whether a remedy is, or will be, protective of human health and the environment.

10.1 ESTABLISH A REVIEW TEAM

Five years after the Action Memorandum resulting from this EE/CA is signed and becomes a decision document directing implementation of the approved risk-reduction alternative, a Recurring Review should be conducted for Five Points OLF. The Recurring Review Team will be familiar with the previous actions conducted on-site, as well as current and proposed land uses.

10.2 SITE REVIEW

The Recurring Review Team will review available site documentation including the Archives Search Report, the EE/CA, and other relevant site-related documents. The Team will summarize proposed actions developed for the site into a concise list and prepare a plan to obtain additional site data that will allow comparison of effectiveness of the completed risk-reduction activities to those envisioned in the planned actions.

10.3 SITE INVESTIGATION

The Recurring Review Team will conduct a site visit to collect site data for analysis. The collected information will include personal interviews with stakeholders and the local community to determine if OE has been encountered within the five-year period. The team will conduct a thorough site survey looking for changes in site conditions such as construction, erosion or changes in land use, and an inspection of any Institutional Controls such as warning signs for deterioration damage and overall effectiveness.

10.4 SITE CONCLUSION

Following the site visit, the Recurring Review Team will prepare a Recurring Review Report documenting current site conditions, changes in anticipated land use, and effectiveness of risk-reduction alternatives.

10.5 COST

Based on experience with similar projects, ZAPATAENGINEERING estimates the cost to conduct a one-time recurring review including a site visit (travel from Charlotte to Arlington, TX); stakeholders interviews, and report preparation is \$40,000.

11.0 REFERENCES

- Code of Federal Regulations (CFR), *National Oil and Hazardous Substances Pollution Contingency Plan (NCP)*, 40 CFR 300.
- Code of Federal Regulations (CFR), *Occupational Safety and Health Administration (OSHA) General Industry Standards*, 29 CFR 1910.
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APPENDIX A
STATEMENT OF WORK

STATEMENT OF WORK
OE ENGINEERING EVALUATION
AND COST ANALYSIS (EE/CA)
FIVE POINTS OUTLYING FIELD
ARLINGTON, TEXAS
PROJECTS NO. KO6TX002801
11 February 2002

1.0 OBJECTIVE: The objective of this task order is to prepare an EE/CA Report for the former Five Points Outlying Field (OLF). The contractor shall perform activities to characterize the site and provide a risk based analysis and recommendations for follow on activities. The Contractor shall use existing data, which includes but is not limited to an Archive Search Report, to prepare the EE/CA Report. Field investigations will not be performed for this EE/CA.

2.0 BACKGROUND: The work required under this Scope of Work (SOW) falls under the Defense Environmental Restoration Program - Formerly Used Defense Sites (DERP-FUDS). Ordnance and Explosives (OE) exists on property formerly owned or leased by the Department of Defense.

2.0.1 Explosive ordnance is a safety hazard and may constitute an imminent and substantial endangerment to site personnel and the local populace, thus the applicable provisions of 29CFR 1910.120 apply. During this EE/CA it is the Government's intent that the contractor's work be performed in a manner consistent with the Comprehensive Environment Response, Compensation, and Liability Act (CERCLA), Section 104 and the National Contingency Plan (NCP), Sections 300.120(d) and 300.400(e).

2.1 History The former Five Points OLF is located within the city limits of Arlington, Texas, in Tarrant County. The former range is located at the corner of Harris Road and Matlock Road.

2.1.1 The government acquired 162.06 acres in 1940 as an Outlying Field (OLF) for the Dallas

Naval Air station (NAS) at Grand Prairie, Texas. The property was developed and designated as the Five Points OLF. Aircraft from the Dallas NAS used Five Points OLF for practice landings and takeoffs. The site was later used as a practice bombing range. Improvements constructed at the field included a practice landing field, a target bull's-eye ring and a boundary fence. The date that the Navy declared Five Points OLF surplus is unknown. The GSA conveyed the former range to Gordon and Pope Supply Company on 19 July 1956. Ownership of the former range has changed several times since 1956. On October 31, 1977, the 8.8 Corporation conveyed the former range to the James Knapp Estate. The Knapp Estate conveyed 74.59 fee acres to the Twin Park Estate Partnership on March 25, 1983.

2.1.2 Approximately 35 acres of the site is called Twin Parks Estates and is a developed mobile home park. The remainder of the property is a developed residential subdivision with new home construction. Most homes have been sold to individual owners. KB Home owns the unsold lots.

2.2 Potential Ordnance

Potential ordnance consists of MK23 practice bombs, M38A2 practice bombs and an unknown version of M47 chemical bombs used for practice.

3.0 SPECIFIC REQUIREMENTS

3.1 (TASK 1) SITE VISIT

Not used for this Task Order.

3.2 (TASK 2) TECHNICAL PROJECT PLANNING (TPP)

The Contractor shall implement the TPP process in accordance with CEHNC Interim Guidance Document 01-02, 27 June 2001 *Implementation of Technical Project Planning (TPP) For Ordnance and Explosives (OE) Formerly Used Defense Sites (FUDS) Projects*. The Contractor shall anticipate 2 meetings to be conducted in Arlington, Texas vicinity, to facilitate the TPP process. The Contractor shall be responsible for planning, organizing, inviting stakeholders, conducting and any other activities associated with these meetings. The Contractor shall prepare

a technical project-planning document for the Five Points OLF site. The Government does not expect the length of this document to exceed 30 pages. The Contractor shall submit “Draft” and “Final” versions of the document. These submissions shall be in accordance with 4.0 of this SOW.

3.3 (TASK 3) - GEOPHYSICAL PROVE-OUT (GPO).

Not used for this Task Order.

3.4 (TASK 4) EE/CA WORK PLAN.

The Contractor shall prepare an EE/CA Work Plan in accordance with DID OE-001, Type I Work Plan. The Contractor shall submit a “Draft” and “Final” version of the Work Plan in accordance with Section 4.0 of this SOW. The Contractor is expected to search for available reports, i.e. police report, EOD reports, etc., that may be available.

3.5 (TASK 5) BRUSH CLEARING.

Not used for this Task Order..

3.6 (TASK 6) LOCATION SURVEYS AND MAPPING.

Not used for this Task Order.

3.7 (TASK 7) GEOPHYSICAL INVESTIGATION AND EVALUATION.

Not used for this Task Order.

3.8 (TASK 8) ESTABLISHMENT AND MANAGEMENT OF GIS.

Not used for this Task Order.

3.9 (TASK 9) INTRUSIVE INVESTIGATIONS

Not used for this Task Order.

3.10 (TASK 10) EE/CA REPORT.

The Contractor shall prepare an EE/CA report in accordance with DID OE-010. The Contractor shall use “Ordnance and Explosives Risk Impact Assessment” (OERIA) for risk assessment on this site. This methodology is detailed in CEHNC OE-CX Interim Guidance document, 01-01, 27 March 2001, “Ordnance and Explosives Risk Impact Assessment”. The USACE Tulsa District will design a soil sampling program for this site, which the USACE Fort Worth District will execute. The Contractor shall include the results of the sampling in the EE/CA Report. The Contractor shall submit a “Draft”, “Draft Final”, and “Final” version of the EE/CA Report in accordance with Section 4.0 of this SOW. The “Draft” version of the EE/CA Report shall be sent to the US Army Corps of Engineers only.

3.11 (TASK 11) PREPARE ACTION MEMORANDUM.

The Contractor shall, based upon close consultation with the Contracting Officer, prepare an Action Memorandum in accordance with EP 1110-1-18, Ordnance and Explosives Response. The Contractor shall submit a “Draft” and “Final” version of the Action Memorandum in accordance with Section 4.0 of this SOW.

3.12 (TASK 12) PROJECT MANAGEMENT.

The Contractor shall perform project management activities necessary to maintain project control, to include but not limited to the following.

3.12.1 Schedule. The Contractor shall submit a proposed Project Schedule in Microsoft Project. The contractor shall update the schedule in the Monthly Status Report.

3.12.2 Public Meetings. The Contractor shall be prepared to attend and participate in public meetings. The Contractor shall be prepared to make presentations and answer questions concerning project activities at the former Five Points OLF. The Contractor shall anticipate 2 public meetings in Arlington, Texas. These meetings are different from and in addition to the TPP meetings.

3.12.3 Reports/Minutes, Record of Meetings. The Contractor shall prepare and submit a report/minutes of all meetings attended in accordance with DID OE-045.

3.12.4 Telephone Conversations/Correspondence Records. The Contractor shall keep a record of each phone conversation and written correspondence concerning this Task Order in accordance with DID OE-055. A copy of this record shall be attached to the Weekly Status Report.

3.12.5 Monthly Status Report. The Contractor shall prepare and submit a monthly status report in accordance with DID OE-080 and include any other items required in the SOW.

3.12.6 Weekly Status Reports. Since there are no field activities being performed under this Task Order, the Contractor will not be required to submit weekly status reports.

3.13 (TASK 13) COMMUNITY RELATIONS PLAN (CRP).

The contractor shall develop and submit a Community Relations Plan for the former Five Points OLF Area. This plan shall be prepared in coordination with the U.S. Army Corps of Engineers – Fort Worth District. This plan is to describe how the Contractor and/or the Corps of Engineers will interface with the public. The contractor shall submit a “Draft” and “Final” version in accordance with section 4.0 of this SOW.

3.14 (TASK 14) COMMUNITY ACTION PLAN.

The Contractor shall develop and submit a Community Action Plan for the former Five Points OLF neighborhood. This plan shall describe how the Contractor and/or the Corps of Engineers will educate, implement institutional controls and implement any other community related activities. Follow on actions to be performed under this task may include developing a video, brochures, pamphlets and/or other documents. The Contractor shall submit a “Draft”, “Draft Final”, and “Final” version of this plan in accordance with section 4.0 of this SOW. In addition to the number of copies required in paragraph 4.7, the Contractor shall prepare additional copies of the “Draft Final” and “Final” versions for public distribution. The number of additional

copies shall be determined during the TPP process and/or public meetings.

3.15 (TASK 15) Web Site.

We would like the contractor to design, create, and maintain a project web site for public access to these documents. This web site will be hosted on a Fort Worth District server, with the contractor submitting monthly updates to the site via compact disk (CD) files).

4.0 SUBMITTALS AND CORRESPONDENCE

4.1 Format of Engineering Reports. Any and all reports and/or plans not covered by a specific DID shall be prepared according to the following guidelines. The front cover of the report or plan shall be prepared in accordance with Attachment 1 of DID OE-030 and shall bear the following statement in addition to other requirements. *“The views, opinions, and/or findings contained in the report are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other documentations.”* The cover shall also denote which version of the report/plan presented (e.g. Draft, Draft Final or Final). When drawings are required, data may be combined to reduce the number of drawings. All drawings shall be of engineering quality in drafted form with sufficient detail to show interrelations of major features. The contents and format of the engineering reports shall be arranged in accordance with all pertinent guidance documents. The report/plan shall be typed on standard size of 8-1/2 inch by 11 inch white paper, with drawings other than the construction drawings folded, if necessary, to this size. Chapters shall be numbered sequentially. Within each chapter the paragraphs shall be numbered sequentially starting with the chapter number. Within each chapter any figures, tables, and charts shall be numbered sequentially starting with the chapter number. Appendices shall be lettered alphabetically and shall be identified and referenced in the text of the report/plan. Within each appendix, each page shall be numbered sequentially starting with the appendix letter. Every page of the report/plan shall contain a date footer, contract number, task order number and version (e.g. draft, final, original, change 1, etc). The report/plan shall be legible and suitable for reproduction. The final version of the report/plan shall also be submitted on CD-ROM in accordance with the other paragraphs

of section 4.0. All data, including raw analytical and electronic data, generated under this task order are the property of the DoD and the government has unlimited rights regarding its use.

4.2 Computer Files. All final text files generated by the Contractor under this contract shall be furnished to the Contract Officer in Microsoft Word 6.0 or higher software. Spreadsheets shall be in Microsoft EXCEL. All final CADD drawings shall be in Microstation 95 or higher. All GIS data shall be in ESRI (Arcview/Arcinfo) format.

4.3 HTML Deliverables. In addition to the paper and digital copies of submittals, the final version of any and all reports and/or plans shall be submitted, uncompressed, on CD ROM in hypertext markup language (HTML) along with a linked table of contents, linked tables, linked photographs, linked graphs and linked figures, all of which shall be suitable for viewing on the Internet.

4.4 Review Comments. Various reviewers will have the opportunity to review submittals made by the Contractor under this contract. The Contractor shall review all comments received through the CEHNC Project Manager and evaluate their appropriateness based upon their merit and the requirements of the SOW. The Contractor shall issue to the Project Manager a formal, annotated response to each in accordance with the established schedule in this SOW. The Contractor shall not non-concur with a comment without discussing the comment with the CEHNC PM. If the PM is not available then the Contractor shall contact the Technical Manager.

4.5 Identification of Responsible Personnel. Each report shall identify the specific members and title of the Contractor's staff and subcontractors that had significant and specific input into the reports' preparation or review.

4.6 Public Affairs. The Contractor shall not publicly disclose any data generated or reviewed under this contract. The Contractor shall refer all requests for information concerning site conditions to the local Corps of Engineers Public Affairs Office (Fort Worth District) with a copy furnished to the CEHNC Project Manager. Reports and data generated under this contract are the

property of the DoD and distribution to any other source by the Contractor, unless authorized by the Contracting Officer, is prohibited.

4.7 Submittals: The contractor shall furnish copies of the plans, maps, and reports as identified in paragraph 4.8, or as specified in this SOW, to each addressee listed below in the quantities indicated. The Contractor shall submit 1 copy on CD of the Final versions with each hard copy, of all submittals (Work Plans, Reports, Plans, etc) in accordance with section 4.2. The Contractor shall submit 1 copy on CD of the Final Versions of all submittals (Work Plans, Reports, Plans, etc) in accordance with section 4.3. For purposes of the SOW all days are considered calendar days.

ADDRESSEE	COPIES
US Army Engineering and Support Center, Huntsville ATTN: CEHNC-OE-DC (Mr. Bill Sargent) PO BOX 1600 Huntsville, Alabama 35807-4301	4
Commander US Army District, Fort Worth CESWF-PM-J ATTN: Mr. Brian Condike P.O. Box 17300 819 Taylor Street Fort Worth, TX 76102-0300	8
Commander 52nd Ordnance Group (EOD) 5011 N. 26 th Street Forest Park. GA 30297	1

4.8 Submittals and Due Dates:

SUBMITTAL	DUE DATES
Proposed schedule	7 days after award

Draft TPP document	14 days after TPP meeting
Final TPP document	14 days after receipt of comments
Draft Community Relations Plan	30 days after award
Final Community Relations Plan	14 days after receipt of comments
Draft EE/CA Report	45 days after first TPP meeting
Draft Final EE/CA Report	14 days after receipt of comments
Final EE/CA Report	14 days after receipt of comments
Draft Action Memorandum	14 days after acceptance of EE/CA
Final Action Memorandum	7 days after receipt of comments

5.0 REFERENCES:

5.1 29CFR 1910, Occupational Safety and Health Administration (OSHA) General Industry Standards

5.2 29CFR 1926, Construction Industry Standards

5.3 29CFR 1910.120/29CFR 1926.65 - Hazardous Waste Site Operations and Emergency Response

5.4 40CFR 300, National Contingency Plan

5.5 NIOSH/OSHA/USCG/EPA (DHHS(NIOSH) Publication #85-115) (OCT 85), Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities

5.6 Federal Acquisition Regulation (FAR) Clause 52.236.13, Accident Prevention

5.7 EM 385-1-1 (3 SEP 96), US Army Corps of Engineers Safety and Health Requirements Manual

5.8 EM 1110-1-4009 (23 June 2000) Engineering and Design – Ordnance and Explosives Response

5.9 EP 1110-1-18 (24 June 2000) Engineering and Design – Ordnance and Explosives Response

5.10 EP 385-1-95a 29 June 2001 Basic Safety Concepts and Considerations for Ordnance and Explosives Operations

5.11 Interim Guidance Document 01-01, 27 March 2001, Ordnance and Explosives Risk Impact Assessment

5.12 Interim Guidance Document 01-02 27 June 2001 Implementation of Technical Project Planning (TPP) For Ordnance and Explosives (OE) Formerly Used Defense Sites (FUDS) Projects

5.13 Data Item Descriptions

The following Data Item Descriptions are part of this contract and are available at the following URL: <http://www.hnd.usace.army.mil/oew/policy/dids/didindx.html>

Number	Title
DID OE-001	Type I Work Plan
DID OE-005-02	Technical Management Plan
DID OE-005-03	Explosives Management Plan (not used this SOW)
DID OE-005-04	Explosives Siting Plan (not used this SOW)
DID OE-005-05	Geophysical Investigation Plan (not used this SOW)
DID OE-005-06	Site Safety and Health Plan (not used this SOW)
DID OE-005-07	Location Surveys and Mapping Plan (not used this SOW)
DID OE-005-08	Work, Data, and Cost Management Plan
DID OE-005-09	Property Management Plan
DID OE-005-10	Sampling and Analysis Plan (not used this SOW)
DID OE-005-11	Quality Control Plan
DID OE-005-12	Environmental Protection Plan (not used this SOW)
DID OE-005013	Investigative Derived Waste Plan (not used this SOW)
DID OE-005-14	Geographical Information System Plan (not used this SOW)
DID OE-010	Engineering Evaluation/Cost Analysis (EE/CA) Report
DID OE-015	Accident/Incident Reports
DID OE-025	Personnel/Work Standards
DID OE-030	Site Specific Final Report (not used this SOW)
DID OE-040	Disposal Feasibility Report
DID OE-045	Report/Minutes, Record of Meetings
DID OE-055	Telephone Conversations/Correspondence Records
DID OE-080	Monthly Status Report
DID OE-085	Weekly Status Report
DID OE-090	Ordnance Filler Report
DID OE-100	Analysis of Institutional Controls

6.0 PERFORMANCE METRICS

See basic contract.

APPENDIX B

LOCATION AND SITE MAPS

FIGURE B-1 SITE LOCATION MAP

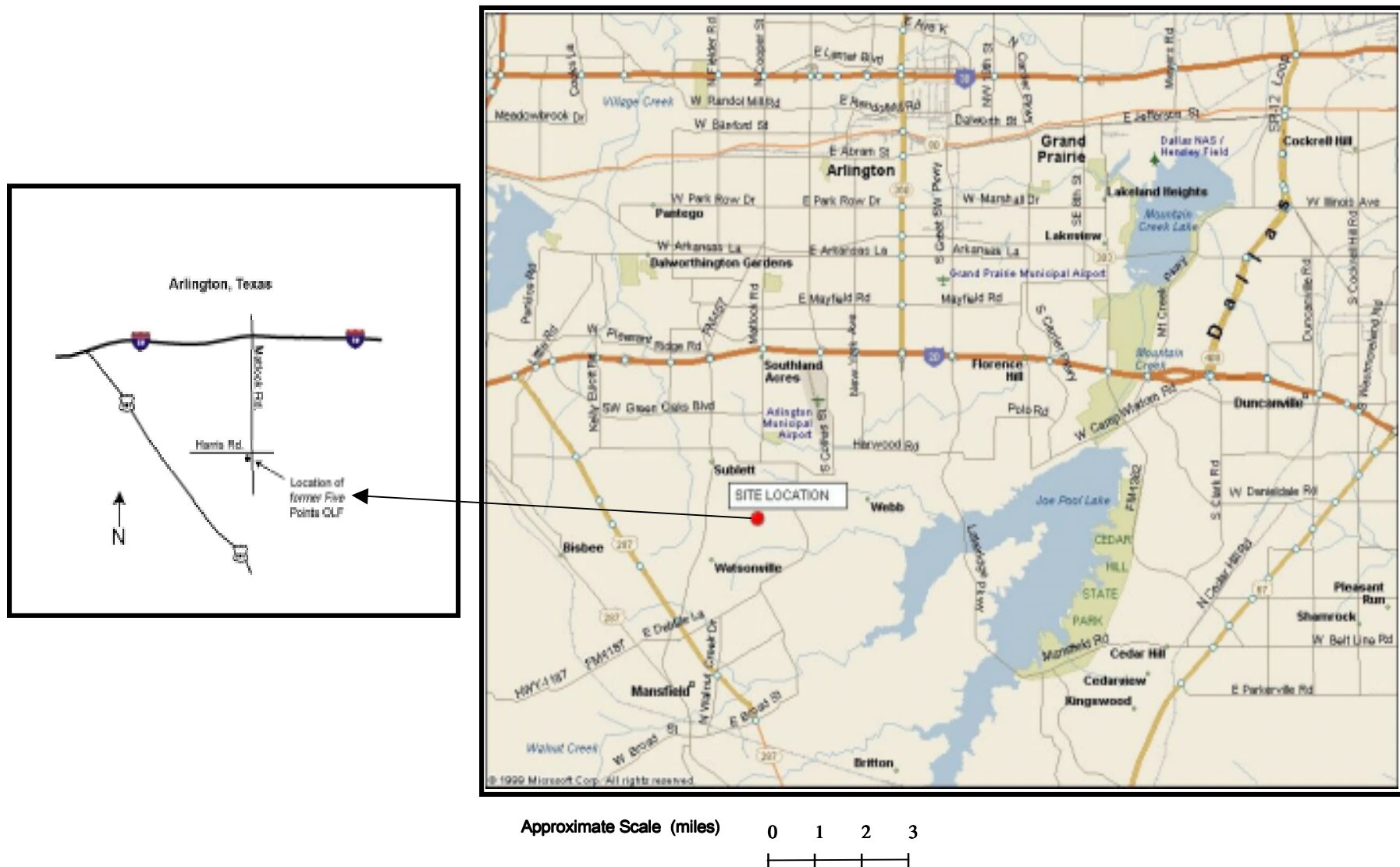
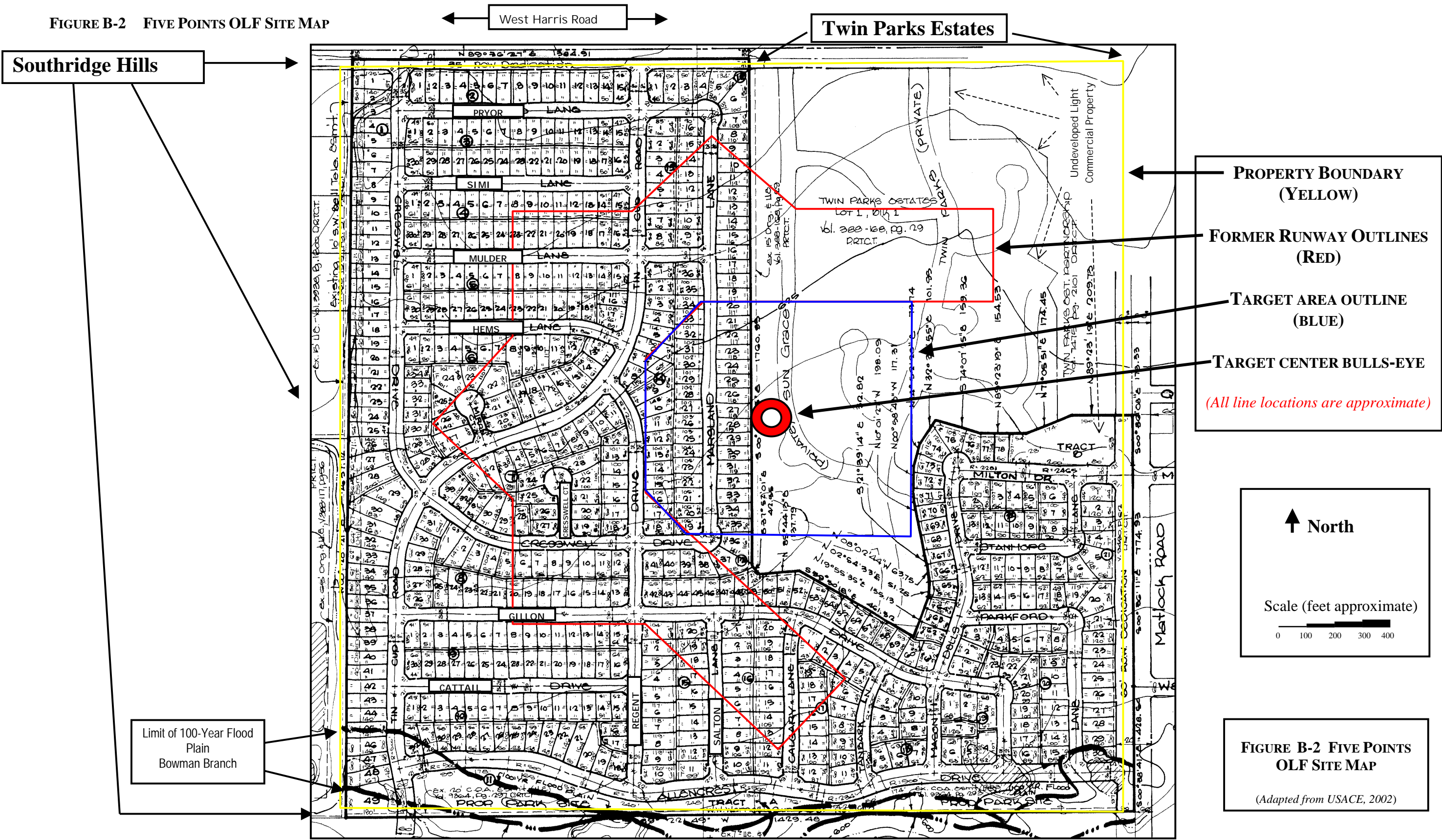


FIGURE B-2 FIVE POINTS OLF SITE MAP



APPENDIX C
COST ESTIMATE SUMMARY

COST ESTIMATE SUMMARY

1.0 INTRODUCTION

1.1 Under the Task Order for this EE/CA, there are no fieldwork requirements (detection, location, and mapping of OE) associated with this project. As such, ZAPATAENGINEERING based its evaluation on archival data, and information gathered during the Technical Project Planning (TPP) Process. ZAPATAENGINEERING then prepared a qualitative ordnance and explosives (OE) risk evaluation based on this available information. The ZAPATAENGINEERING project team encouraged, promoted, and documented stakeholder involvement throughout the EE/CA process.

1.2 In the absence of available field data, the costs provided in this EE/CA represent rough order of magnitude estimates prepared by ZAPATAENGINEERING using best professional judgment, and experience with similar projects.

1.3 Alternative 3 and 4 cost estimates assume an average accessibility of 35% throughout the entire 162.06-acre project area. This accounts for the reduction of the footprint area from existing homes, roads, driveways, sidewalks, and any other improvement precluding access to the near surface and subsurface soil. Surface-removal efforts assume the use of magnetometers to assist the surface clearance, while clearance to detectable depth assumes the use of digital geophysical surveying techniques (i.e., EM-61). Only limited brush clearing will be required in the area.

1.4 For cost estimating purposes, ZAPATAENGINEERING assumes that 567 anomalies are projected to be present within the area for surface clearance, while twice that number (1,134) will need to be investigated in the clearance to depth alternative. ZAPATAENGINEERING estimates that approximately 10 surface acres containing 54 subsurface anomalies could be investigated each day.

1.5 Because of the densely populated nature of the project area and the history of OE finds in the associated neighborhood, it is assumed that whenever subsurface clearance crews are working, all residences and businesses within the exclusion zone will be evacuated from the site. Road closures and evacuation of local residents will occur in areas falling within the minimum separation distance (MSD) for the Most Probable Munition (MPM), which is a Mk23 Mod 01 practice bomb. More than 3,700 Mk 23 practice bombs have been documented as found on the property since its closure. Therefore, evacuation will be assumed, and will not be contingent on discovery of additional (new) UXO items. Evacuation areas may be reduced by employing engineering controls (e.g., sand bag enclosures) during demolition (intentional detonation) activities. Evacuation costs will vary depending upon the number of persons (i.e., local population) affected by these activities.

1.6 The southwestern limit of the project area is within 200 feet of the grounds of D.P. Morris Elementary School. It is assumed that if a removal action is required in this area, the removal will be take place during an off-time, when school is not in session.

2.0 ALTERNATIVE 1 – NO DEPARTMENT OF DEFENSE ACTION INDICATED

2.1 There are no actions and therefore no costs associated with implementation of this alternative.

TABLE 2-1 ALTERNATIVE 1, NO DOD ACTION INDICATED

Item	Unit	Rate	Quantity	Cost
No work associated with this task				\$ 0
TOTAL				\$ 0

Created By: F. Tolen	Reviewed By: C. Walden	Approved By: F. Tolen
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3.0 ALTERNATIVE 2 – INSTITUTIONAL CONTROLS (IC)

3.1 The estimated cost to implement Alternative 2 is \$21,439. The project is estimated to last approximately three weeks. Institutional-control (IC) cost estimates include design and installation of warning signs in the Bowman Branch Linear Park. A UXO Safety Officer will provide on-site UXO avoidance support as local laborers are installing signs. The cost estimate is based on the following assumptions.

- The project design will be conducted by a Task Manager and is estimated to take approximately 56 man-hours (24 for fieldwork, 16 for development of educational materials and 16 for the meeting).
- The project implementation will be conducted by a Task Manager and is estimated to take approximately 40 man-hours (24 for fieldwork and 16 for development of educational material).
- A Project Manager will provide approximately eight man-hours of project oversight.
- A Contracts Officer will use approximately eight man-hours to generate any necessary contractual agreements.
- A UXO Safety Officer will supervise project site work and provide anomaly avoidance support using an estimated 24 man-hours, which includes two eight-hour travel days and one eight-hour workday.
- Mobilization, demobilization and subsistence costs include;
 - Fieldwork – one airfare, three days of a rental vehicle with fuel, two days at a hotel and an estimated 2.5 per diem allowances (two 75% travel days and one full day) for the UXO Safety Officer.
 - Public Meeting – two airfares, three days of a rental vehicle with fuel, two nights at a hotel for two people and an estimated 5.0 per diem allowances (two 75% travel days and one full day) for the Task Manager and the UXO Safety Officer.
- Field equipment includes a digital camera (\$400), a Schonstedt Magnetometer (one week at \$20 per week) and miscellaneous hand tools (\$150).
- Under UXO escort, eight 7" x 10" custom warning signs will be posted in selected locations throughout the park by two local laborers (ZAPATAENGINEERING's laborer rate of \$21.12 per man-hour). Sign establishment will take eight man-hours.
- A hand-held metal detector will be used by the on-site UXO technician to assist in safe installation of the signposts.
- Estimated annual cost for sign maintenance is \$621 per year, assuming replacement of five signs per year. (Not included in Table 3-1).
- Estimated cost for reprinting of 2,000 copies of educational material for distribution is \$4,000.
- Annual cost for brochures, etc. (Not included in Table 3-1).
- Cost for the equipment assumes no Government-Furnished Equipment (GFE).

TABLE 3-1 ALTERNATIVE 2, INSTITUTIONAL CONTROLS (IC)

Item	Unit	Rate	Quantity	Cost
Project Design	Man-hours	\$71.44	56	\$4,001
Project Implementation	Man-hours	\$71.44	40	\$2,858
Project Oversight	Man-hours	\$91.09	8	\$729
Contract Management	Man-hours	\$86.01	8	\$688
UXO Safety Officer (4% differential)	Man-hours	\$51.14	8	\$409
UXO Safety Officer (no differential)	Man-hours	\$49.17	16	\$787
Airfare – Charlotte, NC to Dallas/Ft. Worth, TX	Round trip	\$1,233.00	3	\$3,699
Rental Vehicle	Day	\$69.25	6	\$416
Hotel Stay	Day	\$77.00	6	\$462
Per Diem	Day	\$34.00	7.5	\$255
Field Equipment	Lump sum	\$670.00	1	\$670
Custom Warning Signs ¹	Each	\$48.52	8	\$388
Sign Establishment – (Two local laborers)	Man-hours	\$42.24	16	\$676
Production of Informational Brochures	Each	\$2.00	2000	\$4,000
SUM				\$20,036
TOTAL (including 7% fee)				\$21,439

¹ R.S. Means 02890/700/0900

Created By: F. Tolen	Reviewed By: C. Walden	Approved By: F. Tolen
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4.0 ALTERNATIVE 3 – COMPREHENSIVE SURFACE CLEARANCE WITH IC

4.1 The estimated capital cost to implement Alternative 3 is \$298,142. Fieldwork is estimated to last approximately one and one-half weeks, based on removing 100% of the total assumed surface anomalies (567 anomalies) at a rate of 10 acres per day, four ten-hour days a week. (These figures based on an assumed accessibility of 35% over the 162-acre tract, and ten anomalies per acre.) A Senior UXO Supervisor will supervise a five-man UXO team during the complete surface clearance activities. The cost estimate is based on the following assumptions.

- Institutional control (Alternative 2) costs (\$21,439) are included in this alternative.
- The project design will be conducted by a Task Manager and is estimated to take approximately 300 man-hours.
- The project implementation will be conducted by a Task Manager and is estimated to take approximately 80 man-hours.
- A Project Manager will provide approximately 16 man-hours of project oversight.
- A Contracts Officer will use approximately 16 man-hours to generate any necessary contractual agreements.
- Work week will not exceed 40 hours per week. No stand-down time is assumed for weather, natural disasters, federal holidays, or denied access to any areas.
- Per Diem and lodging are based upon the rates established in the revised edition of the Joint Travel Regulations for the City of Arlington.
- A UXO Safety Officer will support site work using an estimated 76 man-hours, which includes two eight-hour travel days and approximately six ten-hour workdays (57 acres cleared at a rate of 10 acres a day), four days a week for 1-1/2 weeks.
- A Senior UXO Supervisor will supervise a five-man UXO team (one UXO Supervisor and four UXO Technician II) while conducting the surface clearance. Each person is estimated at 76 man-hours, which includes two eight-hour travel days and approximately 6 ten-hour workdays (57 acres cleared at a rate of 10 acres per day), four days a week for 1-1/2 work weeks.
- A local explosives distributor will make a one-time explosives-delivery to the site so that any UXO items discovered during the surface clearance can be destroyed.
- Cost for the equipment assumes no GFE including vehicles, and explosives for demolition purposes.
- Cost for equipment assumes rental of portable explosives magazine.
- Security cost includes nighttime monitoring of portable magazine for duration of clearance action.
- Mobilization, demobilization and subsistence costs include;
 - Initial Site Visit – three airfares, three days of a rental vehicle with fuel, two nights at a hotel for three people and an estimated 7.5 per diem allowances (three

75% travel days and one full day) for the Task Manager, SUXOS and the UXO Safety Officer.

- Fieldwork – seven airfares, 33 days of a rental vehicle with fuel (two SUVs and one pickup for 11 days or 1-1/2 weeks), 77 nights at a hotel (11 nights for seven men) and an estimated 87.5 per diem allowances (two 75% travel days and 11 full days for the UXO Safety Officer and the six-member UXO project team).
- Site Meeting – two airfares, three days of a rental vehicle with fuel, two nights at a hotel for two people and an estimated 5.0 per diem allowances (two 75% travel days and one full day) for the Task Manager and the UXO Safety Officer.
- Field equipment includes a Model 663 explosives magazine (\$578), digital camera (\$400), four Schonstedt Magnetometers at \$20/each per week for 3 weeks (\$240), three hand-held radios at \$200 each (\$600), and other small miscellaneous hand tools and equipment (\$150).
- The costs for the Work Plan, Health and Safety Plan, and Evacuation Plan are included in the cost of the Surface Clearance.
- All recovered OE-related scrap and Non-OE related scrap will be removed, collected, and recycled through a local scrap dealer at no cost to the Government.
- If necessary, noise monitoring will be conducted to ensure that safe noise levels are maintained during demolition operations in the vicinity of occupied structures.
- Land survey teams will establish a 200-foot by 200-foot grid system for surface clearance activities in open areas. Where practical, individual building lots will serve as discrete grids. Surveyors using GPS will locate, mark and record the locations of buried lot corner marker pins.
- Road closures and evacuation of local residents will occur during the Comprehensive Surface Clearance in areas falling within the minimum separation distance (MSD) for the Most Probable Munition (MPM), which is a Mk23 Mod 01 practice bomb, when demolition activities (Intentional Detonations) are required. More than 3,700 Mk 23 practice bombs have been documented as found on the property since its closure.
- It will be assumed that all demolition operations will take place on the undeveloped property, which will reduce the number of local residents to be evacuated and the extent of required road closures. Evacuation costs will vary depending on the number of persons (i.e., local population) affected by these activities. These costs will include:
 - Road closure costs (see TABLE 4-2 of Appendix C) include project planning and direct labor (i.e., road closure costs). Road closures are estimated to last eight hours.
 - Residents will be evacuated from homes for approximately eight to ten hours. No overnight evacuations are anticipated.

- Contract security personnel will oversee road closures. Cost for these support personnel is included in the road closure costs.
- A local hotel will be available for individuals who are evacuated from homes and/or businesses. Project staff members to support residents utilizing the facility and to provide project-related information including future evacuation activities will man the hospitality center. The facility will provide a block of rooms, restroom facilities, communications, tables and chairs. A daily reimbursement for meals will be made based on the JTR per-diem rate for Arlington, Texas. For the purposes of this estimate, the daily cost to establish and operate a hospitality center has been estimated.
- Evacuation costs (see TABLE 4-3 of Appendix C) will vary based on the number of residents affected by the OE response action implemented. Daily evacuation costs are based on a daily estimate of 300 households requiring evacuation, the coordination effort that would be required to evacuate everyone, and the cost to evacuate (e.g., set up of hospitality center, mobilization of those with special medical needs, etc.). The cost of keeping the hospitality center open and staffed will be the same regardless of the number of residents evacuated.
- Notification of homeowners, schools, businesses, community support agencies, and other organizations affected by possible evacuations during surface clearance activities will be conducted approximately 60 days prior to initiation of the clearance activities. Written notifications will be distributed approximately 30 days and ten days prior to the field activities to be conducted in a particular area. Twenty-four hours prior to an evacuation, project representatives will go door-to-door within the affected evacuation area to remind residents about the next day's activities and to answer any specific questions or address any specific needs. Agencies and organizations that are to be notified include (but are not limited to): local law enforcement, fire departments, the Mayor's Office, the Tarrant County Emergency Management Department, the City of Arlington Traffic Control Department, and local media (e.g., radio, television, and newspapers).
- USACE representatives and/or contractor support personnel will perform all evacuation procedures.
- Two contract full-time public affairs representatives under the direction of the USACE will coordinate evacuations and road closures. These individuals will contact persons scheduled for evacuation, maintain a project web site, make themselves available to answer other project-related questions, interact with local agencies and organizations, as well as provide news releases and interact with the local news media.
- Local police and fire departments will be notified approximately 60 days prior to commencement of field activities. These agencies will be briefed on the anticipated field and associated evacuation schedule, the specific areas/addresses

to be impacted on a particular day, and the general withdrawal and relocation procedures, including site security.

- It is assumed that 24-hour notification will be provided to affected residents prior to actual evacuation.
 - A contracted security force will provide conduct security in the evacuated area.
 - No overnight evacuations are anticipated.
 - Evacuation costs include evacuation planning, coordination (including security of UXO item), operation of the hospitality center, transport of affected residents to and from the hospitality center, and area security.
 - At present, no businesses are known to exist within the area influenced by the clearance.
 - If a business exists within the area at the time of the clearance, surface clearance activities will be coordinated in such a manner as to minimize fiscal impacts to local businesses (if possible, surface clearance activities will be conducted during lunch time/around business hours).
- A Task Manager will generate a project report at the conclusion of the site work.
 - A Project Manager will review the project report.

TABLE 4-1 ALTERNATIVE 3, COMPREHENSIVE SURFACE CLEARANCE WITH INSTITUTIONAL CONTROLS

Item	Unit	Rate	Quantity	Cost
Institutional Control Costs (from Alt. 2)	Lump sum		1	\$21,439
Project Design (WP, SSHP, Evacuation Plan)	Man-hours	\$71.44	300	\$21,432
Project Implementation	Man-hours	\$71.44	80	\$5,715
Project Oversight	Man-hours	\$91.09	16	\$1,457
Contract Management	Man-hours	\$86.01	16	\$1,376
UXO Safety Officer (8% Differential)	Man-hours	\$53.11	60	\$3,187
UXO Safety Officer (no differential)	Man-hours	\$49.17	16	\$787
Senior UXO Supervisor (8% Differential)	Man-hours	\$61.55	0	\$0
Senior UXO Supervisor (4% Differential)	Man-hours	\$59.27	60	\$3,556
Senior UXO Supervisor (no Differential)	Man-hours	\$56.99	16	\$912
UXO Supervisor (8% Differential)	Man-hours	\$55.27	60	\$3,316
UXO Supervisor (4% Differential)	Man-hours	\$53.23	0	\$0
UXO Supervisor (no Differential)	Man-hours	\$51.18	16	\$819
4 - UXO Technician II (8% Differential)	Man-hours	\$48.10	240	\$11,544
4 - UXO Technician II (no Differential)	Man-hours	\$44.53	64	\$2,850
Security Guard (Nighttime Magazine Security)	Man-hours	\$19.31	100	\$1,931
Airfare – Charlotte, NC to Dallas/Ft. Worth, TX	Round trip	\$1,233.00	12	\$14,796
Rental Vehicles	Day	\$69.25	39	\$2,701
Hotel Stay	Day	\$77.00	87	\$6,699
Per Diem	Day	\$34.00	100	\$3,400
One-time Explosives Delivery	Each	\$1,000.00	1	\$1,000
Equipment, Supplies and Storage Magazine	Lump sum	\$1,968.00	1	\$1,968
Road Closures	Each	\$605.00	10	\$6,050
Evacuations	Each	\$26,182.00	6	\$157,092
Project Report	Man-hours	\$71.44	60	\$4,286
Project Report Review	Man-hours	\$81.10	4	\$324
SUM				\$278,638
TOTAL (including 7% fee)				\$298,142

Created By: F. Tolen	Reviewed By: C. Walden	Approved By: F. Tolen
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TABLE 4-2 INDIVIDUAL ROAD CLOSURE COST

Item	Unit	Rate	Quantity	Cost
Coordination	Man-Hours	71.44	1.5	\$107
Work Zone Traffic Control Plan ¹	Each	150.00	1	\$150
Private Security ^{2,3}	Man-Hours	19.31	18	\$348
Permits	Each	n/a	not required ¹	0
total				\$605

Created By: F. Tolen	Reviewed By: C. Walden	Approved By: F. Tolen
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1. Paul Iwuchukwu, City of Arlington Traffic Control (817) 459-6376
2. From CLIN 0010 Burdened Labor August 29 2002.
3. Assume road closing for eight hours.

TABLE 4-3 DAILY (PER-DAY) EVACUATION COST

Item	Unit	Rate	Quantity	Cost
Transportation ¹	Man Trips	15.00	300	\$4,500
Information Ctr Ballrooms	Rooms	500.00	3	\$1,500
Meals ²	Day	32.00	150	\$4,800
Evacuation Coordination	Man-Hours	24.00	150	\$3,600
		3.00	77.41	\$232
Rooms ^{3,4,5,6}	Each per Day	77.00	150	\$11,550
total				\$26,182

Created By: F. Tolen	Reviewed By: C. Walden	Approved By: F. Tolen
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1. Plano DFW Van Service, 10 miles one-way (972) 960-8780
2. Head of Household 100% of JTR per diem (\$32), minor child 75% of JTR per-diem (\$24).
3. LaQuinta Inn 825 N. Watson Rd Arlington Room rate \$77(JTR). 817 640-4142
4. Assume 300 households affected per day, but only 150 make use of facility.
5. Assume that two members attend from those households using facility.
6. One room per household using facility.

5.0 ALTERNATIVE 4 - CLEARANCE TO DETECTABLE DEPTH WITH INSTITUTIONAL CONTROLS

5.1 The estimated capital cost to implement Alternative 4 is \$537,734. The project is estimated to last approximately three weeks, based on removing 100% of the total estimated anomalies (1,134 anomalies) in the accessible portion of the 162 acres within the Five Points OLF, at a rate of 54 anomalies per day, four ten-hour days a week. A Senior UXO Supervisor will supervise a five-man UXO team during the limited clearance to detectable depth activities. The cost estimate is based on the following assumptions.

- The project design will be conducted by a Task Manager and is estimated to take approximately 220 man-hours.
- The project implementation will be conducted by a Task Manager and is estimated to take approximately 520 man-hours. This includes 270 hours during geophysical survey and reacquisition and 16 hours related travel, plus 218 hours during intrusive clearance with 16 hours of related travel.
- A Project Manager will provide approximately eight man-hours of project oversight.
- A Contracts Officer will use approximately eight man-hours to generate any necessary contractual agreements.
- Per Diem and lodging are based upon the rates established in the revised edition of the Joint Travel Regulations for the City of Arlington.
- Mobilization/demobilization cost assumes project management, land surveyors, and UXO Supervisors/Technicians are not available locally and will require rental vehicles and transportation reimbursement for air travel between the east coast and Arlington, Texas.
- One two-man geophysical teams will mobilize all geophysical equipment to the site, including EM-61s, all-terrain vehicles (ATV), Trimble Real-Time Kinematic GPS systems and necessary support equipment.
- One two-man geophysical team will collect data over the entire 162-acre area (only 35%, or 57 acres accessible) using grid methodology at a rate of five acres a day for twelve ten-hour days. Rate includes per diem and travel expenses based on the JTR rates.
- Geophysical data will be processed and interpreted offsite by a Project Geophysicist and a geophysical team at a rate of fifteen acres a day for four ten-hour days.
- An estimated 1,134 anomalies will be reacquired using GPS equipment by the two-man geophysical team at a rate of 75 anomalies per day for fifteen ten-hour days.
- A UXO Safety Officer will support site work using an estimated 286 man-hours, which includes two eight-hour travel days, approximately twelve ten-hour workdays (geophysical data collection – 57 acres at a rate of five acres a day, and approximately fifteen ten-hour workdays (anomaly reacquisition – 1,134 anomalies at a rate of 75 anomalies a day).
- A Senior UXO Supervisor will supervise a five-man UXO team (one UXO Supervisor and four UXO Technician II) while conducting the subsurface clearance. Each person is estimated at 234 man-hours, which includes two eight-hour travel days, one eight-hour

day for site preparation, and approximately twenty-one ten-hour workdays (1,134 anomalies at a rate of 54 anomalies per day).

- Cost for equipment assumes no GFE including vehicles, and explosives for demolition purposes.
- Cost for equipment assumes rental of portable explosives magazine.
- Security cost includes nighttime hour monitoring of portable magazine for duration of clearance action.
- A local explosives distributor will make a one-time explosives-delivery to the site so that any UXO items discovered during the surface clearance can be destroyed.
- The costs for the Work Plan, Health and Safety Plan, and Evacuation Plan are included in the cost of the Clearance.
- All recovered OE-related scrap and Non-OE related scrap will be removed, collected, and recycled through a local scrap dealer at no cost to the Government.
- If necessary, noise monitoring will be conducted to ensure that safe noise levels are maintained during demolition operations in the vicinity of occupied structures.
- Mobilization, demobilization and subsistence costs include;
 - Initial Site Visit – three airfares, three days of a rental vehicle with fuel, two nights at a hotel for three people and an estimated 7.5 per diem allowances (three 75% travel days and one full day) for the Task Manager, SUXOS, and the UXO Safety Officer.
 - Fieldwork – seven airfares, 126 days of a rental vehicle with fuel (two SUVs and one pickup for 42 days each), 287 nights at a hotel (41 nights for seven men) and an estimated 290.5 per diem allowances (two 75% travel days and 40 full days for the UXO Safety Officer and the six-member UXO project team).
 - Site Meetings – two airfare, three days of a rental vehicle with fuel, two nights at a hotel for two people and an estimated 5.0 per diem allowances (two 75% travel days and one full day per trip) for the Task Manager and the UXO Safety Officer.
- Field equipment includes Model 663 explosives magazine (\$671), a digital camera (\$400), four Schonstedt Magnetometers at \$20/each per week for one week (\$80), three hand-held radios at \$200 each (\$600), and other small miscellaneous hand tools and equipment (\$150).
- Road closures and evacuation of local residents will occur during the Clearance to Detectable Depth in areas falling within the minimum separation distance (MSD) for the Most Probable Munition (MPM), which is 200 feet for a Mk23 Mod 01 practice bomb. More than 3,700 Mk 23 practice bombs have been documented as found on the property since its closure. Therefore, evacuation will be assumed, and will not be contingent on discovery of additional (new) UXO items. Evacuation costs will vary depending on the number of persons (i.e., local population) affected by these activities. These costs will include:

- Road closure costs (See TABLE 4-2 of Appendix C) include project planning and direct labor (i.e., road closure costs). Road closures are estimated to last approximately eight hours.
- Contract security personnel will oversee road closures. Cost for these support personnel is included in the road closure costs.
- A daily care center will be established to provide a place of shelter for individuals who are evacuated from homes and/or businesses. Project staff members to support residents utilizing the center and to provide project-related information including future evacuation activities will man the hospitality center. The center will provide a block of rooms, restroom facilities, communications, tables and chairs. A daily reimbursement for meals will be made in the amount of 75 percent of the JTR per-diem rate for Arlington, Texas. For the purposes of this estimate, the daily cost to establish and operate a hospitality center has been estimated.
- Evacuation costs (see TABLE 5-1 of Appendix C) will vary based on the number of residents affected by the OE response action implemented. Daily evacuation costs are based on estimates of the number of people needing evacuation and using the temporary evacuation facility, the coordination effort that would be required to evacuate everyone, and the cost to evacuate (e.g., set up of hospitality center, transportation, etc.). The cost of keeping the hospitality center open and staffed will be the same regardless of the number of residents evacuated.
- Notification of homeowners, schools, businesses, community support agencies, and other organizations affected by possible evacuations during surface clearance activities will be conducted approximately 60 days prior to initiation of the clearance activities. Written notifications will be distributed approximately 30 days and ten days prior to the field activities to be conducted in a particular area. Twenty-four hours prior to an evacuation, project representatives will go door-to-door within the affected evacuation area to remind residents about the next day's activities and to answer any specific questions or address any specific needs. Agencies and organizations that are to be notified include (but are not limited to): local law enforcement, fire departments, the Mayor's Office, the Tarrant County Emergency Management Department, the City of Arlington Traffic Control Department, and local media (e.g., radio, television, and newspapers).
- USACE representatives and/or contractor support personnel shall perform all evacuation procedures.
- Two contract full-time public affairs representatives under the direction of the USACE will coordinate evacuations and road closures. These individuals will contact persons scheduled for evacuation, maintain a project web site, make themselves available to answer other project-related questions, interact with local

agencies and organizations, as well as provide news releases and interact with the local news media.

- Local police and fire departments will be notified approximately 60 days prior to commencement of field activities. These agencies will be briefed on the anticipated field and associated evacuation schedule, the specific areas/addresses to be impacted on a particular day, and the general withdrawal and relocation procedures, including site security.
- It is assumed that 24-hour notification will be provided to affected residents prior to actual evacuation.
- Contract force will provide security in the evacuated A contracted area.
- Residents within the exclusion zone will be evacuated from homes for approximately 8 to 10 hours per day, long enough for the demolition team to conduct intrusive investigations and demolition activities. No overnight evacuations are anticipated.
- The number of evacuations determined for Clearance of OE to Detectable Depth are based on the number of days (i.e., production rate) that field crews will be working within the MSD (i.e., safety exclusion zone) for occupied structures.
- Evacuation costs include evacuation planning, coordination (including security of UXO item), operation of the hospitality center, transport of affected residents to and from the hospitality center, and area security.
- At present, no businesses are known to exist within the area influenced by the clearance.
- If a business exists within the area at the time of the clearance, activities will be coordinated in such a manner as to minimize fiscal impacts to local businesses.
- A Task Manager will generate a project report at the conclusion of the site work.
- A Project Manager will review the project report.

TABLE 5-1 DAILY (PER-DAY) EVACUATION COST

Item	Unit	Rate	Quantity	Cost
Transportation ¹	Man Trips	15.00	90	\$1,350
Information Ctr Ballrooms	Rooms	500.00	1	\$500
Meals ²	Day	32.00	45	\$1,440
Evacuation Coordination	Man-Hours	24.00	45	\$1,080
		3.00	77.41	\$232
Rooms ^{3,4,5,6}	Each per Day	77.00	45	\$3,465
			total	\$8,067

Created By: F. Tolen	Reviewed By: C. Walden	Approved By: F. Tolen
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1. Plano DFW Van Service, 10 miles one-way (972) 960-8780
2. Head of Household 100% of JTR per diem (\$32), minor child 75% of JTR per-diem (\$24).
3. LaQuinta Inn 825 N. Watson Rd Arlington Room rate \$77 (JTR). 817 640-4142
4. Assume 90 households affected per day, but only 45 make use of facility.
5. Assume that two members attend from those households using facility.
6. One room per household using facility.

TABLE 5-2 ALTERNATIVE 4, CLEARANCE TO DETECTABLE DEPTH IN LIMITED AREAS WITH INSTITUTIONAL CONTROLS

Item	Unit	Rate	Quantity	Cost
Institutional Control Costs (from Alt. 2)	Lump sum		1	\$21,439
Project Design (WP, SSHP, Evacuation Plan)	Man-hours	\$71.44	220	\$15,717
Project Implementation	Man-hours	\$71.44	520	\$37,149
Project Oversight	Man-hours	\$91.09	20	\$1,822
Contracts Management	Man-hours	\$86.01	8	\$688
Geophysical Mobilization/Demobilization	Lump sum	\$4,020	1	\$4,020
Geophysical Data Collection (EM-61)	Weeks	\$8,825.00	3.0	\$26,475
Geophysical Data Interpretation	Weeks	\$4,225.00	1.0	\$4,225
Anomaly Reacquisition	Weeks	\$8,825.00	3.8	\$33,535
UXO Safety Officer (4% differential)	Man-hours	\$51.14	270	\$13,808
UXO Safety Officer (no differential)	Man-hours	\$49.17	16	\$787
Senior UXO Supervisor (8% differential)	Man-hours	\$61.55	210	\$12,926
Senior UXO Supervisor (4% differential)	Man-hours	\$59.27	8	\$474
Senior UXO Supervisor (no differential)	Man-hours	\$56.99	16	\$912
UXO Supervisor (8% differential)	Man-hours	\$55.27	210	\$11,607
UXO Supervisor (4% differential)	Man-hours	\$53.23	8	\$426
UXO Supervisor (no differential)	Man-hours	\$51.18	16	\$819
4 - UXO Technician II (8% differential)	Man-hours	\$48.10	840	\$40,404
4 - UXO Technician II (4% differential)	Man-hours	\$46.31	32	\$1,482
4 - UXO Technician II (no differential)	Man-hours	\$44.53	64	\$2,850
Security Guard (Nighttime Magazine Security)	Man-hours	\$19.31	420	\$8,110
Airfare – Charlotte, NC to Dallas/Ft. Worth	Round trip	\$1,233.00	12	\$14,796
Rental Vehicles	Day	\$69.25	132	\$9,141
Hotel Stay	Day	\$77.00	297	\$22,869
Per Diem (Two 75% travel days, one full day)	Day	\$34.00	303	\$10,302
One-time Explosives Delivery	Each	\$1,000.00	1	\$1,000
Equipment, Supplies and Storage Magazine	Lump sum	\$1,901.00	1	\$1,901
Road Closures	Each	\$605.00	32	\$19,360
Evacuations	Each	\$8,067.00	22	\$177,474
Project Report	Man-hours	\$71.44	80	\$5,715
Project Report Review	Man-hours	\$81.10	4	\$324
SUM				\$502,556
TOTAL (including 7% fee)				\$537,734

Created By: F. Tolen	Reviewed By: C. Walden	Approved By: F. Tolen
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APPENDIX D

RECORD OF COMMUNICATION WITH MAJOR DALLAS R. LYNCH, US ARMY (RET.)

Record of Communication

From: Ft. Worth District FUDS Projects Manager

Sent: Monday, September 23, 2002 3:04 PM

To: Project Manager, US Army Engineer Support Center, Huntsville (USAESCH)

Cc: USAESCH Technical Manager, USACE Fort Worth District PAO, USACE Fort Worth District Legal

Subject: Five Points OLF Mysteries Revealed...

Importance: High

I talked to Mr. Dallas R. Lynch (501-225-1124; Highwood Drive, Little Rock, AR 72205). This is indeed the same former Major Dallas R. Lynch who is the signatory to the two clearance certificates for the former Five Points OLF. Mr. Lynch is now 82 years young, and has a crystal clear memory of all things explosive.

He recalls clearly that he only ever cleared one (1) site in Arlington, although he could not recall the name. He said that all the M47 chemical bombs he found were of the **blue** practice variety. He found no evidence that any white phosphorus or any other chemical filler was ever used in one of these devices. He noted that the casings would have been OD green had these fillers been used, and the items he found were all blue. All the indications he observed was that these devices were filled with water when dropped. Mr. Lynch described the four-foot long central tube which, when filled with water, would burst, splitting the item. He knew that the M-38 had a four-pound black powder spotting charge, and said that this was similar to the M-47 in many respects.

Mr. Lynch could not explain why he issued the second clearance certificate, unless it was to correct the area of the central target. He thought that the target areas specified were always estimates anyway. He observed that this site was much smaller than the typical bombing range, which was usually around 600 acres. He waxed eloquent about all the Texas bombing ranges he cleared in Midland (he recalled there were 19 of them), Big Springs, Odessa, and Childress, plus those in Clovis, Hobbs, and Roswell, NM. He said that they typically cleared 10,000 bombs from the surface of a 600-acre range.

Mr. Lynch also spoke of Southwest Proving Ground, where his and another team cleared 35 tons of ordnance per week from the site, each week, for a two year period (do the math - that's ~3,500 tons, or 7 million pounds total).

He said in all his experience they only ever had one accident. A contractor was cutting a five-inch rocket in two. The rocket had buried itself in mud, and had extinguished itself before completely exhausting its propellant. When the cutting torch cut the propellant chamber, the propellant ignited, and sent the rocket off into an uncontrolled flight. The rocket fin badly cut the contractor's leg as it sped by. As I understood the story, this occurred at SWPG.

Mr. Lynch explained that they typically cleared ordnance in the fall and winter months when the vegetation was dormant, and they could clear brush via burning. During the winter they would move to the high plains areas where there was little or no vegetation.

Mr. Lynch is a WWII veteran, serving in Africa, Sicily, and other parts of Italy. Following the war he attended the Mine Warfare and Demolition school at Fort Belvoir, and later went to Germany for additional training. He mused that this problem has been around a long time, citing his finding live Civil War cannonballs at Fort Pulaski in Georgia.

I repeat most of our conversation to illustrate the depth of his knowledge and the clarity of his memory. He was very loquacious and eager to talk and to help. He said that we could call him anytime if we had further questions.

District FUDS Projects Manager

APPENDIX E

POTENTIAL SOIL IMPACT SURVEY

**SOIL IMPACT SURVEY TRANSMITTAL LETTER
AND ATTACHMENTS**



DEPARTMENT OF THE ARMY

Fort Worth District, Corps of Engineers
P.O. Box 17300 (819 Taylor Street)
Fort Worth, Texas 76102-0300

Programs and Project
Management Division
CESWF-PM-J

March 24, 2003

Mr. Fred Tolen
Zapata Engineering
1100 Kenilworth Avenue
Charlotte, NC 28204

Dear Mr. Tolen:

This letter concerns our recent soil investigation at the Former Five Points Outlying Field (OLF) in Arlington. You may recall that you helped design a plan for this investigation last June at our Technical Project Planning Workshop. The Texas Commission on Environmental Quality (TCEQ) later reviewed the plan, and approved an amended version which included their suggested improvements.

In accordance with the amended plan, we collected 144 soil samples from 132 locations and performed 2,448 soil tests. We are pleased to report that the native soils we tested showed only safe levels of zinc, lead, and white phosphorus, and no detectable levels of explosives residue. Zinc and lead are naturally occurring metals, and are present in all soils to some degree. Tests for lead and zinc revealed only average values at or below those typical for Texas soils (see Figs. 1 & 2, enclosed). In addition, all of the lead test results were at least 20 times less than the maximum concentration allowed by the State for soil in a residential area, while all the zinc results were at least 150 times below the State allowed maximum (see Figs. 3 & 4). We detected no residues of explosives in any of our tests. We did detect trace amounts of white phosphorus in 18 samples, but all of these results were at least 200 times less than the maximum concentration allowed by the State for soils in residential areas (see Fig. 5).

The complete data report is enclosed for your reference. If you have any questions concerning this report, please feel free to call me at 817-836-1432.

Sincerely,

Brian Condike
Project Manager

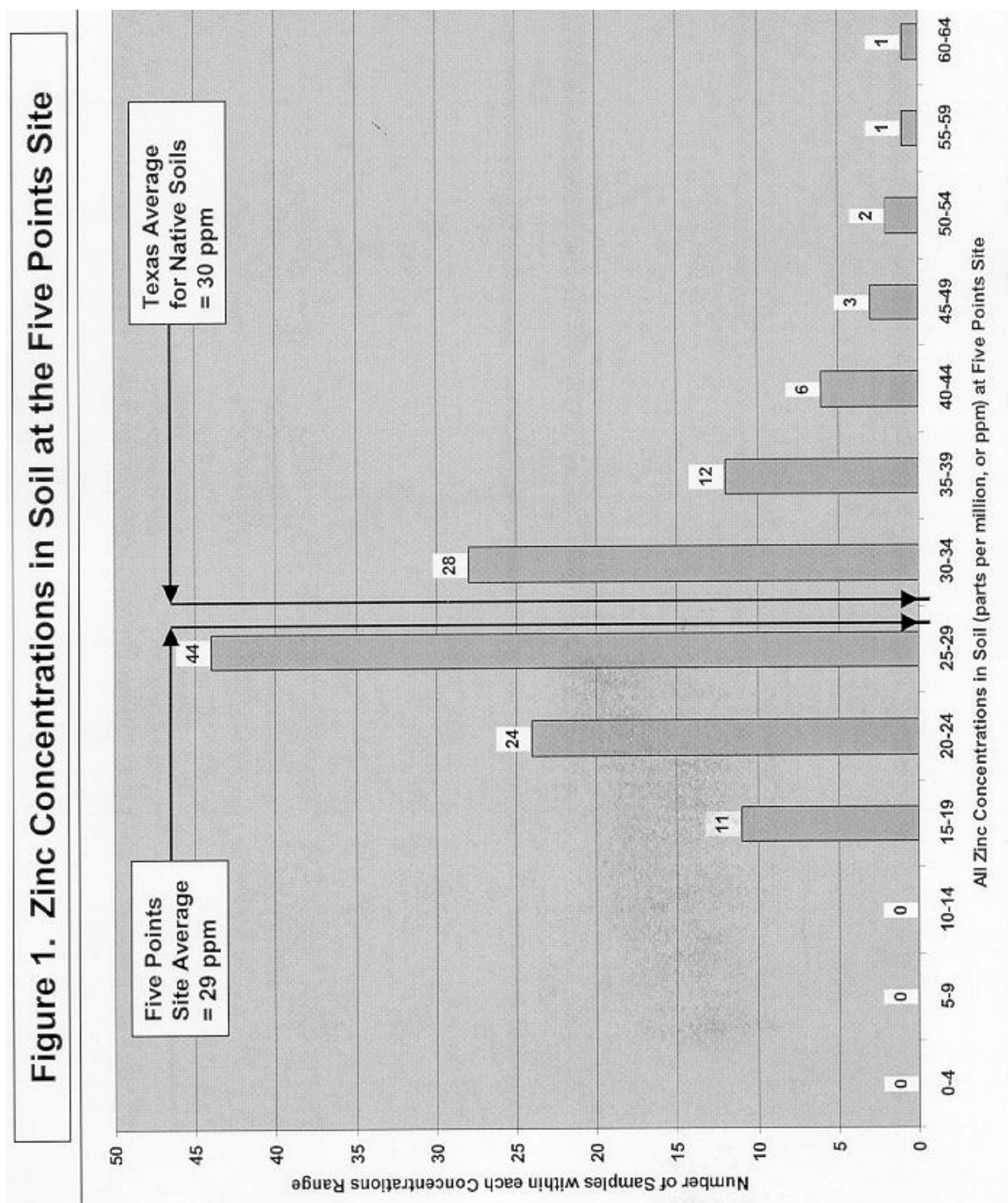
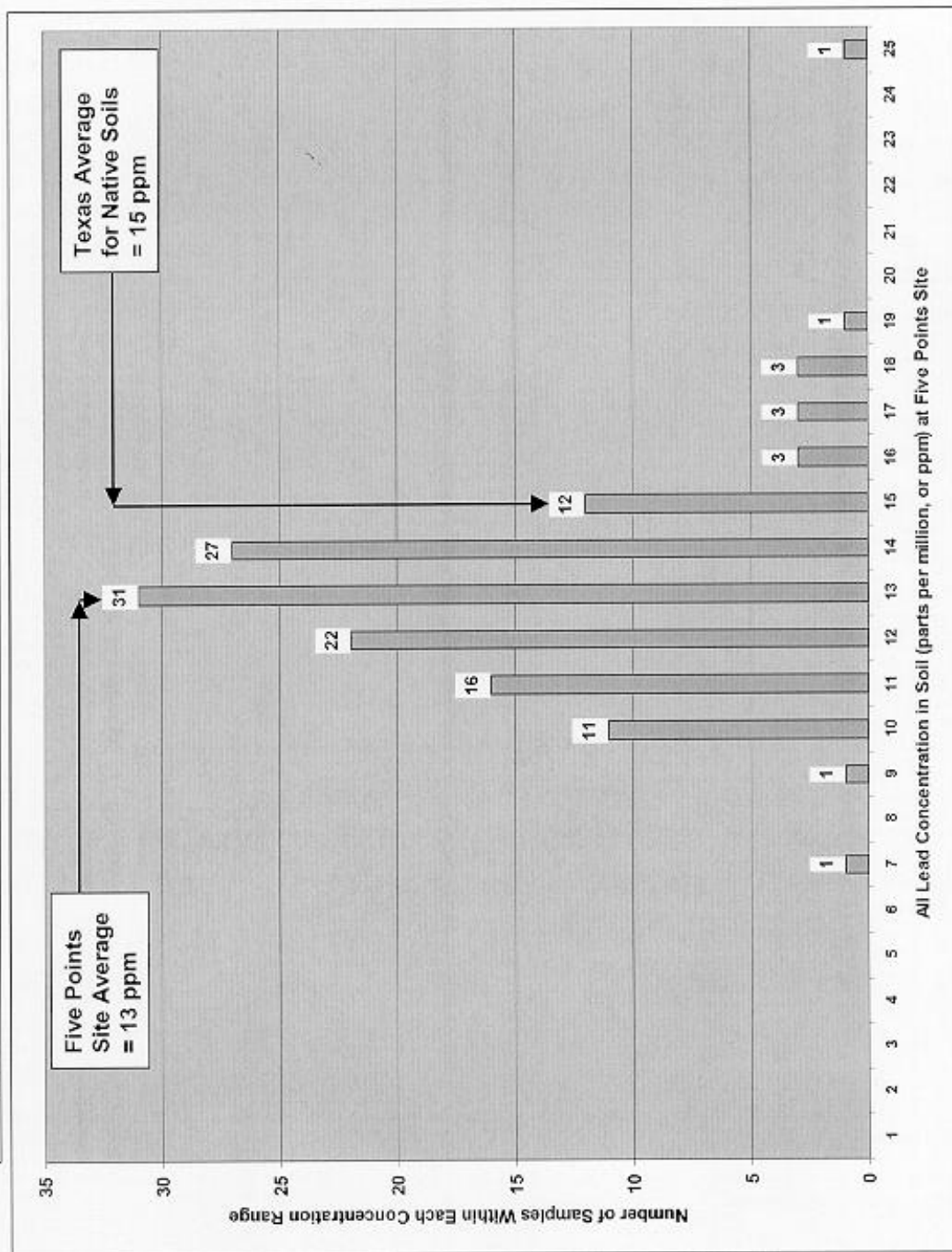
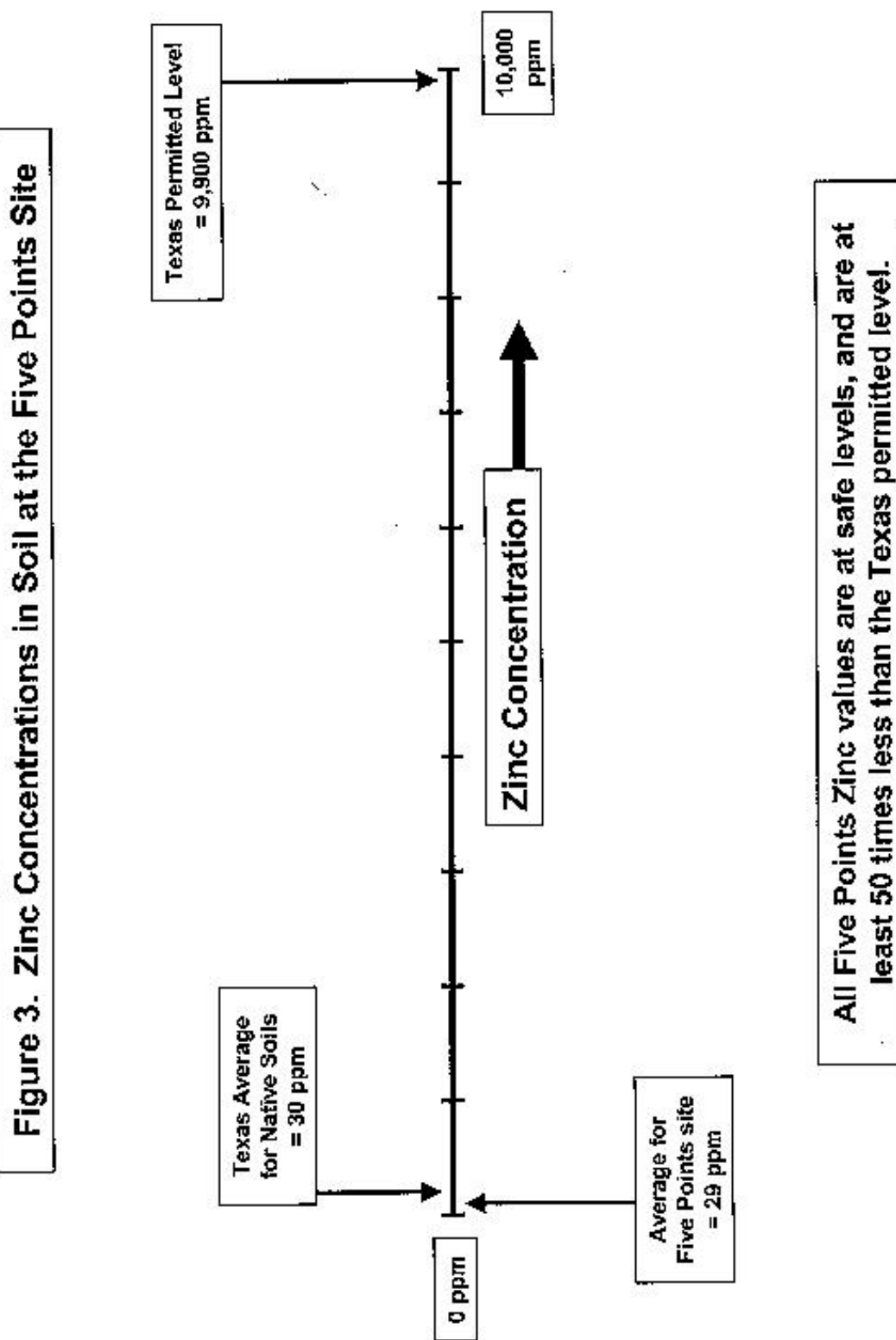
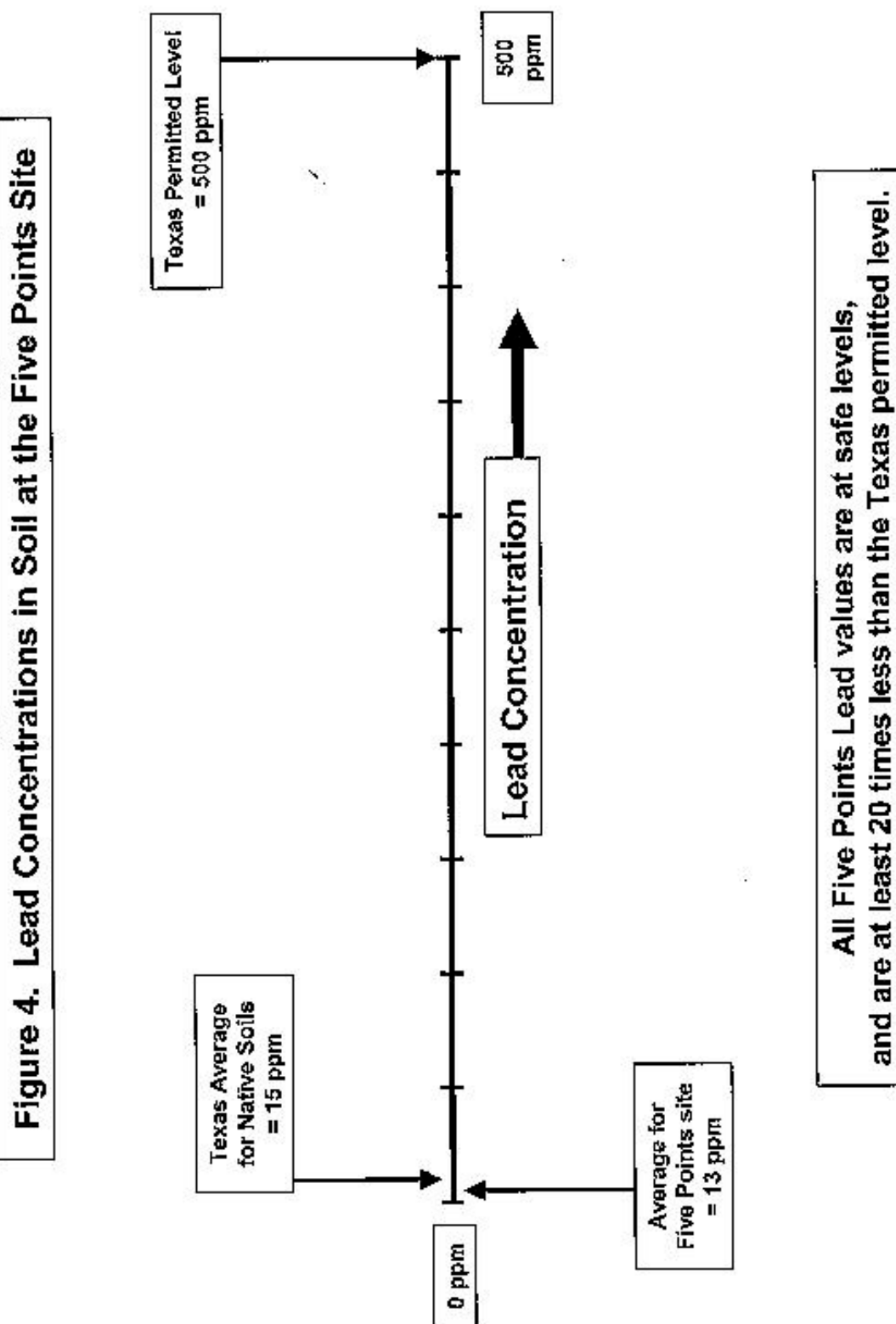


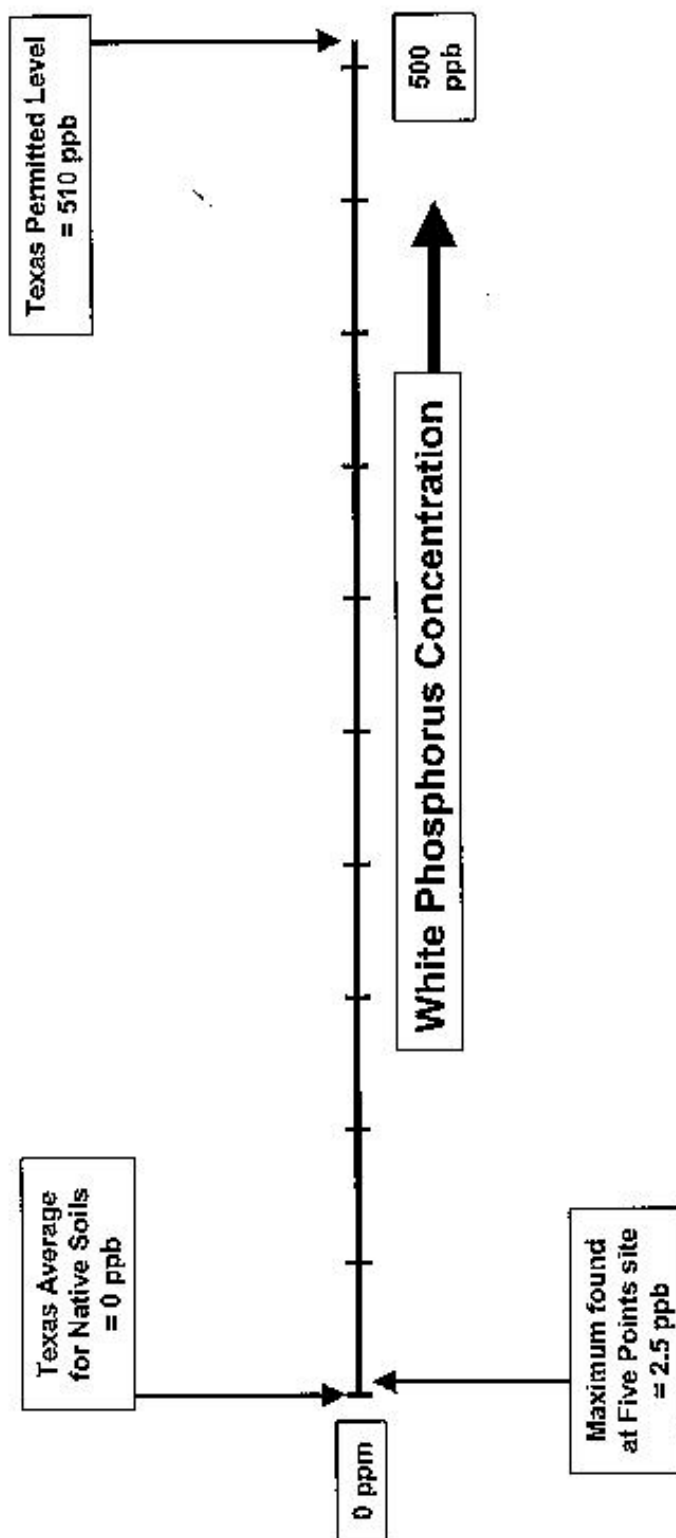
Figure 2. Lead Concentrations in Soil at the Five Points Site





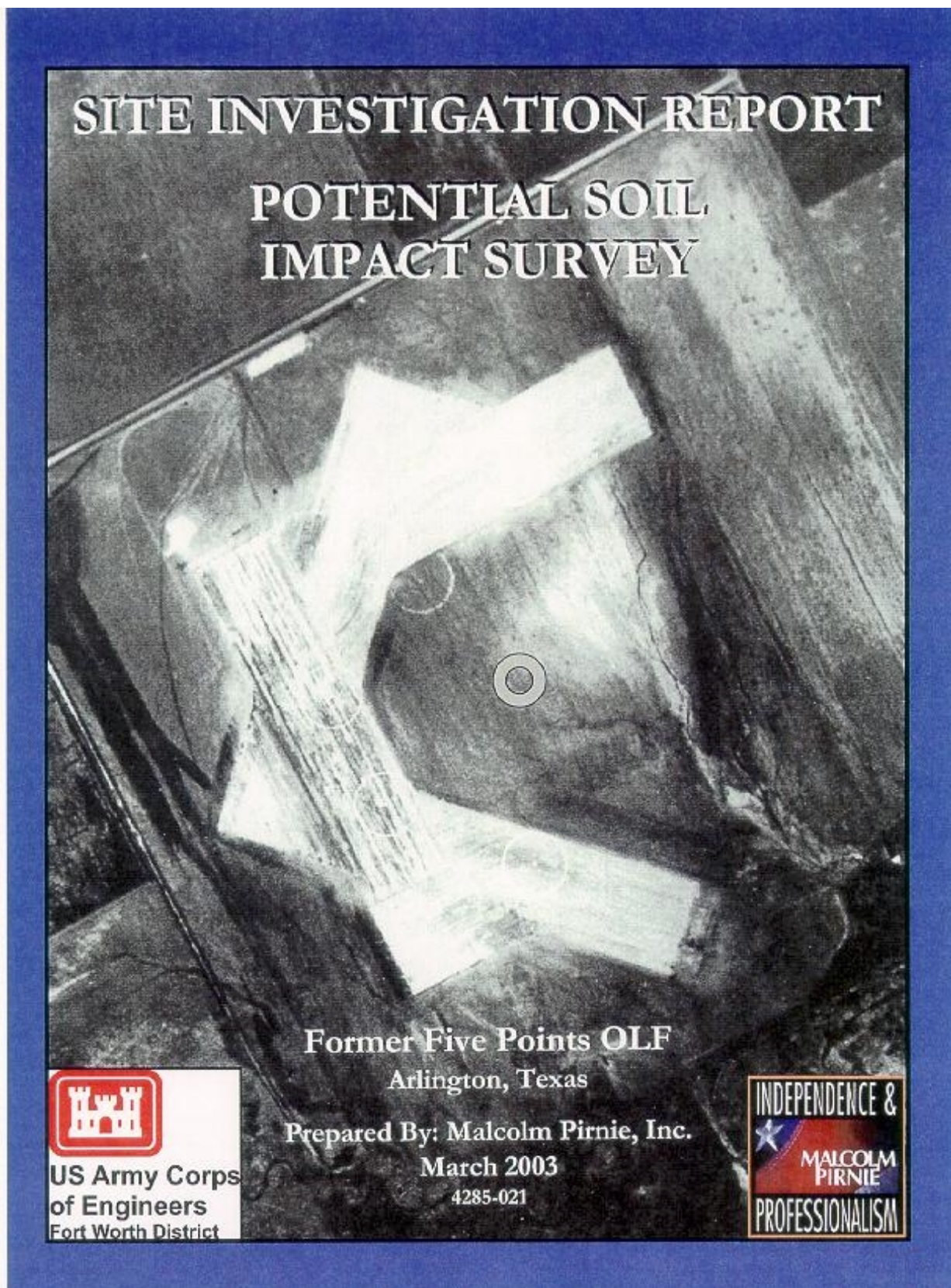


**Figure 5. White Phosphorus Concentrations in Soil
at the Five Points Site**



**All Five Points White Phosphorus values are at safe levels,
and are at least 200 times less than the Texas permitted level.**

**POTENTIAL SOIL IMPACT SURVEY
EXECUTIVE SUMMARY**



**SITE INVESTIGATION REPORT
POTENTIAL SOIL IMPACT SURVEY**

FOR THE

**FORMER FIVE POINTS
OUTLYING FIELD (OLF)**

Arlington, Texas

FOR THE

**UNITED STATES ARMY CORPS OF ENGINEERS
FORT WORTH DISTRICT
P.O. BOX 17300
FORT WORTH, TEXAS 76102-0300**

**CONTRACT NO. DACA63-01-D-0013
TASK ORDER NO. 0010**

PREPARED BY:

**MALCOLM PIRNIE, INC.
1700 WEST LOOP SOUTH, SUITE 950
HOUSTON, TEXAS**

**MARCH 2003
4285-021**

EXECUTIVE SUMMARY

The former Five Points Outlying Field (OLF) is a WWII-era Formerly Used Defense Site (FUDS) located in Arlington, Texas. The site was used as a practice landing strip and later converted into a practice bombing range, utilizing up to three different ordnance munitions for an unknown period of time. The site was closed, cleared of surface ordnance, and sold in 1956.

The site has since been developed into two residential housing communities, the Twin Parks Estates mobile home park (first developed in 1983) and South Ridge Hills (developed from 1998 to the present). Construction activities at both residential developments at the site have uncovered practice ordnance in surface soils and possibly to depths of up to six feet below ground surface (bgs).

The United States Army Corps of Engineers (USACE), Fort Worth District, in conjunction with the USACE Center of Expertise for Ordnance at Huntsville (CEHNC), has initiated an Engineering Evaluation/Cost Analysis (EE/CA) for the Five Points OLF site. This Site Investigation Report presents the results of the surface soil investigation phase of the on-going EE/CA.

The purpose of the surface soil investigation was to evaluate soil quality and compare the results to the risk-based protective concentration levels (PCLs) established under the Texas Risk Reduction Program (TRRP). The chemicals of concern (COCs) investigated at the site were selected based upon the known Department of Defense (DoD) uses of the site and the composition of the three potential munitions. These analytes include lead and zinc (metallic components of the bomb casings), white phosphorus (a smoking agent used as a spotting charge) and tetryl, 2,4,6-trinitrotoluene (TNT), and TNT degradation products (potentially used as detonation materials to expel spotting charges).

The site investigation was performed through surface soil sampling using direct push methods. The regions of the site with the highest probability of containing the COCs were identified as the center of the former practice range and the former surface water drainage areas. Sampling locations were subsequently identified in these two regions. A total of 144 near-surface (zero to two feet bgs) soil samples were collected to address potential surface exposure pathways. Twelve deeper soil samples (approximately six feet bgs) were collected to evaluate the potential for a release of COCs due to potential buried ordnance. The samples were sent to a USACE validated laboratory and three USACE laboratories for chemical analysis.

The analytical results of all of the COCs were compared to their respective Tier 1 total combined exposure pathway PCLs for residential soils established by the Texas Commission on Environmental Quality (TCEQ) under TRRP. See Section 1.5 for an overview of TRRP. Lead and zinc levels were also compared to the Texas-Specific Background Levels, found in 30 Texas Administrative Code (TAC) 350.51, as these

metals are naturally occurring in soils [15 milligrams/kilogram (mg/kg) for lead, 30 mg/kg for zinc].

Results for all samples were either non-detect or below the TRRP PCIs. Tetryl, TNT and the TNT degradation products were not detected in any sample. The total lead and zinc concentrations across the site averaged below the background levels (lead site average of 12.97 mg/kg, zinc site average of 29.91 mg/kg). White phosphorus was detected in 18 of the 156 total samples, all of which were in the shallow soil interval. Of the 18 detections, only four were quantifiable above the method quantitation limit [location B40 at 0.63 micrograms/kilogram ($\mu\text{g/kg}$); location R05-2D at 2.47 $\mu\text{g/kg}$; location R05-2C at 0.58 $\mu\text{g/kg}$, and location R08-2A at 2.22 $\mu\text{g/kg}$], and all four were well below the residential soil PCI. (510 $\mu\text{g/kg}$).

Additional soil sampling at the former Five Points OLF site is not recommended.

APPENDIX F
INSTITUTIONAL CONTROL PLAN

INSTITUTIONAL CONTROL PLAN

FIVE POINTS OUTLYING FIELD ARLINGTON, TEXAS

1.0 GENERAL DESCRIPTION

1.1 BACKGROUND

1.1.1 The Five Points Outlying Field (OLF) is approximately eight miles south of the center of Arlington, and three miles north-northeast of Mansfield, Texas. The Five Points OLF was established during World War II as a pilot training airfield, later converted into a practice bombing range, and is now designated as a Defense Environmental Restoration Program/Formerly Used Defense Site (DERP/FUDS). The US Army Corps of Engineers (USACE) is conducting an Engineering Evaluation/Cost Analysis (EE/CA) under the DERP/FUDS program to evaluate potential risk from any ordnance that may remain on the site from military activities and to develop alternative actions to reduce those risks. This site has at times been referred to as the Twin Parks Estates site; however, the project henceforth will be referred to as the Five Points OLF.

1.1.2 A preliminary Institutional Analysis has been prepared to support the recommendations presented in the Five Points OLF EE/CA. This analysis presents the opportunities to implement an institutional control program at the site and identifies agencies that may be available to assist with implementation and/or maintenance of the institutional control program. The objective of the Institutional Analysis is to identify government agencies having jurisdiction over ordnance-contaminated lands and to assess their appropriateness, willingness, and capability to assert this control. This analysis is included in Section 5 of the EE/CA.

1.2 SITE BOUNDARIES

The Five Points OLF is at the southwest corner of the intersection of Matlock Road (to the east) and West Harris Road (to the north). The 162.06-acre Five Points OLF consists of a 35-acre parcel developed as a mobile home park, known as Twin Park Estates, and nearly 127 acres under development as a single-family community, known as Southridge Hills. A portion to the south of the site along Bowman Branch is dedicated to the City of Arlington as a city park. Another small portion along Matlock Road is being held for light commercial development. Refer to Figure 5, Property Map.

2.0 SELECTED INSTITUTIONAL CONTROLS

A combination of signage, educational materials and public notification will be implemented as the institutional-control option. Although institutional controls addressing physical site access are appropriate where risk to the public has been documented as low and manageable without the removal of OE, such access limitations to the Five Points Site are unrealistic, since the site is already developed, and removal of OE is a component of the preferred-action alternative.

2.1 BEHAVIOR MODIFICATION

2.1.1 Signs

Institutional controls include design and installation of warning signs in the Bowman Branch Linear Park, at the southern boundary of the Five Points OLF. Eight 7" x 10" custom warning signs will be posted in selected locations throughout the park by two local laborers. A UXO Safety Officer will provide on-site UXO avoidance support as laborers are installing signs. Site clearance and sign installation is expected to take eight man-hours. Signage will alert the public to the former use of the area and the possible presence of ordnance and explosives, and discourage intrusive activities within the area.

2.2 NOTICES AND PERMITS

2.2.1 Fact Sheets / News Releases

Fact sheets will be distributed by means of the project mailing list and at public meetings to property owners and tenants, citizen groups, environmental groups, area businesses, regulatory officials, elected/civic officials, and local and regional media, whenever activities warrant such distribution. In any event, fact sheets will be prepared for distribution at least bi-monthly. Both facts sheets and news releases will be prepared and released upon completion of the work phases, such as the EE/CA and decision documents.

2.2.2 Information releases will include the status of studies, removal actions when and if they occur, updates on schedules, and special interest items. Fact sheets may also be issued on an as-needed basis. Copies of the fact sheets and news releases will be placed in the Information Repository, located at the Arlington Central Library. The Information Repository is located on the library's 2nd floor, behind the Reference Desk. These documents are considered non-circulating, so they cannot be removed from the library.

2.2.3 Currently, the documents at the library include the INPR, materials and meeting minutes from the October 2001 and October 2002 public meetings, and the Final ASR. As additional documents are generated, the resulting additional, new information will be placed in this public repository. The library's location and hours of operation are shown below.

**Former Five Points OLF
Information Repository:**

Arlington Central Library
101 E. Abram Street
Arlington, Texas 76010
(817) 459-6900

Hours of Operation:

Monday – Thursday
9:00 am – 9:00 pm

Friday – Saturday
9:00 am – 6:00 pm.

Sunday – seasonal hours

2.2.4 Contractor Fact Sheet

Because the project site is under residential development, a Contractor Fact Sheet was developed for distribution through the City of Arlington Building Inspections Office. This fact sheet provides a brief site history and procedures to follow if a suspect item is found. Concurrence must be received from the City Building Inspections Office prior to production and distribution of the Fact Sheet. Refer to Contractor Fact Sheet (Figure 1).

Figure 1 Contractor Fact Sheet



US Army Corps
of Engineers

To Whom It May Concern:

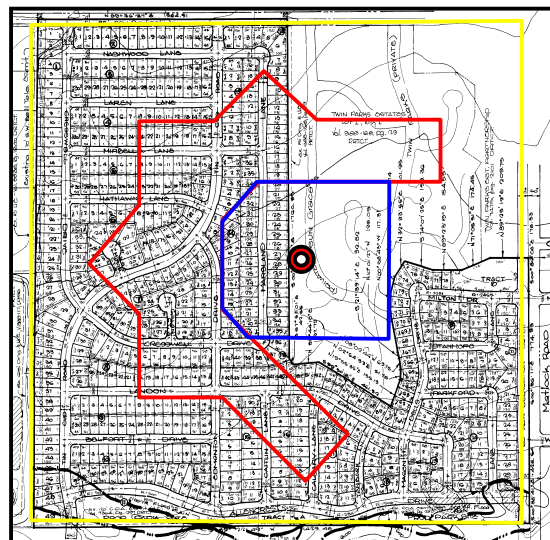
The Southridge Hills/Twin Parks Estates community is located on the former Five Points Outlying Field (OLF). This area was used for US Navy bombing practice during World War II. In 1954, the US Army Corps of Engineers completed a subsurface ordnance clearance operation in this area.

In February 2002, the US Army Corps of Engineers published an *Archives Search Report* detailing the history of the site. Additional information regarding Five Points OLF can be found on the US Army Corps of Engineer's website, www.hnd.usace.army.mil, under Product Lines, Ordnance and Explosives, Project Webs. Contractors working in the Southridge Hills/Twin Parks Estates community should be familiar with the potential for finding ordnance and what steps to take if ordnance is found.

Although the potential for finding ordnance is low, contractors and site personnel should be informed of the former military use of the area, and be particularly cautious of metal items, when digging.

REMEMBER TO:

- **REPORT** suspicious items, call 911 and tell them you may have found a suspected ordnance item.
- **RECORD** the location of the item.
- **RETREAT** from the site.



SOUTHRIDGE HILLS / TWIN PARKS ESTATES COMMUNITY

Yellow Line: Property Boundary
Red Line: Former Runway Outlines
Blue Line: Target Area Outline
Red Circle: Target Center Bulls-Eye

Please do not hesitate to call the US Army Corps of Engineers Public Affairs Office at (817) 886-1313 or (817) 886-1482 if you have any questions concerning ordnance in this area.

2.2.5 Homeowner Fact Sheet

Most of the project site is being developed as a residential neighborhood. As current and future occupants of the community improve landscaping, install irrigation systems, or perform other site activities involving excavation below ground surface, they may unknowingly expose themselves to OE-related safety hazards. It is imperative that prior to such activities, each homeowner has an awareness of the former use of the Five Points OLF site, the potential safety hazards associated with OE possibly located on-site, and the recognition and reporting of suspected OE. Informational Fact Sheets describing the former use as a defense training site and a discussion of Ordnance Awareness and Safety were developed for distribution through the local homeowner's association. Refer to Figure 2 for a sample Homeowner Fact Sheet.

2.3 TRAINING AND EDUCATION

Institutional controls involving education will include dissemination of contractor and homeowner fact sheets, and age-appropriate materials to school-age children.

2.3.1 Age-Appropriate Material for Youth

Several local public schools serving the Five Points OLF attendance area are located in proximity to the site (see Figure 3). One of the best ways to disseminate information about a project like Five Points OLF is through direct presentation to elementary, middle and high school groups. This information will be packaged to target each specific audience, depending on the age group involved. Materials such as coloring books for elementary-age students, puzzles and magnets for middle-school students, and fact sheets for older students all have worked well with similar projects in establishing an awareness of OE safety, and project specifics. Refer to Figure 4 for Middle School Worksheet.

Figure 2 Homeowner Fact Sheet

Five Points OLF Information Sheet

Why is Five Points OLF Important?

The Southridge Hills/Twin Parks Estates community is established on what was once a military airfield/practice bombing range known as Five Points Outlying Field (OLF). Although the US Government has conducted a surface clearance of ordnance at the site, it is important that the children and adults who reside there be aware of the possibility of finding potentially explosive ordnance within this area.



History of Five Points OLF.

The US Navy operated the Former Five Points OLF as a pilot training airfield during World War II. The site was converted into a practice bombing range, and ordnance usage consisted mainly of small 3-pound practice bombs, although records indicate that larger practice ordnance was occasionally used. Since the 1950's, the only recorded finds of ordnance at the site involve the small 3-pound practice bombs.

OE specific to this site may have contained a small spotting or expelling charge to indicate the point of impact. There are no historic documents, anecdotal information, or other indications that chemical warfare material (CWM), white phosphorus, or incendiary materials were used at Five Points OLF. In the 1950's, the US Government declared the area surplus property, and the Five Points OLF was sold to a private entity. Approximately 800 homes are currently located in the community.

US Army Corps of Engineers Continuing Efforts.

During development of the Southridge Hills subdivision, several homeowners have encountered the small 3-pound practice bombs. These finds prompted initiation of investigation of the site. In February 2002, the US Army Corps of Engineers completed the Inventory Phase of the current project with the release of an Archives Search Report, which summarizes all that was known about the site at the time. The current project phase involves investigation of the site hazards, and ways to reduce the risk posed by those hazards. This study will recommend a response action to implement the suggested site remedy.



Figure 2 Homeowner Fact Sheet (page 2)

What To Do.

While the chances of encountering old shells, mortars, and munitions are slim, everyone should be wary of old metal containers that may be found in the area. Regardless of age, ordnance retains its explosive potential. These items remain sensitive over time and detonation could occur with the slightest touch.

Encourage everyone to report any suspicious metal items found in the area to local authorities. If suspicious items are found, children should remember the following:

- ★ **Report** suspicious items
 - ★ **Record** the location
 - ★ **Retreat** to a safe distance
- Call 911**



Emphasis should be placed on marking the spot near the suspected item by placing a hat, jacket, or other visible item on a tree limb, bush, or brush.

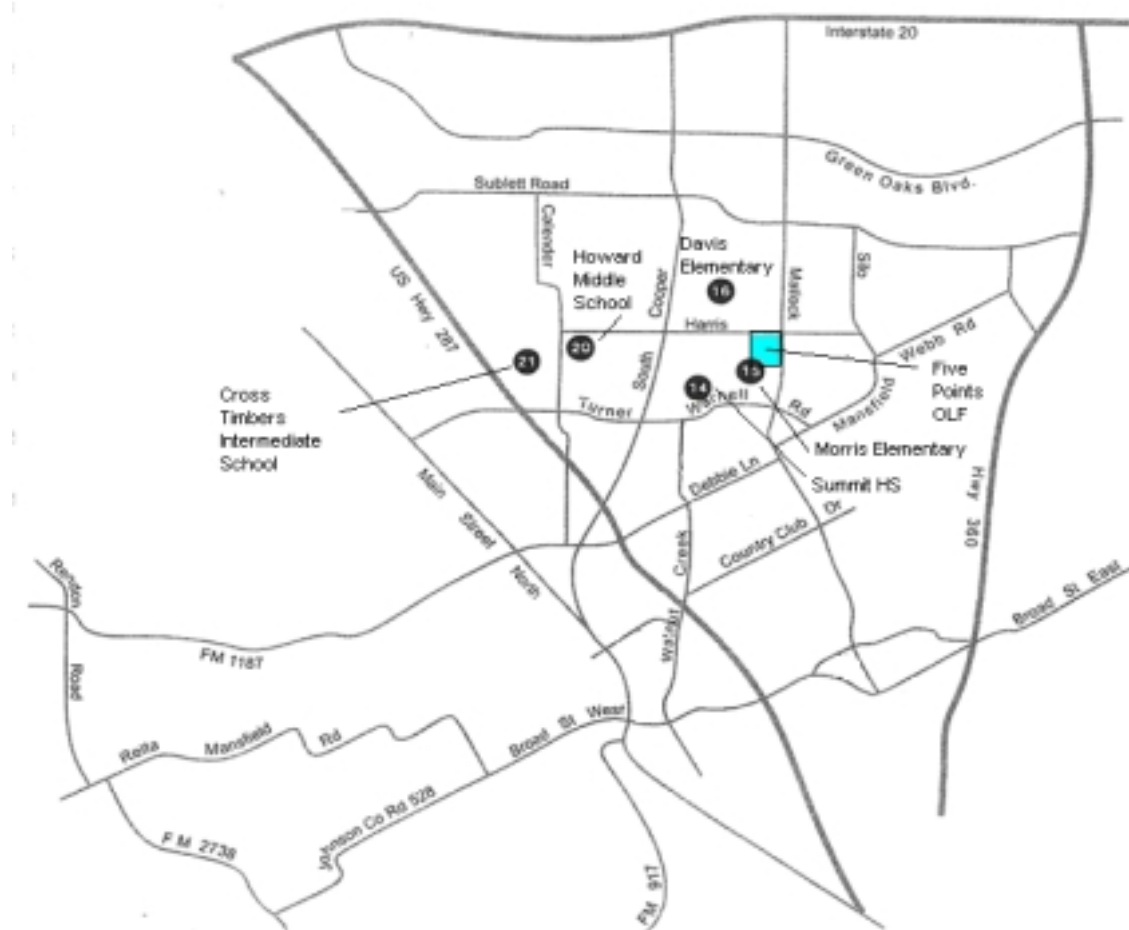
Definitions

1. **Ordnance** - ammunition, ammunition components, or explosives that have been abandoned, expelled, lost, discarded, buried or fired.
2. **Ordnance-Related Scrap** - non-explosive fragments of military munitions which have functioned as designed or were recovered from areas where munitions were intentionally destroyed.
3. **Training Ammunition** - ammunition used for training personnel on how to fire ordnance.
 - a. **Inert Ammunition** - ammunition or ammunition components with no explosive material.
 - b. **Dummy Ammunition** - ammunition or ammunition components having the appearance of actual items.
 - c. **Empty Ammunition** - ammunition or ammunition components with no filler.
 - d. **Practice Ammunition** - ammunition or ammunition components used for training. Practice ammunition simulates a service item in weight, design and ballistic properties.



Designed and produced by ZAPATAENGINEERING for the US Army Corps of Engineers, Fort Worth District

Figure 3 PUBLIC SCHOOLS SERVING FIVE POINTS OLF ATTENDANCE AREA



(Adapted from Mansfield Independent School District Facilities Location Map)

15

DP Morris Elementary School:
7900 Tin Cup Drive
Arlington, TX 76001
(817) 473-5353

16

Kenneth Davis Elementary School
900 Eden Road
Arlington, TX 76001
(817) 472-3260

21

Cross Timber Intermediate School
2934 Russell Road
Arlington, TX 76001
(817) 561-3800

20

TA Howard Middle School
7501 Calendar Road
Arlington TX 76001
(817) 561-3828

14

Summit High School
1071 W. Turner Warnell
Arlington, TX 76001
(817) 473-5660

Figure 4 Middle School Worksheet

Be Safe!

If you see any suspicious metal items:

- ★ **Report** suspicious items
 - ★ **Record** the location
 - ★ **Retreat** to a safe distance
- Call 911



Chances are you may never see old ordnance, but you should be careful if you find any type of old metal containers in the Southridge Hills/ Twin Parks Estates community. All ordnance is dangerous and can hurt or kill you!



Word Search

Be Safe
Southridge
Community
Danger
Do Not Touch
World War II
Mark Location
Military
Five Points
Ordnance
Practice
Twin Parks
Training
911
Outlying Field

M	U	M	C	O	M	M	U	N	I	T	Y
A	I	I	R	A	W	D	L	R	O	W	U
R	P	L	A	R	R	T	I	D	L	I	Y
K	R	I	E	A	P	M	C	O	T	N	R
L	A	T	C	W	S	U	S	N	D	P	A
O	C	A	N	N	T	R	O	O	A	A	T
C	T	E	A	O	N	S	U	T	N	R	I
A	I	F	N	U	I	A	T	T	G	K	L
T	C	A	D	T	O	H	H	O	E	S	I
I	E	S	R	L	P	C	R	U	R	T	M
O	O	E	O	Y	E	A	I	C	9	S	O
N	I	B	U	I	V	Y	D	H	R	T	X
T	R	A	I	N	I	N	G	9	1	1	1
I	1	9	R	G	F	I	E	L	D	L	9

Designed and produced by Zaprut/Associates for the US Army Corps of Engineers, Fort Worth District

Never touch ordnance items!

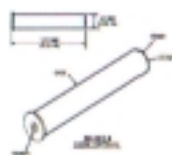


Figure 4 Middle School Worksheet (back)



US Army Corps of Engineers



Southridge Hills/Twin Parks Estates is built on what was once a practice bombing range called Five Points Outlying Field (OLF). Although the US Army Corps of Engineers has conducted ordnance-related investigations in the community, it is important that the children and adults who live in the area are aware of the potential to find ordnance.


Chances are you may never see old ordnance, but you should be careful if you find any type of old metal containers in Southridge Hills/Twin Parks Estates. All ordnance is dangerous and can hurt or kill you.



- « Report suspicious items
- « Record the location
- « Retreat to a safe distance

Call 911







For more information on the former Five Points OLF, please contact,
US Army Corps of Engineers,
Fort Worth District
819 Taylor Street
Fort Worth, TX 76102-0100

Phone: 817.886.1482
or
Phone: 817.886.1313

« REPORT

« RECORD
CALL 911

« RETREAT

3.0 RISK REDUCTION

The response action goal is the reduction and/or mitigation of the potential risk of OE exposure to the public. The Federal government lists several objectives to meet the DERP objective of “the correction of other environmental damage (such as detection and disposal of unexploded ordnance), which creates an imminent and substantial endangerment to public health or welfare or to the environment.” One of those objectives is the minimization of the potential public exposure to OE, while considering current and potential future land and water use, and technical and administrative feasibility.

4.0 SELECTED INSTITUTIONS

ZAPATAENGINEERING selected institutions for consideration without imposition of limits or bias. The selection process reflected inclusion of landowners, and local, county and state agencies. Since the US EPA has delegated its oversight authority to the Texas Commission on Environmental Quality (formerly TNRCC), the US EPA was not included for institutional analysis. The following institutions were identified for evaluation:

- Texas Commission on Environmental Quality (TCEQ)
- City of Arlington Parks and Recreation Department
- City of Arlington Planning and Development Services Department / Building Inspections
- Mansfield Independent School District (MISD)

5.0 SHORT AND LONG-TERM COSTS

The total cost for implementation of Institutional Controls at the Five Points OLF is estimated at \$21,439.

5.1 SHORT TERM COSTS

The short-term costs include design of signage, and notices and educational materials, and implementation of the IC Plan. Implementation will involve installation of eight 7” x 10” custom warning signs in selected locations throughout the Bowman Branch Linear Park, attendance at an educational meeting, and distribution of printed materials to educational and governmental entities. Associated fieldwork costs will include mobilization to the site by a UXO Safety Officer to supervise site work and provide anomaly avoidance, and rental of related field equipment necessary for installation of the signs. Education and Public Notification costs include mobilization of personnel to Arlington, Texas, for the Public Meeting, and to make arrangements for distribution of printed materials.

5.2 LONG TERM COSTS

Long-term costs involve maintenance of signage and the cost to reproduce and distribute additional printed materials. The approximate annual cost for sign maintenance is \$621, assuming the replacement of five signs per year. The annual cost of reproduction of printed materials is estimated at \$2,000, assuming yearly printing of 1,000 copies.

6.0 SCHEDULE FOR IMPLEMENTATION AND INSPECTION

The proposed removal action for the Five Points OLF is projected to take place during fiscal year 2004. This projection is subject to change based on stakeholder and regulator review and comment on the recommended response-action alternative.

7.0 LIFE EXPECTANCY OF CONTROLS

A program of education, public notification and maintenance of warning signs can continue as long as funding remains available. Signs will continue to be maintained, once a removal action has taken place. Educational and public notification materials will also continue to be distributed, but on a less frequent basis.

8.0 MEANS OF MODIFICATION AND/OR TERMINATION OF CONTROLS

As indicated above, controls may be adjusted as situations at the site change. Signage changes must be coordinated through the USACE and the City of Arlington Parks and Recreation Department. Changes to the content and/or distribution of printed materials must be coordinated with the USACE and the public entity involved in their distribution. Changes to and distribution of materials intended for public schools must be cleared through the Mansfield Independent School District, while those distributed to contractors must be cleared through the City of Arlington Building Inspections Office.

9.0 LAND USE

The 162.06-acre Five Points OLF consists of a 35-acre parcel developed as a mobile home park, known as Twin Park Estates, and nearly 127 acres under development as a single-family community, known as Southridge Hills (See Figure 5.) A portion to the south of the site along Bowman Branch is dedicated to the City of Arlington as a city park. Another small portion along Matlock Road is being held for light commercial development.

10.0 RESIDUAL RISK

Common concerns throughout the evaluation were the economic burden of imposing institutional controls on property, including the effect on property value if the property is sold, the aversion to certain controls by stakeholders, and the continuation of institutional controls when the property is subdivided and transferred, or otherwise conveyed to another party. Any of several combinations of institutional controls could be used to provide adequate notice to protect human health and the environment while USACE is conducting OE removals at known and suspected OE sites.

(Adapted from USACE, 2002)