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LETTER REPORT FOR UNEXPLODED ORDNANCE AND ORDNANCE EXPLOSIVES CLEANUP AT GOVERNMENT AND COMMERCIAL FACILITIES

VOLUME 2

REFERENCES

Table 2-1 Summary of DoD sites reviewed in detail
Continued.

Camp Gruber

Your search matched **3** of **4064** documents.
3 are presented, ranked by relevance.

Rank Score Title/Information

1 0.90 **CAMP GRUBER MILITARY RESERVATION INPR** *CAMP GRUBER MILITARY RESERVATION INPR .INPR TABLE OF CONTENTS . for .CAMP GRUBER MILITARY RESERVATION .at.MUSKOGEE, OKLAHOMA . . INPR - Inventory Project Report .This preliminary assessment includes searches of Real Estate records to verify...*

2 0.90 **CAMP GRUBER MILITARY RESERVATION** *CAMP GRUBER MILITARY RESERVATION .CAMP GRUBER MILITARY RESERVATION .MUSKOGEE, OKLAHOMA. PROJECT#K06OK001300. Corps of Engineers Geographic District is:.TULSA District . DERP FUDS Categories: . PRELIMINARY ASSESSMENTS . INPR .Correspondence ...*

3 0.84 **Alphabetical Listing of DERP FUDS Projects** *Alphabetical Listing of DERP FUDS Projects . 26 MILE BEND BOMB TARGET, Broward County, FL .A . ACCESS ROAD FOR EL CENTRO ROCKET TARGETS, Imperial County, CA .AGUADA GUN EMPLACEMENT SITE, Aguada Municipality, PR .AIKEN ARMY AIRFIELD, Aiken S...*

Displaying documents 1-10 (of 16) for domain "USACE - Project Information Retrieval System (PIRS)"

Hits	Size	Document
3	18.2K	Independence Army Air Field Auxiliary Field #7 ASR
3	1.3K	Oklahoma State
2	0.5K	BRAC SITES: Oklahoma
2	0.6K	Oklahoma State
1	7.1K	C:\HMPRO2\gifs\sec10000.htm
1	1.1K	CAMP GRUBER MILITARY RESERVATION
1	3.0K	CAMP GRUBER MILITARY RESERVATION INPR
1	59.1K	Camp Dodge ASR Findings: Appendix C
1	17.0K	Former Fort Mason: Findings Appendix C-2.10
1	5.7K	Former Pampa Army Airfield Findings: Appendix A

MORE...

Dave – all PIRS info on ~~Oklahoma~~ Camp Gruber MIL

Displaying documents 11-16 (of 16) for domain "USACE - Project Information Retrieval System (PIRS)"

Hits	Size	Document
1	2.5K	Former Pampa Army Airfield Findings: Appendix M
1	11.6K	Kansas Army Ammunition Plant: Section 5-8
1	21.3K	Sarasota Army Field ASR Findings: Section 7-8
1	1.3K	TULSA DISTRICT
1	2.7K	Text
1	2.9K	Text to Find DERP Site

INPR TABLE OF CONTENTS

for

CAMP GRUBER MILITARY RESERVATION

at

MUSKOGEE, OKLAHOMA

INPR - Inventory Project Report

This preliminary assessment includes searches of Real Estate records to verify previous DoD ownership or usage, and a determination of site eligibility and the need for cleanup.

NOTE: Each of the following hot links goes to a separately scanned page approximately 100 KB in size. The images are in a TIFF image format with a packbits compression.

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Go Back to the Project Site Page.

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM (DERP)
FORMERLY USED DEFENSE SITES (FUDS)
SITE SURVEY SUMMARY SHEET
FOR
CHEROKEE NATIONAL WILDLIFE AREA
(FORMERLY A PORTION OF CAMP GRUBER MILITARY RESERVATION)
BRAGG, OKLAHOMA

Site No. K06OK001300

SITE NAME: Cherokee National Wildlife Area or Gruber Public Hunting Area (north half), and Gruber Refuge (south half). Formerly a portion of Camp Gruber Military Reservation.

SITE LOCATION: Approximately 19 miles southeast of Muskogee, Oklahoma in Cherokee County (location map attached).

SITE HISTORY: Department of Defense (DOD) use began in 1942 when the United States of America acquired land to be used as Camp Gruber Military Reservation. In 1949, slightly less than half of the acquired acreage was deeded to the State of Oklahoma. Since that time the property has been used as a wildlife management area.

SITE VISIT: A site visit was conducted on 31 March 1992 by Carol Staudenmaier and Randall Bratcher, CESWT-EC-GF. Ron Justice, Manager of the Wildlife Area accompanied Tulsa District personnel during the site visit. Five areas known to have been used by the Army were discussed and four of the five areas were visited. The area known as "Little Tokyo" could not be located, but reportedly is a concrete structure with bullet marks in the sides. The first area visited was a structure similar to what was described as "Little Tokyo". The concrete structure was riddled with machine gun bullet impact marks. The area surrounding the structure is cratered with evidence of artillery explosions. The second area contained one small, stone building, with a concrete roof that may have been used for ordnance storage. The third location was an area where a mortar round was found by tree cutters. Mr. Justice has called the Port Sill Explosive Ordnance Disposal (EOD) Unit on numerous occasions to report such finds. He said he would contact the EOD to report this mortar round. The last area was "Little Round Hill" which was used as a target for artillery fire. The sides of the hill are pock marked with evidence of explosions. 105mm and 155mm artillery rounds have been previously found and removed by the EOD. There was no evidence of CON/HTW, HTRW or building hazards remaining at the site as the result of DOD activities.

CATEGORY OF HAZARD: Ordnance Explosive Waste (OEW).

PROJECT DESCRIPTION: An Ordnance Explosive Waste project is recommended at this site. This is a remote public use area, and unexploded ordnance has been spotted on several occasions. Huntsville Division should determine the next appropriate action for the recommended OEW Project No. K060k001301.

AVAILABLE STUDIES AND REPORTS: None.

DISTRICT POC: Carol Staudenmaier, CESWT-EC-GF, 918-581-6115.

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM (DERP)
FORMERLY USED DEFENSE SITES (FUDS)
FINDINGS AND DETERMINATION OF ELIGIBILITY
FOR
CHEROKEE NATIONAL WILDLIFE AREA
(FORMERLY A PORTION OF CAMP GRUBER MILITARY RESERVATION)
BRAGG, OKLAHOMA

Site No. K06OK001300

FINDINGS OF FACT

1. In 1942 and 1944, the United states of America acquired 65,648.88 acres of land in Muskogee County and Cherokee County, Oklahoma. This Findings of fact pertains only to the 31,283.66 acres now owned by the Oklahoma Department of Wildlife Conservation. The remaining acreage is still under Department of Defense (DOD) control.

2. The U.S. Army used the property as a military reservation known as Camp Gruber. Camp Gruber was an Army training camp between 1944 and 1949. The available real estate documents revealed no DOD improvements. The subject property was never known to be under other than DOD use or control during the period of DOD interest.

3. In 1949, the United States of America deeded 31,283.66 acres, more or less, to the State of Oklahoma. The deed contained a recapture clause regarding any national emergency.

DETERMINATION

Based on the foregoing Findings of Fact, the site has been determined to be formerly used by the DOD. It is, therefore, eligible for the Defense Environmental restoration - Formerly Used defense Sites established under 10 USC 2701 et seq.

_____
DATE

_____
ROBERT L. HERNDON
Brigadier General, USA
Commanding

PROJECT SUMMARY SHEET
FOR
DERP-FUDS OEW PROJECT NO. K06OK001301
CHEROKEE NATIONAL WILDLIFE AREA
(FORMERLY A PORTION OF CAMP GRUBER MILITARY RESERVATION)
SITE NO. K06OK001300

24 August 1992

PROJECT DESCRIPTION: This project involves the assessment of ordnance at the former Camp Gruber Military Reservation. One artillery round was observed at the site. Others have reportedly been removed by the Fort Sill Explosive Ordnance Disposal Unit.

PROJECT: The property was used by the U.S. Army for ordnance related purposes. The Department of Wildlife has not used the property for ordnance production or storage, deeming the Department of Defense (DOD) responsible for ordnance contamination. This project has been evaluated in accordance with Appendix A of the CEMP-RT memorandum dated 5 April 1990.

POLICY CONSIDERATIONS: There were no provisions in the disposal documents specifically absolving the Government from site restoration. There were no restrictions relating to the land use or the potential OEW contamination. The property has not been used for ordnance related purposes, except for public hunting since DOD disposal.

PROPOSED ACTIVITIES: Huntsville Division should determine appropriate actions for the potential OEW project at this site.

RISK ASSESSMENT: A Risk Assessment Code (RAC) of 4 has been established for this site indicating that a site inspection is appropriate. The RAC evaluation form is attached.

DISTRICT POC: Carol Staudenmaier, CESWT-EC-GF, 918-581-6115.

Umatilla Army Depot

U.S. Army Corps of Engineers
Huntsville Center

FORMERLY USED DEFENSE SITES (FUDS)
PROJECT FACT SHEET

3 June 1996
Updated 6 December 1996

1. SITE NAME: UMATILLA DEPOT ACTIVITY (Ammunition Demolition Activity)

SITE NUMBER: OR-UMATB2-NPS

LOCATION:
City: Hermiston
County: Umatilla and Morrow
State: Oregon

CATEGORY: BRAC - Engineering Evaluation/ Cost Analysis/ EE/CA

PROJECT SCOPE: This project includes conducting a 100% geophysical mapping of the ADA site with selected subsurface sampling of 75 acres to 4ft, surface clear approximately 30 grids not previously cleared and remove a debris pile in the ADA. A report outlining cleanup lternatives consistent with the Record of Decision, risk and cost will be prepared.

2. POCs:

PROJECT MANAGER: Mike Nelson , CENPS-EN-GT-EM, telephone 206-764-3458

TECHNICAL MANAGER: Glenn Earhart, CEHNC-OE-DG, telephone 205-895-1577

BASE POC: Mark Daughtery, SDSTE-UAS-EV, telephone 541-564-5294

3. SITE DESCRIPTION: Umatilla Depot Activity (UMDA) is located in northeastern Oregon. It lies approximately 3 miles south of the Columbia River. The Depot occupies a roughly rectangular area of 19,728 acres, of which 17,054 is owned by the U.S. Army. The remaining acreage is covered by restrictive easements. Generally the ground surface within the installation boundaries ranges from relatively flat to gently rolling terrain, that is occasionally marked by shallow depressions and ridges. The Ammunition Demolition Area (ADA) site consists of approximately 1,750 acres in the northwest corner of the installation. The ADA was used for demilitarization and destruction of ammunition stored at the installation.

4. SITE HISTORY: Umatilla Depot Activity was established in 1941 as an ordnance facility for storing conventional munitions in support of the United State's entry into World War II. The construction of 1,001 ammunition storage igloos began in February 1941. Subsequently, the functions of the Depot were extended to include ammunition demolition (1945), renovation (1947) and maintenance (1955). In 1962, the Army began storing chemical munitions at UMDA. No manufacturing operations have been conducted at UMDA, but testing, rework and demolition operations have been performed in several areas throughout the facility, notably the Explosive Washout Plant area and the Ammunition Demolition

Activity area.

5. PREVIOUS SITE ACTIVITIES:

- Ammunition Demolition Area (ADA): This area had a 95% surface sweep for OEW. All hazardous surface OEW was destroyed. Seattle District is preparing a soil remediation contract for five sites within the ADA in FY 1996. All remediation will be consistent with end land use.
- Quality Assurance Range (Site 39): This area had a 100% surface sweep for OEW. Approximately 10% of the sub-surface area was investigated to verify source and potential hazard in FY 1996. All hazardous OEW was destroyed leaving the site safe for surface activities. The need for further remediation of sub-surface OEW will be determined after the future use of Site 39 is determined. All remediation will be consistent with end land use.
- Site 18: This 200' x 200' area was cleared to a depth of 4 feet in FY 1996. This will remove the potential hazard to future geophysical mapping, and will allow Seattle District to conduct needed soil sampling in the area.
- Washout Sump: Contractor removed the sludge from an interceptor sump between the old washout plant and the TNT lagoon. TNT content ranges from 40 - 70%.

6. CURRENT STATUS: A contract was awarded to Earth Tech on 12 July 1996 for $1,933,712. The support Activities Work Plan was approved on 20 November to initiate all non-intrusive activities on site. Site mobilization was initiated on 4 Novemer 1996. Geophysical investigations and surface clearance activities have commenced. The draft intrusive work plan is scheduled to be forwarded to CEHNC on 17 December 1996.

7. ISSUES AND CONCERNS: The draft work plans are delayed until 17 January 1997.

9. SCHEDULE SUMMARY: For Official Use Only

10: FUNDING/BUDGET SUMMARY: For Official Use Only

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Return to OE Home Page.

Former Black Hills Army Depot

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1 0.95 **FORMER BLACK HILLS ARMY DEPOT REMOVAL ACTION: SITE-SPECIFIC SAFETY AND HEALTH PLANS** *FORMER BLACK HILLS ARMY DEPOT REMOVAL ACTION: SITE-SPECIFIC SAFETY AND HEALTH PLANS . ADDENDUM. .SITE-SPECIFIC SAFETY AND HEALTH PLAN .for .SAMPLING AND ANALYSIS .BURNING GROUNDS 1 AND 2. .FORMER BLACK HILLS ARMY DEPOT (BHAD) .EDGEMONT, SOU...*

2 0.95 **BLACK HILLS ARMY DEPOT: Scope of Work** *BLACK HILLS ARMY DEPOT: Scope of Work . STATEMENT OF WORK .ENGINEERING EVALUATION/COST ANALYSIS .FORMER BLACK HILLS ARMY DEPOT .EDGEMONT, SOUTH DAKOTA . .1. BACKGROUND . .The work required under this Scope of Work (SOW) falls under the Defe...*

3 0.92 **FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS** *FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS . A13. .SAMPLE HANDLING, DOCUMENTATION, .AND TRACKING PROCEDURES. .Equipment Needs .Chain of Custody forms .Field Log Book .Ice .Coolers .Vermiculite .Bubble Wrap .Strappin...*

4 0.92 **BLACK HILLS ARMY DEPOT EE/CA: Work Plans-Geophysical Investigations, Appendix A-Annex B** *BLACK HILLS ARMY DEPOT EE/CA: Work Plans-Geophysical Investigations, Appendix A-Annex B . APPENDIX A .ANNEX B .STATEMENT OF WORK. ENGINEERING EVALUATION/COST ANALYSIS. FORMER BLACK HILLS ARMY DEPOT. EDGEMONT, SOUTH DAKOTA. 11 August 1994. ....*

5 0.92 **BLACK HILLS ARMY DEPOT EE/CA: Work Plans-Geophysical Investigations, Appendix A, Annex G** *BLACK HILLS ARMY DEPOT EE/CA: Work Plans-Geophysical Investigations, Appendix A, Annex G . APPENDIX A .ANNEX G .STATEMENT OF WORK. GEOPHYSICAL INVESTIGATION. FORMER BLACK HILLS ARMY DEPOT (BHAD). EDGEMONT, SOUTH DAKOTA. 15 AUGUST 1994. . 1....*

6 0.92 **BLACK HILLS ARMY DEPOT EE/CA: WORK PLAN GEOPHYSICAL INVESTIGATIONS, section 7** *BLACK HILLS ARMY DEPOT EE/CA: WORK PLAN GEOPHYSICAL INVESTIGATIONS, section 7 . 7.0 WORK, DATA, AND COST MANAGEMENT PLAN. .7.1 INTRODUCTION. This Work, Data, and Cost Management Plan (WDCMP) provides a review and discussion ofthe administra...*

7 0.92 **BLACK HILLS ARMY DEPOT EE/CA: Sampling and Analysis Plan Appendix A** *BLACK HILLS ARMY DEPOT EE/CA: Sampling and Analysis Plan Appendix A . WORK PLAN .CHEMICAL WARFARE MATERIAL SAMPLING .AND ANALYSIS PLAN .FORMER BLACK HILLS ARMY DEPOT .EDGEMONT, SOUTH DAKOTA. .APPENDIX A .STANDARD OPERATING PROCEDURES. .A1 O...*

8 0.92 **HISTORY OF THE SITE - Black Hills Army Depot** *HISTORY OF THE SITE - Black Hills Army Depot . 1.0 HISTORY OF THE SITE. .The site of the former Black Hills Army Depot (BHAD) was selected in 1941 because of its remoteness from human habitation. Homesteaders were sparse because the area's ...*

9 0.92 **BLACK HILLS ARMY DEPOT EE/CA: Sampling and Analysis Plan Introduction** *BLACK HILLS ARMY DEPOT EE/CA: Sampling and Analysis Plan Introduction . WORK PLAN .CHEMICAL WARFARE MATERIAL SAMPLING .AND ANALYSIS PLAN .FORMER BLACK HILLS ARMY DEPOT .EDGEMONT, SOUTH DAKOTA. .1.0 INTRODUCTION. .This Field Sampling Plan (F...*

10 0.92 **BLACK HILLS ARMY DEPOT: Removal Action Initial Project Management Plan**
BLACK HILLS ARMY DEPOT: Removal Action Initial Project Management Plan .Initial Project Management Plan . for .Former Black Hills Army Depot .at.Former Black Hills Army Depot, South Dakota . TITLE PAGE Page 1 .Reviews and Approvals .Page 1 ...

11 0.86 **FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS** *FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS . A14. .FIELD DOCUMENTATION. .Several types of documentation will be prepared in the field to record information concerning soil borings, well installation and sampling rel...*

12 0.86 **FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS** *FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS . A11. .SURFACE WATER AND SEDIMENT SAMPLING .EQUIPMENT AND PROCEDURES. .Equipment Needs .pH meter/buffer .Conductivity Meter/Standards .Turbidimeter .Thermometer .Trenching...*

13 0.86 **FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS** *FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS . A12. .EQUIPMENT DECONTAMINATION PROCEDURES. .Equipment Needs .Plastic sheeting .Wash and rinse tubs/troughs .Alconox® .Tap water .Deionized water .Scrub brushes .Pap...*

14 0.86 **FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS** *FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS . A8. .MONITORING WELL DESIGN .AND INSTALLATION .Equipment Needs. . Drill rig with the capability of: . a. Advancing soil borings with 6.25 inch (I.D.) hollow-stem augers o...*

15 0.86 **FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS** *FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS . A10. .GROUNDWATER SAMPLING .EQUIPMENT AND PROCEDURES. .Equipment Needs .pH meter/Buffers .Conductivity Meter/standard .Thermometer .Turbidity Meter .Teflon disposable bai...*

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16 0.86 **FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS** *FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS . A9. .MONITORING WELL DEVELOPMENT .EQUIPMENT AND PROCEDURES. .Equipment Needs .pH meter/Buffers .Conductivity Meter/standard .Thermometer .Turbidity Meter .PVC disposable ...*

17 0.86 **FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS** *FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS . A7. .HEADSPACE ANALYSIS .EQUIPMENT AND PROCEDURES. .Equipment Needs .Plastic sandwich bags .8 oz. glass jars .Aluminum foil .PID Instrument, calibrated .HTW Boring log (s...*

18 0.86 **FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS** *FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS . A6. .HAZARDOUS AND TOXIC WASTE (HTW) BORING LOG. .Logs will be prepared on the HTW Drilling Log form that accompanies this SOP. Examples of a completed form and blank for...*

19 0.86 **FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS** *FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS . A3 .SUBSURFACE SOIL SAMPLING. .EQUIPMENT AND PROCEDURES. .Equipment Needs .Foerster Ferex metal detector .Drill rig and equipment (see Drilling SOP A1) .Stainless steel s...*

20 0.86 **FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS** *FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS . A5. .LITHOLOGIC DESCRIPTION OF SURFACE .AND SUBSURFACE SOIL SAMPLES. .Equipment Needs .Drill rig and equipment .Stainless steel split spoon .Pocket knife or small spatula...*

21 0.86 **FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS** *FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS . A4. .SOIL HOMOGENIZATION .EQUIPMENT AND PROCEDURES. .Eqluipment Needs .Stainless steel bowl or pan .Stainless steel spoon or spatula .Sample containers .Disposable nylon ...*

22 0.86 **FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS** *FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS . A2 .DRILLING EQUIPMENT AND PROCEDURES. .Equipment Need,. . Drill rig capable of: . a. Advancing soil borings with 6-1/4 or 4-1/4 inch (I.D.) hollow-stem auger or approved...*

23 0.86 **FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS** *FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS . A1. .ORDNANCE AVOIDANCE PLAN. .Equipment and Supplies .Foerester Ferex Metal Detector .Whites Metal Detector .Stakes .Survey Ribbon .Field Notebooks. .Ordnance Survey Pro...*

24 0.86 **BLACK HILLS ARMY DEPOT: ANNEX N INTRUSIVE EXCAVATION PLAN** *BLACK HILLS ARMY DEPOT: ANNEX N INTRUSIVE EXCAVATION PLAN. ANNEX N .INTRUSIVE EXCAVATION PLAN . FOR .FORMER BLACK HILLS ARMY DEPOT EDGEMONT, SOUTH DAKOTA ORDANCE & EXPLOSIVE WASTE (OEW) ASH LANDFILL SUBSURFACE CLEARANCE DACA87-93-D-0002. DE...*

25 0.86 **BLACK HILLS ARMY DEPOT: ANNEX M CONFINED SPACE ENTRY PLAN** *BLACK HILLS ARMY DEPOT: ANNEX M CONFINED SPACE ENTRY PLAN. ANNEX M .CONFINED SPACE ENTRY PLAN . FOR .FORMER BLACK HILLS ARMY DEPOT EDGEMONT, SOUTH DAKOTA*

ORDANCE & EXPLOSIVE WASTE (OEW) ASH LANDFILL SUBSURFACE CLEARANCE DACA87-93-D-0002. DE...

26 0.86 **BLACK HILLS ARMY DEPOT: ANNEX O ADI GEOPHYSICAL SURVEY RESULTS** *BLACK HILLS ARMY DEPOT: ANNEX O ADI GEOPHYSICAL SURVEY RESULTS. ANNEX O .ADI GEOPHYSICAL SURVEY RESULTS . FOR .FORMER BLACK HILLS ARMY DEPOT EDGEMONT, SOUTH DAKOTA ORDANCE & EXPLOSIVE WASTE (OEW) ASH LANDFILL SUBSURFACE CLEARANCE DACA87-93-...*

27 0.86 **BLACK HILLS ARMY DEPOT: ANNEX L REMEDIAL ACTION SAFETY PLAN (RASP)** *BLACK HILLS ARMY DEPOT: ANNEX L REMEDIAL ACTION SAFETY PLAN (RASP). ANNEX L .REMEDIAL ACTION SAFETY PLAN (RASP) . FOR .FORMER BLACK HILLS ARMY DEPOT EDGEMONT, SOUTH DAKOTA ORDANCE & EXPLOSIVE WASTE (OEW) ASH LANDFILL SUBSURFACE CLEARANCE DA...*

28 0.86 **BLACK HILLS ARMY DEPOT: ANNEX H EXPLOSIVE ORDNANCE DISPOSAL PLAN** *BLACK HILLS ARMY DEPOT: ANNEX H EXPLOSIVE ORDNANCE DISPOSAL PLAN. ANNEX H .EXPLOSIVE ORDNANCE DISPOSAL PLAN . FOR .FORMER BLACK HILLS ARMY DEPOT EDGEMONT, SOUTH DAKOTA ORDANCE & EXPLOSIVE WASTE (OEW) ASH LANDFILL SUBSURFACE CLEARANCE DACA87...*

29 0.86 **BLACK HILLS ARMY DEPOT: ANNEX K SURVEYING AND MAPPING PLAN** *BLACK HILLS ARMY DEPOT: ANNEX K SURVEYING AND MAPPING PLAN. ANNEX K .SURVEYING AND MAPPING PLAN . FOR .FORMER BLACK HILLS ARMY DEPOT EDGEMONT, SOUTH DAKOTA ORDANCE & EXPLOSIVE WASTE (OEW) ASH LANDFILL SUBSURFACE CLEARANCE DACA87-93-D-0002. ...*

30 0.86 **BLACK HILLS ARMY DEPOT: ANNEX J SCOPE OF WORK** *BLACK HILLS ARMY DEPOT: ANNEX J SCOPE OF WORK . ANNEX J .SCOPE OF WORK (SOW) . FOR .FORMER BLACK HILLS ARMY DEPOT EDGEMONT, SOUTH DAKOTA ORDANCE & EXPLOSIVE WASTE (OEW) ASH LANDFILL SUBSURFACE CLEARANCE DACA87-93-D-0002. DELIVRY ORDER 0021 ...*

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31 0.86 **BLACK HILLS ARMY DEPOT: ANNEX I BLANK OPERATIONAL FORMS**
BLACK HILLS ARMY DEPOT: ANNEX I BLANK OPERATIONAL FORMS . ANNEX I .BLANK OPERATIONAL FORMS . FOR .FORMER BLACK HILLS ARMY DEPOT EDGEMONT, SOUTH DAKOTA ORDANCE & EXPLOSIVE WASTE (OEW) ASH LANDFILL SUBSURFACE CLEARANCE DACA87-93-D-0002. DELIV...

32 0.86 **BLACK HILLS ARMY DEPOT: ANNEX G SAFETY CONCEPTS AND BASIC CONSIDERATIONS** *BLACK HILLS ARMY DEPOT: ANNEX G SAFETY CONCEPTS AND BASIC CONSIDERATIONS. ANNEX G .SAFETY CONCEPTS AND BASIC CONSIDERATIONSFOR UNEXPLODED ORDANCE (UXO) OPERATIONS . FOR .FORMER BLACK HILLS ARMY DEPOT EDGEMONT, SOUTH DAKOTA ORDANCE & EXPLOSI...*

33 0.86 **BLACK HILLS ARMY DEPOT: ANNEX F ENVIRONMENTAL PROTECTION PLAN** *BLACK HILLS ARMY DEPOT: ANNEX F ENVIRONMENTAL PROTECTION PLAN. ANNEX F .ENVIRONMENTAL PROTECTION PLAN . FOR .FORMER BLACK HILLS ARMY DEPOT EDGEMONT, SOUTH DAKOTA ORDANCE & EXPLOSIVE WASTE (OEW) ASH LANDFILL SUBSURFACE CLEARANCE DACA87-93-D-...*

34 0.86 **BLACK HILLS ARMY DEPOT: ANNEX C PERSONNEL RESUMES** *BLACK HILLS ARMY DEPOT: ANNEX C PERSONNEL RESUMES. ANNEX C .PERSONNEL RESUMES . FOR .FORMER BLACK HILLS ARMY DEPOT EDGEMONT, SOUTH DAKOTA ORDANCE & EXPLOSIVE WASTE (OEW) ASH LANDFILL SUBSURFACE CLEARANCE DACA87-93-D-0002. DELIVRY ORDER 0021...*

35 0.86 **BLACK HILLS ARMY DEPOT: ANNEX E QUALITY CONTROL PLAN** *BLACK HILLS ARMY DEPOT: ANNEX E QUALITY CONTROL PLAN. ANNEX E .QUALITY CONTROL PLAN . FOR .FORMER BLACK HILLS ARMY DEPOT EDGEMONT, SOUTH DAKOTA ORDANCE & EXPLOSIVE WASTE (OEW) ASH LANDFILL SUBSURFACE CLEARANCE DACA87-93-D-0002. DELIVRY ORDE...*

36 0.86 **BLACK HILLS ARMY DEPOT: ANNEX D WORK, DATA, AND COST MANAGEMENT PLAN** *BLACK HILLS ARMY DEPOT: ANNEX D WORK, DATA, AND COST MANAGEMENT PLAN. ANNEX D .WORK, DATA, AND COST MANAGEMENT PLAN . FOR .FORMER BLACK HILLS ARMY DEPOT EDGEMONT, SOUTH DAKOTA ORDANCE & EXPLOSIVE WASTE (OEW) ASH LANDFILL SUBSURFACE CLEARANC...*

37 0.86 **BLACK HILLS ARMY DEPOT: Annex B PERSONNEL RESUMES** *BLACK HILLS ARMY DEPOT: Annex B PERSONNEL RESUMES. ANNEX B .PERSONNEL RESUMES . FOR .FORMER BLACK HILLS ARMY DEPOT EDGEMONT, SOUTH DAKOTA ORDANCE & EXPLOSIVE WASTE (OEW) ASH LANDFILL SUBSURFACE CLEARANCE DACA87-93-D-0002. DELIVRY ORDER 0021...*

38 0.86 **Black Hills Site Specific Safety and Health Plan** *Black Hills Site Specific Safety and Health Plan . APPENDIX A. .Site Specific Safety and Health Plan. .TABLE OF CONTENTS. 1.0 INTRODUCTION ..... A-1 .2.0 PERSONNEL RESPONSIBILITIES .....*

39 0.86 **Black Hills Site Specific Safety and Health Plan** *Black Hills Site Specific Safety and Health Plan . APPENDIX C. .Standard Operating Procedures .for Notification of UXO .at the Black Hills Army Depot. . PURPOSE: .To define the procedures to be used for notifying required personnel at the f...*

40 0.86 **Black Hills Site Specific Safety and Health Plan** *Black Hills Site Specific Safety and Health Plan . 4.0 UXO OPERATIONS. .The BHAD OEW/CSM site classification and characterization is centered*

around three OB/OD grounds-two chemical operations areas, a tracer test range, and the proposed si...

41 0.86 **Black Hills Site Specific Safety and Health Plan** *Black Hills Site Specific Safety and Health Plan . WORK PLAN .1.0 INTRODUCTION .Human Factors Applications, Inc. (HFA) has been contracted by the U. S. Army Corps of Engineers, Huntsville Division (CEHND), Huntsville, Alabama, to provide un...*

42 0.86 **FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS** *FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS . APPENDIX A. .STANDARD OPERATING PROCEDURES. .A1 Ordnance Avoidance Plan .A2 Drilling Equipment and Procedures .A3 Subsurface Soil Sampling Equipment and Procedures .A4 So...*

43 0.86 **FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS** *FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS . 9.0 MONITORING AND SAMPLING. .Because soil, sediment, and surface and ground water sampling are required by this Delivery Order, Section 9.0 of the UXB SSHP has been repr...*

44 0.86 **FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS** *FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS . 7.0 UXO SAFETY. .7.2 HANDLING AND DISPOSAL OF HAZARDOUS ITEMS .Hazardous items encountered during the work to be performed under this Delivery Order will not be secured b...*

45 0.86 **FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS** *FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS . 12.0 EXCAVATIONS AND CONFINED SPACE. .No excavations will be dug during the performance of this Delivery Order, and all sample locations will be readily accessible. There...*

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Your search matched **60** of **4064** documents.
15 are presented, ranked by relevance.

[Prev] 1 2 3 4

Rank Score Title/Information

46 0.86 **FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS** *FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS . 13.0 ACCIDENTS. .In addition to the investigations conducted by UXB, all accidents will be investigated by the Dames & Moore Project Manager, Assistant Project Manage...*

47 0.86 **FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS** *FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS . 6.0 SITE CONTROL. .Although CWM/OEW/UXO avoidance procedures will be followed, it is possible that CWM will be encountered. Therefore, the site control procedures in the ...*

48 0.86 **FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS** *FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS . 5.0 EQUIPMENT SAFETY. .5.6 DRILLING SAFETY. .5.6.1 Basic Requirements .Employees will not proceed with work on, or in the proximity of, hazardous equipment until they hav...*

49 0.86 **FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS** *FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS . 2.0 ORGANIZATION/RESPONSIBILITIES. .The Dames & Moore Organizational Chart for this project is enclosed as Figure B-1A. The functions and qualifications of key person...*

50 0.86 **FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS** *FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS . 3.0 SAFETY PLAN. .During those times when the UXB UXO Supervisor is not present at the site (e.g., well installation/development/sampling), the Dames & Moore SSO will...*

51 0.86 **FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS** *FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS . 4.0 HEALTH AND SAFETY WORK PRECAUTIONS. .Preliminary evaluation of each additional major task to be performed at BHAD has been identified and the hazards associated with ...*

52 0.86 **FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS** *FORMER BLACK HILLS ARMY DEPOT SITE-SPECIFIC SAFETY AND HEALTH PLANS . 1.0 INTRODUCTION. .This Addendum amends the Site-Specific Safety and Health Plan (SSHP) that is included as Annex B in the UXB International, Inc. Work Plan for Ordnance ...*

53 0.86 **INTRODUCTION Black Hills Army Depot** *INTRODUCTION Black Hills Army Depot . INTRODUCTION .This Work Plan discusses the procedures to be used to obtain geophysical field data required to prepare an Engineering Evaluation/Cost Analysis (EE/CA) for the former Black Hills Army Depo...*

54 0.86 **BLACK HILLS ARMY DEPOT EE/CA: Sampling and Analysis Plan Facility Sampling Locations** *BLACK HILLS ARMY DEPOT EE/CA: Sampling and Analysis Plan Facility Sampling Locations . WORK PLAN .CHEMICAL WARFARE MATERIAL SAMPLING .AND ANALYSIS PLAN .FORMER BLACK HILLS ARMY DEPOT .EDGEMONT, SOUTH DAKOTA. .3.0 FACILITY SAMPLING LOCATIONS...*

55 0.86 **BLACK HILLS ARMY DEPOT EE/CA: Sampling and Analysis Plan Appendix B** *BLACK HILLS ARMY DEPOT EE/CA: Sampling and Analysis Plan Appendix B . WORK PLAN .CHEMICAL WARFARE MATERIAL SAMPLING .AND ANALYSIS PLAN .FORMER BLACK HILLS ARMY*

DEPOT .EDGEMONT, SOUTH DAKOTA. . APPENDIX B. .EQUIPMENT SPECIFICATIONS .AND OPER...

56 0.86 **BLACK HILLS ARMY DEPOT EE/CA: Sampling and Analysis Plan Site Characterization** *BLACK HILLS ARMY DEPOT EE/CA: Sampling and Analysis Plan Site Characterization . WORK PLAN .CHEMICAL WARFARE MATERIAL SAMPLING .AND ANALYSIS PLAN .FORMER BLACK HILLS ARMY DEPOT .EDGEMONT, SOUTH DAKOTA. .2.0 SITE CHARACTERIZATION. .The follo...*

57 0.86 **BLACK HILLS ARMY DEPOT: Interagency Agreements Table of Contents** *BLACK HILLS ARMY DEPOT: Interagency Agreements Table of Contents. ANNEX A .SITE-SPECIFIC SAFETY ANDHEALTH PLAN (SSHP) . FOR .FORMER BLACK HILLS ARMY DEPOT EDGEMONT, SOUTH DAKOTA ORDANCE & EXPLOSIVE WASTE (OEW) ASH LANDFILL SUBSURFACE CLEARA...*

58 0.86 **BLACK HILLS ARMY DEPOT EE/CA: INVESTIGATIVE DERIVED WASTE PLAN** *BLACK HILLS ARMY DEPOT EE/CA: INVESTIGATIVE DERIVED WASTE PLAN . INVESTIGATIVE DERIVED WASTE PLAN .FORMIER BLACK HILLS ARMY DEPOT. .TABLE OF CONTENTS. . INTRODUCTION.....3 .IDW GENERAT...*

59 0.86 **BLACK HILLS ARMY DEPOT EE/CA: Sampling and Analysis Plan Table of Contents** *BLACK HILLS ARMY DEPOT EE/CA: Sampling and Analysis Plan Table of Contents . WORK PLAN .CHEMICAL WARFARE MATERIAL SAMPLING .AND ANALYSIS PLAN .FORMER BLACK HILLS ARMY DEPOT .EDGEMONT, SOUTH DAKOTA. .TABLE OF CONTENTS . Page .1.0 INTRODUCTIO...*

60 0.86 **BLACK HILLS ARMY DEPOT: REMOVAL ACTION Page** *BLACK HILLS ARMY DEPOT: REMOVAL ACTION Page .Site Safety and Health Plans . for . Former Black Hills Army Depot .at.Edgemont, SD . .NOTE: Each of the following hot links goes to a separate home page which contains hot links to separately sc...*

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EE/CA Main Report

for

Black Hills Army Depot

at

Black Hills Army Depot, Edgemont, Sd

NOTE: Each of the following hot links goes to a separate home page which contains hot links to separately scanned pages approximately 100 KB in size. The images are in a TIFF image format with a packbits compression.

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HUMAN FACTORS APPLICATIONS, INC.
EXPLOSIVE ORDANCE DISPOSAL DIVISION

ORDANCE AND EXPLOSIVE WASTE
PHASE I
REMEDIAL INVESTIGATION

BLACK HILLS ARMY DEPORT
FINAL REPORT

CONTRACT NUMBER:DACA87-92-D-0133
DELIVERY ORDER:0002
CLIENT NAME:U.S. ARMY CORPS OF ENGINEERS
PRIME CONTRACTOR:HUMAN FACTORS APPLICATIONS, INC.
PROJECT TITLE:PHASE I - REMEDIAL INVESTIGATION BLACK HILLS ARMY DEPOT
PROJECT LOCATION:EDGEMONT, SOUTH DAKOTA

DECEMBER 29, 1994

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- APPENDIX B--SCOPE OF WORK
- APPENDIX C--LESSONS LEARNED
- APPENDIX D--CHEMICAL AREA-PLANNIMETRIC MAPS
- APPENDIX E--TRACER TEST RANGE AND WHITE PHOSPHORUS CASING BURIAL AREA-PLANIMETRIC MAPS
- APPENDIX F--BURNING GROUND 3-PLANIMETRIC MAPS
- APPENDIX G--ASH LANDFILL AND COMBAT MATERIALS AREA-PLANIMETRIC MAPS
- APPENDIX H--SURVELLANCE BURNING GROUND AND AMMUNITION WORKSHOP/LAECHING BEDS-PLANIMETRIC MAPS
- APPENDIX I--BURNING GROUND 1-PLANIMETRIC MAPS
- APPENDIX J--BURNING GROUND 2-PLANIMETRIC MAPS
- APPENDIX K--BURNING GRIUND 1 INCIDENT REPORT


Go Back to the EE/CA Page.

PROJECT SUMMARY SHEET
FOR
DERP-FUDS OEW PROJECT NO. B08SD000802
BLACK HILLS ARMY DEPOT
SITE NO. B08SD000800
FEBRUARY 1992

PROJECT DESCRIPTION: The Depot was established in 1942 primarily for long-term storage of ammunition and consisted of 21,095.85 acres of land. The site was developed with industrial storage, administrative, housing and related support facilities and utilities. The Depot was used for the receipt, storage, maintenance, inspection, testing, restoration, issue and shipping of ammunition, propellants and chemical toxics, unpacking and functional packing of small arms ammunition, and the demilitarization of unsafe, obsolete and surplus ammunition, chemical ammunition, ammunition components, chemical toxics and general supplies. By Statement of Clearance dated 31 January 1967, the site was given a careful search and was cleared of all dangerous and/or explosive materials reasonably possible to detect. Also in the Statement of Clearance and on map enclosure 2, Areas 1, 2, 4, 5, and 6 were entirely restricted from any use and Area 3 was restricted to surface use only. The site was reported excess in 1968.

The "Archive Search Report" dated September 1980 stated that during 1944, 586 railroad carloads of ammunition were received. Records did not specify the type of ammunition. Known ammunition at the Depot consisted of: 90mm ammunition; .30-.50 caliber ammunition; 105mm ammunition; M-70 mustard (H)-filled munitions; M-78 and M-79 munitions; M-55 rockets; and AN-M47 series, 100 pound bombs. Historical records indicate that munitions containing white phosphorous, high explosives, mustard, cyanogen chloride, phosgene, and nerve agents were stored at the Depot. Records also indicate that 1.5 million pounds of ammonium nitrate were stored in the early 1940's. Leaking mustard (H) filled munitions have allegedly been duried in Burning Ground No. 2. In 1971 the Edgewood Arsenal conducted mustard gas tests and obtained air samples, analyzed pieces of metal fragments, and collected and analyzed 35 soil samples. All tests proved negative.

PROJECT ELIGIBILITY: The areas recommended for further investigation and possible remedial action were generated by the Department of the Army.

POLICY CONSIDERATIONS: The 6000 Area, Burning Ground No. 1, Burning Ground No. 2, Burning Ground No. 3, site where white phosphorous bomb casings were buried, site where white phosphorous casings were burned, and acid leaching beds were part of the former ordnance depot. These areas have been not used since DOD excessed the site.

Encl 4

PROPOSED PROJECT: Further investigation beyond the scope of this PA is proposed by CEHND.

RISK ASSESSMENT PROCEDURES FOR EXPLOSIVE ORDNANCE: Attached.

DISTRICT POC: Linda L. Wagner or Bruce K. Little, CEMRO-ED-EC, Telephone: (402) 221-7693.

PROJECT SUMMARY SHEET
FOR
DERP-FUDS HTW PROJECT NO. B08SD000801
BLACK HILLS ARMY DEPOT
SITE NO. B08SD000800
FEBRUARY 1992

PROJECT DESCRIPTION. The Depot was established in 1942 primarily for long-term storage of ammunition and consisted of 21,095.85 acres of land. The site was developed with industrial storage, administrative, housing and related support facilities and utilities. The Depot was used for the receipt, storage, maintenace, inspection, testing, restoration, issue and shipping of ammunition, propellants and chemical toxics, unpacking and functional packing of small arms ammunition, and the demilitarization of unsafe, obsolete and surplus ammnunition, chemical ammunition, ammunition components, chemical toxics and general supplies. The site was reported excess in 1968. By Statement of Clearance dated 31 January 1967, the site was given a careful search and was cleared of all dangerous and/or explosive materials reasonably possible to detect. In the Statement of Clearance, Areas 1, 2, 4, 5 and 6 were entirely restricted from any use and Area 3 was restricted to surface use only. By purchase agreement dated 4 November 1968 and quitclaim deed dated 27 June 1975, the site was conveyed to the City of Edgemont and Securities Industries, Inc. The deed stated that portions of the property were contaminated or may be contaminated from residual explosives and were restricted, fenced and placarded, "Contaminated Area, Surface Use Only, No Digging". There has been problems with fencing and posting signs indicating the contaminated areas. In 1981 when Ecology and Environment, Inc. conducted a field investigation, the entire site was used for raising livestock. The study did indicate that a change in land use which would generate direct human contact, such as housing or crops for human consumption, should be avoided. Studies have revealed that certain munition wastes were disposed of on the property including black powder, explosive "D" (ammonium 2,4,6 trinitrophenolate), TNT (trinitroltoluene), tetryl, white phosphorous, unspecified cleaning acids, and organic solvents. The Depot stored high explosives, white phosphorous, mustard, cyanogen chloride, and phosgene used in 105mm, M-70, M-78, and M-79 munitions, along with ammonium nitrate. In the early 1960's, M-55 rockets filled with nerve agent (GB or VX) were stored. The following areas have been identified on a May 1965 Black Hills Army Depot map as being hazardous and contaminated areas: 8000 Area - Ammunition Normal Maintenance, 3000 Area - Ammunition Workshop Area, 3046 Area - Ammunition Workshop Area, leaching beds, deactivation furnace, disassembly plant (TV), and leaching beds for acids. Water for the Depot's operations was supplied by three artesian wells. Well #1 (3990 feet deep) and Well #2 (3855 feet deep) provided the drinking water for the Depot. Water at Well #1 had a temperature of 150 degrees fahrenheit and a compensated hardness of 760 ppm. Water at Well #2 had a temperature of 150 degrees fahrenheit and a compensated hardness of 670 ppm. Well #3 (1930 feet deep) was used for industrial purposes.

Encl 3

PROJECT ELIGIBILITY. The areas recommended for environmental sampling and possible remedial action were generated by the Department of the Army and are potential sources of environmental contamination.

POLICY CONSIDERATIONS. The areas recommended for environmental sampling and determination of remedial action, if necessary, have not been used since the Department of the Army excessed the site.

PROPOSED ACTIVITIES. The 8000 Area (Ammunition Normal Maintenance), 3000 Area (Ammunition Workshop Area), 3046 Area (Ammunition Workshop Area), leaching beds, deactivation furnace, disassembly plant (TV), leaching beds for acids, and three water wells meet eligibility criteria and policy considerations. These areas are proposed for environmental sampling and testing.

DD FORM 1391: Attached.

EPA FORM 2070-12: Attached

DISTRICT POC: Linda L. Wagner or Bruce K. Little, CEMRO-ED-EC, Telephone: (402) 221-7693.

5. SCHEDULES

A. Period of Performance

The period of performance for each specific site varies with the requirements specified in the delivery order.

A general life cycle project schedule is included in Annex B covering the general sequence of events for the project. As specific project phases are begun, this life cycle project schedule will be updated.

B. Current Project Schedule

A site specific project schedule will be developed by the contractor as part of the site work plans. These schedules will be available for review in the site work plans.

6. BUDGET AND COST ESTIMATE BASIS

The DERA program budget is generated through funding Work Plans that are established for the overall DERP-FUDS program. This project is funded under the authorities of DERP-FUDS. The programmed amounts (for OEW projects only) as they are currently known are;

FY	AMOUNT (x$1,000)	PURPOSE
92	50.0	Preliminary Assessment
	9.7	In-House
93	240.835	Site Investigation
	225.876	In-House (Includes Fly-over)
94	2,924.100	EE\CA Contract (DO #1 & 2)
	158.0	NCRA Proposed Ash Monofill
	242.0	TCRA - Partial Funding BG 1 & 2
	63.7	In-house
95	4,548.0	NTCRA - Contract (unfunded)
	862.0	EE\CA Sampling and Analysis
	510.0	In-house
96	200.0	Site Safety Submissiion - Contract
	3,000.0	TCRA
	200.0	EECA
	900.0	In-house
97	200.0	Remedial Design

	4,000.0	Removal Action
	200.0	EE\CA
	1,100.0	In-house
98	10,000.0	Removal Action
	1,000.0	In-house
99	10,000.0	Removal Action
	1,000.0	In-house

7. RESOURCE ALLOCATION PLAN

The following Huntsville Division resources will be required to support this project:

Engineering Directorate
- Civil Structures Division
  - Site Development Branch
  - Geotechnical Branch
- Cost Engineering Division
  - Cost Engineering Branch
- Services Branch

Program & Project Management Directorate
- Mandatory Center of Expertise - OEW
- Ordnance & Technical Programs Division
- Safety Division

Resource Management Directorate
- Program Budget Division
- Finance and Accounting Division

Contracting Directorate
- Environmental Acquisition Division

Public Affairs Office.

Office of Counsel

INPR TABLE OF CONTENTS

for

Black Hills Army Depot

at

Igloo, SD

INPR - Inventory Project Report

This preliminary assessment includes searches of Real Estate records to verify previous DoD ownership or usage, and a determination of site eligibility and the need for cleanup.

NOTE: Each of the following hot links goes to a separately scanned page approximately 100 KB in size. The images are in a TIFF image format with a packbits compression.

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APPENDIX A

ANNEX G

STATEMENT OF WORK
GEOPHYSICAL INVESTIGATION
FORMER BLACK HILLS ARMY DEPOT (BHAD)
EDGEMONT, SOUTH DAKOTA
15 AUGUST 1994

1.0 BACKGROUND

The work required under this Scope Of Work (SOW) falls under the Defense Environmental Restoration Program - Formerly Used Defense Sites Ordnance and Explosive Waste (OEW) contamination exists on property formerly owned by the Department of the Army.

1.1 General. OEW is a safety hazard and constitutes an imminent endangerment to the public. These actions will be performed in accordance with the Comprehensive Environmental Response,.Compensation, and Liability Act (CERCLA), and the National Contingency Plan (NCP). For any actions on site, no Federal, State.or Local permits are required. The provisions of 29 CFR 1910.120 shall apply to all actions taken at this site.

1.2 This site is a suspected Chemical Warfare Materiel (CWM) site. If the A-E encounters suspected CAM during work, the A-E shall immediately withdraw from the work area and notify the Corps of Engineers on-site Safety Specialist for guidance. The Huntsville Division Safety Office will notify the Technical EscortUnit (TEU).

1.3 Site Description. The Former Black Hills Army Depot was established as a reserve depot in 1942 and designated the Black Hills Ordnance Depot (SHOD). The depot provided for the maintenance, storage, renovation, and demilitarization ofordnance, ordnance components, and bulk munitions containing high explosive, incendiary, or chemical fillers. In 1962, the BHOD was renamed the Black Hills Army Depot(BHAD). The BHAD isapproximately 21,095 acres in size.

1.3.1 Burning Ground 1. This area consists of one 438 acresite and several smaller areas totaling about 495 acres. UXO is present in this area. Prior to 1946, Burning Ground 1 was used for the destruction of white phosphorous, mustard, and conventional ordnance. Numbers disposed of are not available.

1.3.2 Burning Ground 2 (Area 5000). This area was constructed in 1946 as a facility for heavy demolition and destruction of toxic gas-filled ammunition. Burning Ground 2 isapproximately 965 acres. The chemical bombs were placed in trenches or pits, the nose plugs were blown off, and the leaking chemicals were then ignited and burned. According to the former demolition foreman, chemicals, including phosgene, cyanogen chloride, and mustard were poured into trenches 20-25 feet deep and were allowed to seep into the ground. Occasionally, chemical bombs were not placed in pits but were burned along the sides ofthe roads at Burning Ground 2.

1.3.3 Burning Ground 3 (Area X). This area consisted of approximately 675 acres. A white phosphorous fire ignited in Area X and burned for several days. Burned casings were buried north of Block J. Burning Ground 3 was used for burning of smallarms, conventional ammunition, fragmentation bombs, ammunition

components, propellants, bulk explosives, and guided missile fuels and oxidizers. All references to the burning of ammunition at Burning Ground 3 indicate the ordnance destroyed contained high explosives fillers rather than chemical fillers. Howeverchemical fillers can not be ruled out

1.3.4 Chemical Area (Area 6000). This area contains 114 acres. The Chemical Area consisted of two separetly fenced areas which included a chemical plant and storage area, achemical burning pit, and an outdoor storage facility. According to documentation, the 6000 Area was used for the disposal of mustard, cyanogen chloride, and phosgene bombs.

1.3.5 Burial Site (North of Igloo Block J. In 1946, a large fire occurred when a fork-lift driver accidently punctured a 100 lb. bomb containing white phosphorous which engulfed the entire stack of 38,500 bombs in flames. When the area was cleared, the remaining white phosphorous casings were buried in two pits located north of Igloo Block J. This area is approximately 2.8 acres.

1.3.6 Tracer Test Range (yea 9000). There is little information on this area. It was, however, shown as a restricted area on old maps and the Statement of Clearance described it as a "non-use restricted area."

1.3.7 Surveillance Area. This area is approximately 4.4 acres Spent igniter tubes and primers have been found in the area and a partially denuded portion suggests some type of disposal activity took place. Little actual information exists to establish the exact use.

1.3.8 Ammunition Work Shop Area (Area 3000). This 48 acre site is currently used for cattle grazing. Of primary concern is the washout facility and leaching beds. Several unexploded explosive ordnance (UXOs) have been found in the area. The area was used for extracting explosives and renovation of ordnance.

1.3.9 Disassembly Plant (Also Area 3000). Area is part of the Ammunition Work Shop Area.

1.3.10 Igloo Block G. This area is known to have been the main storage area for V and G nerve agents. According to several former workers, no maintenance, modification, renovation, or demilitarization were performed on nerve agent filled M55 rockets. There is little other information on this area.

1.3.11 Igloo Block F. At about 0810 on 31 Mar 50, an explosion blew off the top of Igloo F-1304, shattering one wall, and scattering grenades throughout the area. The structure collapsed upon the men inside, trapping them under concrete and other debris. Three men died and the igloo was destroyed. Due to the presence of hand and rifle grenades scattered throughout the site, the area was fenced and barricaded. Records do not indicate the final disposition of the area and Igloo F-1304 isnot mentioned in any decontamination documents found.

1.3.12 Igloo Block D. Quantity distance tests were conducted in Igloo Block D in 1957. Approximately 4,000 M61 rockets containing nerve agent simulant (ethylene glycol) were placed in igloos and donated. According to information supplied by former depot personnel, the rockets within the igloos were dificult to detonate. As a result, additional explosives were added.

1.3.13 Combat Material Area (Areas 1800 and 2000). In the Combat Materials Area, small arms ammunition ranging in size from 22 caliber to 50 caliber was either stored or unpacked and reassembled into functional packs by either linking, belting, Clipping, or recycling. Additionally, inert materials and salvage items were stored at this location. A salvage yard landfill and burning pit for inert and nonsalvageable meterial were located within the area south of Building 1818.

1.3.14 Deactivation Furnace (Area 4000). A deactivation furnace was located on an 11.2 acre site within the 4000 Area. All types of small arms, ammunition components, and tracers were destroyed in the furnace by burnout.

1.3.15 Normal Maintenance Area (Area 8000). This area consisted of 7.8 acres and provided additional facilities for the maintenance, modification, renovation, and demilitarization of ordnance. Items worked on included conventional ammunition ranging from 20mm through 240mm with HE filler, rockets ranging in size from 2.75 inch to 4.5inch with HE and WP filler, hand and rifle grenades with HE filler,fuses, primers, boosters, and propellants.

1.4 Objective The ultimate objective of this work is for the A-E to perform an Engineering Evaluation/Cost Analysis (EE/CA) to determine the nature and extent of OEW contamination at the site.There will be no intrusive investigation at B HAD for the firstphase of the investigation. The EE/CA Action Memorandum shall be prepared by the A-E. The EE/CA and the EE/CA Action Memorandum will be performed in accordance with the EPA Guidance Document, " Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA ",August 1993. Location survey and mapping of each area (GRID) investigated under this EE/CA action is required.

2.0 TASK 1- REVIEW EXISTING DATA

2.1 The A-E shall continue researching historical data and conduct additional interviews in order to further identify and define areas of suspected contamination. The A-E shall advertise inlocal news media the intent of this work, and solicit responses by knowledgeable individuals to give statements concerning contamination. Additionally, the A-E shall maintain a dedicated telephone line (1-800 if available) to receive information from the public. This telephone line shall be worked by an individual who is knowledgeable about the project, is familiar with interviewing techniques, and has been instructed as to technical details to be introduced during interviews.

2.2 The A-E shall prepare and submit Work Task Proposals detailing the locations to be visited, the methods in accomplishing interviews, and any other work deemed necessary forthe completion of this task prior to actual work being accomplished. This task may be started and completed prior to the Site Specific Work Plans (SSWP) being approved.

3.0 TASK 2- PREPARE SITE SPECIFICWORK PLAN (SSWP)

The A-E shall prepare and submit a Work Task Proposal that outlines the manner in which the A-E intends to accomplish each Taskin this SOW. The Work Task Proposal shall include milestones, expected completion dates, and any other planning data the A-E will use to accomplish all Tasks. In order for the A-E to perform theEE/CA investigation at BHAD, the SSWP shall be prepared. It is notthe Government's intent for the A-E to encounter surface ordnanceduring field investigation. Ordnance avoidance techniques shall be employed during all phases of A-E operations. The SSHP shall provide the methodology to be used in the event OEW is encountered during the field investigation. The A-E shall prioritize all of the areas listed in paragraph 1.3 and propose a method of selecting sample sites within these areas. Site priorities shall be based on such things as suspected contaminates, accessibility, site dynamics, and hazard assessment. The field investigation shall encompass all areas of concern. No subsurface sampling shall be done during this phase. If additional areas are identified based on further data review, they shall be added to the prioritized list for inclusion in this or future studies. The following plans shall be included in the SSWP:

3.1 Health and Safety Program (HSP) . The A-E shall develop and maintain a Health and Safety Program in compliance with the requirements of OSHA standard 29 CFR 1910.120(b)(1) through

(b)(4).Written certification that the HSP has been developed and implemented shall be submitted to the KO and the plans shall be made available upon request. The A-E shall develop a Site-Specific Safetyand Health Plan (SSHP) in accordance with (IAW) the requirements of Section 5.0 of this SOW. The SSHP shall be submitted to the KO for review and approval prior to any of the field work described in this SOW. All work shall be performed IAW with the approved plan. The SSHP shall specifically include an " Ordnance Management Plan " which addresses procedures to be followed should known or potential UXO be encountered during any phase of field work In addition, the Ordnance Management Plan shall address CWM management.

3.2 Geophysical Investigation Plan. The A-E shall propose the surface geophysical investigation method to be performed. Thereshall be no intrusive investigation or soil sampling during this phase of the site investigation. The A-E shall specify all equipmentand methods to perform required geophysical investigation at BHAD.As stated in Paragraph 3.0 above, the A-E shall prioritize all areas and propose selected sites within those areas to be investigated.

3.3 Equipment Demonstrat on Plan. The A-E shall prepare a plan for an equipment demonstration of the equipment selected to perform the geophysical investigations at BHAD. Geophysical sensors may not always provide the desired or optimum results at every location. The A-E shall insure that the equipment selected to perform the geophysical investigations for this delivery order is capable of providing the desired results in the environment and soil conditions found at BHAD. A demonstration shall be conducted prior to any field work beginning, and shall be conducted at the site. This demonstration shall be based on this plan.

3.4 Work, Data. and Cost Management Plan (WDCMP). The A-E shall prepare and submit a WDCMP which describes how the work is to be managed and accomplished. The WDCMP shall contain a schedule forthe accomplishment of the tasks. More detailed information in the WDCMP may be required on an area by area basis. The WDCMP shall also consist of the organization structure; the assignment of functions, duties and responsibilities; and the functional relationships among organizational elements that will participate in the accomplishment of the tasks.

3.5 Quality Control (QC) Plan. Items addressed should include, as a minimum:

3.5.1 Equipment testing and calibration.

3.5.2 Performing and documenting QC field inspections.

3.5.3 Monitoring proper --functioning of all electronic equipment.

3.5.4 OEW identification briefings.

3.5.5 All surveys and mapping performed under Task 3(below) - Perform Geophysical Investigation.

4.0 TASK 3 - PERFORM GEOPHYSICAL INVESTIGATION

The A-E shall investigate those areas approved in the SSWP using a Global Positioning System (GPS), magnetometers, metal detectors, ground penetrating radar, or other adequate and approved methods. The contractor shall produce an overlay to maps that depicts anomalies in the soil to a depth of 8 feet. This overlay shall show both the horizontal and vertical dimensions of the anomalies to the extent possible. All mapping shall be done using State Plane Coordinates referenced to the North American Datum of 1983 (NAD83).

5.0 TASK 4- PREPARE ENGINEERING EVALUATION/COST ANALYSIS REPORT

The A-E shall prepare an EE/CA report which documents the investigation and evaluation at BHAD. The report shall be prepared in accordance with EPA Guidance_as stated in paragraph 1.4 "OBJECTIVE," above. The A-E shall not limit the alternatives reviewed to a removal action, but shall detail costs associated with each alternative. Viable alternatives may be any, from a "no further action " to a "total removal action". Site dynamics and contamination mobility should play a large part in proposing any alternative. Further investigation and proposed methodology is also an acceptable alternative. Elimination of any specific sites by data review and geophysical results review is encouraged. Costs associated with each alternative shall be provided. The objective of this EE/CA is to find the best method to close out this site and remain within the environmental laws and regulations that apply. The following items shall be included in the EE/CA Report:

5.1 A daily journal of all activities associated with this SOW.

5.2 Planimetric maps at a metric scale no smaller than 1:2,000 showing all survey lines and significant ground surface features.

5.3 A detailed listing of all UXO and debris encountered, to include positive identification and disposition.

5.4 A video tape of all Field Tasks

5.5 A recapitulation of exposure data. This shall include the total number of man-hours worked on-site and total motor vehicle mileage. Exposure data refers to possible exposure tohazards and man-hours worked on the project.

5.6 QC documentation.

5.7 Public meeting record.

6.0 TASK 5 - PREPARE EE/CA ACTION MEMORANDUM

The A-E shall prepare an EE/CA Action Memorandum as directed by the Contracting Officer. This Action Memorandum shall be based on the Government selected alternatives as proposed in the EE/CA. This Action Memorandum will be used in the decision making process to select remedial actions for this site. It shall also, along with the EE/CA Report, become a matter of Public Record and comment.

9.0 TASK 8 - RECORD AND SUBMIT VIDEO TAPE

9.1 The A-E shall furnish the necessary personnel and equipment to video tape activities from all field tasks of this SOW. Taping shall be of typical activities and accurately depict all work accomplished.

9.2 The video tape shall be standard VHS 1/2-inch color tape with voice background describing the actions being filmed, containing a minimum of 60 minutes footage.

9.3 One Copy of the video tape shall be submitted as part of the EE/CA Report.

10.0 SAFETY REQUIREMENTS

10.1 The A-E shall prepare and submit a Site-Specific Safety and Health Plan (SSHP) to the Contracting Officer for review and approval prior to commencement of any field work. The SSHP shall be prepared in accordance with the requirements specified in this section and shall comply with all federal, state and local health and safety requirements, e.g., the Occupational Safety and Health Administration (OSHA) requirements (29 CFR 1910 and 1926), the U. S. Environmental Protection

Agency (USEPA) hazardous waste requirements (40 CFR 260 - 270), and the U.S. Army Corps of Engineers Safecy and Health Requirements Manual (EM 385-1-1) and the U.S. Army Corps of Engineers Safety and Occupational Health Documert Requirements for HTRW and OEW Activities (ER 325-1-92) dated 13 March 1994. The A-E shall submit versions of this document in accordance with the schedule provided in this SOW. The A-E shall revise and re-submit this document as necessary to address all comments and deficiencies.

10.2 The SSH? shall address the elements as described in this section. The level of detail provided shall be tailored to the type of work, complexity of operations to be accomplished and the hazards anticipated. Where a specific element is not applicable, make negative declaration in the plan to establish that adequate consideration was given the topic and provide a brief justification for its omission.

10.3 General. The SSHP shall be reviewed, approved and implemented by a board certified or board eligible Industrial Hygienist with at least 2 years hazardous waste site operations experience. Board certification or eligibility shall be documented by written confirmation by the American Board of Industrial Hygiene (ABIH) and submitted to the Contracting Officerfor review. A fully trained and experienced site safety and health officer (SSHO) (a UXO Specialist at minimum) responsible to the A-E shall be delegated to implement the on-site elements of the SSHP. The SSHP shall be in a form usable by authorized U.S. Government representatives and other authorized visitors to the site during site operations.

10.4 Staff Organization, Qualifications and Responsibilities.The operational and health and safety responsibilities of each keyperson shall be provided. The organizational structure, with linesof authority and overall responsibilities for safety and health ofthe A-E and all subcontractors shall be discussed. An organizational chart showing the lines of authority for safety shall be provided. Each person assigned specific safety and health responsibilities shall be identified and his/her qualifications andexperience documented by a resume in the SSHP.

10.5 Site Description and Contamination Characterization.Provide a description of the site based on results of previousstudies, site history and prior site uses and activities. Describethe location topography and approximate site of the site, the on-site job tasks to be performed and the duration of planned activities. Compile a summary of hazardous substances and safety and health hazards likely to be encountered on site. Include ordnance and chemical/biological names, concentration ranges,media in which found. locations on-site and estimated quantities/volumes to be impacted by site work. The site descriptions shall be based on results of previous studies, andthe history Of prior site uses and activities conducted under Task1 of this Scope of Work.

10.6 Hazard Assessment and Risk Analysis. In the SSHP, the A-Eshall provide a complete description of the work to be performed a teach site. The A-E shall identify the chemical, physical, safety and biological hazards that may be encountered for each task and/or site operation to be performed. Each task/operation is to be discussedseparately. Routes and sources of exposure for chemical hazards anticipated on-site along with chemical/biological names, concentration ranges, media in which found, locations on-site, estimated quantities/volumes, and the applicable regulatory standards (PELs) and recommended protective exposure levels (TLVs) shall be provided. Action levels shall be specified and justified for implementation of engineering controls/and or work practice controls, for emergency evacuation of on-site personnel, and for the prevention and/or minimization of public exposure to hazards created by on-site activities.

10.7 Accident Prevention. The SSHP may serve as the Accident Prevention plan provided it addresses

all content requirements of both 29 CFR 1910.120 and EM 385-1-1 (Table 1). All Accident Prevention Plan elements required by EM 385-1-1, Table 1, but not specifically covered by these elements shall be addressed in this section of the SSHP. Daily safety and health inspections shall be conducted to determine if site operations are conducted in accordance with the approved plans and contract requirements.

10.8 Training All general site workers shall receive 40 hours of initial off-site health and safety training (24 hours for non-exposed on-site personnel) which is relevant to hazardous waste site activities, plus three days of supervised field experience (one day for non-exposed personnel), incompliance with 29 CFR 1910.120 (e).In addition, site-specific, supervisory, refresher and visitor training and training in accordance with the aforementioned regulation and training in accordance with DA PAM 385-61 shall be addressed. The content, duration and frequency of all training shall be described. The A-E shall provide written certification that the required training has been received by the contractor's affected personnel to the Contracting Officer prior to engaging in on-site activities.

10.9 Personal Protective Equipment. A written Personal Protective Equipment (PPE) Program shall be provided in the SSHP.The program shall address all the elements of 29 CFR 1910.120 (g)(5)and 29 CFR 1910.134. Minimum levels of protection necessary for each task/operation to be performed at each site based on probable site conditions, potential occupational exposure (including heat stress)and the hazard assessment/risk analysis required above. Include specific types and materials for protective clothing and respiratory protection. Establish and justify upgrade/downgrade criteria based upon the action levels established as required by paragraph 10.11. as a minimum and as appropriate the following emergency and first aid equipment shall be immediately available for on-site use: (1) First aid equipment and supplies approved by the consulting physician; (2)Emergency eyewashes/showers which comply with ANSI Z-358.1; (3)Emergency use respirators (worst case appropriate); (4) Spill control materials and equipment and (5) Fire extinguishers (specifytype, size and locations).

10.10 Medical Surveillance. All personnel performing on-site activities shall participate in an ongoing medical surveillanceprogram meeting the requirements of 29 CFR 1910.120, ANSI Z-88.2 andDA PAMs 40-8 and 40-173. The medical examination protocols and results shall be overseen by a licensed physician who is certified iOccupational Medicine by the American Board of Preventive Medicine,or who by necessary training and experience is board eligible. Minimum specific exam content and frequency based on probable site conditions, potential occupational exposures and required protectiveequipment shall be specified. A written medical opinion from the examining physician as to fitness to perform the required work shall be made available to the CO upon request for any site employee.

10.11 Environmental and Personal Monitoring. Where it has been determined that there may be employee exposures to and/or off sitemigration potentials of hazardous airborne concentrations of hazardous substances, appropriate direct reading (real-time) air monitoring and integrated (time weighted
average) air sampling shall be conducted in accordance withapplicable federal, state and local requirements. Both air monitoring and air sampling must accurately represent concentration of aircontaminants encountered on and leaving the site. The types andfrequency of monitoring/sampling to be performed shall be specified for on-site and perimeter, where applicable. Where perimeter monitoring is not deemed necessary,provide suitable justification forits exclusion. When applicable, NIOSH and/or EPA sampling andanalytical methods shall be used. Personal samples, where necessary,shall be analyzed by laboratories successfully participation in and meeting the requirements of the American Industrial Hygiene Association's (AIHA) Proficiency Analytical Testing (PAT) or

laboratory Accreditation Program. Include, as appropriate, real-time(direct-read) monitoring and integrated time Weighted Average (TWA) sampling for specific contaminants of concern, Meteorological, noise and radiation monitoring shall be conducted as needed depending upon the site hazard assessment. All monitoring and sampling protocol shall be specified to include instrumentation to be used andcalibration of instruments. All monitoring results shall be comparedto action levels to determine the need for corrective actions.

10.12 Heat/Cold Stress Monitoring Heat and cold stress monitoring protocols, as appropriate, shall be described in detail. Work/rest schedules shall be determined based upon ambient temperature, humidity, wind speed (wind chill), solar radiation intensity, duration and intensity of work and protective equipment ensembles. Minimum required physiological monitoring protocols which will affect work schedules shall be developed. In cases where impervious clothing is worn the NIOSH/OSHA/USCG/EPA" Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities " protocol for prevention of heat stress shall befollowed and heat stress monitoring shall commence at temperaturesof 70 degrees Fahrenheit and above. Where impervious clothing is notworn, the ACGIH heat stress standard (TLV) shall be used. For coldstress monitoring to help prevent frostbite and hypothermia, the ACGIH cold stress standard shall be referenced and followed, as a minimum.

10.13 Site Control. The A-E shall describe site control measures which include site maps, the work zone delineation and access points, the on/off site communication system, general site access controls and security procedures (physical and procedural).

10.14 Personnel and Equipment Decontamination. The A-Eshall develop and specify decontamination procedures in accordance with 29 CFR 192.0.120, AR 385-61 and DA PAM 385-61 for personnel, personal protective equipment, monitoring instruments,sampling equipment, and heavy equipment. Decontamination procedures shall address specific measures to ensure that contamination is confined to the work site. Necessary facilities and their locations,detailed standard operating procedures, frequencies, supplies and materials to accomplish decontamination of site personnel and to determine adequacy of equipment decontamination shall be discussed.

10.15 Emergency Response and Contingency Procedures On- and Off-Site. An Emergency Response Plan as required by 29 CFR 1910.120 and DA PAM 50-6 shall be developed and implemented. As a minimum itshall address the following elements: (1) Pre-emergency planning and procedures for reporting incidents to appropriate government agencies for potential chemical exposure, personal injuries,fire/explosions, environmental spills and releases, discovery of radioactive materials; (2) Personnel roles, lines of authority,communications; (3) Posted instructions and list of emergency contact: physician; nearby notified medical facility, fire andpolice departments, ambulance service, state/local/federal environmental agencies, CIH, and Contracting Officer; (4) Emergencyrecognition and prevention; (5) Site topography, layout andprevailing weather conditions; (6) Criteria and procedures for site evacuation (emergency alerting procedures/employee alarm system,emergency PPE and equipment, safe distance, place of refuge, evacuation routes, site security and control; (7) specific procedures for decontamination and medical treatment of injured personnel; (8) Route maps to nearest pre-notified medical facility;(9) Criteria for initiating community alert program, contacts and responsibilities; and (10) Critique of emergency responses and follow-up. Material Safety Data Sheets (MSDS) for each hazardous substances anticipated to be encountered on site shall be made accessible to site personnel at all times and shall be submitted in an appendix to the SSHP.

10.16 Standing Operating Drocedures Engineering Controls and Work Practices The A-E shall develop Standing Operating Procedures to protect field personnel, prevent accidents, hazards and to

take action to correct hazards where necessary. Site rules and prohibitions for safe work practices shall be discussed and shall include such topics as use of the buddy system, smoking restrictions, material handling procedures,confined space entry, excavation safety, physiological and meteorological monitoring for heat/cold stress, illumination, sanitation, and daily safety Inspections, etc. This list of topics is not intended to be all inclusive.

10.17 Logs, Reports and Record Keeping Record keeping procedures for training logs, daily safety inspection logs,employee/visitor registers, medical surveillance records and certifications, air monitoring results and personal exposure records shall be specified. All personnel exposure and medical monitoring records shall be maintained in accordance with applicable OSHA standards, CFR 1904, 1910 and 1926. The A-E shall develop, retain and submit training logs, daily safety inspection logs as part of the daily QC Reports, employee/visitor registration and medical opinions/certifications as part of the final contract file. All recordable accidents / injuries/ illnesses shall be reported to the Contracting Officer immediately.A completed ENG 3394, Accident Investigation Report, shall be submitted within two working days in accordance with AR 385-40 and USACE Supplement 1 to that regulation.

11.0 SCHEDULE OF MEETINGS AND DELIVERABLES

Task	Date
Review Existing Data (Task 1)	Upon Notice to Proceed
Draft SSWP	1 Dec 94
Draft SSHP	1 Dec 94
Final SSWP	15 Jan 95
Final SSHP	15 Jan 95
Draft EE/CA	6 Jul 95
Draft Final EE/CA	25 Aug 95
Final EE/CA	29 Sep 95
EE/CA Action Memorandum	29 Sep 95

ADDRESSEE	**COPIES**
U.S. ARMY ENGINEER DIVISION, HUNTSVILLE ATTN: CEHND-PM-OT (MR. C. TWING) 106 WYNN DRIVE HUNTSVILLE, AL 35805-1957	10
U.S. Army Engineer District, Omaha ATTN: CEMRO-MD-HA (MR. R. DWORKIN) 215 North 17th Street Omaha, NE 68102-4978	5

11.1 Format and Content of EE/CA. All drawings shall be of engineering quality with sufficient details to demonstrate the intent of the drawing and of sufficient quality to become a matterof public record and scrutiny. The report shall consist of 8 1/2" x 11" pages. The report covers shall consist of durable binders and shall hold pages firmly while allowing easy removal, additions, or replacement of pages. A title shall identify the site, the A-E, the Huntsville Division, and the date. The A-E identification or Logo shall not dominate the title page.

11.2 Review Comments. The A-E shall review all comments received through the CEHND Project Manager and evaluate their appropriateness based upon their merit. The A-E shall Incorporate all applicable comments and provide a written response to each comment no later than 21 calendar days

after the A-E receives the comments.

11.3 Identification of Responsibility. Each submittal shall identify the specific members and title of the subcontractor and A-E's staff who had significant input into the report. All final submittals shall be sealed by the registered Professional Engineer-in-Charge.

11.4 Presentations. The A-E shall make presentations of work performed as directed by the Contracting Officer. The presentation shall consist of a summary of the work accomplished and anticipated, followed by an open discussion.

11.5 Minutes of Meetings. Following the presentation and public meeting, the A-E shall prepare and submit minutes of the meeting within 10 calendar days to the Contracting Officer.

11.6 Correspondence. The A-E shall keep a record of all phone conversations and written correspondence affecting decisions related to the performance of this delivery order. A summary of the phone conversations and a copy of the written correspondence shall be submitted to the Contracting Officer withthe monthly progress report.

11.7 Monthly Progress Report. The A-E shall prepare and submit monthly progress reports describing the work performed since the previous report, work currently underway, and work anticipated. The report shall state whether current work is on schedule. If the work is not on schedule, the A-E shall state what actions are taken in order to get back on schedule. The report shall be submitted to the Contracting Officer not later than the 10th day of each calendar month.

11.8 Computer Files. All final text files generated by the A-E under this delivery order shall be furnished to the Contracting Officer in WordPerfect, IBM PC compatible format. All drawings_shall be on reproducible (mylar) and 3D design files in the Intergraph Corporation format, compatible with CEHND Graphics system and provide in accordance with attachment 1 of this SOW.

11.9 Public Affairs. The A-E shall not publicly disclose any data generated or reviewed under this contract. The A-E shall refer all requests for information concerning the site condition to the CEHND Project Manager. Reports and data generated under this delivery order are the property of the Department of Defense and distribution to any other sources by the A-E, unless authorized by the Contracting Officer, is prohibited.

12.0 REFERENCES

12.1 The A-E shall use the following references as applicable:
12.1.1 AR 385-40 with USACE Supplement
12.1.2 EM 385-1-1, CE Safety and Health Requirements Manual
12.1.3 TM 9-1300-206, Ammunition and Explosive Standards
12.1.4 CEHND Safety Concepts and Basic Considerations for UXO

13.0 GOVERNMENT-FURNISHED
13.1 Right of Entry (CEMRO).
13.2 Archives Search Report, Black Hills Ordnance Depot (BHOD), TOT St. Louis.
13.3 Other BHOD documentation.


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3.0 DESCRIPTION OF GEOPHYSICAL METHODS PROPOSED

A number of areas at the BHAD are suspected of being contaminated with ordnance and explosive wastes (OEW) and chemical warfare materials (CWM). These contaminants may be in the form of buried ordnance (primarily metal); trenches or pits (areas of disturbed soil) used for chemical disposal or burning of OEW; buried pipes (possibly containing chemical agents); and leach fields (possibly containing explosive waste). Geophysical equipment capable of locating these contaminants include magnetic, electromagnetic, and ground penetrating radar methods. The following sections provide a brief overview of these geophysical methods, and discuss their sensitivity and limitations with regard to the objectives of this project.

3.1 MAGNETIC METHODS

3.1.1 Theory

The earth possesses a magnetic field which exhibits characteristics similar to a dipole magnet, with the ends of the dipole in the polar regions. The intensity of the magnetic field is measured in nanoTesla (nT), also commonly referred to as gammas. The field varies from a low of about 25,000 nT in equatorial regions to over 65,000 nT in polar areas. In the region of the BHAD site, the field has an average intensity of about 57,000 nT. The natural magnetic field of the earth, when measured at any specific location, will show time-varying changes referred to as drift. This drift may be caused by a number of factors including atmospherics, storms, and solar flare eruptions.

The magnetic field intensity at any given location may deviate from the expected normal field due to the presence of geologic or man-made features. The shape and magnitude of magnetic anomalies is dependent on the magnetic susceptibility, mass, shape, orientation, and depth of burial of these features. Geologic structures such as faults may be evidenced by magnetic measurements because of the presence of magnetic minerals in earth materials. Manmade features are evidenced because of the presence of iron-bearing objects. Objects such as steel shell casings, drums, tanks, or steel pipelines produce magnetic anomalies which may be quite pronounced as a result of the high magnetic susceptibility of iron or steel.

The magnetic signature which is shown by an anomaly is the combined result of both remanent and induced magnetism. Remanent magnetism is a property that is fixed in a material at some specific point in its past history. It results from the parallel alignment of magnetically susceptible crystals or grains in the material to the lines of force of the earth's magnetic field at the time the remanent magnetism was fixed. Remanent magnetism may result from such things as the cooling of molten metals or magma, heat firing, or the settling of fine particles, and remains unchanged unless the material is altered. Induced magnetism is a property which results from interaction of magnetically susceptible materials with the present magnetic field of the earth. Generally, in the search for buried metallic debris, it is sufficient to consider only the induced field as the source for anomalies.

Measurement of the magnetic field is often done to obtain both the total magnetic field intensity and the vertical magnetic gradient. Total field measurements show responses in the magnetic field which have both deep seated (large area) and near surface (local) sources. The vertical magnetic gradient, which is obtained by taking two readings of the total field intensity at two different heights above the

ground surface at the same location, represents the change in the total field strength between those two heights. The vertical gradient is typically expressed as nT/meter or nT/foot. An advantage which the vertical magnetic gradient offers is that because the strength of anomalies is in part controlled by the distance between the source and the reading sensor (depth of burial), shallow source anomalies tend to be more pronounced with vertical magnetic gradient data than with total field data.

Magnetic drift can interfere with the continuity of measurements and obscure the targets of more sensitive surveys. Drift values may equal or exceed the threshold of anomalies which are created by the presence of target objects. For that reason, and to permit ties between data taken over periods of time, it is advisable to apply drift corrections to data collected during a magnetic survey. The use of a separate recording magnetometer at a fixed base station will provide a record of the natural drift that occurs. Subtraction of that drift from data collected by roving field units will eliminate the problems which arise due to drift. In cases where more than one magnetometer is in use in a survey area, the same base station data may be applied to all of the roving field units. Drift correction is not necessary for vertical gradient measurements on systems where reading of both sensors is performed concurrently.

Magnetic surveys may be performed using several classes of instrumentation. The most commonly applied instruments in the search for buried objects are of the fluxgate type or the proton precession type. The current generation of proton magnetometers generally are considered to be well suited for surveys in areas of buried objects because of their ability to provide data in the presence of high magnetic gradients.

Data typically is collected in a magnetic survey by obtaining readings along profiles or on a rectangular grid system, with the "ridded data then contoured in map form. The spacing of the lines of traverse and the reading points along each line are varied according to the objective of the survey. Large scale reconnaissance work to evaluate features with large dimensions may use line and station spacings of 50 feet or more. Detailed searches for isolated small objects may require that data be collected at spacings as close as 1 to 3 feet; smaller objects contain less magnetically susceptible material and thus produce smaller deviations from the normal magnetic field. Since these anomalies are both smaller in intensity and are smaller in the area over which they occur, readings must be made at close spacings in order to detect their presence.

Similarly, the depth at which an object can be detected will vary with the size of the object. Smaller objects must lie closer to the ground surface to be detected, while larger objects or clusters of objects may lie at greater depth and still be detectable. As an example, one pound of iron will produce an anomaly of 10 nT at a distance of approximately 5 feet, whereas 1000 pounds of iron will yield a 10 nT anomaly at a distance of about 50 feet.

3.1.2 Instrumentation

Two commonly available types of magnetometers are the proton precession and fluxgate magnetometer. These magnetometers include both those systems which provide quantitative measurement of the total field intensity and vertical gradient ("radiometer) of the magnetic field, and those which provide a qualitative response to changes in the magnetic field (metal locators).

Currently, proton precession magnetometers can measure the total field intensity and vertical magnetic gradient to a resolution of 0.01 nT. Fluxgate magnetometers have a resolution of 0.1 nT. With these sensitivities, interference from buildings, steel fencing, culvert pipes, and drain tiles, buried utilities and pipes, and other cultural sources can degrade the ability to detect target objects. At locations where

cultural interference does not occur, anomalies on the order of 5 to 10 nT can be readily detected. This intensity of anomaly equates to that produced by a one pound ferrous object buried at a depth of approximately 5 feet.

The magnetometers selected for use at the BHAD include the Geometries GSM-19 Overhauser Magnetometer and Schonstedt GA-72CV Magnetic Locator. The Geometries GSM-19 is a proton precession magnetometer with the capability of simultaneous measurement of the total field intensity and vertical gradient of the magnetic field to a resolution of 0.01 nT, and an absolute accuracy of 0.2 nT. The instrument's advanced Overhauser technology utilizes continuous radio frequency polarization and special sensors to maximize the signal-to-noise ratio. The data and corresponding locations are digitally recorded within the instrument for later downloading to a computer.

The Schonstedt GA-72CV operates as a fluxgate "radiometer. When magnetic gradients exceed a threshold value, an audible tone is emitted. The stronger the response, the louder the tone. The audio tone is indicative of both positive and negative gradients. The system also incorporates a meter gauge to monitor output and to assist in the identification of the polarity of the anomaly.

The GA-72CV responds to small objects that are buried very close to the ground surface. For deeper sensing, the target object must be of increasing size. Typical maximum search depths for the GA-72CV are in the range of 2 to 4 feet; however, detection to depths of about 8 feet is possible in some cases.

3.2 ELECTROMAGNETIC METHODS

3.2.1 Theory

Conductivity (the reciprocal of resistivity) is a parameter that can be measured by electromagnetic methods. In most earth materials, the conductivity is determined more by the porosity of the material and the chemical content of the water filling the pore spaces than by the conductivity of the mineral grains of which the material itself is composed. Disturbance of the natural soils, such as those caused by excavation and backfilling, tends to cause a change in the ground conductivity which often can be measured at the surface. The high conductivity of buried metallic objects (e.g. ordnance) also creates an anomaly in the ground conductivity that can be measured.

3.2.2 Instrumentation

Electromagnetic (EM) instruments operate by inducing alternating circular current flow in the ground. This is done through a transmitter coil that emits a low frequency alternating current. The current flow, which is determined by the conductivity of the ground, produces a secondary EM field which is detected by a receiver coil. There are two components of the induced magnetic field that can be measured by EM instruments: the quadrature-phase, which is linearly related to ground conductivity; and the in-phase, which is sensitive to metallic objects. Depending upon the type of instrument and method of survey, a receiver coil may be used to measure the inducted magnetic field for its strength, phase, or time decay.

The depth of material which effectively contributes to the instrument reading changes depending upon the orientation of the antenna coil dipoles, and the spacing between the transmitting and receiving coils. For vertical dipoles, the effective depth of investigation is 1.5 times the intercoil spacing. For

horizontal dipoles, the effective depth of investigation is 0.75 times the intercoil spacing.

The EM instruments selected for use at the BHAD include the Geonics EM3 1 electromagnetic ground conductivity meter and the Geonics EM61 time-domain metal detector. Selection of these two instruments is based on the project objective of locating buried ordnance and trenches, and the need to obtain quantitative data.

The EM31 consists of a control console located at the center of a nonconductive boon. A transmitter coil at one end of the boom radiates an electromagnetic field (primary field) which induces alternating eddy currents loops (secondary field) in the earth beneath the instrument. A receiver coil at the opposite end of the boom senses both primary and secondary fields. The instrument measures the ratio of the strength of the secondary field produced by the eddy currents to the strength of the primary magnetic field. Measurement is taken immediately following a transmission cycle and simultaneously measures both the quadrature phase and inphase component of the induced magnetic field. The measurements can be read directly from the instrument display, or can be digitally recorded using a data logger attached to the instrument. The normal orientation of the dipoles when the EM31 is carried by its shoulder strap is vertical. With an intercoil spacing fixed at approximately 12 feet. its effective depth of investigation is about 18 feet.

The terrain conductivity measured with the EMS 1 represents a "bulk" conductivity value for the earth underlying the instrument, with most of the contribution to this reading being from the interval above the effective depth of investigation. The measured terrain conductivity is expressed in milliSeimens/meter (mS/m). The readings which are obtained are values which are valid at low induction numbers. In cases where the constraint of low induction is exceeded, the linear relationship of readings to true values no longer holds true. With the EM31, this condition is reached at approximately 300 mS/m; above that, reading values fall off rapidly and can even become negative. High terrain conductivities may, among other causes, be indicative of the presence of disturbed ground, the occurrence of bulk waste burial, elevated saturation levels, or the occurrence of buried metallic waste.

With the in-phase component of the EM31, the system performs as a sophisticated and sensitive metal locator. Readings obtained from the in-phase component are expressed in parts per thousand (ppt). Higher values represent stronger responses. EM31 responses, unlike those of a magnetometer, do not require that the metal be iron or steel. Because of its potential to provide data on both the occurrence of buried metal objects and disturbed ground, the EM31 is an excellent general purpose reconnaissance unit.

Data collected in an EM survey may be obtained in profile form or on a "ridded station basis. One advantageous method of obtaining and evaluating data is to obtain readings in two perpendicular directions at each reading station. Maps then can be generated showing both the average of the two readings and the difference of the two readings. In cases where the absolute value of the differences increases, it is often indicative of the presence of a buried feature or object. Modeling software can be used to estimate the depth of an interface and conductivity values for a two layer system, if reading are obtained with both vertical and horizontal dipole configurations and at multiple heights above the ground surface.

The EM31 is sensitive to interference by cultural sources such as fences, pipelines and utilities, and power lines. Because of this, readings made near objects such as fences may be difficult to interpret for the presence of target features and objects.

The EM61 is a coincident time-domain transmitter and receiver which induces secondary EM fields in

the ground by generating 150 EM pulses per second and measuring the secondary field between pulses. The secondary fields are induced in both the earth materials and metallic objects. The secondary field formed in earth materials decays rapidly following the completion of the energizing cycle, while the field produced in metallic objects persists much longer. Between each pulse, the EM61 waits for the induced field from the earth to dissipate, and then measures the prolonged field generated by buried metallic objects. By sensing only the response from the buried metal, the EM61 can detect targets which otherwise might have been missed.

The EM61 consists of a control console and two antenna coils. The antenna coils are arranged in a vertically stacked configuration with the antenna dipoles oriented vertically. The system can be operated while being carried using a shoulder harness system or can be mounted on a wheeled cart which is towed over the survey area by hand. Data from the EM61 can be input to a data logger which is programmed to store reading values along with corresponding reading locations. The EM61 provides readout in units of millivolts (mV).

The EM61 has several distinct advantages over the EM31 or conventional metal locators in the search for buried metallic objects. As with the EM31, the response of the EM61 does not require that buried metal be iron or steel. However, unlike the EM31, the EM61 permits modeling calculation of the depth of targets identified during the survey. Compared with conventional metal locating devices, the EM61 provides a quantitative measure of response and has much greater sensitivity. The increased sensitivity allows for detection of targets at greater depth. As with other geophysical instruments, the depth to which the EM61 can detect buried metallic objects is a function of the size of the object. Smaller targets can be located to lesser depths than can larger targets. The EM61 can detect a single 55-gallon drum to a depth of up to 12 feet. Individual ordnance can be detected to depths of one to three feet.

The EM61 has an extremely high lateral resolution which permits it to resolve closely spaced anomalies. For optimum resolution of closely spaced targets, data should be collected at an interval of eight inches. In general, a separation between survey points is approximately three to six feet will provide good results. Where six foot spacing is used, large buried metallic targets will be detected, but smaller near surface targets could be missed.

Data collected during an EM61 surveys is typically collected in profile form or on a "ridded station basis. Data are contoured in map form. Anomalies are evaluated on feature by feature basis for depth through modeling calculation.

3.3 GROUND PENETRATING RADAR METHOD

Ground penetrating radar (GPR) produces a subsurface profile using high frequency radio waves (radar) emitted by a transmitter. The impulse signal which is emitted from the transmitter is in the megahertz range. When this signal is broadcast from the transmitter in impulse form, it propagates radially into the subsurface. At points along the wavefront where contrasts in electrical properties are encountered, a portion of the signal is reflected back towards the earth's surface and the remaining signal penetrates further, encountering more interfaces and producing more reflections. A receiving antenna is used to capture the returning signals which then can be displayed in various formats after processing by the system electronics.

The depth of penetration and resolution of impulse GPR systems are a function of both the frequency of the signal used and of the electrical conductivity of the ground over which the survey is run. High frequency signals provide less penetration than do lower frequency signals. Typical ranges for antenna

frequencies are between 80 MHz and 1,000 MHz. For a given signal frequency, electrically resistive ground yields greater depth penetration than does electrically conductive ground. At the extremes, dry sandy soil or dry bedrock would be considered electrically resistive. Wet clay soils would be considered electrically conductive. Depths of penetration may range from less than 1 foot to tens of feet depending on site specific conditions.

Target resolution is a function of antenna frequency that is inverse to penetration. That is, high frequency signals permit resolution of smaller objects, while lower frequencies require that objects be larger to be resolved. For example, detection of reinforcing bar might require the use of a 1,000 MHz unit, while an 80 MHz unit might be used for locating trench boundaries.

Metallic targets give characteristically sharp reflections, though diffractions from irregular or inclined surfaces may diminish the sharp response. Trench limits are often defined from the reflection pattern difference seen between horizontally layered native ground and the disturbed soil within the trench limits.

Under most circumstances, the radar antenna must be directly coupled to the ground, but may be towed either by hand or with a vehicle. Data is collected along lines of traverse, with the reflections representing conditions directly below the transducer, with a limited "side-scan" capacity. Thus, detailed examination of the subsurface with full coverage over an area requires that lines of traverse be located at closely spaced intervals.

The GPR unit selected for use at the BHAD is the Geophysical Survey Systems, Inc. (GSSI) SIR SYSTEM-10 Subsurface Interface Radar. The SIR SYSTEM-10 consists of a processor unit, a control and display module, an antenna/transducer system, and optionally a graphic recorder or plotter. A selection of GSSI manufactured antenna units may be used in the system. Data may be archived on diskette or on mass tape storage. The system offers selectable signal filtering, color monitor display, real time processing and signal enhancement, and a choice of display formats (including color linescan or wiggle trace). PC driven computer software (RADAN or RADAN III) from GSSI may be used to post-process data.

3.4 COMPARISON OF METHODS

The geophysical methods discussed in the proceeding sections were selected based on the project objective of locating buried ordnance and trenches. A comparison of the characteristics of these methods is presents in Table 3-1

Although seismic and electrical methods are capable of locating trenches, they were eliminated from consideration because data acquisition is relatively slow (and expensive) compared to electromagnetic methods. In addition, some EM based metal locators were eliminated because they lacked an appropriate depth range and/or quantitative data output.

3.5 GLOBAL POSITIONING SYSTEM (GPS)

GPS is a means of determining locations on earth using satellite signals as references. A planned network of 24 satellites (21 operational and 3 spares), placed in earth orbit by the U.S. Department of Defense (DOD), transmit radio signals that provide the basis for location determinations. The satellites, which orbit earth at altitudes of over 10,000 miles along 6 orbits, are tracked by earth stations that very accurately monitor each of the satellite's orbits. Precise timing for each satellite is

provided by onboard atomic clocks. The radio signals transmitted by each satellite contain information on their instantaneous location and the precise time at which signals are emitted. The signal from each satellite also is encoded with information to identify the particular satellite from which it came. The encoded signal is composed of both a protected code (P-Code) and a unprotected code (course acquisition or C/A Code). The P-Code is restricted for military use, the C/A Code is intended for public access.

In simplest form, a GPS receiver on the ground reads the C/A Code on signals from three or more satellites and determines the distance between the receiver and each satellite. The distance is computed from the difference in time between when the signal is emitted and when it is received, assuming a uniform travel speed for each signal. The distance between each satellite and receiver defines the surface of a sphere. The intersection of four spheres defines a unique point, the location of the receiver.

The precision of the location that is defined by the satellite signals is affected by very small errors in timing and in the location (ephemeris) of each satellite. In addition, variation in the propagation speed of the radio signals through the atmosphere and refractions and reflections in the travel paths all act to degrade the precision of the measured location. These inaccuracies are variable over time and from place to place.

A GPS system will be used during the geophysical investigation to establish the coarse grid points. Horizontal accuracy of the unit will be less than .05-feet.

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4.0 GEOPHYSICAL DEMONSTRATION PLAN

This Geophysical Equipment Demonstration Plan documents the methods and procedures to be used to evaluate the performance of geophysical survey equipment and field techniques selected for possible use at the BHAD. The objective of this demonstration will be to: (1) assess the performance of the selected geophysical survey equipment and field techniques under sitespecific environmental and soil conditions; and (2) to determine the combination of equipment and field techniques capable of locating OEW and CWM to depths of eight feet.

Because of the diversity of the OEW and CWM which may exist at the site, and the diversity of the activities at the site that resulted in the presence of OEW or CWM (such as deliberate disposal by burial deliberate or accidental explosions, etc.), different geophysical techniques may be appropriate at different areas of concern at the site.

The results of the geophysical equipment demonstration, along with Dames & Moore's recommendations, will be provided to the USACE for review and approval prior to proceeding with the geophysical investigation.

4.1 DEMONSTRATION SITE LAYOUT

The geophysical equipment demonstration will be conducted on a 200- by 200-foot test site to be constructed at the BHAD for this purpose. The test site will be constructed in an area with no known subsurface utilities or structures, and no known history of ordnance storage or disposal. Several potential test site areas will be selected and submitted to the USACE for approval prior to mobilizing to the site. Final site selection will be based on visual, electromagnetic, and metal detector sweeps of the area. Dames & Moore will obtain permission from the owner of the property prior to preparing the geophysical demonstration area. The general area selected for the demonstration is south of Igloo, adjacent to the former officers quarters, in the northeast section of the BHAD (refer to Figure 4-1). The area selected is near the housing/administrative area of the BHAD, greatly reducing the probability the area was used for OEW or CWM activities. For this reason, personnel from the Technical Escort Unit (TEU) and the Edgewood Research and Development Engineering Center (ERDEC) will not be present during preparation of this area.

The 200- by 200-foot investigation area will be established with north and east axes. Survey lines spaced ten feet apart will be established within the area using stakes or flags. The location of the southwest corner of the area (grid origin) will be established to within 0.05-feet using GPS equipment.

Figure 4-1. Demonstration Site Layout

The selected test site will be seeded with targets of known composition, size, shape, location, and depth. These targets will include individual inert ordnance (metallic) or equivalent; bulk inert ordnance (metallic) or equivalent; trenches and pits (areas of disturbed soil); and pipes (metallic and nonmetallic). A ten-foot grid will be established on the site prior to initiating the demonstration. Because of the limitations of the EM61 to detect objects that are not directly under the probe, a 5-foot grid will be established in those portions of the area that will be used to demonstrate the ability of this equipment to detect buried metallic objects.

Individual inert ordnance (20 mm through 240 mm conventional munitions) or equivalent targets will be buried at depths of one and two feet. Bulk inert ordnance or equivalent (e.g. individual and groups of drums) will be buried at depths of four, six, and eight feet. One trench (approximately 8-feet deep, 10-feet wide, and 20-feet long), will be excavated and backfilled to simulate the existence of trenches which may have been used to dispose of nonmetallic CWM. Individual 4-inch by 20-foot vitrified clay and steel pipes will be buried at depths of 4- and 6- feet. The depth of test targets and trenches will not exceed 8-feet or to the top of bedrock, whichever is less.

4.2 GEOPHYSICAL DEMONSTRATION

The geophysical survey equipment to be evaluated during the geophysical demonstration will include a Geometries GSM-19 Overhauser Magnetometer, Geonics EM31 Ground Conductivity Meter, Geonics EM61 Time-Domain Metal Detector, GSSI SIR SYSTEM-10 Ground Penetrating Radar, and a Schonstedt GA-72CV Magnetic Locator. Geophysical measurements generally will be collected on a 10-foot grid to allow evaluation of the spatial resolution of each instrument using 10- and 20-foot grid spacings and staggered grid layouts; a 10-foot grid will be used when evaluating the EM61, GSM-19 magnetometer, and the Schonstedt GA-72CV Magnetic Locator.

The following sections provide descriptions of the procedures to be used to collect and analyze the data for evaluating the performance of the proposed geophysical survey equipment.

4.2.1 Magnetic Methods

4.2.1.1 Schonstedt GA-72CV Magnetic Locator

A Schonstedt GA-72CV or equivalent magnetic locator will be used to survey the portion of the demonstration site containing buried individual inert ordnance. The survey will be performed by systematically sweeping each 5-foot by 5-foot grid in this portion of the test site. The sensitivity of the instrument will be calibrated by checking and recording its response to an inert 20 mm cartridge or equivalent target buried at a depth of one foot.

Metallic contacts will be marked on a "ridded sheet. Individual contacts will be identified by the letter "C", and large anomalous areas will be identified with the letter "A". The sensitivity of the instrument will be assessed by comparing the identified metallic contacts against the known location of buried targets in the test site.

4.2.1.2 Geometries GSM-19 Magnetometer

The GSM-19 magnetometer survey will be conducted along north-south grid lines spaced five feet apart, with total field and vertical gradient measurements collected at five foot intervals along each line. Repeat readings will be made at a predetermined base station at approximately one hour intervals to obtain data on diurnal or other variations (drift) in the earth's magnetic field during the survey. Alternately, a second magnetometer may be installed at the base station to record changes in the magnetic field during the survey.

The instrument readings and position will be digitally recorded and transferred to a computer at the completion of the survey. During the survey, field notes will record the position and instrument

reading for selected grid nodes as a quality control check. The recorded data then will be loaded into a spreadsheet for data editing, validation, and drift correction.

The data will be used to generate contour maps based on 5-foot, 10-foot, and 20-foot sampling grids of both the total field and vertical gradient measurements. Spatial resolution then will be assessed by evaluating how tightly the contoured data fit the known targets. Vertical resolution will be assessed by evaluating the intensity of the magnetic anomaly measured for each known target. A generalized model of each anomaly will be developed to estimate the depth to the target for comparison with the known depth.

4.2.2 Electromagnetic Methods

4.2.2.1 Geonics EM31

The EM31 survey will be conducted along north-south grid lines spaced ten feet apart. Readings will be obtained at ten-foot intervals with the instrument set in the vertical dipole position. A measurement first will be taken with the boom of the instrument aligned in a northsouth direction. The instrument then will be rotated 90 degrees in a horizontal plane, where a second reading will be taken. The EM31 will record both the in-phase and quadrature-phase measurement for each orientation. The instrument readings and position will be digitally recorded using a data logger and transferred to a computer at the completion of the survey. During the survey, field notes will record the position and instrument reading for selected grid nodes as a quality control check.

The recorded data then will be loaded into a spreadsheet for data validation and editing. The data files generated will contain the in-phase and quadrature-phase data for both the northsouth and east-west boom orientations, and will be used to generate contour maps based on 10and 20-foot survey grids.

The quadrature-phase contour maps will be used to evaluate changes in ground conductivity which may be due to disturbed ground (e.g., trenches). The in-phase contour maps will be used to assess the presence of buried metallic objects. Spatial resolution then will be assessed by evaluating how tightly the contoured data fit the known targets.

4.2.2.2 Geonics EM61

The EM61 survey will be conducted along north-south grid lines spaced 10-feet apart. Readings will be obtained at 10-foot intervals, digitally recorded using a data logger, and transferred to a computer at the completion of the survey. During the survey, field notes will record the position and instrument reading for selected grid nodes as a quality control check.

The recorded data will be loaded into a spreadsheet for data validation and editing. The data files then will be used to generate contour maps based on 10- and 20-foot sampling grids. Spatial resolution will be assessed by evaluating how tightly the contoured instrument readings fit the known targets. Vertical resolution will be assessed by evaluating the intensity of the magnetic anomaly measured for each known target. A generalized model of each anomaly will be developed to estimate the depth to the target for comparison with the known depth.

4.2.3 Ground Penetrating Radar Method

The ground penetrating radar survey will be conducted using a GSSI SIR SYSTEM-10. The survey will be conducted along north-south grid lines spaced 10-feet apart, with readings obtained continuously as the antennas are drawn along each line. The radar reflection data and position will be digitally recorded by the instrument for later processing and playback.

Following completion of the survey, radar reflection profiles will be generated for each grid line. Each profile then will be evaluated to identify subsurface contacts. The sensitivity of the instrument will be assessed by comparing the identified subsurface contacts against the known location of buried targets in the test site.

4.3 DATA REDUCTION AND ANALYSIS

Preliminary data analysis will be performed in the field to verify the integrity of the data and to evaluate if the quality of the data is adequate to meet project goals. If instrument data or recorded positions are incorrect, the grid lines or stations may be resurveyed. Following completion of the field activities, office analysis will be performed to generate depth models and fmal color contour maps that will be used to evaluate the performance of the geophysical equipment at the demonstration test site.

4.4 RESTORATION OF SITE

Permission will be obtained from the landowner to leave the buried objects in the ground. Since the location of the test site will be well known, and the test objects will be inert and harmless, restoration of the site by removing the buried objects is not necessary. To reduce the possibility of concern in the event the 55-gallon drums are excavated in the future, the ends of the drums will be removed prior to burial.

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9.0 SITE SAFETY AND HEALTH PLAN

All work will be performed in accordance with the approved Site Safety and Health Plan(SSHP); a copy of this document is enclosed as Appendix 1 to this Work Plan.

UXB International has prepared the general Site Safety and Health Plan under their contract with the USACE/Huntsville. The SSHP for the work to be performed by Dames & Moore also was developed by UXB, and adapts the procedures required for non-intrusive and intrusive activities (surface and underground clearing of other areas of the BHAD) to the work required under the Dames & Moore contract with the USACE/Huntsville. Although the work to be performed by Dames & Moore generally is considered non-intrusive, there are a few portions of the work that are considered intrusive, such as the installation of permanent survey monuments, and the preparation of the geophysical survey equipment demonstration area. Appropriate procedures for this intrusive work have been included in the UXB/Dames & Moore SSHP

10.0 PUBLIC INVOLVEMENT

10.1 INTRODUCTION

Public involvement is considered crucial to performing the work necessary to investigate and remediate the facility. Two forms of public participation are specified in regulations for removal projects such as the BHAD: Community Relations Activities, and Administrative Record Activities. Both of these types of activities will be addressed in a detailed Public Involvement Plan currently being prepared by the USACE/Omaha which is taking the lead in coordinating public involvement activities for the work at theBHAD. The Dames & Moore project team will work through the USACE/Huntsville to provide public involvement support as needed. At a minimum, Dames & Moore recognizes there will be a 30-day public comment period on the EE/CA, and will assist the Corps in preparing written responses to public comments.

10.2 RESTORATION ADVISORY BOARD

The Restoration Advisory Board (RAB) for the BHAD project was formed in the spring of1994, and is comprised of local citizens, State and Federal Agency representatives, and affected property owners. Participation is voluntary, and is intended as a vehicle for communicating information and progress on the investigation and restoration of the site. A charter currently is being drafted toformalize the organization, operating policies, and responsibilities of the RAB.

The Dames & Moore project team has attended two meetings with the RAB, in November,1994 and in February, 1995. It is anticipated that RAB meetings will be held in Edgemont, South Dakotaon a monthly basis during site investigations. Two representatives from the Dames & Moore team will beavailable to attend the RAB meetings when requested to do so by the USACE. Brief presentations of project team activities may be prepared for these meetings.

A Technical Review Committee also may be established by the RAB. A representative from the Dames & Moore project team will participate in this Committee if requested to do so by the USACE.

10.3 TELEPHONE "1-800" NUMBER

In response to public requests, a toll-free telephone number will be established to receive information from the public concerning historic activities at the former depot. This activity is intended tobe an extension of archive searches, and will be used to solicit additional information concerning OEW

and/or CWM, including disposal practices followed, areas of disposal, types of wastes, etc. A pre-recorded message will be used to describe the intent of the 800 number, and how to leave information.The caller also will be given the option of leaving their name and number so that in-person interviews canbe arranged, if though to be appropriate. The message also will include details on how to get additional information concerning the current status of the project. A six-month trial period for the toll-free numberis anticipated. The use of the telephone number will be evaluated at the end of six months to determine the need to continue the service.

10.4 PUBLIC HEARINGS

It is anticipated that at least one formal public hearing will be held during the project. Dames &Moore will assist the USACE in preparing for the hearing, and will be available to present information, if requested to do so by the USACE.

10.5 DEVELOP ON-SITE INNOVATIVE TECHNOLOGIES (DOIT) INITIATIVE

The Black Hills Army Depot was identified as a potential DOIT munitions waste demonstration site by the Western Governors Association, in conjunction with the Department of Defense, on January31, 1994. The DOIT initiative is a public involvement process intended to expedite and ensure acceptance of remediation technologies. As such, a DOIT committee may be formed that will interactwith the USACE throughout site investigations and remediation.

10.6 PUBLIC AFFAIRS

Dames & Moore will not disclose any data or information obtained as a result of archive searches, or generated during field operations, or developed during the preparation of the EE/CA. All requests for information regarding the site and project activities will be referred to the USACE Project Manager.

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ORDNANCE AND EXPLOSIVES (OE)

consists of either (1) or (2) below:

1. Ammunition, ammunition components, chemical warfare materials or explosives which have been lost, abandoned, discarded, buried, fired, thrown from demolition pits or burning pads, or shot off ranges. Such ammunition, ammunition components and explosives are no longer under accountable record control of any DOD organization or activity.
2. Explosive Soil. Explosive soil refers to mixtures of explosives in soil, sand, clay, or other solid media at concentrations such that the mixture itself is explosive.

Bluebonnet Ordnance Plant

- Archive Search Report (ASR)
- Expanded Site Investigations (ESI)
- Engineering Evaluation/ Cost Analysis (EE/CA)
- Community Relations
- Removal Response

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Hits	Size	Document
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7	48.8K	Bluebonnet Ordnance Plant: Findings Section 1-4
4	8.8K	Bluebonnet Ordnance Plant: Findings Table of Conte
2	2.0K	Bluebonnet Ordnance Plant: ASR Page
2	15.9K	Bluebonnet Ordnance Plant: Findings Section 5-7
2	1.2K	Bluebonnet Ordnance Plant: OE Page
2	1.0K	Bluebonnet Ordnance Plant: Project Page
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1	3.2K	Bluebonnet Ordnance Plant: Reports and Drawings
1	7.7K	FORT WORTH DISTRICT

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
for
FORMERLY USED DEFENSE SITES

FINDINGS

ORDNANCE AND EXPLOSIVE WASTE ARCHIVES SEARCH REPORT FOR FORMER BLUEBONNET ORDNANCE PLANT McGREGOR, TEXAS PROJECT NUMBER K06TX032301

April 1994

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ORDNANCE AND EXPLOSIVE WASTE ARCHIVES SEARCH REPORT FOR FORMER BLUEBONNET ORDNANCE PLANT McGREGOR, TEXAS PROJECT NUMBER K06TX032301

ACKNOWLEDGEMENTS

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ORDNANCE AND EXPLOSIVE WASTE
ARCHIVES SEARCH REPORT
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ORDNANCE AND EXPLOSIVE WASTE
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1. INTRODUCTION

a. Subject and Purpose

(1) This report presents the findings of a historical records search and site inspection for ordnance and explosive waste (OEW) presence located at the former Bluebonnet Ordnance Plant, McGregor, Texas. See plate 1 for general location map. The investigation was performed under the authority of the Defense Environmental Restoration Program for Formerly Used Defense Sites (DERP FUDS).

(2) The purpose of this investigation was to characterize the site for potential OEW contamination, to include chemical warfare material (CWM). This was achieved by a thorough evaluation of historical records, interviews, and an on-site visual inspection.

b. Scope

(1) Bluebonnet Ordnance Plant (BOP) consisted of 18,151 acres during WWII. Of this area, 9,754 acres are still owned by the US Navy and operated by Hercules for the manufacture of rocket motors and is not eligible for consideration under DERP FUDS. This investigation focuses on the 8,397 acres that have been returned to private ownership.

(2) This report presents the site history, site description, real estate ownership information, and confirmed ordnance presence, based on available records, interviews, and the site inspection. It further provides a complete evaluation of all information to assess potential ordnance contamination where actual ordnance presence has not been confirmed.

2. PREVIOUS INVESTIGATIONS

a. Preliminary Assessment

A Preliminary Assessment of the Bluebonnnet Ordnance Plant was conducted under by the Southwest Division, Fort Worth District Office (CESWF) in 1991 (see document E-1). That report determined that the site was formerly used by the Department of War/DoD and recommended an OEW investigation to evaluate the presence of ordnance contamination. Table 2-1 represents an overview of the PA phase.

TABLE 2-1
DERP-FUDS PRELIMINARY ASSESSMENT PROJECTS

Project Number	DERP Category	Present Phase	Comments	Location
K06TX032301	OEW	SI	Ordnance or explosive contamination	See plate 6
	HTRW	-	None	-
	BD/DR	-	None	-

b. Navy Installation Assessment Study

In March, 1983, Envirodyne Engineers prepared an Environmental Assessment on the portion of BOP property owned by the Navy. While it primarily focused on the Navy property, this report also addressed contamination on the privately-own lands and provided valuable information. Information from this report is further addressed in section 4 (see document E-2).

c. Navy Soil Survey and Groundwater Testing

(1) In August, 1983, the Navy did a Confirmation Study based on the findings of the Environmental Assessment. One of the issues was TNT contamination of the groundwater at the bomb lines. The report found no indication of surface water contamination from TNT and recommended no corrective action. The report did not address the possibility of soil contamination (see document E-3).

(2) In February 1983, the Navy did a groundwater assessment of the former booster line for tetryl contamination. While this area is on Navy property about 1 mile north of the two FUDS-eligible bomb lines (lines 1 & 2), the 1981 soil borings will be useful for EE/CA studies (see document E-4).

3. SITE DESCRIPTION

a. Existing Land Usage

(1) The original Bluebonnet Ordnance Plant consisted of 18,151.586 acres located immediately southwest of McGregor, Texas. Most of the plant was in McLennan County, but a small area on the western side was in Coryell County. Roughly half of the acreage remains under government control as a rocket motor plant, while the other half has been returned to private ownership and the city of McGregor. The privately-owned lands are used primarily for agriculture, though there is a light manufacturing operation at the former bomb line #1. See table 3-1 and plate 6 for a breakdown of property ownership and current usage.

TABLE 3-1
CURRENT LAND USAGE

FORMER USAGE	PRESENT OWNER	PRESENT USAGE	SIZE/ ACRES	COMMENTS
Area A: Bomb Line 1	Felix Morris	Furniture plant	124.5	See plate 2, docs L-5 & L-8, photos J-1 thru J-5, J-18 & 19
Area B: Bomb Line 2	Lendon Dutton	Agriculture (buildings vacant)	124.24	See plate 3, docs L-6 & L-9, photos J-6 thru 10, J-17 & 20
Area C: Burning Area	Texas A&M	Headquarters area/open	3*	See plate 4, doc K-2, L-2, & L-8, photos J-11 & 12
Area D: Burial Site	Texas A&M	Dump	8*	See plate 4, doc K-2, L-2, & L-7
Area E: Sewage Plant	McGregor	Sewage Plant	33.41	See plate 5 & doc F-4
Area F: Finished Ammunition Storage Area	Texas A&M	Agriculture	446*	See plate 4, doc L-7, photos J-13 thru 16
Area G: Housing	McGregor	High school	66.45	See plate 6

	McGregor	Park	85.31	See plate 6
Housing and Open Land	Lester Robertson	Agriculture	90.44	See plate 6
Open Land/ Buffer Area	McGregor	Water tower	11.29	See plate 6
	Hercules	Agriculture	242.76	See plate 6
	Texas A&M	Agriculture	5673*	See plate 6
	Charles Affenbach	Agriculture	70.06	See plate 6

TABLE 3-1 (continued)
CURRENT LAND USAGE

FORMER USAGE	PRESENT OWNER	PRESENT USAGE	SIZE/ ACRES	COMMENTS
Area G (cont):				
Open Land/ Buffer Area	Felix Morris	Agriculture	321.27	See plate 6 east of Area A
	Lendon Dutton	Agriculture	902.38	See plate 6 surrounds Area B and west side of Area A
	McLennan County	Easement for Route 2671	23.8	See plate 6
	Various Coryell County Owners	Agriculture & park	161*	See plate 6
Railroad Right of Way	GC & SF RR	Railroad	9.98	See plate 6
Area H: Production, Storage, & Admin	US Navy	Production, Storage, & Admin	9,754.44	See plate 6 Not FUDS eligible

TOTAL 18,151

*Indicates approximate acreage

b. Climatic Data

(1) The climate of McLennan County is humid, subtropical continental. Summers are long with high temperatures, while winters are short and mild. In the six winter months (November thru April), the average low temperature is 44 degrees Fahrenheit and the average high is 66 degrees. For the six summer months, the average low is 69 degrees and the average high is 90 degrees. The extremes are -5 (1949) and 112 (1969).

(2) The amount of precipitation in any one year is extremely variable. Most rainfall is the result of thunderstorm activity. There is an average of 77 days per year with precipitation, but much of the precipitation in any one year is concentrated in just a few thunderstorms. Total annual rainfall has ranged from 60 inches (1905) to 13 inches (1917), with the average precipitation being 31 inches. April and May are normally the wettest months, with July and August being the driest. There is no appreciable snowfall in the area, but winter brings occasional freezing rain.

(3) The average relative humidity at noontime is 57 percent. Humidity is higher at night, and the average at dawn is 73 percent. The sun shines 75 percent of the time possible in the summer and 50 percent in the winter. The prevailing wind is from the south, with an average speed of about 12 miles per hour.

(4) Evaporation rates are high in relation to annual precipitation. For example, in 1980 the pan evaporation rates for March thru November totalled 82 inches compared to the average annnual precipitation of 31 inches. Much of the precipitation is evaporated, which serves to reduce the possibility of leachate production and contamination migration (ref B-10 & B-26).

c. Topography

The BOP site is located in the easternmost portion of the Grand Prairie, with the Blackland Prairie located to the south and the east. In general, the surface of the Grand Prairie is composed of gently sloping, almost level dip plains, broken only by the drainageways which can be observed at various points within the site. The surface features roughly parallel the underlying bedrock. The topography of the site is gently undulating with slopes ranging from nearly level to five percent. The southern portion of BOP is about 700 feet above sea level. The surface vegetation is primarily grassy plain, with minimal brush and tree cover (ref B-10 & B-37).

d. Geology and Soils

(1) Regional Geology

The geologic formations underlying the whole of central Texas are of Cretaceous age. All of Central Texas was covered by an advance of the sea during Cretaceous time, resulting in the present sequence of geologic units. The Cretaceous aged rocks have been divided into two series, Gulfian and Comanchean, with Gulfian being the younger. The Gulfian series is not present at the BOP site, but does occur to the southeast. This absence is the result of the regression of the sea during the late Cretaceous time which shifted the sea east of McGregor.

(2) Site Geology

(a) The geologic units within the boundary of BOP all belong to the Comanchean series. The Comanchean series is further divided into three groups. From the oldest to the youngest, they are: Trinity, Fredericksburg, and Washita. Only the Washita group crops up in the vicinity of BOP.

(b) Within the Washita group, only the Georgetown formation crops out within the boundaries of BOP. The Georgetown formation is divided into seven units, five of which can be found within the boundaries of BOP: Main Street Limestone, Pawpaw Shale, Weno Limestone, Denton Marl, and Fort Worth Limestone. Of these, only Main Street Limestone is likely to be present in the areas with confirmed or potential OEW contamination (ref B-10 & B-37).

(3) Bomb Line and Sewage Plant Soils

(a) The most common soil in these areas is San Saba Clay. This is a very dark-grey to black crumbly clay underlain by limestone. Soil depth ranges from 18 to 50 inches. This series is moderately well-drained with slow to medium runoff, and is not very susceptible to erosion. Permeability is very slow, except when the soil is dry and cracked at which time it becomes rapid. The clay content ranges from 45 to 65 percent.

(b) Also present is the Denton Clay series, which consists of dark-brown crumbly soils underlain by limestone. This soil is typically 18 to 40 inches deep. The series is well-drained and have medium to rapid surface runoff, with moderate susceptibility to erosion. Permeability is slow. The clay content ranges from 35 to 55 percent.

(c) The third soil found is Crawford Clay, made up of dark-brown

to reddish-brown non-calcareous clays usually 14 to 34 inches deep. This series is well-drained with slow to medium runoff, and is slightly susceptible to erosion. Permeability is very slow, except when the soil is dry and cracked at which time it becomes rapid. The clay content ranges from 40 to 60 percent (ref B-10 & B-34).

(4) Burning Area and Burial Site Soils

(a) There are four soil types found at the burning area and burial site. Two of these, Crawford and Denton Clays, are described in the preceding paragraphs. The other two are Trinity Clay and Tarrant Stony Clay. Tarrant Stony Clay is comprised of dark, very shallow soil over limestone, usually 12 inches deep. Runoff is medium to rapid, and it is slightly susceptible to erosion. Permeability is moderately slow, and the clay content ranges from 40 to 60 percent.

(b) Trinity Clay is a dark calcareous alluvial soil, normally up to 50 inches deep. This soil is found near stream beds and is very heavy. It is not susceptible to erosion but is can be scoured by flooding from adjacent streams. The soil is generally level and drainage is slow (ref B-10 & B-34).

e. Hydrology

(1) Surface water at BOP is provided by tributaries of Station Creek, Harris Creek, and the South Bosque River. The property can be divided into three watersheds which correspond to these streams. The three streams are intermittent in nature, subject to drying up during periods of drought. Many of the tributaries flow only after periods of rain. These surface waters, as well as other surface waters in the region, are used solely for agricultural purposes, mainly as water for livestock, though some shallow wells also provide agricultural water. The five areas of potential OEW contamination all drain into the South Bosque River, which flows to Lake Waco, a major water supply reservoir for the City of Waco. The entire BOP site lies within the Brazos River Basin.

(2) The rate of flow from the site is extremely variable. Much of the surface discharge into the site's streams percolates into the stream bed or evaporates before it leaves the boundaries of the site. Surface contamination migration, while possible, is probably extremely slow.

(3) Groundwater is the source for all potable and process water used in McGregor as well as much of Central Texas. The water for Central Texas is obtained from two main aquifers, the Hensel and the Hosston. These aquifers are composed of fine to coarse sand, and separated by beds of limestone and shale. The Hensel aquifer is the only available source of groundwater for McGregor because the area is situated on what is called the McGregor High, an erosional high where non-deposition occurred during early Cretaceous time. The Hensel aquifer is located 960 feet below the surface and ranges from 19 to 100 feet in thickness.

f. Natural Resources

(1) Information obtained from the McLennan County Soil Conservation District noted that there are currently no endangered or threatened species, plant or animal, on the former BOP site. However, a review of federal and state listings shows endangered or threatened species with ranges that could include the McLennan County area and could therefore someday be found on BOP. These listings are summarized in table 3-2 (ref B-35, B-36, and I-12).

g. Historical/Cultural Resources

The Texas Historical Commission provided a listing of historical and cultural sites in McLennan and Coryell Counties. No protected sites are located on any of the former BOP property (ref B-25).

TABLE 3-2
NATURAL & CULTURAL RESOURCES

Resource Classification	Type	Comment
Wildlife	Red Wolf	Endangered
	White-faced Ibis	Threatened
	Bald Eagle	Endangered
	Golden-Cheeked Warbler	Endangered
	Whooping Crane	Endangered
	Alligator Snapping Turtle	Threatened
	Texas Horned Lizard	Threatened
	Timber Rattlesnake	Threatened
Historical	None	

4. HISTORICAL ORDNANCE PRESENCE

a. Chronological Site Summary

(1) The Bluebonnet Ordnance Plant was established in early 1942, shortly after America's entry into World War II. The site chosen was on generally level farmland in McLennan and Coryell Counties, immediately southwest of the city of McGregor (see plate 1). In order to secure the site, the federal government condemned 20,188 acres belonging to about 135 landowners. Once the Corps of Engineers specifically determined how much property was required, the total land area was revised to 18,151 acres (see documents G-1 & G-2).

(2) The location was chosen for several reasons, including McGregor's central location that would ensure an ample supply of manpower from Waco (20 miles east) and Temple (20 miles south). Also, McGregor was the junction of two rail lines, the Gulf Central & Santa Fe and the St. Louis & Southwestern, assuring rail routes to the north, south, and east. Two well-paved roads, US Highway 84, and Texas Highway 317, intersected in McGregor. Another reason was the fact that no similar establishment was located in central Texas.

(3) On February 11, 1942, Job Directive M1-1 was issued authorizing construction of four bomb lines, a booster line, and an ammonium nitrate line, and various support facilities. The Corps of Engineers issued Contract W-359-Eng-4053 to the newly-formed Bluebonnet Constructors, a joint venture of the W.E. Callahan Construction Company and the Howard, Needles, Tammen, and Bergendoff Architect/Engineers. Construction began on March 3, 1942. The first manufacturing line, the bomb booster line, was transferred to the Ordnance Corps on September 8, 1942 (ref B-19).

(4) The original requirement of four bomb loading lines was reduced to three by Directive M1-2, April 8, 1942. A subsequent change put the requirement back to four, and line 4 was activated on February 19, 1944. To support the explosives production lines, the contractor also built an

administration area, a housing site, rail lines, roads, utilities including a sewage plant, shops and warehouses, and two ammunition storage areas (ref B-19).

(5) On February 9, 1942, contract W-ORD-607 was awarded to National Gypsum Company of Buffalo, New York for operation of the plant on a cost plus a fixed fee basis. The first production item, a 1000# bomb, was made at line 1 on October 16, 1942. During the war, BOP manufactured various high explosive items, mostly aircraft bombs and components, on four bomb lines and a booster line. Ammonium nitrate was produced on another line (ref B-8 & B-10).

(6) On August 15, 1945, the Commanding Officer, LTC Walker, announced that production had been stopped with notice of Japan's unconditional surrender and that production facilities would permanently shut down on September 2. On November 30, the National Gypsum Company ceased operation of BOP, and the plant was turned over to the Reconstruction Finance Corporation (see document H-3).

(7) Once the plant closed, the six explosive production areas identified on plate 1 were sold to private owners. The Spencer Chemical Company purchased the ammonium nitrate plant in May of 1946 and produced fertilizer before closing two years later. In January of 1948, the Western Stove Company took over former bomb line #2 for production of gas ranges. That same month, Norwood Manufacturing, a subsidiary of Sears & Roebuck, took over bomb line #1 to produce household furniture. In January of 1949, the Geigy Company leased the machine shop to produce insecticides. In December, Geigy also took over the ammonium nitrate line to manufacture fertilizer grade ammonium nitrate. In February of 1949, the Union Asbestos & Rubber Company took over bomb line #3 to produce asbestos. Other smaller companies also used portions of the former plant (see document H-4).

(8) On December 10, 1947, the War Assets Administration transferred the largest portion of BOP (17,483 acres excluding the 6 explosive production areas) to the Agricultural & Mechanical College of Texas (Texas A & M) to conduct agricultural research. The cost was $1,950,318 to be repaid in services to the public. The College developed an extensive plan to use the property for animal research as well as cropland experimentation (ref B-14).

(9) All the deeds to the property contained recapture clauses, which the government used in 1952 when the Air Force decided to reactivate the plant to produce jet-assisted take-off (JATO) rocket bottles. The Phillips Petroleum Company was designated as prime contractor, and the plant was named Air Force Plant 66. The Air Force took back about 11,000 acres, essentially the northern 2/3 of the property. They allowed Texas A & M to keep about 6,300 acres and left bomb lines 1 & 2 in private ownership (ref B-24 & B-32).

(10) In the years after the Air Force reactivated the plant (AF Plant 66), they transferred small parcels of land back to private ownership and local municipalities. Among these parcels were 33 acres of the sewage treatment plant to the city of McGregor, and 66 acres of the former housing area to the McGregor Schools as well as 85 acres for a city park. In addition, Hercules purchased 242 acres which they lease to A&M for grazing (ref B-50 & B-51).

(11) Air Force Plant 66 has been operated by several contractors since it reopened. After Phillips, operators were North American, Rockwell, Astrodyne, and Rocketdyne. In May, 1966, the Air Force transferred the plant to the Navy, and the its name became the Naval Weapons Industrial Reserve Plant (NWIRP), McGregor. In January, 1978, Hercules took over the contract. They continue to operate the plant, manufacturing solid propellant rocket motors for all services (see document H-4).

(12) When the Army owned Bluebonnet, areas were named by their function, e.g. bomb line #1, bomb line #2, booster line, etc. When the Air Force restarted part of the plant in 1952, they renamed sections into areas A thru T, and the Navy continued that system. Because this report deals with Bluebonnet, areas are identified by their original functional names such as

bomb line #1. However, historical documents from 1952 and after use the letters. In the appendix, documents E-2, E-3, E-4, and L-1 show areas identified by letter. On those documents, Area J is bomb line #1, Area K is bomb line #2, and Area N is the finished ammunition storage area.

(13) Of the original 18,151 acre site that was the Bluebonnet Ordnance Plant, 9,754 are under DoD ownership as the Navy plant. There are 8,397 acres that are no longer owned by the government. Table 4-1 summarizes the history of the site.

TABLE 4-1
SUMMARY OF BOP HISTORY

Date	Action	Comments
February 1942	Property condemned	135 landowners
March 3, 1942	Construction begins	
October 16, 1942	First product	1000# bomb
February 19, 1944	Bomb line #4 opens	No Amatol
September 2, 1945	Production stopped	WWII ends
November 30, 1945 operations	Contractor ceases	Turned over to RFC
1946 - 1949 start operations	Various companies fertilizer,	Products include asbestos, stoves, furniture, and pesticides
December 10, 1947	Texas A&M given 17,483 acres	Bluebonnet Farm begins agricultural research
1952	US Air Force takes back 11,000 acres	Renamed AF Plant 66
May 1, 1966	Transferred to US Navy	Renamed NWIRP McGregor
January 1968	Hercules takes over as contractor	Produces solid fuel rocket motors

b. Ordnance Related Records Review

(1) Research efforts began with a thorough review of all reports, historical documents, and reference material gathered during the archival search. During this review, an effort was made to focus on areas of potential OEW contamination as described in the OEW project summary sheet (see document E-1) as well as additional areas that were identified during the research.

(2) A large collection of documents, including numerous maps and drawings, production reports, real estate papers, and various other records were located. There was no decontamination plan or manual located, nor could any decontamination records be found or obtained.

(3) The only information on decontamination was found in the Navy's 1983 Environmental Assessment (see document E-2). Paragraph 5-2 states:

"Decontamination of production lines was completed by November 30, 1945 in accordance with FDAP Decontamination Manual Sept 1945, and TB-eng-547.

Inspections by both Ordnance representatives from OFDAP, and US Army Engineers, Galveston, Texas, of all decontamination procedures were made and approved.

No decontamination work was carried out in the High Explosive or Finished Ammunition areas due to the fact that these areas were being used for storage of approximately 40,000,000 pounds of explosives. Loading docks 1, 2, and 3 were likewise not decontaminated, because of awaited shipping orders of stored materials. Buildings which could not be adequately decontaminated were marked for destruction."

(4) Records indicate that bomb lines 1, 2, and 3 were identical, with buildings for pouring TNT and amatol. Bomb line #4 was the last to be constructed, in early 1944, but unlike the other lines did not use amatol in loading. The high explosive fillers were either straight TNT or other fillers that required mixing with TNT (amatol, tritonal, Comp B, and picratol). The ammonium nitrate (AN) line manufactured AN for mixing until about May of 1943, when the line converted to making fertilizer grade AN because TNT became more available. Lines 3 and 4 as well as the AN line are owned by the Navy (see plate 1). Bomb lines 1 and 2 both have the bomb wash pits and settling basins used to dispose of excess explosive waste (see plates 2 & 3 and photos J-5 and J-19). Table 4-2 lists the areas of potential contamination on each bomb line.

TABLE 4-2
BOMB LINE POTENTIAL OEW LOCATIONS

Area	Building Number	Building Designation	Potential Contamination
Line 1	111	Bomb wash pit	Soil - TNT
	111-A	Bomb wash pit	Soil - TNT
	112	Amatol screening	Soil - TNT
	113	Amatol melt & pour	Soil - TNT
	116	TNT screening	Soil - TNT
	117	TNT pouring	Soil - TNT
	126	Nose pour (TNT)	Soil - TNT
	142	Vacuum house	Soil - TNT
	142-A	Vacuum house	Soil - TNT
	143	Vacuum house	Soil - TNT
	143-A	Vacuum house	Soil - TNT
	145	Vacuum house	Soil - TNT
	156	Settling basin	Soil - TNT
	156-A	Settling basin	Soil - TNT
Line 2	211	Bomb wash pit	Soil - TNT
	211-A	Bomb wash pit	Soil - TNT
	212	Amatol screening	Soil - TNT
	213	Amatol melt & pour	Soil - TNT
	216	TNT screening	Soil - TNT
	217	TNT pouring	Soil - TNT
	242	Vacuum house	Soil - TNT
	242-A	Vacuum house	Soil - TNT
	243	Vacuum house	Soil - TNT
	244	Vacuum house	Soil - TNT
	244-A	Vacuum house	Soil - TNT
	246	Vacuum house	Soil - TNT
	247	Vacuum house	Soil - TNT
	256	Settling basin	Soil - TNT
	256-A	Settling basin	Soil - TNT
	256-B	Settling basin	Soil - TNT
	257	Settling basin	Soil - TNT

(5) One additional explosive was produced at BOP. The booster line manufactured tetryl for use in boosters and adapter boosters, and one of the

historical maps shows a booster proving ground east of bomb line 1 near the site of the propellant disposal area used by Hercules. The booster line and the booster proving grounds are both on Navy property (see document L-2 and plate 1).

(6) Table 4-3 has been made from available records to identify what specific items were produced on each line. It should be noted that references provided inconsistent information on production. For example, the GOCO plant report (ref F-3) did not show production of 2000# bombs, nor did the few plant historical reports (ref B-16 through 20). The Environmental Assessment (ref B-10) and one newspaper article (H-4) did indicate production of 2000# bombs. There were other minor discrepancies as well. Table 4-2 provides the best available guide to items produced at the different lines. Although it cannot be proven from the references, it is likely that some of the bomb lines produced other items from this table. See figure 4-1 for a flow chart of the manufacturing process.

TABLE 4-3
EXPLOSIVES PRODUCTION AREAS

AREA NAME	ORDNANCE PRODUCED
Bomb Line #1	Bomb 1000# SAP AN-M59 Shell 105mm Bomb fragmentation M72
Bomb Line #2	Bomb 500# GP AN-M64 Bomb 1000# SAP AN-M59 Bomb 100# GP AN-M30* Bomb cluster fragmentation AN-M4*
Bomb Line #3	Bomb 1000# SAP AN-M59 Bomb 500# GP M64A1* Bomb 100# GP AN-M30* Bomb 2000# SAP M103* Demolition block M2 and other blocks
Bomb Line #4	Bomb 500# GP AN-M64*
Ammonium Nitrate (AN)	AN for amatol & fertilizer.
Booster Line	Auxiliary booster M104 Adapter booster M102 Adapter booster M115

*Indicates unconfirmed data.

(7) Several newspaper articles were found on BOP. One showed that the plant received the Army-Navy "E" Award for excellence. The same article noted that the plant had not had a serious accident (see document H-2). Another article was particularly helpful by showing that the plant detonated explosives at the burning area (see document H-1). This detonation function was confirmed by a 1944 aerial photo (see document K-2).

(8) As part of their quality assurance mission, inspectors would routinely check a certain number of bombs per shift on a random basis. Those that did not pass this inspection were returned to the production line for repair. If unrepairable, these failures were marked as rejects and sent out for eventual destruction (see document F-2).

(9) Another part of the inspection process required inspectors to cut open the high explosive charge of finished bombs to check for voids (cavitation) and test for specific gravity. This process was confirmed in two

interviews with former workers (see documents F-1, I-1, & I-3). After the inspection, these bombs were most likely detonated at the burning area.

(10) Records also revealed the burial site on Texas A&M property. In the 1983 Environmental Assessment, paragraph 2-8 states that "...ordnance materials may have included unspent shells as explosions were reported at the site during burning, although this could not be documented." Paragraph 6-11 later states that there is a separate "...old dump believed to contain rubble generated during decontamination and cleanup operations performed at the end of WWII." (see documents E-2 & L-7).

(11) A sewage disposal plant was constructed to treat BOP wastewater using the Hays Process of Contact Aeration (see document F-4). The bomb lines generated wastewater contaminated with TNT, which was not removed by the process. Records indicate that the wastewater was then allowed to flow into the soil at the bomb lines. Other than the brief mention of decontamination in paragraph (3) above, there is nothing to show that the sewage pipes were ever decontaminated, on the bomb lines or at the plant. See documents L-8 and L-9 for maps of the utility lines at bomb lines #1 & 2. See pages 104 & 105 of document E-2 and plate 5 for additional information on the sewage plant, which was transferred to the city of McGregor in 1972. A former city worker stated that the Army plant was replaced by a new plant in 1990. This worker was unaware of any decontamination process or any problems with explosive residue (see document I-18).

c. Interviews With Site-Related Personnel

(1) Interviews were conducted with four former employees of BOP. Of these, only three were knowledgeable about the ammunition production mission. The fourth was a carpenter who was interviewed over the phone. Of the three with relevant information, two were interviewed in person, while the third was contacted by telephone.

(2) Two of the former employees are a married couple, Cecil and Maureen Vick, who were interviewed at their residence. Mr. Vick was a guard from 1942-45, and he patrolled the entire area, mostly on horseback. He stated that BOP burned explosive scrap as well as wood at the burning area. He pointed out that the hill described in the newspaper article was just south of the buring area. Mrs. Vick began as a switchboard operator before transferring to bomb line #2. She worked in shipping and receiving and painted the yellow band on bombs. Mrs. Vick stated that inspectors cut bombs open for testing, and she related one potentially hazardous incident when the inspectors started cutting a bomb but abruptly stopped when they realized the booster was installed (see documents I-1 and I-2).

(3) Mr. Melvin Bone was contacted by telephone. He said that he worked from 1942-1945 at bomb line #2, and became maintenance foreman in building 17 (TNT pouring). He described the process for filling the bombs, and he was aware that inspectors cut open bombs in a separate building. He was unaware of what happened to the cut bombs nor did he know if any explosives were detonated at the burning area (see document I-3).

(4) An interview was also conducted with an individual who worked for the Norwood Manufacturing Company on bomb line 1 after the war. Mr. Bob Kattness stated that he found fingernail-sized pieces of a tan-yellowish substance east of building 113 (amatol melt and pour). This susbtance was possibly waste TNT (see document I-15).

(5) Interviews were conducted with local law enforcement agencies as well as the EOD unit at Fort Hood. None of the individuals were aware of any incidents involving OEW from BOP, nor had they heard any rumors of buried ordnance (see documents I-4 through 6).

(6) Interviews were also conducted with numerous local residents with connections to BOP. None of these individuals had heard any rumors about ordnance buried at the plant (see documents I-5 through 9).

(7) The only information on buried ordnance came from the 1993 Environmental Assessment which brought up the possibility of ordnance buried in the dump (see document E-2). Contact was made with one of the authors, but he did not recall specific information and could not locate notes from the report (see document I-10).

(8) Mrs. Margaret Smith, the official historian for the City of McGregor, provided some useful information. She did not work at the plant, but she did go on site several times with the Red Cross bloodmobiles. Mrs. Smith said that operations were kept secret during the war, and she gained most of her knowledge after BOP closed. She stated the workers blew up old bombs there after the war. Mrs. Smith also recalled driving on the plant after the war and seeing black smoke from bomb line 1 or 2. She added that there was a railcar explosion in a revetment at the north end at the plant. Mrs. Smith stated that bomb line #1 had been under consideration as the site for a new state prison, but another location was selected (see document I-11).

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Camp Fannin

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23 0.84 **Camp Fannin Findings: Appendix C** *Camp Fannin Findings: Appendix C . Appendix C GLOSSARY Ordnance and Explosive Waste Archives Search Report for CAMP FANNIN TYLER, TEXAS Project Number K06TX006101 APPENDIX C GLOSSARY AAA Anti-aircraft Artillery AASHTO American Association o...*

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DEFENSE ENVIRONMENTAL RESTORATION PROGRAM

FOR
FORMERLY USED DEFENSE SITES

CONCLUSIONS AND RECOMMENDATIONS

ORDNANCE AND EXPLOSIVE WASTE
ARCHIVES SEARCH REPORT
FOR
CAMP FANNIN
TYLER, TEXAS
PROJECT NUMBER K06TX006101

SEPTEMBER 1994

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ORDNANCE AND EXPLOSIVE WASTE
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ACKNOWLEDGMENTS
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ORDNANCE AND EXPLOSIVE WASTE
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The following conclusions and recommendations are provided by the Archives Search Team. These recommendations may not be the actions taken to remediate the site.

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1. INTRODUCTION

a. **Subject and Purpose**

(1) This report presents the findings of an historical records search and site inspection for ordnance and explosive waste (OEW) presence located at the former Infantry Replacement Training Center (IRTC), Camp Fannin, 6 miles northeast of Tyler, Smith County, Texas. The investigation was performed under the authority of the Defense Environmental Restoration Program for Formerly Used Defense Sites (DERP/FUDS).

(2) The purpose of this investigation was to characterize the site for confirmed and/or potential OEW contamination, to include chemical warfare materiel (CWM) and conventional munitions.

b. **Scope**

(1) The investigation initially focused on 14,093 acres of land that was leased or acquired in fee from private citizens for use as a training site for the infantry. Adjacent areas of potential OEW contamination were not discovered.

(2) This report presents the site history, site description, real estate ownership information and confirmed ordnance presence (prior to and after site closure), based on available records, interviews, and the site inspection. It further provides a complete evaluation of all information to assess actual and potential present day ordnance contamination.

(3) For the purpose of this report Ordnance and Explosive Waite (OEW) is considered unwanted and abandoned ammunition or components thereof, which contain energetic, toxic, or radiological materials and was manufactured, purchased, stored, used, and/or disposed of by the War Department/Department of Defense.

2. PREVIOUS INVESTIGATIONS

a. **1986 Preliminary Assessment**

(1) In 1986 a preliminary assessment of the Camp Fannin IRTC was conducted under the DERP FUDS by the U.S. Army Corps of Engineers, Fort Worth District (CESWF). At that time, the Findings and Determination of Eligibility (FDE), dated 3 July 1986, concluded that 14,075 acres had been leased and/or acquired for use as the Camp Fannin IRTC (see document E-1).

(2) This investigation concluded that there was an eligible category under DERP FUDS (see document E-2 and table 2-1). Due to the fact that the site was found to have been utilized by the IRTC an OEW project was recommended - DERP FUDS OEW Project Number K06TX006101, which is the subject of this report.

b. **Other Investigations**

No other investigations or studies relevant to DERP FUDS were discovered during this Archive Search Report(ASR).

TABLE 2-1

DERP FUDS PRELIMINARY ASSESSMENT PROJECTS

Project Number	DERP Category	Present Phase	Comments	Location
K06TX006101	OEW	SI	Ordnance/ Explosive contamination	Entire 14,075 acres
	HTRW	-	-	-
	BD/DR	-	-	-

3. SITE DESCRIPTION

a. **Existing Land Usage**

(1) The former Camp Fannin IRTC consisted of 147 parcels of land approximately 6 miles northeast of Tyler, Texas in the northeastern portion of the state. 3,071.46 acres were acquired in fee and an additional 11,022.02 acres were leased from private citizens. The parcels varied in size, ranging from approximately .23 to 1,169.14 acres. This is 13 acres greater than what was assessed in the FD & E.

(2) The northern border of the site is currently privately owned and utilized for grazing and cultivation of roses, with residential properties mixed in as well. Interstate Highway 20 bisects the site and it is alleged that the roadbed was cut through the impact area. The southern border of the site is U.S. Route 175, then northeasterly to RM 3311. The southwestern portion of this site is the camp hospital area which is now the University of Texas Health Center at Tyler (UTHCT). This section also contains the camps ordnance storage area which is being utilized for long-term storage by private individuals. The eastern border of the site is owned by Triton Development, an oil development company which has partially developed this area as an industrial park. The western portion of this site is owned by several individuals and businesses which are largely agricultural in nature There are also residences in this area.

(3) Table 3-1 represents the current land usage of the areas depicted on plate 2 (facilities layout).

TABLE 3-1
LAND USAGE

AREA	FORMER USAGE	PRESENT OWNER(S)	PRESENT USAGE	SIZE ACRES	COMMENTS
A	Impact area	Private	Agricultural	3593	See Plate 3
B	Magazine area	Private(2)	Storage	50	See Plate 4
C	Grenade court 1	Private(1)	Pasture	4	See Plate 4
D	Grenade court 2	Private(1)	Tree Nursery	4	See Plate 5
E	Hospital area	State	Health Center	614	Expansion plann
F	Cantonment area	Private(+20)	Industrial Park	784	See Plate 3
G	POW camp	Private(1)	Pasture	60	See Plate 3
H	Suspect Burial Pit	Private	Pasture	3	See Plate 4
I	Buried Dynamite Pit		Pasture	3	See Plate 5
J	Remaining FUDS-eligible Areas	Private	Various	8978	See Plate 3

**approximate acreage Total: 14,093

(4) Area A, the Impact area, consists of low rolling hills and flat areas used for grazing cattle and horses; cultivation of roses and timber; as well as residences with the occasional church and graveyard dispersed throughout. Foundations and chimneys are still evident. Most of the properties are fenced and posted with "No Trespassing" signs. U.S. Interstate 20 bisects the impact area (see plate 4).

(5) Area B. the Magazine area, is privately owned and the extant structures are utilized for storage; one of the structures appears to be abandoned. The area is a flat section, with brush and trees. The original roads while in poor condition are still usable. This area is fenced with split rail fencing and barbed wire (see plate 4).

(6) Area C, Grenade Court 1, is in an area of low, rolling hills. This area is now used for pasture and as a woodlot. The area is fenced with standard barbed wire. This area is privately owned (see plate 4).

(7) Area D, Grenade Court 2, is now a nursery. The ground has been extensively cultivated; young trees appearing to be 3-4 years old cover the site. It is fenced with barbed wire and posted. This area is privately owned (see plate 5).

(8) Area E, the Hospital area, is still functioning in that capacity with the establishment and construction of the UTHCT. Most of the original structures have been removed; a motor pool building and a large smokestack remain. This area is open to the public but patrolled by security personnel see plate 3).

(9) Area F. the Cantonment area, has several buildings still existing. The area is used as an industrial park with several different companies and types of businesses existing, some of which use old warehouse and shipping and receiving docks from the old camp. This area is generally open to the public and routinely patrolled by law enforcement personnel (see plate 3).

(10) Area G. the POW camp area, lays on a piece of fallow land that is posted, fenced with barbed wire, and appears to be abandoned. No traces of the camp remain (see plate 3).

(11) Area H. the Suspect burial pit is south of U.S. Route 20 in the old impact area. Its existence is anecdotal (see plate 4).

(12) Area I, Dynamite area was discovered by a landowner doing some grading with heavy equipment in May of 1994. It is one-quarter mile north of State Highway 271, one mile east of the former main gate (see plate 4).

(13) Area J. Remaining FUDS-eligible areas, are interspersed with the Areas identified in paragraphs (1) through (12) above. They are privately held, generally fenced and posted; and are used for agricultural purposes with residences attached or interspersed between the properties (see plate 3).

b. **Climatic Data**

(1) The following climatic data appears in a document provided by Soil Conservation Service, Tyler Field Office (reference B-8).

(2) Average rainfall in the Tyler area is 44 inches per year, largely falling in the period from April to May July and August are the driest months. The low rainfall of August combined with high temperature, causes severe slumps in plant growth curves. Extended droughts occur on the average one year out of five when rainfall is less than three-fourths of normal.

(3) High winds are common from February through mid-April. These winds cause large losses of moisture by evaporation from the soil surface, especially where surfaces are exposed. Annual evaporation is about 51 inches.

(4) Average temperature in January is 43 degrees Fahrenheit with 82 degrees

Fahrenheit being the average temperature in July. Last killing frost is usually about 15 March with the first fall frost occurring around 18 November.

c. **Topography**

The topography of the area is nearly level to hilly, with some areas of the site having been further leveled during construction of the camp and the affiliated ranges.

d. **Geology and Soils**

(1) The major geological formations in Smith County are from the Eocene Age. These formations, in ascending order, include Carrizo Sand, Reklaw Formation, Queen City Sand, Weches Formation, and Sparta Sand. The Soil survey for this county is being revised and should be available for review in October 1994 (see reference B-8 and B-7).

(2) Table 3-2 is derived from the draft soil survey and identifies the soils on site and some of their characteristics (see reference B-8):

TABLE 3-2

Soil Name	Depth in inches	Permeability	Water Holding Capacity	Capabili Subcla
Attoyac Fine Sandy Loam	>60	Moderate	Medium	2e Dryl
Briley Loam Fine Sand	>60	Moderate	Medium	3e Dryl
Cuthbert and Redsprings	>60	Slow	Medium	6e Dryl
Elrose Fine Sandy Loam	>60	Moderate	Medium	2e Dryl
Kirvin very Fine Sandy Loam	>60	Slow	Medium	3e Dryl
Lilbert Fine Loamy Sand	>60	Moderately Slow	Medium	4e Dryl
Mantachie Loam	>60	Moderate	High	5w Dryl
Oakwood Fine Sandy Loam	>60	Moderately Slow	High	3e Dryl
Owentown Loamy Fine Sand	>60	Moderate	Medium	2w Dryl
Raino Fine Sandy Loam	>60	Moderate	High	3s Dryl
Redsprings Gravelly Loam	>60	Slow	Medium	4E Dryl
Wolfpen Loamy Fine Sand	>60	Moderate	Medium	3s Dryl

e. **Hydrology**

(1) There are two large bodies of water on this site, Greys Lake and Pinedale Lake, both in the northwest portion of the site. Smaller bodies of water include farm ponds both natural and man-made. Wiggins Creek bisects the site from east to west in area A. Harris creek runs north to south in the eastern portion of the site in area D, identified as a live grenade range (see reference B-8, B-7 and Plate 2).

(2) The area is well drained, generally to the north-northwest, with no wetlands except along the creek banks and lakesides. The water is generally from deep aquifer wells and classified as soft water rather than hard (see reference B)

f. **Natural Resources**

(1) The site is located in an area rich in oil and gas reserves. Original lessors retained their mineral rights and will probably exploit them. The owners of property acquired by fee simple lost their mineral rights, but the rights will probably be Explored at a later time by the holders. Soil is a natural resource that must be considered because the production of livestock, forage, crops, and timber provide livelihoods that depend on the soil. Timber production significant to the local economy is typically done on small locally-owned tracts.

(2) The most abundant wildlife resources in the area are squirrel, white-tailed deer, raccoon, bobcat, coyote, and fox. Quail, mallard, wood duck,

doves and teal are also found in sufficient number to provide sportsmen with opportunities to hunt them. The profusion of small lakes, ponds, and streams, provide good fishing for warm water species like black bass, channel catfish, crappie, flathead catfish, and various sunfish. Several endangered/threatened species inhabit Smith County. These animals and plants as well as the type of protection afforded them are listed in table 3-3.

TABLE 3-3
NATURAL/CULTURAL RESOURCES

Resource Classification	Type	Protection
Minerals	Oil	--
	Natural Gas	--
	Timber	--
	Soil	--
Wildlife	Bald eagle	Federal
	Migratory gamebirds	Federal
	Red-cockaded woodpecker	Federal
	Wood stork	State
	Bachman's sparrow	State
	Ivory billed woodpecker	State
	Bluehead shiner	State
	Creek chubsucker	State
	Blue sucker	State
	Alligator	State/Federal
	Alligator snapping turtle	State
	Red wolf	State/Federal
Vegetation	Navasota Ladie's Tresses	State
	Rough stem aster	State
	Sandhill four-o'clock	State
	Mohlenbrock's umbrella sedge	State
Historical/Culturalural	Potential archeological sites	
Coordinate with SHPO		

g. **Historical/Cultural Resources**

(1) The Texas Historical Commission lists several National Register sites in Smith County but none of them are on lands occupied by Camp Fannin IRTC.

(2) There are no State archaeological landmarks on the site of Camp Fannin IRTC. However, representatives of the Texas Historical Commission stated there could be because the area has -not been adequately surveyed.


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4. Historical Ordnance Presence

a. **Chronological Site Summary**

(1) Early in 1942, the Government acquired 3,000 acres of land by lease, purchase or condemnation on the site of what would become Camp Fannin. From the initial appropriation of 3,000 acres the site grew to 14,093 acres and by December 1942 construction had begun on the training and support facilities. The station hospital was completed and formally activated on 7 June 1943. Formal opening and dedication of the camp was on 6 September 1943. No information was discovered on activation dates of the POW camp, but it was redesignated as a "Priso of War Branch Camp" on 21 September 1943. Training began in July 1943 and continued for 25 months. During the time that Camp Fannin was utilized as an IRTC, over 200,000 soldiers were trained in basic infantry skills. In September 1945, a Separation Point was established at Camp Fannie. On 19 December 1945, a range clearance was completed (see document F-1). On 10 May 1946, the Prisoner of War Camp was inactivated. On 15 June 1946, Camp Fannin was inactivated and turned over to the District Engineer. The site was declared excess in November 1946.

(2) In April 1948, 614 acres was deeded to the State of Texas for use as a tuberculosis hospital. The transfer included the barracks area for the camp hospital and the rest of the buildings in the old hospital area. This portion of the former site is now under the control of the University of Texas System Board of Regents. Most of the wooden barracks were torn down in the late 1950s after the construction of a six-floor brick hospital in 1957. Six of these structures remain and are in use as storehouses and laboratories.

(3) The remainder of the property was owned in early 1948 by the Owen Development Corporation, which offered the use of the existing warehouses and freezer facilities, paved roads, and utilities to new industries. In the early 1980s, Triton Energy Company of Dallas purchased approximately 5,000 acres for future development that has been stalled due to the slump in the oil industry' Most of the land is sitting vacant. The remainder of the property was returned to the original owners, although the shot up homes and barns of many property owners were damaged beyond repair. The mineral rights were also sold to persons other than the original property owners.

b. **Ordnance-Related Records Review**

(1) Research efforts began with a thorough review of all reports, books, historical documents, newspaper articles, and reference materials collected during the archival records search. During this review, an effort was made to target the areas of potential OEW described in the Inventory Project Report (INPR) (see reference B-17). None of the real estate documents listed (see reference B-17). None of the real estate documents listed any restrictions from use or development due to OEW contamination (see appendix G).
(2) During the years following the use of the property by the War Department quantities of hand grenades, mortar projectiles, small arms ammunition, and practice rockets were discovered and removed from the site (see photographs J-16 and J-17).

(3) The search revealed no incidents of known or reported deaths or injuries on any portion of the site related to OEW post-closure. Interviews and museum exhibits clearly indicate that OEW items have been found on different areas of

the site. The alleged burial pit mentioned in the INPR could not be verified by interview or by archival record. A range clearance document was found, as was a map documenting firing fans and ranges (document F-1 and plate 5). Explosive Ordnance personnel from the 47th EOD detachment at Fort Hood have no record of any incidents in the past two years, nor did the parent unit, the 546th EODCT at Fort Sam Houston. The detachment holds it's records two years, then transfers them to the Control Team, which holds them an additional two years before the records are destroyed in accordance with the MARKS Filing system.

(4) Many personal letters and photographs were used in the compilation of a book called Camp Fannin, Texas ... A 50-Year Perspective. by Gordon J. Neilson, former Public Affairs Officer at the camp during the period 1943-1946 (reference B-13 and document D-9). Some of the letters describe arms and ammunition as well as training procedures.

(5) Original real estate documents show 14,093.48 acres versus the 14,075 shown on the Findings and Determination of Eligibili ty (see appendix G and document E-2).

c. **Interviews with Site-Relatod Personnel**

(1) Les Axtell, Jr. is president of the Camp Fannin Association, a 610 member group made up of Camp Fannin trained veterans and concerned citizens from the Tyler area. The task of interviewing the entire membership was not feasible, so with Mr. Axtell's assistance, the assessment team met with veterans who were camp cadre and knowledgeable about the whole ''lifetime" of Camp Fannin.

(2) Mr. Axtell arrived for training in September 1943. He remembers a vigorous training schedule that included .30 caliber rifle and carbine; hand and rifle grenades; bazooka; advancing behind a "rolling barrage" of 105mm high explosive shells, as well AAA training utilizing .22 rifles and targets on long poles. He was also familiar with 60mm and 81mm mortar training occurring and related that at night during maneuvers, the sky was filled parachute flares and signal clusters. He did not recall burial pits, but did remember that cadre used dynamite to simulate enemy bombs and shelling (see document I-1).

(3) Mr. Bob Hobkirk was assigned to the training cadre at Camp Fannin in July 1943. He stayed on until camp closure, working for the most part in the orderly room. He remembers the furious pace of training and speaks of the necessity of round the clock training to meet the training schedule. He recalls the use of grenades both hand and rifle; bazookas; 30 caliber rifles and carbines; 105mm howitzer; 60mm and 81mm mortars; practice booby traps; demolition exercises; and the use of flares, signals, simulators and the use of tear gas in the gas chambers. He also remembers the lit up nights from illuminating rounds. Mr. Hobkirk identified the site of Grenade court 2. He was also able to show us the general area of several other ranges (see document I-2).

(4) Mr. Dave Stieghan is the director of the Smith County Historical Society. The fledgling Camp Fannin Museum is housed in his facility. In his display cases were some ordnance items retrieved from the grounds of Camp Fannin and donated to the Society. These items included practice 2.36" rockets, 60mm mortar training bodies, and practice hand grenades (see photographs J-16 and J-17). When asked for the names of some of his donors, for interviewing, Mr. Stieghan became reticent and declined on the grounds of privacy issues and alienating himself in the community (see document I-3).

(5) In a telephone conversation with Chief Deputy Johnny Beddingford, Smith County Sheriff's Department, we discussed the location of dynamite found in May 1994. He was willing to give me the general location of the incident but not the specifics, such as exact locations or identity of the property owner. The chief deputy said this was due to respecting the constituent's rights to privacy privacy (see document I-4).

5. SITE ELIGIBILITY

a. **Confirmed Formerly Used Defense Site**

(1) Former ownership and leasing of 14,075 acres for Camp Fannin IRTC has been confirmed and summarized in U.S. Army Corps of Engineer Findings and Determination of Eligibility (document E-1).

(2) The Camp Fannin site was made up of 11,022.02 leased acres and 3,071.46 acres acquired in fee. The facility was used to train replacement infantry for the U.S. Army during the period 1943-1945. The site was declared excess in November 1946.

b. **Potential Formerly Used Defense Sites**

No other potential formerly used defense sites were verified during the historical records search and site inspection.

6. VISUAL SITE INSPECTION

a. **General Procedures and Safety**

(1) Inspection was limited to nonintrusive methods; subsurface sampling was not authorized nor was it performed. Prior to the on-site visit, a thorough review of all available reports, historical documents, and available reference material gathered during the archival search was conducted to ensure Assessment Team members were aware of potential types and usage of ordnance that could be expected to be found on the site.

(2) Real estate rights of entry were not obtained by inspection personnel due to the willingness of the landowners to accommodate the Assessment Team. Control and jurisdiction of the site remained with the owners during this inspection.

(3) A site safety plan was developed and utilized by the Assessment Team to assure safety from injury during the site inspection. A pre-inspection briefing was conducted which stressed that OEW should not be touched or handled except by military EOD personnel. Landowners and personnel on the site were briefed on the hazards of handling or otherwise disturbing OEW or metallic items that could potentially be OEW.

(4) Prior to the site visit, a thorough review of all available reports reports, historical documents, texts, and technical ordnance re ference materials gathered during the historical record search portion of the process to ensure awareness of potential ordnance types and hazards.

(5) The team consisted of Messrs. Ron Plante and Mike LaForge. The areas were visited over the period 8-11 February 1994. Land owners contacted gave permission for entry and the team was escorted on some occasions by local experts on Camp Fannin IRTC.

b. **Area A - Impact Area**

(1) The impact area was inspected over the course of several days by the assessment team. This 2200 acre area is bisected by U.S. Route 20 and for the most part consists of low hills and wooded areas (see plate 4).

(2) The team began in the northeast corner of the area, identified by Les Axtell and maps as a mortar range. Evidence of trenches and the firing point were visible, as was damage to a bridge abutment from machine gun bullets (see photographs J-1 and J-2 and plate 4).

(3) The team proceeded to the west on the northern border of the impact area. This area is used for agricultural purposes and contains the impact area for 105mm HE rounds used in a training maneuver where troops advanced behind a rolling barrage (see document I-1, photograph J-3 and plate 4).

(4) The team proceeded southerly on the western border of the area where Little Tokyo, the urban combat training area, was located as well as

anti-aircraft training utilizing .22 caliber rifles. Several concrete foundations were noted (see photograph J-4 and plate 4).

(5) The impact area on both sides of U.S. Route 20 was inspected by vehicle from the highway and afoot where accessible by frontage road. The median area was examined and found to be well maintained, the grass cut short-to-medium length in most places. No evidence of OEW was noted (see plate 4).

(6) The southern border of this area was inspected and found to be heavily overgrown with brush and timber. Numerous concrete foundations were noted in this area. No OEW was noted on the s ur face in this area (see plate 4).

c. **Area B: Magazine Area**

The Magazine area is west of the hospital and north of Highway 271. It consists of six earth-covered magazine and a road network encompassing 50 acres. The Team drove around the area and then covered the ground on foot. The earth-covered magazines vary as to condition and have been put to beneficial use by the owners for long-term storage. Inspection of the magazines included checking the interiors of those unlocked, their vents, doors and hardware. The parking and holding areas were surveyed on foot and the site of the ammunition office was discovered with no evidence of the building remaining except the concrete footings (see photographs J-5 through J-9 and plate 4). No evidence of OEW contamination was noted in this area.

d. **Area C: Grenade Court 1**

The Team visited the area where the Grenade court was located according to historical documents (see plate 5). The area was surveyed on foot. Although the area was thoroughly searched, no evidence of the court was discovered. This area is used agriculturally and seems to be cultivated regularly. No evidence of OEW was noted in this area.

e. **Area D: Grenade Court 2**

The team, in company with Mr. Bob Hobkirk (see document I-2), visited the site of the former grenade court. The Grenade court as it existed is gone and has been replaced with a tree farm (see photographs J-10 and J-11). The site was quartered on foot and visually searched for fragments, fuze levers, and pins commonly found on former grenade courts. No evidence of OEW contamination was noted in this area (see plates 4 and 5)

f. **Area E: Hospital Area**

There is no historical evidence to indicate that this area was ever used for training involving ordnance or used as a storage or disposal area. The Team visited the grounds of the hospital and did not note any OEW. Several buildings from Camp Fannin still exist and are put to beneficial use (see photographs J-12, J-13 and plate 4). The potential BD/DR project is located here; a large chimney that is now owned by the University of Texas (see photograph J-14).

g. **Area F: Cantonment Area**

The cantonment area shows no sign of most of the individual soldier barracks, offices, and orderly rooms. Many of the warehouses are being used beneficially. OEW contamination, was not witnessed by the team during the assessment visit (see photograph J-15 and plate 4).

h. **Area G: POW Camp**

The area where the POW camp was located, east of the main cantonment area, is a pasture. The facility formerly on this site housed about 900 German Prisoners of War (POW) (see reference B-13). It did not appear to have been plowed or tilled recently. There is no evidence of the POW camp on the site. The team surveyed the site on foot and found no evidence of OEW contamination (see plate 4).

i. **Area H: Suspect Burial Pit**

The area that has been rumored to be a burial pit was examined visually by the assessment team. None of the personnel contacted had any evidence of a burial pit at this or any location on the former Camp Fannin. This area of about 3 acres is centered in a wooded area. There are no trees in the center of the area. No OEW was noted on this area. Personnel assigned to the camp had no knowledge of any burial pits in this or any other area of the camp (see documents I-1, I-2 and plate 4).

j. **Area I: Buried Dynamite Pit**

This area was not inspected by the team but bears mention because of the discovery of WOO-II vintage military dynamite buried next to a road during a grading operation. This occurred on 2 May 1994, 3 months after the site inspection. The dynamite was destroyed by local authorities (see document H-1 and plate 4).

k. **Area J: Remaining FUDS-eligible Areas**

The Remaining FUDS-eligible land, as identified on plate 8,978 acres, was driven over or visually inspected by the team. There is no evidence of any OEW in any of these areas and no reason to suspect it (see plate 4).

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ORDNANCE AND EXPLOSIVE
WASTE
ARCHIVES SEARCH REPORT
FOR
CAMP FANNIN
TYLER, TEXAS
PROJECT NUMBER K06TX006101

7. EVALUATION OF ORDNANCE HAZARDS

a. General Procedures

(1) This site was evaluated to determine whether there is a confirmed ordnance presence, a potential ordnance presence, or it is Uncontaminated by ordnance. Confirmed ordnance contamination is based on verifiable historical evidence or direct witness of ordnance items since site closure. Verifiable historical record evidence consists of ordnance items located on site and documented by local bomb squads, military Explosive Ordnance Disposal (EOD) teams, newspaper articles, correspondence, current findings, etc. Direct witness of ordnance items consists of the site assessment team directly locating ordnance items by visual inspection. Additional field data is not needed to identify a confirmed site.

(2) Potential ordnance contamination is based on a lack of confirmed ordnance. Potential ordnance contamination is inferred from records or indirect witness. Inference from historical records would include common practice in production, storage, usage, or disposal at that time, which could have allowed present day ordnance contamination. Potential ordnance contamination could also be based on indirect witness or present day site features. Additional field data is needed to confirm potential ordnance subsites.

(3) Uncontaminated ordnance subsites are based on a lack of confirmed or potential ordnance evidence. All evidence found in historical records and present day site inspections do not indicate confirmed or potential ordnance contamination. There is no reasonable evidence, direct or inferred, to suggest present day ordnance contamination. Additional field data is not needed to assess uncontaminated ordnance subsites.

b. Area A - Impact Area

(1) This area has confirmed ordnance presence. All evidence, including historical documents, eyewitness accounts, and common practice indicate this area is contaminated with explosive loaded howitzer and mortar shells. A wide variety of other ammunition will be found as well due to the practice of using impact areas for more than one type of training mission where ammunition is expended (see reference B-35 and photographs J-1 through J-4 and J-16 through J-17).

(2) A clearance document does exist for Camp Fannin. Common practice was to do surface clearance and not worry about buried duds and OEW subsurface (see document F-1).

c. Area Be Magazine Area

The Magazine area is considered to be uncontaminated based on the site inspection (see photographs J-5 through J-9).

d. Area C: Grenade Court 1

The area where the Grenade court was located is considered potentially contaminated with OEW through its use as a live grenade range. Eyewitness accounts of the training conducted make it appear that the range was cleared of duds on a daily basis (see document I-1). The possibility exists for low order fragmentation to be present subsurface.

e. Area D: Grenade Court 2

The area of this grenade court is considered to be potentially contaminated

The area of this grenade court is considered to be potentially contaminated in view of its use as a live grenade range. Since it has been plowed over during the planting of pine trees, the fragments, fuzes, levers, and pins normally found on former grenade ranges are probably buried under this area. No evidence of OEW contamination was noted in this area when the assessment team surveyed the area on foot (see photographs J-10 and J-11).

f. **Area E: Hospital Area**

This area is considered uncontaminated based on a lack of potential or confirmed ordnance presence. There is no historical evidence to indicate that area was ever used for training involving ordnance or used as a storage or disposal area. No OEW was noted during the site survey which was conducted on foot and by vehicle (see photographs J-12 and J-13).

g. **Area F: Cantonment Area**

The cantonment area is considered uncontaminated. No OEW was noted on this area during the site survey, nor did review of historical documents provide any evidence of confirmed contamination (see photograph J-15).

h. **Area G: POW Camp**

This area is considered uncontaminated based on a lack of confirmed or potential OEW findings. There is no historical evidence to infer or suggest this area has any OEW contamination nor was any seen during the site survey.

i. **Area H: Suspect Burial Pit**

This area is considered potentially contaminated based on the rumors of a burial pit that have persisted to this day from 1944. A common practice was to surface clear ranges and bury the scrap. A range clearance certificate exists, so it is probable that this area has the scrap generated by over 200,000 infantry soldiers (see reference B-13). This can further be inferred from its location at a central point near the southern portion of the impact area which would have made a convenient central collection point.

j. **Area I: Buried Dynamite Pit**

This area has confirmed ordnance presence based on the discovery of 50 sticks of military dynamite uncovered by a farmer operating a bulldozer during a fence installation project. The markings on the box were those of the Corps of Engineers and included a restriction to front line combat use (see document H-1 and I-6).

k. **Area J: Remaining FUDS-eligible Areas**

The Remaining FUDS-eligible land is classified as uncontaminated based on a lack of confirmed or potential OEW findings. There is no historical evidence to infer that these areas were ever used for training which would leave OEW residues.

8. SITE ORDNANCE TECHNICAL DATA

a. **End Item Technical Data**

(1) Table 8-1 has been developed to establish a list of potential ordnance items that could exist at various subsurface levels within the former Camp Fannin IRTC. As no comprehensive list of the exact types/models of ordnance could be located, this table has been developed based on historical documentation and interviews indicating actual items retrieved from the area since site closure, as well as interviews with personnel who actually utilized the items on site. Exact types/models have been included as documentation and interviews permit.

(2) Based on table 8-1, drawings of and information pertaining to ammunition items have been provided at appendix D.

TABLE 8-1
AMMUNITION USED AND EXPLOSIVE/CHEMICAL FILLER

ITEM	MODEL/TYPE	FILLER/WEIGHT
Cartridge .22 caliber Rifle	Commerical Ball	40 gr. Load 2.86 gr. smokeless powder
Cartridge .30 caliber Rifle	M1909 Blank	12 grains Smokeless powder
	M2, Ball	Lead antimony
	M1, Tracer	Tracer composition
	M2, AP	Tungsten chrome steel
	M1, Inc	Incendiary mixture
	Rifle Grensde, M3	brass case 5 grains black powder 45 grains IMR 4676
Cartridge .30 caliber Carbine	Blank	15 grains IMR 4809
	M1 Ball	Lead antimony
	M16 Tracer	Tracer composition
	M27 Tracer	Tracer composition
Cartridge .45 caliber Pistol	M9, Blank	7 grains E.C. Blank Powder Brass or Steel Cartridge c
	M1911, Ball	5.6 grains Pistol Powder 4 Copper Plated Steel Bullet Gilding Plated Steel Bulle
Cartridge .50 caliber, MG	M1, Blank	43 grains E.C. balnk powde
	M2, Ball	Soft steel
	M2, AP	Tungsten Chrome steel
	M1, M10,M21,M17, TR	Tracer composition
	M20, API-T	Incendiary mixture
	M1, M23, INC	Inceddiary mixture
	M8, API	Inceddiary mixture
Rocket, 2.36"	M7A3, A4, A5, A6 Practice	Inert Loaded
	M643, A4, A5, AT	.47# 50-50 Pentolite .026# Cast TNT
	M10, A1, A2, A3, Smoke	.89# White Phosphorus
Grenade, Hand	M21, Practice	.0056# Black Powder
	MK 2, HE	.04625# EC Powder .1075# TNT
	MK 3A1, A2, HE	.4269# TNT
	AN-M8, Smoke, HC	.67# Hexeclorethane
	M15, Smoke WP	.957# White Phosphorus
	M18, Series, Smoke, Colored	.72# Smoke mixture
Grenade, Rifle	M11A3, AT, Practice	Empty
	M9A1, AT	.25#
	M22 Series, Smoke, Colored	.4# Smokes Mixtures
	M19A1, Smoke, WP	.53# White Phosphorus
Mine, Antipersonnel	M8, Practice	Cast Iron .24# Black Power
CN	Tear gas	Pellet or powder
Mine Antitank	M1, Practice	Mild Steel 60 grains Black Powder 100 grains Red Phosphoru
Shell, 60mm Mortar	M69, Prac	Cast Iron
	M50A2, Prac	Steel .05# Black Powder

	M49A2, HE	.29# Inert Material .34# TNT
	M83A1, Illuminating	.526# Illuminant
	M302, Smoke, WP	.75# White Phosphorus
Shell, 81mm Mortar	M68, TP	Cast Iron
	M43A1, HE	Steel 1.23# TNT
	M56, HE	Steel 4.3# TNT
	M301, Illum	Steel 2.64# Illuminant
	M57, Smoke, WP	Steel 4.09# White Phosphorous
	M57, Smoke, FS	Steel 4.59# Sulfar Trioxide
Shell, 105mm Howitzer	M2, Blank	Brass 1.5# Black Powder
	M1, HE	Steel 4.84# TNT
	M60, Smoke, FS	Steel 4.61# Sulfar Trioxide
	M60, Smoke, WP	Steel 4.06# White Phosphorous
	M314, Illuminating	Steel 3.26# Illuminant
Torpedo, Bangalore	M1A1	7.6# 80/20 Amatol .82# TNT
Dynamite, Military	M1	Waxed Cardboard Sawdust 40-60% Nitroglycerine by
Block, Demolition	M2	2.41# 75/25 Tetrytol
Block, Demolition	M3	2.25# Comp C-3
Block, Demolition	M4	.50# Comp C-3
Activator	M1	36 grains Tetryl
Cap, Blasting Electric	Various	Tetryl
Cap, Blasting Non-Electric	Various	Tetryl
Cord, Detonating	Various	7#/100 feet PETN Core
Fuse, Time	Various	Black Powder Core
Signal, White Star, Para	M17 Series	Sheet Metal .16# Illuminant 16 grains Black Powder 15 grains Smokeless Powd
Signal, Green Star, Cluster	M18 Series	Sheet Metal .25# Illuminant 16 grains Black Powder 17 grains Smokeless Powd
Signal, Green Star, Para	M19 Series	Sheet Metal .16# Illuminant 15 grains Smokeless Powd 16 grains Black Powder
Signal, Green Star, Cluster	M20 Series	Sheet Metal

		.25# Illuminant 15 grains Smokeless Powd 16 grains Black Powder
Signal, Amber Star, Para	M21 Series	Sheet Metal .13# Illuminant 15 grains Smokeless Powd 16 grains Black Powder
Signal, Amber Star, Cluster	M21 Series	Sheet Metal .22# Illuminant 17 grains Smokeless Powd 16 grains Black Powder
Signal, Red Star, Para	M51 Series	Sheet Metal .13# Illuminant 15 grains Smokeless Powd 16 grains Black Powder
Signal, Red Star, Cluster	M21 Series	Sheet Metal .23# Illuminant 17 grains Smokeless Powd 16 grains Black Powder
Flare, Tip	M49	Sheet Metal .7# Illuminant
Flare, Trip , Parachute	M48	Sheet Metal .5# Illuminant
Simulator	M80	Cardboaard Tube .0005# Photoflash Powder 25 grains Black Powder
Igniters	Various	Igniter Compositions
Incendiary elements	Various	Incendiary Compositions
Primers	Various	Primer Compositions
Tracer Elements	Various	Tracer Compositions

b. **Chemical Data of Ordnance Fillers**

Table 8-2 has been developed to provide information on the explosive/chemical compounds used in the ordnance cited in table 8-1.

Table 8-2
SUMMARY OF SITE ORDNANCE FILLERS

EXPLOSIVE MATERIEL	SYNONYM(S)	CHEMICAL FORMULA
Smokeless Powder Various %S of:	FNH Powder	
Nitrocellulose	Nitrocotton	C3H5(ONO2)3
Dinitrotoluene	DNT	C6H2CH3(NO2)2
Dibutylphthalate	Gelling Agent	C6H4(CO2C4H9)2
Diphenylamine	DPA; Stabilizer	(C6H5)2NH
Black Powder 74% Potassium Nitrate	Niter, Salt Peter	KNO3
11% Sulfur		S

16% Charcoal		C
Titanium Tetrachloride		TiCl4
Red Phosphorus	RP; Red (DOT)	P4
Zinc Oxide	Chinese White	ZnO
Ballistite	JPN	
60% Nitrocellulose	Nitrocotton	C3H5(ONO2)3
40% Nitroglycerin	NG	C6H7(OH)2(ONO2)
Tetryl	Trinitrophenylmethylnitramine	(NO2)3C6H2N(NO2)C
PETN	Pentaerythritetetranitrate	C(CH2ONO2)4
E.C. Black powder		
80.4% nitrocellulose	Nitrocotton	C3H5(ONO2)3
8.0% barium nitrate		Ba(NO3)2
3.0% starch		
0.6% diphenylamine	DPA; Stabilizer	(C6H5)2NH

Table 8-2
SUMMARY OF SITE ORDNANCE FILLERS

EXPLOSIVE MATERIEL	SYNONYM(S)	CHEMICAL FORMULA
Amatol		
Ammonium	Nitrate	NH4NO3
TNT	2,4,6 Trinitrotolulene	C6H2CH3(NO2)3
Hexechlorethane	HC	Zn + C2Cl6
Pentolite 50/50		
TNT	2,4,6 Trinitrotolulene	C6H2CH3(NO2)3
PETN	Pentaerythritetetranitrate	C(CH2ONO2)4
TNT	2,4,6 Trinitrotolulene	C6H2CH3(NO2)3
80/20 Tetrytol		
TNT	2,4,6 Trinitrotolulene	C6H2CH3(NO2)3
Tetryl	Trinitrophenylmethylnitramine	(NO2)3C6H2N(NO2)CH
C-3		
77% RDX		
23% explosive plasticizer		
TNT	2,4,6 Trinitrotolulene	C6H2CH3(NO2)3
Tetryl	Trinitrophenylmethylnitramine	(No2)3C6H2N(NO2)CH
Nitrocellulose	Nitrocotton	C3H5(ONO2)3
Photoflash powder, Typical		
Aluminum		Al
Magnesium		Mg
Barium Nitrate		Ba(NO3)2
Potassium Chlorate		KClO3
Sulfur trioxide	FS Smoke	SO3
White phosphorus	WP, Willy Pete	P
CN	Tear gas, chloracetophenone	C6H5CO-CH2Cl
Lead		Pb
Antimony Sulfide		Sb2S3
Igniter Compositions *		
I-136 & 136A		
10% Calcium Resinate		
90% Strontium Peroxide		SrO2

I-194		
94% Igniter Composition I-136		
6% Magnesium Powder		Mg

Table 8-2
SUMMARY OF SITE ORDNANCE FILLERS

EXPLOSIVE MATERIEL	SYNONYM(S)	CHEMICAL FORMULA
I-276		
84% Barium Peroxide		BaO2
16% Magnesium Powder		Mg
I-280		
85% Igniter Composition 1-136A		
15% Magnesium Powder		Mg
I-508		
79% Barium Peroxide		BaO2
15% Magnesium Powder		Mg
1% Chlorinated Rubber		
Incendiary Compositions *		
IM-11		
50% Barium Nitrate		Ba(NO3)2
50% Magnesium Aluminum Alloy		Mg & Al
IM-23		
50% Potassium Perchlorate		KClO3
50% Magnesium Aluminum Alloy		Mg & Al
IM-28		
40% Barium Nitrate		Ba(NO3)2
50% Magnesium Aluminum Alloy		Mg & Al
10% Potassium Perchlorate		KClO3
IM-68		
24% Barium Nitrate		Ba(NO3)2
50% Magnesium Aluminum Alloy		Mg & Al
25% Ammonium Nitrate		NH4NO3
IM-136		
49% Potassium Perchlorate		KClO3
49% Magnesium Aluminum Alloy		Mg & Al
IM-142		
48% Barium Nitrate		Ba(NO3)2
46% Magnesium Aluminum Alloy		Mg & Al
IM-144		
50% Barium Nitrate		Ba(NO3)2
50% Red Phosphorus		Red P4
IM-162		
75% Zirconium		Zr
25% Incendiary Composition IM-23		

Table 8-2
SUMMARY OF SITE ORDNANCE FILLERS

EXPLOSIVE MATERIEL	SYNONYM(S)	CHEMICAL FORMULA
IM-163		
50% Incendiary Composition IM-23		
50% Zirconium		Zr
Tracer Compositions *		
R-256		
8.3% Calcium Resinate		

26.7% Strontium Peroxide	SrO2
26.7% Magnesium Powder	Mg
33.3% Strontium Nitrate	Sr(NO3)2

R-284	
17% Polyvinyl Chloride	
28% Magnesium Powder	Mg
55% Strontium Nitrate	Sr(NO3)2

R-321	
16% Polyvinyl Chloride	
26% Magnesium Powder	Mg
52% Strontium Nitrate	Sr(NO3)2

* Most frequently used chemical compositions and their major ingredients

---

9. OTHER ENVIRONMENTAL HAZARDS

a. **Hazardous, Toxic, and Radiological Waste.**

During the site visit, there was nothing found to indicate potential HTRW considerations.

b. **Building Demolition/Debris Removal**

(1) The team saw several buildings that appear to be have been beneficially used by the owners, but there are no BD/DR considerations that need to be addressed.

(2) Although asbestos is not a criteria for BD/DR projects, it should be noted that most of these WW II era buildings were built with nonfriable asbestos shingling on the exterior, should any BD/DR projects be approved.

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FORMERLY USED DEFENSE SITES

FINDINGS

ORDNANCE AND EXPLOSIVE WASTE
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FOR
FORMER PAMPA ARMY AIRFIELD
PAMPA, TEXAS
PROJECT NUMBER K06TX006201

May 1994

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ACKNOWLEDGMENTS

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* Team Leader

ORDNANCE AND EXPLOSIVE WASTE
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ORDNANCE AND EXPLOSIVE WASTE ARCHIVES SEARCH REPORT FOR FORMER PAMPA ARMY AIRFIELD PAMPA, TEXAS PROJECT NUMBER K06TX006201

1. INTRODUCTION

a. **Subject and Purpose**

(1) This report presents the findings of historical records searches and on-site inspections for ordnance and explosive waste (OEW) presence located at the former Pampa Army Airfield, Pampa, Texas. This investigation was performed under the authority of the Defense Environmental Restoration Program for Formerly Used Defense Sites (DERP/ FUDS). Refer to plate 1 for a general location map of this site.

(2) The purpose of this investigation was to characterize the site for potential OEW contamination utilizing historical records, interviews, and on-site visual inspection results.

b. **Scope**

(1) The investigation focused on 2,544.71 acres of land, which were used as the primary Pampa Army Airfield, most commonly referred to as Auxiliary Field #1. All of this land is currently being used for agricultural purposes, either as a cattle feedlot or in the production of grains.

(2) This report presents the site history, site description, real estate ownership information, results of a visual site inspection, confirmation of ordnance presence based on Available records, and evaluation of potential ordnance contamination based on site ordnance components and site information.

2. PREVIOUS INVESTIGATIONS

a. **1989 Inventory Project Report**

Based on a 1989 Finding and Determination of Eligibility (FDE), dated 6 October 1989, this site was found to have been formerly used by the Department of Defense (DOD). However, it was found that there was no evidence of unsafe conditions resulting from Department of Defense use.

Therefore, it was determined that an environmental restoration project was not an appropriate undertaking within the purview of the Defense Environmental Restoration Program, established under 10 U.S.C. 2701 et. seq., for these above stated reasons. (Ref B-11, E-6)

b. **1991 Revised Inventory Project Report**

On 3 April 1991, a visit was made to the site by employees of Tulsa District of the U.S. Army Corps of Engineers. It was determined that a potential for unexploded ordnance may exist at this location. A risk assessment code (RAC) of 5, indicating no action required, was derived from this on-site assessment. An FDE, dated 7 October 1991, determined this site to be eligible under the DERP/FUDS program (Ref B-12, E-7).

c. **1992 Revised Inventory Project Report**

At the request of Huntsville Division, a second inventory project report was submitted by Tulsa District in March of 1992. This request appears to be based on a revised layout map of Pampa Army Airfield, (Ref L-1,

plate 2), supplied by Southwestern Division Real Estate Suboffice. Subject map shows a storage ordnance area A, which depicts the storage area for munitions used at this base. Based on this above mentioned map, and without further investigation, worse case was assumed and a RAC of 2 was assigned by Huntsville Division (Ref B-13, E-8).

TABLE 2-1
DERP-FUDS PRELIMINARY ASSESSMENT PROJECTS

Project Number	DERP Category	Present Phase	Comments	Location
K06TX006201	OEW	SI	Ordnance or explosive contamination	2,544.71 acres
-	CON/HTRW	-	None Recommended	-
-	HTRW	-	None Recommended	-
-	BD/DR	-	None Recommended	-

3. SITE DESCRIPTION

a. **Existing Land Usage**

(1) The former Pampa Army Airfield was comprised of 2,544.71 acres which were acquired in fee by the United States of America in 1942.

(2) The main airfield site, again most commonly referred to as Auxiliary Field #1, is located approximately 12 miles east of Pampa, Texas, on Highway 152 in Gray County, Texas (Ref L-2).

(3) The former site is mostly under cultivation at this time, while a portion of the site is being used as a cattle feedlot (Ref Table 3-1, and plate 3).

TABLE 3-1
LAND USAGE

AREA	FORMER	PRESENT	PRESENT	SIZE/ ACRES	COMMENTS
A	Ordnance Storage	Ruby Dilger	Agricultural	8	Ref plate 3
B	Storage/ Ranges	Moody Farms	Agricultural	41	Ref plate 3
C	Gas Chamber	Moody Farms	Agricultural	7	Ref plate 3
D	Suspected Burial Site	Gene Hall	Agricultural	8	Ref plate 3
E	Remaining Land	Moody Farms	Agricultural	1552	Ref plate 3
		Gene Hall	Agricultural	312	Ref plate 3
		Hamilton Estate	Agricultural	275	Ref plate 3
		Texin Farms	Agricultural	199	Ref plate 3
		Ruby Dilger		152	Ref plate 3

TOTAL * 2,554

*Indicates approximated acreage (10 acre discrepancy believed due to road and private lane easements)

b. **Climatic Data**

(1) Gray County has a semiarid climate, and an average annual precipitation of 20.13 inches. Rainfall occurs most frequently in the form of thunderstorms, and the amount of monthly and annual precipitation is extremely variable. Thundershowers are most frequent late in spring and early in summer. About 84% of rainfall occurs from April to October. Severe windstorms and hailstorms may accompany these thunderstorms.

(2) Winds are strongest during intense thunderstorms, or squalls, but these storms last for only a short time. The strongest continuous winds occur during March and April, when the prevailing direction of the winds is southwesterly. These winds sometime produce severe dust storms in spring.

(3) Average annual temperature in this area is 57 degrees Fahrenheit. Monthly averages range from 35 degrees Fahrenheit in January, to a high of 79 degrees Fahrenheit in July. Days over 90 degrees Fahrenheit average about 62 annually (Ref B-1, D-1).

c. **Topography**

(1) Gray County, Texas is in the Great Plains province. It is divided into the High Plains and the Rolling Plains land resource areas.

(2) The High Plains part of the county is a nearly level to gently sloping plain that extends into the surrounding counties. The slope of the plain is a few feet per mile to the southeast. The soils of the High Plains are dark and fine textured.

(3) The Rolling Plains extend to the east and north as the Ogallala formation feathers out. Relief is rolling in most places and is steepest near the edge of the High Plains. The streams in the area are entrenched to a depth of several hundred feet in some places. The area slopes away from the edge of the High Plains. Generally, the soils are more sandy with distance from the edge of the High Plains (Ref B-1, D-1).

d. **Geology and Soil**

(1) The Permian red beds of Paleozoic era make up the oldest exposed geological formation in the county. They are exposed in the central, eastern, and southern parts of the county, along the North Fork Red River, McClellan Creek, and the tributaries of these streams. Following the uplift from which the present day Rocky Mountains were carved, eastward flowing streams deposited a large quantity of gravel, sand, and silt over the red beds. These deposits are several hundred feet thick in places and make up the Ogallala formation. The present surface of the High Plains conforms to the surface of the Ogallala formation. The eroding away of the eastern edge of this formation resulted in its feathering out in that direction.

(2) Geological erosion continues to slowly cut away the edges of the High Plains, downward and lateral erosion by streams continues to cut into the Ogallala formation and the Permian beds. Wind erosion continues to rework many surfaces, particularly those of the sandy soils (Ref B-1, D-1).

e. **Hydrology**

(1) Only a small amount of water runs off the High Plains. Most of the water flows into saucerlike depressions called playa lakes. The water remains in these lakes until it evaporates.

(2) The gravel, sand, and silt of the Ogallala formation form one of the largest natural underground water reservoirs in this part of the country. So far as is known, the only recharge of the water supply in this reservoir is by infiltration of a small amount of rainfall into the under ground water supply. All evidence indicates that the Canadian River to the north and the Pecos River to the west have cutoff all of the underground flow from the Rocky Mountains. This ground water is of good quality for agriculture, municipal, and industrial uses, and its increased use, as yet, has not seriously depleted the supply. In many areas of range, this water pumped into stock tanks by windmills, supplies the water for livestock.

(3) Depth to the water table under the High Plains ranges from about 275 feet to about 350 feet. The water bearing sand is as much as 400 feet thick (Ref B-1, D-1).

f. **Natural/Cultural Resources**

(1) Subject site may at times contain wildlife designated as endangered species by the Department of the Interior (DOI). Gray County, Texas is classified as a wintering range area for the American Bald Eagle. The eastern portion of the county also lies within the migration route of the Whooping Crane (Ref Table 3-2, B-14, F-1).

TABLE 3-2
Natural and Cultural Resources

Resource Classification	Type	Comments
Wildlife	Bald Eagle	Endangered Species Wintering Range
	Whooping Crane	Endangered Species Migration Route

(2) No sites have been identified as archeological landmarks within Gray County, Texas (Ref B-16, F-3).

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4. HISTORICAL ORDNANCE PRESENCE

a. **Chronological Site Summary**

(1) In 1942, the United States of America acquired the 2,544.71 acres which comprise the main base of the former Pampa Army Airfield, in fee. This site is located approximately 12 miles east of Pampa, Texas on Highway 152 in Gray County, Texas.

(a) This acreage was acquired for use by the Army Air Corps as a twin engine flying school. The school specialized in the training of soldiers to pilot and maintain the B-25 bomber. Training with munitions was limited to small arms, pyrotechnics, and chemical training (such as tear gas and chlorine). Department of Defense (DOD) improvements to the site included runways, roads, hangars, water wells, a water tower, sewage disposal plant, ordnance areas, skeet range, and numerous other buildings to house and support base personnel.

(b) The facility was declared excess for the last time in 1955 and the last tract of land was sold in 1957. The site is now agricultural in nature, mostly under cultivation, while a portion of the site is used as a cattle feedlot (Ref E-6).

(2) A memorandum, Subject: Decontamination of Pampa AAF and Pampa Auxiliaries No. 1&2, dated 10 January 1947, shows certification that this entire station at Pampa, Texas has been cleared of all unexploded ammunition and poisonous gases, and has been decontaminated in accordance with WD 195 (1945) (Ref G-6).

b. **Review of Ordnance Related Records**

(1) Research efforts began with a review of all reports, articles, historical documents, and reference materials gathered during the archival records search. During this review an effort was made to focus on areas of potential OEW contamination.

(2) A revised layout map, undated, shows ordnance areas A and B. as well as pistol and skeet ranges. This map indicates that storage of ordnance at this site consisted of small arms ammunition, pyrotechnics, and chemical storage (Ref L-1, plate 2). No other munitions were found to be used on this site.

(3) Newspaper articles confirm chemical training at the Pampa facility. This training is a direct result of Japan using gas against the Chinese, and its possible use in Europe and the Pacific. This training was designed to prepare our soldiers for the possibility of operating under conditions which may have required prolonged usage of gas masks. It should be stressed that chemical training in this instance refers to tear gas and chlorine. Live nerve and blister agents were not used in this portion of their required training. Soldiers were also required to wear these masks during smoke grenade training on the open fields of Pampa Army Airfield (Ref H-1).

(4) A documented history of the former Pampa Army Airfield, 1 March 1944 - 1 May 1944, reveals that live mustard gas was also used at this site. This in the form of war gas identification sets (M1 and M2), used to train decontamination squads in the proper procedures with which to handle

decontamination facilities and equipment (Ref B30, H-2). Courses were held to educate the soldier in the first aid procedures which everyone must know in the event of a chemical attack. Only under controlled conditions would live agents be used in this training.

(5) SB742-1365-94-14 states that materials for disposal, after chemical decontamination, or incineration will be sent to landfill. One cannot positively state the disposition of subject sets. However, reference G-6 is included to show a memorandum directed to the U.S. Engineers Office, Tulsa, Oklahoma certifying decontamination of facilities. This document is included to show that the entire station at Pampa Army Airfield has been certified as being cleared of any unexploded munitions and poisonous gases and has been decontaminated in accordance with WD 195 (1945).

c. **Interviews With Site-Related Personnel**

(1) Attempts were made by the assessment team to interview citizens thought to be credible in their knowledge of this former facility, and others in positions of authority within the Pampa community. Interviews were conducted with individuals in the Pampa area who had previously been employed at the former Pampa Army Airfield, local historians, land owners, and individuals from the local law enforcement agencies (Ref App.I).

(2) Individuals stated that no aerial gunnery or bombing occurred at the former airfield. Again, the only training involving ammunition was small arms, pyrotechnics, and chemical training which was primarily located on the small arms range of the main airfield. (Ref App.I).

(3) Interviews with local authorities and current owners revealed that there have never been any reported incidents involving ordnance and explosive waste (OEW) at this site (Ref App.I).

(4) A common thread through these interviews is the persistent story of munitions, as well as all other excess materials at time of base closure, being buried in surrounding playa lakes. No one interviewed can offer first hand knowledge of such, however, this thought appears to persist throughout the local community (Ref App.I).

5. SITE ELIGIBILITY

a. **Confirmed Formerly Used Defense Sites**

(1) Former land usage and ownership of Pampa Army Airfield by the War Department has been confirmed and summarized in previous U.S. Army Corps of Engineer Findings and Determination of Eligibility (Ref E-6, E-7, E-8).

(2) The site of the main airfield consisted of 2544.71 acres of land and was acquired for use by the U.S. Army Air Corps as a twin engine flying school. The facility was declared excess for the last time in November of 1955. The last tract of base land was sold in 1957.

b. **Potential Formerly Used Defense Sites**

(1) No other potential formerly used defense sites were verified during the historical records and site inspection. However, it should again be mentioned that Auxiliary Field #2, also at times referred to as Auxiliary Field #1, located approximately 6 miles to the south of Pampa, is alleged to also contain the purported trenches, which supposedly were dug to bury excess material at the time of base closure. This site may be considered to be a potential FUDS site and should possibly be investigated further. (Ref B-46, L-2, photo J-8).

(2) Tulsa District personnel are aware of the fact that Auxiliary Field #2 is a potential FUDS site, and are taking action towards conducting an inventory project report at this time.

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6. VISUAL SITE INSPECTION

a. **General Procedures and Safety**

(1) During the period of 31 January through 4 February 1994, members of the Site Inspection (SI) team traveled to the former Pampa Army Airfield, Pampa, Texas. The primary task of the SI team was to assess OEW presence and potential. The site inspection was limited to non intrusive methods, i.e., subsurface sampling was neither authorized nor performed at this location.

(2) Real Estate rights-of-entry were not deemed necessary as the vast majority of land in question was easily accessible, thanks to Mr. Rex McAnelly, manager of Moody Farms cattle feedlot. Mr. Gene Hall, owner of 320 acres of the former site, declined granting permission to access his land. The land owned by Mr. Hall encompasses the purported site of burial. The team then proceeded to perform an inspection of as much of the former site as possible.

(3) A site safety plan was developed and utilized by the SI team to assure safety from injury to all personnel during the site inspection of this facility. A briefing was conducted prior to the inspection, at which time it was stressed that OEW should only be handled by military EOD personnel. During this on-site inspection, the assessment team maintained site safety at all times.

(4) Prior to the site visit, a thorough review of all available reports, historical documents, texts, and technical ordnance reference materials gathered during the historical records search portion of the ASR was made, to ensure awareness of potential ordnance types and hazards.

b. **Area A - Ordnance Storage**

(1) This former ordnance storage area was inspected by the on-site assessment team. Ordnance area A consisted of approximately five buildings which were used to store small arms, pyrotechnics, and chemical munitions. All that remains of this area today are two buildings which remain in good condition and are being beneficially used by the land owner (Bldgs. 994 and 998). An additional building (Bldg. 996) has previously been put to beneficial use by the owner, however, it is falling down at this time. The remaining ordnance storage structures in this area are no longer in existence (Ref photos J-1, J-2, J-3, plate 4).

(2) Since the closure of this facility, no OEW or evidence of OEW has been found at this ordnance storage area. The on-site inspection team saw no evidence of OEW while visiting this site.

c. **Area B - Ordnance Storage Area/Firing Ranges**

(1) Ordnance area B no longer exists. All that remains of this area is the cement foundation of subject buildings (Ref B-42, photo J-4, plate 5).

(2) The area which comprised the pistol and skeet ranges at this former

facility was inspected by the assessment team (Ref L-1, photo J-5 and plate 5). This site is located' directly to the left of the entrance to Moody Farms Cattle Feedlot, the former main entrance to the Pampa Army Airfield facility. All that remains of the former firing range is the berm into which the ammunition was fired (Ref photo J-6). This area of concern has previously been addressed, as documented in a conversation record between Mr. McAnelly and Ms. Carol Staudenmaier (Ref F-4).

(3) Since the closure of this facility, no OEW or evidence of OEW has been found at this ordnance storage area. The on-site inspection team saw no evidence of OEW while visiting this site.

d. **Area C - Gas Chamber**

(1) All that remains of the gas chamber area is the shell of a small concrete structure (Ref L-1, photo J-7, plates 2 and 6).

(2) Since the closure of this facility, no OEW or evidence of OEW has been found at this ordnance storage area. The on-site inspection team saw no evidence of OEW while visiting this site.

e. **Area D - Suspected Burial Site**

(1) Mention of suspected burial sites at the former Pampa Army Airfield is based solely on conversation/interviews with local citizens. These individuals have either previously been employed at this facility, heard stories from others who may have worked here, or have access to the land itself (Ref I-1 thru I-8).

(2) The assessment team was unable to physically inspect the acreage most commonly referred to as that which contains the purported site of burial. Mr. Gene Hall now owns this land in question and would not grant access to subject land (Ref I-4, L-4, photo J-9, plate 7).

(3) Since the closure of this facility, no OEW or evidence of OEW has been found at this ordnance storage area. The on-site inspection team saw no evidence of OEW while visiting this site.

f. **Area E - All Remaining Land**

(1) Area E consists of all other land comprising the main field of the former Pampa Army Airfield, not included in the previous four areas mentioned.

(2) Since the closure of this facility, through this inspection, there has been no evidence found to support any claim of OEW presence in subject area.

7. EVALUATION OF ORDNANCE HAZARDS

a. **General Procedures**

(1) The former airfield site was evaluated to determine confirmed, potential, or uncontaminated ordnance presence. Confirmed ordnance contamination is based on verifiable historical evidence or direct witness of ordnance items. Verifiable historical records evidence consists of ordnance items located on site and documented by the local bomb squad, Army Explosive Ordnance Demolition Team, newspaper articles, correspondence, current findings, etc. Direct witness of ordnance items consists of the inspection team directly locating ordnance items by visual inspection. Additional field data is not needed to identify a confirmed subsite.

(2) Potential ordnance contamination is based on a lack of confirmed ordnance. Potential ordnance contamination is inferred from records or indirect witness. Inference from historical records would include common practice in production, storage, usage, or disposal, at that time, which

could have allowed present day ordnance contamination. Potential ordnance contamination could also be based on indirect witness or from present day site features. Additional field data is needed to confirm potential ordnance subsites.

(3) Uncontaminated ordnance subsites are based on a lack of confirmed or potential ordnance evidence. All evidence found in historical records and present day site inspections do not indicate confirmed or potential ordnance contamination. There is no reasonable evidence, either direct or inferred, to suggest present day ordnance contamination. Additional field data is not needed to assess uncontaminated ordnance subsites.

b. **Area A - Ordnance Storage**

(I) There was no direct witness by this assessment team to verify any ordnance or explosive waste contamination at this site (refer to paragraph 6.b. above). No incidents involving OEW have ever been reported to local authorities, which could well be expected , as this was used only as a storage location at this site.

(2) Subject buildings located in ordnance area A were used only to store ordnance at this facility. This area has been used agriculturally for over 40 years with no ordnance related incidents reported. There should be no reason to suspect contamination of any kind in this area. The possibility of ordnance and explosive waste in this area is remote.

c. **Area B - Ordnance Storage/Firing Ranges**

(1) There was no direct witness by this assessment team of any ordnance and explosive waste contamination at these sites (refer to paragraph 6.c. above). In the years since this facility closed, no incidents involving OEW have ever been reported to local authorities.

(2) Ordnance area B and the nearby firing ranges appear to pose no threat of contamination. The three storage locations were more than likely temporary storage locations for munitions and other materials unloaded from trains, as they were located next to the railroad tracks. This area has been part of a cattle yard for over 40 years with no incidents reported. The question of lead on the firing ranges has already been addressed by individuals from Tulsa District. Therefore it is believed that the possibility of ordnance and explosive waste in this area is remote.

d. **Area C - Gas Chamber**

(1) There is no indication of Ordnance and Explosive Waste contamination resulting from use of this tear gas chamber at the former Pampa Army Airfield (refer to paragraph 6.d. above).

(2) Area C was used as a training area in which soldiers trained with tear gas, chlorine, and smokes to familiarize themselves with wearing a gas mask. Nothing remains but for a small cement structure. There should be no reason to believe that any of these gases remain in this area. It is believed that the possibility of ordnance and explosive waste in the gas chamber area is remote.

e. **Area D - Suspected Burial Site**

(1) There was again no direct witness by this assessment team of any ordnance or explosive waste contamination at this site (refer to paragraph 6.e. above). Contradictory statements regarding the burial of munitions at this site have been received. It has even been stated that previous unofficial "digs" have already been performed on subject site, with no munitions or explosives being found (Ref Appendix I).

(2) No incidents involving ordnance or explosive waste have ever been reported to local authorities in regard to this site, and no first hand knowledge of such was verified by this team (Ref I-7).

(3) Reference G-6 certifies that the entire station at Pampa Army Airfield has been cleared of all unexploded ammunition and poisonous gases, therefore it is believed that the possibility of ordnance and explosive waste in this area appears to be remote.

f. **Area E - All Remaining Land**

(1) There was no direct witness by this assessment team to verify any ordnance or explosive waste contamination on subject land (refer to paragraph 6.f. above). No incidents involving OEW have ever been reported to local authorities since base closure.

(2) The possibility of ordnance and explosive waste in this area again appears to be remote.

8. SITE ORDNANCE TECHNICAL DATA

a. **End Item Technical Data**

No complete listing of the exact types or models of ordnance used at the former Pampa Army Airfield could be located. Table 8-1 has been included to show a listing of potential ordnance items which were in all probability used at this former facility. Listed items are based on historical documentation, as well as personal interviews conducted during the on-site inspection (Ref Table 8-1).

TABLE 8-1
AMMUNITION USED AND EXPLOSIVE/CHEMICAL FILLER

ITEM	MODEL/TYPE	FILLER/WEIGHT	FUZE/
Small Arms Ammunition			
.30 Caliber w/gilding metal jacket	Ball M1	Smokeless powder, 1 antimony	N/A
	Tracer MI	Smokeless powder, 1 antimony (39lead)	N/A
	M1 Incendiary	Nitrocellulose, Nitroglycerin	N/A
Cartridge,Ball,.45Cal	M1911	Smokeless powder, 1 antimony (39lead)	N/A
	Tracer M1	Smokeless powder, I antimony (39 lead)	N/A
Shell, Shotgun, 12 Gauge		Bulk smokeless, 26 gram No.OO buckshot, 1.25 ounces	N/A
Grenade, Hand, Smoke	CN Tear	Chloroacetophenone	N/A
Grenade, Hand, Smoke	HC	Hexachlorothane-Zinc	N/A
War Gas Identification Set	M1 and M2	Mustard Agent	N/A

b. **Chemical Data of Ordnance Fillers**

Table 8-2 has been developed to provide information on the explosive/chemical compounds used in the ordnance cited in Table 8-1.

TABLE 8-2
CHEMICAL DATA OF ORDNANCE FILLERS

Explosive/Chemical Material	Synonyms	Chemical Compounds
Chloroacetophenone	CN	C6H5CO-CH2Cl
Chlorine	CL	Cl
Hexachlorothane-Zinc	HC	Zn+C2Cl6
Mustard Agent	H. HD	

Nitrocellulose	Guncotton, Pyroxylin, Nitrocotton Cellulose Nitrate	C6H8O5(NO2)3]n
Nitroglycerin		CH2NO3CHNO3CH2NO3
Smokeless Powder	(See nitrocellulose)	

9. EVALUATION OF OTHER ENVIRONMENTAL HAZARDS

a. **Hazardous, Toxic and Radiological Waste**

Tulsa District, U. S. Army Corps of Engineers, has already addressed all potential HTRW and CON HTRW hazards at this site.

b. **Building Demolition/Debris Removal**

All structures on the former Pampa Army Airfield are currently being or have been put to beneficial use. The remaining buildings on this site still appear to be in a sound and usable condition.

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Hurricane Mesa Test Site

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1 1.00 **Hurricane Mesa Test Site ASR Findings: Section 5-7** *Hurricane Mesa Test Site ASR Findings: Section 5-7 . 5.0 Real Estate The 3,500.78-acre site was acquired by the U.S. Air Force in 1955 for construction of a rocket sled test track to test aircraft escape systems. The property was acquired i...*

2 0.97 **Hurricane Mesa Test Site ASR Findings: Appendix E** *Hurricane Mesa Test Site ASR Findings: Appendix E . TELEPHONE OR VERBAL CONVERSATION RECORD DATE 9/14/94 For use of this form, see AR340-15; the proponent agency is the Adjutant General's Office. . SUBJECT OF CONVERSATION .Hurricane Mesa . ...*

3 0.93 **Hurricane Mesa Test Site ASR Findings: Section 1-4** *Hurricane Mesa Test Site ASR Findings: Section 1-4 . 1.0 Introduction 1.1 .Authority In 1980, Congress enacted the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) 42 USC 9601 et seq. Ordnance and Explosive Wast...*

4 0.90 **Hurricane Mesa Test Site ASR Findings: Appendix G** *Hurricane Mesa Test Site ASR Findings: Appendix G . ORDNANCE AND EXPLOSIVE WASTE CHEMICAL WARFARE MATERIALS ARCHIVES SEARCH REPORT FOR .HURRICANE MESA TEST SITE WASHINGTON COUNTY, UTAH DERP-FUDS PROJECT NO. J08UT002601 .APPENDIX G .PRESENT ...*

5 0.87 **Hurricane Mesa Test Site ASR Findings: Appendix C4** *Hurricane Mesa Test Site ASR Findings: Appendix C4 . MEMORANDUM FOR: Mike Dace 21 November 1994 SUBJECT: Hurricane Mesa - Site Visit St. Louis District Participants: Ted Moore Project Manager Pat O'Donnell Historian and Safety Officer Jim L...*

6 0.87 **Hurricane Mesa Test Site ASR Findings: Appendix C3** *Hurricane Mesa Test Site ASR Findings: Appendix C3 . SITE SPECIFIC SAFETY AND HEALTH PLAN (SSHP). OEW/CWM Archives Search Site Inspection Visit .Hurricane Mesa Virgin, UT Project # J08UT002601 1. REFERENCES: a. Safety Manual, CELMS-PM-M, 16...*

7 0.84 **Hurricane Mesa Test Site ASR Findings: Appendix I** *Hurricane Mesa Test Site ASR Findings: Appendix I . 10 Feb 93 RISK ASSESSMENT PROCEDURE FOR ORDNANCE AND EXPLOSIVE WASTE (OEW) SITE . Site Name .Hurricane Mesa .Rater's Name .Ted Moore .Site Location .Virgin, UT .Phone No. .(314) 331-8849 ....*

8 0.84 **Hurricane Mesa Test Site ASR Findings: Appendix J** *Hurricane Mesa Test Site ASR Findings: Appendix J . ORDNANCE AND EXPLOSIVE WASTE CHEMICAL WARFARE MATERIALS ARCHIVES SEARCH REPORT FOR .HURRICANE MESA TEST SITE WASHINGTON COUNTY, UTAH DERP-FUDS PROJECT NO. J08UT002601 .APPENDIX J .REPORT D...*

9 0.84 **Hurricane Mesa Test Site ASR Findings: Appendix C** *Hurricane Mesa Test Site ASR Findings: Appendix C . ORDNANCE AND EXPLOSIVE WASTE CHEMICAL WARFARE MATERIALS ARCHIVES SEARCH REPORT FOR .HURRICANE MESA TEST SITE WASHINGTON COUNTY, UTAH DERP-FUDS PROJECT NO. J08UT002601 .APPENDIX C .REPORTS/...*

10 0.84 **Hurricane Mesa Test Site ASR Findings: Appendix B** *Hurricane Mesa Test Site ASR Findings: Appendix B . ORDNANCE AND EXPLOSIVE WASTE CHEMICAL WARFARE MATERIALS ARCHIVES SEARCH REPORT FOR .HURRICANE MESA TEST SITE WASHINGTON COUNTY, UTAH DERP-FUDS PROJECT NO. J08UT002601 .APPENDIX B .ACRONYMS...*

11 0.84 **Hurricane Mesa Test Site ASR Findings: Appendix A** *Hurricane Mesa Test Site ASR Findings: Appendix A . ORDNANCE AND EXPLOSIVE WASTE CHEMICAL WARFARE MATERIALS ARCHIVES SEARCH REPORT FOR .HURRICANE MESA TEST SITE WASHINGTON COUNTY, UTAH*

DERP-FUDS PROJECT NO. J08UT002601 .APPENDIX A .REFERENC...

12 0.84 **Hurricane Mesa Test Site ASR Findings: Table of Contents** *Hurricane Mesa Test Site ASR Findings: Table of Contents . ORDNANCE AND EXPLOSIVE WASTE CHEMICAL WARFARE MATERIALS ARCHIVES SEARCH REPORT FOR .HURRICANE MESA TEST SITE WASHINGTON COUNTY, UTAH DERP-FUDS PROJECT NO. J08UT002601 .TABLE OF CONT...*

13 0.84 **Hurricane Mesa Test Site ASR** *Hurricane Mesa Test Site ASR .ARCHIVE SEARCH REPORT (ASR) . for .HURRICANE MESA TEST SITE . at .Washington County, Utah . .ASR - Archives Search Report .This is the report detailing the information discovered during the archives search. The...*

14 0.84 **Hurricane Mesa Test Site OE Page** *Hurricane Mesa Test Site OE Page .ORDNANCE AND EXPLOSIVES (OE) .consists of either (1) or (2) below: Ammunition, ammunition components, chemical warfare materials or explosives which have been lost, abandoned, discarded, buried, fired, thro...*

15 0.84 **Hurricane Mesa Test Site** *Hurricane Mesa Test Site .Hurricane Mesa Test Site .Washington County, Utah. PROJECT# J08UT002601. Corps of Engineers Geographic District is:.Sacramento District . DERP FUDS Categories: . PRELIMINARY ASSESSMENTS . INPR .Correspondence .Othe...*

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17	0.80	**Alphabetical Listing of DERP FUDS Projects** *Alphabetical Listing of DERP FUDS Projects . G . GAMBELL SITE, St. Lawrence Island, AK .GARDEN CITY ARMY AIR FIELD, Garden City, KS .GARDEN CITY AUXILIARY FIELD No.1, Finney County, KS .GARDEN CITY AUXILIARY FIELD No.2, Finney County, KS .G...*

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ORDNANCE AND EXPLOSIVE WASTE
CHEMICAL WARFARE MATERIALS
ARCHIVES SEARCH REPORT
FOR
HURRICANE MESA TEST SITE
WASHINGTON COUNTY, UTAH

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1.0 Introduction

1.1 Authority

In 1980, Congress enacted the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) 42 USC 9601 et seq. Ordnance and Explosive Wastes (OEW) are included in the CERCLA definition of pollutants and contaminants that require a remedial response.

In 1983, the Environmental Restoration Defense Account (ERDA) was established by Public Law 98-212. This Congressionally-directed fund was to be used for environmental restoration at Department of Defense (DOD) active installations and formerly used properties. The DOD designated the Army as the sole manager for environmental restoration at closed installations and formerly used properties. The Secretary of the Army assigned this mission to the Corps of Engineers (USACE) in 1984.

The 1986 Superfund Amendments and Reauthorization Act (SARA) amended certain aspects of CERCLA, some of which directly related to OEW contamination. Chapter 160 of the SARA established the Defense Environmental Restoration Program (DERP). One of the goals specified for the DERP is "correction of environmental damage (such as detection and disposal of unexploded ordnance) which creates an imminent and substantial endangerment to the public health or welfare or to the environment"

The DERP requires that a CERCLA response action be undertaken whenever such "immine and substantial endangerment" is found at:

A. A facility or site that is owned by, leased to, or otherwise possessed by the United States and under the jurisdiction of the Secretary of Defense.

B. A facility or site that was under the jurisdiction of the Secretary of Defense and owned by, leased to, or otherwise possessed by the United States a the time of actions leading to contamination.

C. A vessel owned or operated by the Department of Defense.

The National Contingency Plan (NCP) was established by the Clean Water Act of 1972. The NCP has been revised and broadened several times since then. Its purpose is to provide the organizational structure and procedures for remedial actions to be taken in response to the presence of hazardous substances, pollutants, and contaminants at a site. Section 105 of the 1980 CERCLA states that the NCP shall apply to all response actions taken as a result of CERCLA requirements.

The March 1990 National Oil and Hazardous Substances Pollution Contingency Plan given in 40 CFR part 300 is the latest version of the NCP. Paragraph 300.120 states that "DOD will be the removal response authority with respect to incidents involving DOD military weapons and munitions under the jurisdiction, custody, and control of DOD."

On 5 April 1990, U.S. Army Engineer Division, Huntsville (USAEDH) was designated as the USACE Mandatory Center of Expertise (MCX) and Design Center for Ordnance and Explosive Waste (OEW). As the MCX and Design Center for OEW, USAEDH is responsible for the design and successful implementation of all Department of the Army OEW remediations required by CERCLA. USAEDH will also design and implement OEW remediation programs for other branches of the Department of Defense when requested. In cooperation with the Huntsville Division, the U.S. Army Corps of Engineers St. Louis District has been assigned the task of preparing Archives Search Reports for those Formerly Used Defense Sites (FUDS) suspected of ordnance and explosive waste (OEW) and chemical warfare materials (CWM) contamination.

1.2 Subject

The Hurricane Mesa Supersonic Research Site is located approximately two miles west of Virgin, Washington County, Utah (see Map 1). The Air Force acquired the 3,500.78 acre site in 1955 and constructed a rocket sled test track, on which they tested aircraft escape systems. The Air Force acquired the property in three ways. The Bureau of Land Management (BLM) transferred 2,851.68 acres, the State of Utah leased 643.83 acres, and private property owners leased 3.68 acres of land to the Air Force.

The property consists of Hurricane Mesa, where the test track and support facilities were constructed, and an area below the mesa. The site was also used for testing 40mm grenades, 60mm mortars, and 2.75" rockets. These munitions were fired or launched from a pad on the mesa to the impact area below (see Map 2). Harry Diamond Laboratories (HDL) conducted tests for the United States Army from 1966 to 1976. Other munitions may have been tested at the site.

The Air Force returned the 2,851.68 acre parcel to the BLM in 1962. The leases from the State of Utah and private property owners were terminated in 1963. As shown on Map 2, the State of Utah now owns most of the site. The BLM owns approximately 680 acres below the mesa and the State of Utah owns the rest.

Since the Air Force disposed of the property, private contractors have leased the portion owned by the State of Utah. The test track is currently leased and used by a private contractor. The munitions tests were conducted under agreements with the lessees of the State of Utah property.

After the conclusion of the 40mm grenade testing, unexploded grenades were taken to an area below the mesa (see Map 2) and detonated with C4 explosives. Many of the grenades were scattered rather than destroyed. One unexploded grenade was found by a group of seven people at a campfire on State of Utah property in January 1986 (Area 1 on map 2). The grenade was thrown into the fire to see if it would explode. Eventually the grenade did explode, injuring six of the seven people.

1.3 Purpose

This Archives Search Report (ASR) compiles information obtained through historical research at various archives and records-holding facilities, interviews with persons associated with the site, and a site inspection. All efforts were directed at determining the possible use or disposal of ordnance on the site.

1.4 Scope

This ASR focused on the potential for contamination from the munitions tests on the site, especially from the attempted destruction of the unexploded 40mm grenades. However, the entire site is a FUDS and the potential for contamination of all parts of the site was considered.
This report presents site history, description and characterization of the immediate surrounding area, real estate ownership information. findings of the site inspection, and evaluation of potential ordnance contamination.

2.0 Previous Site Investigations

An Inventory Project Report (INPR) was prepared in April 1991 by the Sacramento District, Corps of Engineers. The INPR provided details of the 1986 campfire incident and recommended further investigation of the site.

A police report covering the campfire incident is contained in Appendix C-5.

As a result of the campfire incident, the Washington County Sheriff's Department and the National Guard conducted searches of the area for additional grenades.

Representatives from the Huntsville Division, Corps of Engineers visited the

site in 1989 to assess the area requiring further investigation and possible cleanup.

3.0 Site and Site Area Description

3.1 Location of the Site

The site is located in Washington County, Utah, two miles west of the town of Virgin.

3.2 Past Uses of the Site

Prior to the arrival of the U.S. Air Force in 1954, the 3,500.78 acre site was for the most part undeveloped with some cattle grazing below the mesa.

3.3 Current Uses of the Site

The site is currently owned by the State of Utah and the BLM. Universal Propulsion Company, Inc. leases part of the site and conducts aircraft escape system tests (Talley 1991).

3.4 Demographics of the Site

3.4.1 Center of Activity

Hurricane Mesa is located near the City of Hurricane, Washington County, Utah. The town of Virgin is actually closer, but certain demographic information for Virgin was unavailable, therefore, except where indicated, demographic information for Hurricane will be used. The community of Hurricane has numerous centers of activity such as Zion National Park, Pioneer Heritage Park, Hurricane Canal, Pah Tempe Mineral Springs, Trinity Park, Molly's Nipple, Blow Holes, and various parks located throughout the community.

3.4.2 Population Density

City:	Hurricane	County:	Washington
Area:	N/A sq.mi.	Area:	2,422 sq.mi.
POP:	3,915	POP:	48,560
PD:	N/A persons per sq.mi.	PD:	20.04 persons per sq.mi.

Population and area are based on the U.S. Department of Commerce, Bureau of the Census, 1990 statistics, and telephone interviews.

3.4.3 Type of Businesses

A review of both telephone interviews and County Business Patterns (1990) assisted in developing a business profile of the area. The City of Hurricane is diversified. The largest employers are: Chum's Ltd., Curatech, Bullberry Barrel Works, RM Precision Swiss, and Scholzen Products.

3.4.4 Type of Industry

Hurricane is an economically diverse community. The community supports retail and service industries, along with agriculture, transportation, utilities, and manufacturing.

3.4.5 Type of Housing

Housing in Hurricane and Virgin is comprised of both single and multi-family homes. 3.4.6 New Development in the Area
Development in the Virgin area includes residential dwellings, along with agricultural and service type businesses.

3.4.7 Typical Cross-Section of Population

The ancestry in Hurricane is diverse. The percentage of those under the age of 18 is 39.1%, over 65 years is 17.0%. The median age is 30. Approximately 97.4% of the population is White, 0.0% Black, 1.0% Hispanic, 0.8% American Indian or Eskimo, and 0.8% Asian or Pacific Islander. There are approximately

1,325 housing units with a median value of $ 67,800. The work force, based on the number of establishments, of Washington County is broken down into the following: manufacturing, 4.0%; services, 32.3%; agriculture, 1.6%; trade and finance, 38.8%; and other, 23.3%.

4.0 Physical Characteristics of the Site

4.1 Geology/Physiography

Hurricane Mesa is located in the extreme southwestern corner of Utah, on the edge of the Great Basin section of the Basin and Range province. This section is marked by numerous short mountain ranges and intermontane aggradational plains in roughly equal proportions. Most of this section has internal drainage.

Rocks in this province range in age from Precambrian to Quaternary. Precambrian granites and gneisses are extensively exposed in the southern part of the province. Block faulting is prevalent in this province and has notably influenced the topography. One thing that characterizes basin-range faulting more than any other is that the normal-faulting is antithetic, meaning the fault dips opposite to the direction in which the strata dip. Thus the same stratigraphic units along a profile at right angles to the faults may repeat themselves several times. The mountain ranges in the section are short and rise precipitously to heights of 900 to 1500 m. The ranges run almost exclusively north-south. The mountain ranges are typically asymmetrical, with the scarp slope being fairly straight or sinuous. The mountains are bounded by smooth piedmont slopes that extend into basins.

There is very little rainfall, but what does fall is generally very heavy and sporadic. Due to the nature of the rains and the sparse vegetal cover, sheetflooding and streamflooding move great quantities of rock debris downslope (Thornbury 1965).

4.2 Soils

The soils in the Hurricane Mesa site are shallow, and very easily profiled and recognized. The soils are derived from the type of bedrock on which they are lying. In the northern portion of the site are found nearly barren, multicolored beds of actively eroding shale, shale interbedded with sandstone and shale interbedded with layers of gypsum. The landscape here is rolling and severely dissected. On the very steep slopes of these areas, the rock is generally capped with sandstone and conglomerate.

In the southern half of the site, where soils are present, the layers are thin and distinct. The surface layer is reddish-brown clayey silty sand to a depth of 10 cm. The subsoil is yellowish-red clayey silty sand to a depth of 30 cm. Under this soil is shale bedrock. The last soil type that occurs here is separate because it lies on limestone bedrock. The surface layer is composed of brown or reddish-brown, very cobbly or fine sandy silty clay to a depth of 25 cm. The subsoil is a mixture of reddish-brown sandy silty clay and brown or pinkish very cobbly sandy silty clay. At depths of around 40 to 50 cm, limestone bedrock is encountered. In the majority of areas the hazard of soil erosion is severe due to lack of vegetation and the potential for heavy rainfall (Mortensen and others 1977).

4.3 Hydrology

4.3.1 Ground Water

Depth to bedrock is a major factor contributing to any ground-water movement within the site. Bedrock at the surface in the northern part of the site restricts any downward movement of water. The shallow soil in the southern part also is underlain by bedrock at a depth of less than 1 m. The water does not move downward below bedrock and therefore, all drainage in the area is on the surface. The water table is greater than 20 m below land surface.

4.3.2 Surface Water

Runoff from the site flows into the Virgin River drainageway. The drainage area of the Virgin River at Virgin is 934 square miles. The Virgin River at Virgin has a maximum flow of 22,800 cfs, and a minimum flow of 844 cfs based on the period of record 19101988. The base flow is 1,600 cfs. A maximum stage of 18.0 feet was recorded on 12/06/66, and a minimum stage of 6.46 feet was recorded on 05/03/45.

4.4 Weather

Based on the Washington County area data, summers are characterized by hot, relatively dry weather. The average maximum temperature in July ranges from slightly more than 100 degrees in the lower Virgin River Valley to the upper eighties at elevation of about 5,000 feet. Maximum temperatures above 100 degrees are rarely recorded above 5,000 ft. Winters are normally short and relativ Temperatures of less than 1 0 degrees occur only about one year out of every three. Subzero readings are rare. Snowfalls range from about 40 inches a year at New Harmony to less than five inches in the lower valleys.

The annual total precipitation ranges from about 20 inches a year in the higher mountains to about six inches at the lowest levels. The limited rainfall occurs in two distinct seasons. The first rainfall occurs during winter and early spring when storms from the Pacific Ocean move across the intermountain area. A secondary precipitation maximum occurs in summer during July and August when occasional thunderstorms develop because of the moist air moving northward across the region from the Gulf of Mexico.

Winds are generally quite light except in the mouths of the larger canyons. The strongest winds are associated with active thunderstorms in summer or occasionally with strong canyon winds near the mouth of the larger canyons.

4.5 Ecology

The information on the endangered and threatened species for this site has been provided by the U.S. Fish and Wildlife Service and the Utah Department of Natural Resources Division of Wildlife Resources.

The U.S. Fish and Wildlife Service has indicated that the following Federally endangered, threatened, or candidate species may occur in Washington county: desert tortoise (Gopherus agassizi), threatened; Arizona southwestern toad (Bufo microscaphus microscaphus). candidate; lowland leopard frog (Rana yavapaiensis), candidate; banded gila monster (Heloderma suspectum cinctum), candidate; peregrine falcon (Falco peregrinus), endangered; southwestern willow flycatcher (Emipidonax traillii extimus), proposed endangered; Mexican spotted owl (Strix occidentalis Lucida), threatened; black tern (Chlidonias niger), candidate; ferruginous hawk (Buteo regalis), candidate; loggerhead shrike (Lanius ludovicianus), candidate; long billed curlew (Numenius americanus), candidate; mountain plover (Charadrius montanus) candidate; northern goshawk (Accipiter gentilis), candidate; western least bittern (Ixobrychus exilis hesperis), candidate; western snowy plover (Charadrius alexandrinus nivosus), candidate; white-faced ibis (Plegadis chihi), candidate; Virgin River chub (Gila Seminuda), endangered; woundfin (Plagopterus argentissimus), endangered; Virgin spinedace (Lepidomeda mollispinis mollispinis), proposed threatened; flannelmouth sucker (Catostomus latipinnis), candidate; Bonneville cutthroat trout, (Oncorhynchus clarki utah), candidate; MacNeill sooty wing skipper (Hesperopsis gracielae), candidate; spotted Warner Valley Dunes June beetle, (Polyphylla avittata); candidate; Utah chaetarthrian water scavenger beetle (Caetarthria utahensis); candidate; Utah prairie dog (Cynomys parvidens), threatened; Merriam's kangroo rat (Dipodomys merriami frenatus), candidate; pygmy rabbit (Brachylagus idahoensis), candidate; spotted bat (Euderma maculatum), candidate; Virgin River montane vole (Microtus montanus rivularis), candidate; dwarf bear poppy (Arctomecon humilis), endangered; Siler cactus (Pediocactus sileri), threatened; Canaan daisy (Erigeron canaanii), candidate; Cedar Breaks goldenbush (Haplopappus zionis), candidate; chuckwalla (Sauromalus obesus), candidate; gumbo milk-vetch (Astragalus ampullarius), candidate; Holmgren milk-vetch (Astragalus holmgreniorum), candidate; Nevada

willowherb (Epilobium. nevadense), candidate; no common name [Asplenium andrewsii (=A. adiantum-nigrum)], candidate; Pine Valley goldenbush (Haplopappus crispus), candidate; pink egg milk-vetch (Astragalus oophorus var. lonchocalyx), candidate; pinyon penstemon (Penstemon pinorum), candidate; sand-loving beardtounge (Penstemon ammophilum), candidate; Shem milk-vetch (Astragalus eremiticus var. ampullarioides), candidate; Utah spike-moss (Selaginella utahensis), candidate; Virgin River thistle (Cirsium virginensis) candidate; and Zion tansy (Sphaeromeria ruthiae) candidate.

The State of Utah Department of Natural Resources has listed the following State endangered, threatened, or sensitive species which may occur in Washington county: banded gila monster, desert iguana (Dipsosaurus dorsalis), Mojave Desert sidewinder (Crotalus cerastes), Mojave rattlesnake (Crotalus scutulatus), Mojave (western) patchnose snake (Salvadora hexalepis), Mojave zebratail lizard (Callisaurus draconoides), sonoran (western) lyre snake (Trimorphodon biscutatus), Utah mountain kingsnake (Lampropeltis pyromelana), American white pelican (Pelecanus erythrorhynchos), Barrow's goldeneye (Bucephala islandica), Bendire's thrasher (Taxostoma bendirei), brant (Branta bernicla), common barn-owl (tyto alba), common moorhen (Gallinula chloropus), Eurasian wigeon (Anas Penelope), gray vireo (Vireo Vicinior), ladder backed woodpecker (picoides scalaris), long billed curlew, mountain plover, peregrine falcon, oldsquaw (Clangula hyamalis), osprey (Pandion haliaetus), phainopepla (Phainopepla nitens), red-shouldered hawk (Buteo lineatus) Ross' goose (Chen rossii), summer tanger (Piranga rubra), varied thrush (Ixoreus naevius), western chuckwalla (Sauromalus obesus), western snowy plover, winter wren (Troglodytes troglodytes), wood duck (Aix sponsa), yellow-billed cuckoo (Coccyzus americanus), Allen's big-eared bat (idionycteris phyllotis), big free-tailed bat (Tadarida macrotis), cactus mouse (Peromyscus eremicus), desert kangaroo rat (Dipodomys deserti), desert shrew (Notiosorex crawfordi), Merriams kangaroo rat (Dipodomys merriami), red bat (Lasiurus borealis), spotted bat (Euderma maculatum), Utah prairie dog (Cynomys parvidens).

No additional information on the occurrence of 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. An on site inspection by appropriate state and federal personnel may be necessary to verify the presence, absence, or location of listed species, or natural communities if remedial action is recommended as part of the final ASR.

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5.0 Real Estate

The 3,500.78-acre site was acquired by the U.S. Air Force in 1955 for construction of a rocket sled test track to test aircraft escape systems. The property was acquired in three parts: 2,851.68 acres transferred from the BLM on 15 April 1955, 647.51 acres were leased, and 1.59 acres were licensed for water pipelines from Washington County and the State of Utah. Of the leased area, 643.83 acres were leased from the State of Utah, and 3.68 acres were leased from private owners.

In addition to the test track facility, other improvements made to the site included an oil surface roadway, underground communication network, water pipelines, three explosive storage facilities, quonset hut, offices, living quarters, and a steel water tower. The site was subsequently used for 40mm grenade and 60mm mortar testing by Harry Diamond Laboratories for the U.S. Army between 1966 and 1976.

The site was disposed of in two parts: 2,851.68 acres were relinquished to the BLM on 2 October 1961 by Public Land Order (PLO) 1125, the leases totaling 647.51 acres and the licenses totaling 1.59 acres were terminated on 30 June 1963. By PLO 3122, the property was transferred to the BLM on 3 July 1963.

Approximately 680 acres of the site are now owned by the BLM and the rest is owned by the State of Utah. The test track is currently leased by Universal Propulsion, Inc.

6.0 OEW/CWM Site Activities

6.1 Historical Summary of OEW/CWM Activities

6. 1.1 General

Construction began on the Supersonic Military Air Research Track (SMART) in June 1954 under the U.S. Air Force Systems Command. The 12,000-foot-long test track was built by Coleman Engineering Company, Inc. as a rocket test sled for aircraft escape systems. Coleman Engineering Company, Inc. supervised 334 tests and several countries, including England and Canada, conducted tests (Alexander 1966). In December 1961, the base was closed and held by Edwards AFB, California on a stand-by basis (Alexander 1966).

The site was leased to Stanley Aviation (a Defense Contractor) of Denver, Colorado on June 30, 1963 to continue testing. On May 21, 1965, Saco[, Inc. leased the Hurricane Supersonic Test Track (HSTT) from Stanley Aviation for testing of its products (Sacramento District ACOE 1991). On November 12, 1980, Sacol, Inc. sold the Hurricane Mesa Test Track facility to Stencil Aero Engineering Corporation.

6.2 CWM Activities

We found no evidence of chemical munitions ever having been used on the site (Alexander 1966).

6.3 OEW Activities

In 1958, Coleman Engineering Company, Inc. was conducting tests other than those involving rocket ejection seats, and the name of the site was changed to Hurricane Supersonic Research Site (HSRS). Long distance rocket experiments were conducted at balloon targets 75 miles away along with other secret projects (Alexander 1966). On April 27, 1967, a budget proposal was submitted by Sacol, Inc. to Naval Ordnance Laboratories to perform ten low drag inert bomb runs off the end of the mesa using the Hurricane Mesa Test Track facility (Ryan 1967). It is unknown if the tests were conducted. The Denver Research Institute (DRI) contracted the use of the Hurricane Mesa Test Track Facility for five or six days beginning on November 3, 1969 to launch inert and live disc flares (Ford 1969). It is unknown if the tests were conducted. From 1966 to 1976 the site was used for 40mm grenade and 60mm mortar tests by Harry Diamond Laboratories for the Army and numerous M414A1 fuzes were fired on 5-inch Zuni rockets. The rockets were fired from the mesa to a target area 1,300 feet below (Pride

1967-68).

6.4 References Cited

Alexander, Thomas G.
1966 The Vicissitudes of "Hurricane Sam': The Supersonic Military Air Research Site at Hurricane Mesa, 1954-61 *Utah Historical Quarterly* V. 34, No. 2, Spring 1966.

Ford, M. E.
1969 Use of the Hurricane Mesa Facilities by Denver Research Institute under Purchase Order 13198. October 20, 1969. Earth Technology Corporation, Lo Beach, California.

House, Dawn
1991 Campers Who Put Grenade in Fire Can't Blame Injuries on U.S. *The Salt Lake Tribune*, May 30, 1991.

Pride, Clarence L.
1967 - 68 Six Field Test Reports. Army Research Laboratory, Adelphi, Maryland

Ryan, J.L.
1967 Testing at Hurricane Mesa Test Track. April 27, 1967. Earth Technology Corporation, Long Beach, California.

Sacramento District ACOE
1991 Site Survey Summary Sheet. Field inspection completed February 27, 1991. Army Corps of Engineers, Sacramento, California.

Talley Industries
1991 Brochure for public distribution by Talley Industries and Universal Propulsion Company, Inc.

6.5 Records Reviewed

United States Air Force
Historical Research Agency
Maxwell Air Force Base
Montgomery, AL

K237.163-26 Wurtsmith AFB 1951-58 Aircraft Escape Capsules.
K237.163-33 Wurtsmith AFB 1960-67 Aircraft Escape Capsules.

National Personnel Records Center
Military Records
St. Louis, MO

338-78-0331
Boxes 1-3/3 Harry Diamond Labs manuals and technical reports; no information found.
338-78-0434
Box 1/5 Harry Diamond Labs various field test reports still classified, one declassified on Hurricane Mesa.
Box 2/5 Harry Diamond labs purchase contracts; no information found.
Box 3/5 Harry Diamond Labs - Lacrosse missile; no information found.
Box 4/5 Harry Diamond Labs purchase contracts; no information found.

Federal Records Center
Denver, CO

Federal Property Resources Service
291-68A-0192
Box 3 Corps of Engineers records on Utah sites.
291-82-0019
Box 3/14 Various Utah and North Dakota sites; no information found.

National Archives
Washington, D. C.

Record Group 153 (Judge Advocate General)
JAG Reservation File 1800-1950
Box 507 Utah to Vermont, no information found.

Washington National Records Center
Suitland, MD

338-75-0076
Boxes 1-7 Harry Diamond Labs Technical Reports 1974; no information found.
338-76-0551
Boxes 1-5 Harry Diamond Labs Technical Reports 1974-75; no information found.
338-69A-5821
Box 1/2 Harry Diamond Labs Technical Reports; Hurricane Mesa information.
Box 2/2 Harry Diamond Labs Technical Reports; no information found.
338-73A-1434
Box 1/4 Harry Diamond Labs Technical Reports; no information found.
Box 2/4 Harry Diamond Labs Technical Reports; no information found.
Box 3/4 Harry Diamond Labs Technical Reports; no information found.
Box 4/4 Harry Diamond Labs Technical Reports; no information found.
338-75A-0077
Box 1 Harry Diamond Labs Technical Reports; no information found.
338-75B-0077
Box 11 Harry Diamond Labs Technical Reports; no information found.
Box 12 Harry Diamond Labs Technical Reports; no information found.
Box 13 Harry Diamond Labs Technical Reports; no information found.
Box 14 Harry Diamond Labs Technical Reports; no information found.
Box 15 Harry Diamond Labs Technical Reports; no information found.
338-75D-0077
Box 19 Harry Diamond Labs Technical Reports; no information found.
Box 20 Harry Diamond Labs Technical Reports; no information found.
Box 21 Harry Diamond Labs Technical Reports; no information found.
Box 22 Harry Diamond Labs Technical Reports; no information found.
Box 23 Harry Diamond Labs Technical Reports; no information found.
Box 24 Harry Diamond Labs Technical Reports; no information found.
Box 25 Harry Diamond Labs Technical Reports; no information found.
Box 26 Harry Diamond Labs Technical Reports; no information found.
Box 27 Harry Diamond Labs Technical Reports; no information found.

Washington National Records Center
Suitland, MD

338-69A-5821
Box 2/2 Harry Diamond Labs Technical Reports; no information found.
338-73A-1 434
Box 1-4/4 Harry Diamond Labs Technical Reports; no information found.
338-75-0076
Boxes 1-7/7 Harry Diamond Labs Technical reports; no information found.
338-75-0077
Box 20 Harry Diamond Labs Technical Reports; no information found.
Box 21 Harry Diamond Labs Technical Reports; no information found.
Box 22 Harry Diamond Labs Technical Reports; no information found.
Box 23 Contractor Reports to Harry Diamond Labs from the 1950's; no information found.
Box 24 Harry Diamond Labs Technical Reports; no information found.
Box 27 Harry Diamond Labs Technical Reports and Correspondence from the 1950's; no information found.
338-76-0551
Box 1-5/5 Harry Diamond Labs Technical Reports; no information found.

Utah State Archives
Salt Lake City, UT

Utah Historical Quarterly
Volume 34, Number 2 Spring 1966: The Vicissitudes of 'HURRICANE SAM': The Supersonic Military Air Research Site at Hurricane Mesa, 1954-610, by Thomas G. Alexander.

Microfilm
Governor George Clyde
#662 1959 Armed Forces to Interstate Oil Compact; no information found.
#663 1958-59 Public Welfare to Armed Forces; no information found.
#697 Federal Government Correspondence 1962-63; State offered to buy BLM portion of Hurricane Mesa.
#700-A Federal Government Correspondence 1962; no information found.
#736 Correspondence to State Agencies 1962; no information found.
#737 Correspondence to State Agencies 1962; no information found.
Governor Bracken Lee
#597 Material for speeches, Foreign Policy to Military 1949-56; Hurricane Mesa lease information without specifics.
#598 Material for speeches, military to state civil services; no informati found.
#3047 Administrative correspondence to military; no information found.

6.6 Summary of Interviews

6.6.1 SFC Durred Francher, 62nd EOD, Fort Douglas, UT

We contacted the 62nd EOD to see if they have incident reports for Hurricane Mesa. SFC Francher reviewed their files and could find nothing related to Hurricane Mesa. He only keeps records for 3 years, so anything prior to 1991 would have been destroyed.

6.6.2 Sheriff Glenwood Humphries, Washington County, UT

We contacted Sheriff Humphries to see if he was aware of any incidents at Hurricane Mesa since the campfire incident in 1986. He said he helped investigate the incident and that the Sheriff's Department and the National Guard searched the area and found several more grenades. He said the National Guard had walked "shoulder to shoulder'.

We told Sheriff Humphries that we needed to inspect the area. He said he would be willing to show us the campfire area and the detonation area, but felt we would not find any other grenades since the area had been searched so thoroughly.

6.6.3 Mr. Ron Chase, Director, and Mr. Ron Spendlove, Employee, Universal Propulsion Co., Test Track Lessee

The interview was conducted during the site visit to Hurricane Mesa. Universal Propulsion Co. is the tenant occupying and operating the test track site owned by the State of Utah. Mr. Chase is the test track director. Mr. Spendlove is a long time employee at the test track and was on the site when Harry Diamond Laboratories conducted test firings from the mesa to the land below.

Mr. Chase gave us a general description of activities conducted at the site and a chronology of previous tenants. We told Mr. Chase we had no particular area of concern on the mesa but we know that Harry Diamond Laboratories had used the mesa for tests. We got a general tour of the facilities and specifically the area where Harry Diamond Laboratories performed its tests. The test area consists of a concrete pad where a rocket launcher was mounted. No evidence of specific facilities for 40mm grenade or 60mm mortar test firings was found. Mr. Chase indicated that the Harry Diamond Laboratories test firings were from the mesa to the land below. After our inspection of the southern rim of the mesa, we returned to the office to inform Mr. Chase of the rocket found in the

crevice. We also asked about the debris that had been thrown off the mesa (See Trip Report Section).

Mr. Spendlove joined the conversation and indicated he was an employee at the test track when Harry Diamond Laboratories was conducting tests. He verified that the mesa was never used as an impact area. He said that the large flattened area below the mesa was the impact area. He also verified that unexploded 40mm grenades had been taken to the land below the mesa for disposal. Mr. Spendlove thinks the rocket found in the crevice was a LOKI rocket that was tried as a propellant for the rocket sled. He says they quit using the rocket for that purpose because it was unsafe. He also indicated the debris dumped over the edge of the mesa consisted of spent propellant casings for 40mm grenades and packaging for rockets tested by Harry Diamond Laboratories. He says he once rappelled down to the debris and found no evidence of unexploded ordnance.

6.7 Site Inspection

6.7.1 General

The Hurricane Mesa site inspection was conducted in conjunction with site visits to the Buckley Bombing Range and the Lowry Training Annex near Denver, Colorado during the week of 14 November 1994 by the following:

St. Louis District Personnel:

Ted Moore	Project Manager
Pat O'Donnell	Historian and Safety Officer
Jim Luebbert	Historian

Other Participants:

Craig Zufelt	Bureau of Land Management (Part time)
Scott Hirschi	Utah Land Specialist (Part time)
Glen Humphries	Washington, County Sheriff (Part time)

6.7.2 Detailed Site Inspection

Monday, 14 November 1994

1515 We met with Sheriff Humphries and Mr. Zufelt at the site to familiarize ourselves with the campfire area and the area where the 40mm grenades were exploded. Sheriff Humphries informed us the area was thoroughly inspected by the National Guard and the Sheriff's Department after the campfire incident and that we probably wouldn't find any more grenades. After the sheriff and Mr. Zufelt left the site, we found an unexploded grenade approximately 30' from the campfire site. We marked the grenade for future reference.

Tuesday, 15 November 1994

0730 We met Scott Hirschi at the site and proceeded to the top of the mesa to inspect the area around the test track. The activities associated with the test track were not suspected of causing ordnance contamination, but we had written evidence that 40mm grenades, 60mm mortars, and 2.75" rockets were fired from the mesa. We found a partially buried rocket in a crevice near the point where the above ordnance items were fired. No other evidence of ordnance was found. While we were at the grenade/mortar/rocket test firing area we noticed a lot of debris had been discarded over the edge of the mesa. We were told it was all trash and inert ordnance debris. The lessee of the property said he was going to hook a chain to the rocket and pull it out with a backhoe. We advised him against doing that but we don't know if he retrieved the rocket after we left.

We proceeded to the land below the mesa to inspect a portion of the State of Utah property while Mr. Hirschi was still with us. The area inspected was a triangular shaped parcel at the east end of the site. No evidence of ordnance was found.

After lunch, we began our inspection of the BLM property below the mesa. We

began at the east end and worked to the west. Approximately half way across BLM property, we found remnants of a rocket. In the general vicinity of the rocket, we found three unexploded 40mm grenades. We then walked further west intending to inspect the impact area used for test firing from the mesa. Before we got to the impact area, we found four more unexploded 40mm grenades in an area littered with beer bottles and cans and other trash. We marked all seven grenades for future reference and recorded coordinates from the global positioning system (GPS). Our inspection of the impact area revealed shrapnel from 2.75" rockets, 60mm mortars, and 40mm grenades, but no unexploded ordnance was found. We decided to try to reach the debris area but the terrain in the immediate area was too rough and we were not able to make it all the way to inspect the area.

Wednesday, 16 November 1994

0830 Departed Las Vegas for Denver, CO to conduct Buckley Bombing Range and Lowry Training Annex site visits.

After arriving in Denver, Ted Moore called Sheriff Humphries (St. George, UT) to let him know we found eight 40mm grenades. Sheriff Humphries had agreed earlier to take responsibility for disposal of the grenades. (A follow-up phone call made on 23 November 1994 to the sheriffs office verified that all eight 40mm grenades referenced above were removed from the area and placed in a secured ordnance storage area controlled by Washington County).

6.8 Interpretation of Aerial Photography

Photo analysis and land-use interpretation were performed using the following photographic sources:

Photography Date	Approximate Scale	Source	Frame ID #s
18 Jul 1939	1"=1,667'	NATIONAL ARCHIVERS	07 thru 09 208 thru 211
05 Oct 1952	1"=1,667'	ASCS	164 thru 167 197 thru 201
27 Jun 1960	1"=1,667'	ASCS	22 thru 26 161 thru 165
13 Sep 1967	1"=1,667'	ASCS	215 thru 219 263 thru 267
05 Nov 1980	1"=2,458'	EROS	49 thru 50

Aerial photography for this site was referenced using the VIRGIN, UTAH USGS 7.5' topographic quadrangle.

The 1939 and 1952 photography indicates that the test site was not built at this time. The actual site area does not reveal any contamination of OEW material.

By 1960 the Hurricane Mesa Test Track was built. There is a major road leading up to the test site. The test track has several roads connecting to it. There are also several buildings associated with the test track. A site that lies southwest of the track shows a few areas of possible bombing, but due to the fact that this area is in an add to semi-arid region no true conclusion can be confirmed.

The 1967 photos indicate several new buildings in the area at the end of the test track on the south side. There is a new track addition to the northeast of the original test track. A few more roads have been added to the area, along with some buildings. The area southwest of the track reveals some small craters (more than the previous photos) in the area. No other sites of OEW use were detected.

The 1980 photos indicate there was much activity in the area, however, it is dificult to determine what took place on the site. There are some small depressions in the area where bombing appears to have taken place.

6.9 Map Analysis

The VIRGIN, UTAH 7.5'USGS topographic quadrangle was used in the analysis of the site. The approximate geographic coordinates for the center of the area are as follows:

37°12'30"N
113°12'30"W

The quadrangle contains both topographic and planimetric features. The topographic features reveal rugged terrain over the entire quad. Vegetation is sparse throughout the area. The Virgin River flows in a west to east direction. There are many intermittent drains in the area that flow into the river. The site itself lies in a semirugged to rugged terrain with very little vegetation.

The planimetric features are not numerous in the area. One major hard surface road runs across the sheet. This road also runs in the site area. Part of the Hurricane Mesa Test Track is also included in the site area. Other planimetric features include small buildings and loose surface roads.

No other areas of chemical or explosive waste were found during the photo analysis.

7.0 Evaluation of Ordnance Contamination

This site should be considered as two areas, the mesa and the land below the mesa.

Historical data, interviews, and our site inspection give little reason to believe the mesa was used as an impact area or that ordnance contamination is present. The rocket found in the crevice appears to be an isolated incident. Our inspection clearly showed the pad where munitions were either launched or fired. There is evidence of the 2.75" rocket packaging near the pad. We walked the southern rim of the mesa and found no other evidence of ordnance or ordnance testing.

The land below the mesa is another matter. See Map 2 for the locations of the various areas of concern and the photographs of ordnance found during our inspection.

Detonation Area
This area is a miniature box canyon where the unexploded grenades were wrapped with C4 explosive for destruction. There is shrapnel on the ground in all directions from the detonation point.

Area 1

Area 1 is on State of Utah property and is the location of the campfire incident and also contains a grenade found during our inspection. The grenade was found approximately 30' from the campfire site. This area is along a dirt road easily accessible to the public.

Area 2

Area 2 is on BLM property and is the location of a rocket and three grenades found during our inspection. This area is at a lower level than Area 1 and there is evidence of motorcycle and all terrain vehicle tracks throughout the BLM property.

Area 3

Area 3 is on State of Utah property and is the location of four grenades found during our inspection. This area is a level above Area 2 and is near the munitions testing impact area. There are beverage cans and bottles scattered over the area and there is evidence of a trail through the area.

Impact Area

There is evidence of shrapnel over this entire area. Some of the shrapnel is obviously part of 40mm grenades and 2.75" rockets. There are larger metal fragments that are more difficult to identify. There is no evidence of public use of this area. We found no evidence of unexploded ordnance in this area.

Portions of this impact area are outside the original boundaries of Hurricane Mesa. These areas are owned by BLM.

Debris Area

From the rim of the mesa, we were able to see what looked like packing tubes and wood crating scattered over an area several hundred feet below the rim. The area looked like it might be accessible, so we tried to reach it after we inspected the impact area. We got close to the debris area, but the terrain became too rugged and steep. We were not able to reach the area and it is unlikely that anyone else has without great difficulty. Mr. Spendlove said the only way he could get there was by rappelling over the rim of the mesa.

We marked all of the grenades for future reference. Sheriff Humphries was contacted later and given coordinates and instructions on how to find the grenades. GPS coordinates were recorded for Areas 2 and 3. Area 2: N37°12'52" W113°13'21". Area 3: N37°13'02" W113°13'43". No coordinates were recorded for Area 1.

A follow-up phone call made on 23 November 1994 to the sheriff's office verified that all eight 40mm grenades referenced above were removed from the area and placed in a secured ordnance storage area controlled by Washington County.


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10 Feb 93

RISK ASSESSMENT PROCEDURE FOR
ORDNANCE AND EXPLOSIVE WASTE (OEW) SITE

Site Name Hurricane Mesa Rater's Name Ted Moore
Site Location Virgin, UT Phone No. (314) 331-8849
DERP Project # J08UT002601 Organization CELMS PM-M
Date Completed January 18, 1995 RAC Score 1

OEW RISK ASSESSMENT:

This risk assessment procedure was developed in accordance with MIL-STD 882B and AR 385-10. The RAC score will be used by CEHND to prioritize the remedial action at this site. The OEW risk assessment should be based upon best available information resulting from records searches, reports of Explosive Ordnance Disposal (EOD) detachment actions, and field observations, interviews, and measurements. This information is used to assess the risk involved based upon the potential OEW hazards identified at the site. The risk assessment is composed of two factors, **hazard severity and hazard probability.**
Personnel involved in visits to potential OEW sites should view the CEHND videotape entitled "A Life Threatening Encounter, OEW."
Part I. Hazard Severity. Hazard severity categories are defined to provide a qualitative measure of the worst credible mishap resulting from personnel exposure to various types and quantities of unexploded ordnance items.

TYPE OF ORDNANCE
(Circle all values that apply)

A. Conventional Ordnance and Ammunition	VALUE
Medium/Large Caliber (20 mm and larger)	10
Bombs, Explosive	10
Grenades, Hand and Rifle, Explosive	***10***
Landmines, Explosive	10
Rockets, Guided Missiles, Explosive	10
Detonators, Blasting Caps, Fuzes, Boosters, Bursters	6
Bombs, Practice (w/spotting charges)	6
Grenades, Practice (w/spotting charges)	4
Landmines, Practice (w/spotting charges)	4
Small Arms (.22 cal - .50 cal)	1
Conventional Ordnance and Ammunition (Select the largest single value)	10

What evidence do you have regarding conventional OEW? 40mm grenades, 60mm mortars, and 2.75" rockets were tested at the site. We found eight unexploded 40mm grenades during our site inspection.

B. Pyrotechnics. (For munitions not described above)

	VALUE
Munition (Container) Containing White Phosphorous or other Pyrophoric Material (i.e., Spontaneously Flammable)	10
Munition Containing a Flame or Incendiary Material (i.e. Napalm, Triethlaluminum Metal	6

Incendiaries)	
Flares, Signals, Simulators, Screening Smoke (other than WP)	4
Pyrotechnics (Select the largest single value)	0

What evidence do you have regarding pyrotechnics? None.

C. Bulk High Explosives (Not an integral part of convention ordnance; uncontainerized.)

	VALUE
Primary or Initiating Explosive (Lead Styphnate, Lead Azide, Nitroglycerin, Mercury Azide, Mercury Fulminate, Tetracene, etc.)	10
Demolition Charges	10
Secondary Explosives (PETN, Composition A, B, C, Tetryl, TNT, RDX, HMX, HBX, Black Powder, etc).	8
Military Dynamite	6
Less Sensitive Explosives (Ammonium Nitrate, Explosive D, etc).	3
High Explosives (Select the largest single value)	0

What evidence do you have regarding bulk explosives? None.

D. Bulk Propellants (Not an integral part of rockets, guided missiles, or other conventional ordnance; uncontainerized)

Solid or Liquid Propellants	6
Propellants	0

What evidence do you have regarding propellants? None.

E. Chemical Warfare Material and Radiological Weapons

	VALUE
Toxic Chemical Agents (Choking, Nerve, Blood, Blister)	25 X
War Gas Identification Sets	20
Radiological	15
Riot Control and Miscellaneous (Vomiting, Tear)	5
Chemical and Radiological (Select the Largest Single Value)	0

What evidence do you have of chemical/radiological OEW? None.

==========

TOTAL HAZARD SEVERITY VALUE 10

(Sum of Largest Values for A through E--Maximum of 61).

Apply this value to Table 1 to determine Hazard Severity Category.

TABLE 1

HAZARD SEVERITY*

Description	Category	Hazard SeverityValue
CATASTROPHIC	I	21 and greater
CRITICAL	*II*	10 to 20
MARGINAL	III	5 to 9
NEGLIGIBLE	IV	1 to 4
**NONE		0

*** Apply Hazard Severity Category to Table 3.**

** If Hazard Severity Value is 0, you do not need to complete Part II. Proceed to Part III and use a RAC score of 5 to determine your appropriate action.

Part II. Hazard Probability. The probability that a hazard has been or will be created due to the presence and other related factors of unexploded ordnance or explosive materials on a formerly used DOD site.

AREA, EXTENT, ACCESSIBILITY OF CONTAMINATION
(Circle all values that apply)

A. Locations of OEW Hazards

	VALUE
On the surface	*5*
Within Tanks, Pipes, Vessels or Other confined locations	4
Inside walls, ceilings, or other parts of Buildings or Structures	3
Subsurface	2
Location (Select the single largest value)	5

What evidence do you have regarding location of OEW? We found eight 40mm grenades on the ground surface during our site inspection.

B. Distance to nearest inhabited locations or structures likely to be at risk from OEW hazard (roads, parks, playgrounds, and buildings).

	VALUE
Less than 1250 feet	5
1250 feet to 0.5 miles	4
0.5 miles to 1.0 miles	*3*
1.0 miles to 2.0 miles	2
Over 2 miles	1
Distance (Select the single largest value)	3

What are the nearest inhabited structures? Residences

C. Number of buildings within a 2 mile radius measured from the OEW hazard area, not the installation boundary.

	VALUE
26 and over	5
16 to 25	4
11 to 15	3
6 to 10	2
1 to 5	1
0	0

Number of Buildings (Select the single largest value) 5

Narrative _____

D. Types of Buildings (within a 2 mile radius)

	VALUE
Educational, Child Care, Residential, Hospitals, Hotels, Commercial, Shopping Centers	5
Industrial, Warehouse, etc.	4
Agricultural, Forestry, etc.	3
Detention, Correctional	2
No Buildings	0

Types of Buildings (Select the largest single value) 5

Describe types of buildings in the area. The town of Virgin is within two miles of the grenades. The test track facilities are within two miles of the grenades.

E. Accessibility to site refers to access by humans to ordnance and explosive wastes. Use the following guidance:

BARRIER	VALUE
No barrier or security system	5
Barrier is incomplete (e.g., in disrepair or does not completely surround the site). Barrier is intended to deny egress from the site, as for a barbed wire fence for grazing.	4
A barrier, (of any kind of fence in good repair) but no separate means to control entry. Barrier is intended to deny access to the site.	3
Security guard, but no barrier	2
Isolated Site	1
a 24-hour surveillance system (e.g., television monitoring or surveillance by guards or facility personnel) which continuously monitors and controls entry onto the facility, or An artificial or natural barrier (e.g., a fence combined with a cliff), which completely surrounds the facility; and a means to control entry, at all times, through the gates or other entrances to the facility (e.g., an attendant, television monitor, locked entrance, or controlled roadway access to the facility).	0

Accessibility (Select the single largest value) 5

Describe the site accessibility. The grenades are on public land

readily accessible from Highway 9 and the local streets in Virgin.

F. Site Dynamics - This deals with site conditions that are subject to change in the future, but may be stable at the present. Example would be excessive soil erosion by beaches or streams, increasing land development that could reduce distance from the site to inhabited areas or otherwise increase accessibility.

	VALUE
Expected	5
None Anticipated	0
Site Dynamics (Select largest value)	5

Describe the site dynamics. The soil is easily erodible and rain may expose more grenades. Highway 9 is the route to Zion National Park. The area is already heavily used by the public even though Virgin is a very small community.

==========

Total Hazard Probability Value (Sum of Largest Values for A through F--Maximum of 30) 28

Apply this value to Hazard Probability Table 2 to determine Hazard Probability Level.

TABLE 2
HAZARD PROBABILITY*

Description	Level	Ha Pr Va
FREQUENT	A	27 gre
PROBABLE	B	21
OCCASIONAL	C	15
REMOTE	D	8 t
IMPROBABLE	E	les

***Apply Hazard Probability Level to Table 3.**

Part III. Risk Assessment. The risk assessment value for this site is determined using the following Table 3. Enter with the results of the hazard probability and hazard severity values.

TABLE 3

Probability Level	FREQUENT A	PROBABLE B	OCCASIONAL C	REMOTE D	IMPROBABLE E
Severity Category:		X			

CATASTROPHIC	I	1	1	2	3	4
CRITICAL	II	*1*	2	3	4	5
MARGINAL	III	2	3	4	4	5
NEGLIGIBLE	IV	3	4	4	5	5

RISK ASSESSMENT CODE (RAC)

RAC 1 Expedite INPR, recommending further action by CEHND - Immediately call CEHND-ED-SY--commercial 205-955-4968 or DSN 645-4968.

RAC 2 High priority on completion of INPR - Recommend further action by CEHND.

RAC 3 Complete INPR - Recommend futher action by CEHND.

RAC 4 Usually indicates that no further action (NOFA) is necessary. Submit NOFA and RAC to CEHND.

Part IV. Narrative. Summarize the documented evidence that support this risk assessment. If no documented evidence was available, explain all the assumptions that you made. We know from historical documents and interviews that 40mm grenades, 60mm mortars, and 2.75" rockets were tested at this site. Six campers were injured when they threw a 40mm grenade into their campfire. Seven more grenades were found during subsequent investigation of the site right after the campfire incident. During our site inspection, we found eight more grenades. There are all terrain vehicle tracks throught the area where we found three grenades. We found one grenade near the location of the campfire incident. There were numerous beverage containers and a road in the area where we found the other four grenades.

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Yellow Jacket Target Area

Your search matched **10** of **4064** documents.
10 are presented, ranked by relevance.

Rank Score Title/Information

1 1.00 **YELLOW JACKET TARGET AREA ASR Findings: Sections 1-5** *YELLOW JACKET TARGET AREA ASR Findings: Sections 1-5 . ORDNANCE AND EXPLOSIVE WASTE .CHEMICAL SURETY MATERIALS .ARCHIVE SEARCH REPORT .FINDINGS .FOR .YELLOW JACKET RANGES .TOOELE COUNTY, UT . .DERP-FUDS SITE NO. J09UT109800 . .1.0 Introduct...*

2 0.98 **YELLOW JACKET TARGET AREA ASR Findings: Appendix C2.1** *YELLOW JACKET TARGET AREA ASR Findings: Appendix C2.1 . APPENDIX C2.1 .DUGWAY PROVING GROUND .ATTACK AGAINST CAVE-TYPE FORTIFICATIONS .1945 . . DEFENSE ENVIRONMENTAL RESTORATION PROGRAM .FORMERLY USED DEFENSE SITES . .INVENTORY PROJECT REPO...*

3 0.98 **YELLOW JACKET TARGET AREA ASR Findings: Sections 5-9** *YELLOW JACKET TARGET AREA ASR Findings: Sections 5-9 . 5.0 Real Estate .5.1 DOD Ownership .The DOD does not appear to have formerly had a completely clear title (owned or leased) on the Yellow Jacket Ranges. According to information gathere...*

4 0.93 **YELLOW JACKET TARGET AREA ASR Findings: Appendix C4.2** *YELLOW JACKET TARGET AREA ASR Findings: Appendix C4.2 . APPENDIX C4.2 .SITE VISIT TRIP REPORT . .ORDNANCE AND EXPLOSIVE WASTE .CHEMICAL WARFARE MATERIALS .ARCHIVES SEARCH REPORT .FOR .YELLOW JACKET MINES .TOOELE COUNTY, UTAH . .DERP-FUDS SI...*

5 0.91 **YELLOW JACKET TARGET AREA EE/CA: Management Plans/Work Plans-Work Plan** *YELLOW JACKET TARGET AREA EE/CA: Management Plans/Work Plans-Work Plan .EVALUATION/COST ANALYSIS DRAFT WORK PLAN . for .YELLOW JACKET RANGES .at.TOOELE COUNTY, UTAH . . COVER PAGE .1.0 INTRODUCTION . 1.1 PROJECT DESCRIPTION AND OBJECTIVES 1...*

6 0.87 **YELLOW JACKET TARGET AREA ASR: Table of Contents** *YELLOW JACKET TARGET AREA ASR: Table of Contents . . Defense Environmental Restoration Program .for .Formerly Used Defense Sites . .Ordnance and Explosive Waste .Chemical Warfare Materials . .ARCHIVES SEARCH REPORT . .FINDINGS . .YELLOW JAC...*

7 0.82 **YELLOW JACKET TARGET AREA EE/CA: Management Plans/Work Plans-Work Plan Appendix F** *YELLOW JACKET TARGET AREA EE/CA: Management Plans/Work Plans-Work Plan Appendix F . APPENDIX F . DUGWAY PROVING GROUND YELLOW JACKET RANGES EE/CA WORK TASK PROPOSAL . COVER PAGE .WORK TASK PROPOSAL . 1.0 PURPOSE PAGE 1 2.0 TECHNICAL APPROAC...*

8 0.82 **YELLOW JACKET TARGET AREA ASR Findings: Appendix C** *YELLOW JACKET TARGET AREA ASR Findings: Appendix C . ORDNANCE AND EXPLOSIVE WASTE .CHEMICAL WARFARE MATERIAL .ARCHIVES SEARCH REPORT .FOR .YELLOW JACKET MINES .TOOELE COUNTY, UTAH . .DERP-FUDS SITE NO. J08UT109800 . .APPENDIX C .REPORTS/STU...*

9 0.82 **YELLOW JACKET TARGET AREA EE/CA Scope of Work** *YELLOW JACKET TARGET AREA EE/CA Scope of Work .STATEMENT OF WORK . for .YELLOW JACKET RANGES .at.TOOELE COUNTY, UTAH . . STATEMENT OF WORK - SITE SURVEY OF FORMERLY USED DEFENSE SITES 1.0 BACKGROUND AND GENERAL STATEMENT OF WORK PAGE 1 2.0 ...*

10 0.82 **YELLOW JACKET TARGET AREA ASR** *YELLOW JACKET TARGET AREA ASR .ARCHIVE SEARCH REPORT (ASR) . for .Yellow Jacket Ranges Dugway Proving Grounds . at .Toole County, UT . .ASR - Archives Search Report .This is the report detailing the information discovered during the archive...*

Defense Environmental Restoration Program

for

Formerly Used Defense Sites

Ordnance and Explosive Waste

Chemical Warfare Materials

ARCHIVES SEARCH REPORT FINDINGS

YELLOW JACKET RANGES DUGWAY PROVING GROUND

Toole County, Utah

Site No. J08UT109800

NOVEMBER 1993

Prepared by
US ARMY CORPS OF ENGINEERS
ST. LOUIS DISTRICT

ORDNANCE AND EXPLOSIVE WASTE

CHEMICAL SURETY MATERIALS

ARCHIVES SEARCH REPORT

FINDINGS

FOR

YELLOW JACKET RANGES

TOOELE COUNTY, UT

DERP-FUDS SITE NO. J09UT109800

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YELLOW JACKET RANGES

TOOELE COUNTY, UT

DERP-FUDS SITE NO. J09UT109800

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ORDNANCE AND EXPLOSIVE WASTE

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FINDINGS

FOR

YELLOW JACKET RANGES

TOOELE COUNTY, UT

DERP-FUDS SITE NO. J09UT109800

1.0 Introduction

1. 1 Authority

In 1980, Congress enacted the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) 42 USC 9601 et seq. Ordnance and Explosive Wastes (OEW) are included in the CERCLA definition of pollutants and contaminants that require a remedial response.

In 1983, the Environmental Restoration Defense Account (ERDA) was established by Public Law 98-212. This Congressionally directed fund was to be used for environmental restoration at Department of Defense (DOD) active installations and formerly used properties. The DOD designated the Army as the sole manager for environmental restoration at closed installations and formerly used properties. The Secretary of the Army assigned this mission to the Corps of Engineers (USACE) in 1984.

The 1986 Superfund Amendments and Reauthorization Act (SARA) amended certain aspects of CERCLA, some of which directly related to OEW contamination. Chapter 160 of the SARA established the Defense Environmental Restoration Program (DERP). One of the goals specified for the DERP is "correction of environmental damage (such as detection and disposal of unexploded ordnance) which creates an imminent and substantial endangerment to the public health or welfare or to the environment."

The DERP requires that a CERCLA response action be undertaken whenever such "imminent and substantial endangerment" is found at:

A. A facility or site that is owned by, leased to, or otherwise possessed by the United States and under the jurisdiction of the Secretary of Defense.

B. A facility or site that was under the jurisdiction of the Secretary of Defense and owned by, leased to, or otherwise possessed by the United States at the time of actions leading to contamination.

C. A vessel owned or operated by the Department of Defense.

The National Contingency Plan (NCP) was established by the Clean Water Act of 1972. The NCP has been revised and broadened several times since then. Its purpose is to provide the organizational

structure and procedures for remedial actions to be taken in response to the presence of hazardous substances, pollutants, and contaminants at a site. Section 105 of the 1980 CERCLA states that the NCP shall apply to all response actions taken as a result of CERCLA requirements.

The March 1990 National Oil and Hazardous Substances Pollution Contingency Plan given in 40 CFR part 300 is the latest version of the NCP. Paragraph 300.120 states that "DOD will be the removal response authority with respect to incidents involving DOD military weapons and munitions under the jurisdiction, custody, and control of DOD."

On April 5, 1990, U.S. Army Engineer Division, Huntsville (USAEDH) was designated as the USACE Mandatory Center of Expertise (MCX) and Design Center for Ordnance and Explosive Waste (OEW). As the MCX and Design Center for OEW, USAEDH is responsible for the design and successful implementation of all Department of the Army OEW remediations required by CERCLA. USAEDH also designs and implements OEW remediation programs for other branches of the Department of Defense when requested. In cooperation with the Huntsville Division, the U.S. Army Corps of Engineers St. Louis District has been assigned the task of preparing Archives Search Reports (ASR) for those Formerly Used Defense Sites (FUDS) suspected of Chemical Warfare Materials (CWM) contamination.

1.2 Subject

Dugway Proving Ground (DPG) was established in 1942 to develop and test chemical weapons and biological defense systems. DPG has served as the primary field test area for chemical munitions from 1942 to 1947, and again from 1950 to the present. Open air testing of chemical agents was performed at DPG until 1969, when all such activities were suspended. Since then, only chemical simulants have been tested in the open air. Conventional munitions have also been tested at this facility, and the Utah National Guard routinely uses ranges located on Dugway for training.

The **Yellow Jacket Ranges** were used in the 1940's as part of Project Sphinx, which tested chemical munitions against cave type fortifications. Three different mine areas were used as part of the tests. The largest number of tests were conducted at the Yellow Jacket Mines which consisted of ten separate mines located in one valley area. Tests were also conducted at the Great Western Mines and at Old Ironsides Mine. See Maps M-3 & M-4 for locations of chemical weapons tests and of mine claims, respectively. No specific boundaries of the test areas have been uncovered as a result of this archives search, and the targets may have overlapped more than one mine claim. Additionally, short or long rounds would have impacted outside of the immediate target areas. Short and long rounds are of a specific

concern because munitions from these tests have been recovered outside what is considered the **Yellow Jacket Ranges** test area.

1. 3 Purpose

This Archives Search Report compiles information obtained through historical research at various archives and records-holding facilities, interviews with persons associated with the site or its operations, and personal visits to the site. AR efforts were directed toward determining the possible use or disposal of chemical warfare materials on the site. Particular emphasis was placed on establishing the chemical (agent), type of munitions or container, quantities, and area of disposal. Information obtained during this process was used to develop the Conclusions and Recommendations for further action furnished by separate Executive Summary.

1.4 Scope

This investigation centered on the potential that CWM contamination could remain on the site from activities associated with Project Sphinx which tested chemical munitions against cave type fortifications. The potential locations for chemical weapons contamination on the **Yellow Jacket Ranges** FUDS are delineated on Map M-3.

This report presents the history of the site, description and characterization of the immediate surrounding area, real estate ownership information, findings of a visual field survey, and OEW (CWM) site analysis, including an evaluation of potential ordnance contamination.

- Location Map

2.0 Previous Site Investigations

2.1 Findings of Fact and Determination of Eligibility (INPR)

The 4 Feb 1993 MEMORANDUM FOR ALL MAJOR SUBORDINATE CO S (EXCEPT EUROPE AND ASIA) had as its subject the accomplishment of a Site Reconnaissance at those FUDS with Potentially Chemical Warfare Material Contamination. This action was in support of the requirement for release of the U.S. Army Chemical Material Destruction Agency (USACMDA) Interim Report to Congress on Non-Stockpile Materials. This Memorandum was signed by Col Michael H. Fellows, Chief, Environmental Restoration Division, Directorate of Military Programs; and directed, along with other items, the preparation/approval of the INPR for each listed FUDS. This preliminary assessment was to be given the highest priority.

The Dugway South Triangle and **Yellow Jacket Ranges** were DERP-FUDS included on the list. In response to this requirement, personnel from the Sacramento District performed a Site Review including site visits and interviews, prepared Fact Sheets, and drafted an INPR. A copy of these documents (draft) are included as Appendix C1.1. Review of, comment on, and signing of the INPR was transpiring during the time frame this archive search was conducted by the St. Louis District.

2.2 Historic Properties Report

Under contract CX-0001-2-0033 between Building Technology Incorporated, Silver Spring, Maryland and the I-Iistoric American Building Survey/Historic American Engineering Record, National Park Service, U.S. Department of the Interior, the Final Report entitled *Historic Properties Report, Dugway Proving Ground, Utah* was prepared for the United States Army Materials Development and Readiness Command (DARCOM) (Appendix C3.2). T'he report, dated July 1984, presented the results of an historic properties survey of Dugway Proving Ground. It was prepared to assist the Army in bringing the DPG installation into compliance with the National Historic Preservation Act of 1966 and its amendments, and related federal laws and regulations. The document provides a synopsis of the scope and methodology, the architectural and a brief history of the facility, a technological overview of the installation, identifies the significant historical properties and then categorizes the properties on DPG and sets forth preservation recommendations.

2.3 Environmental Assessment of the 6545TH TEST GROUP

In accordance with the National Environmental Policy Act of 1969, (Public Law 91-190, 1970), Air Force Regulation 19-2, and the Department of the Army Regulation 200-2 Environmental Sciences Section, Computer Sciences Corporation prepared an *Environmental Assessment OF THE 6545TH TEST GROUP (Air Force Systents Command, Hill AFB, Utah) on the Routine Operations and*

Facilities on U. S. Army Dugway Proving Ground (Appendix C3.3). This report, dated February 1990, was prepared by the Army in response to the requirement that all routine operations and missions of the USAF at DPG be assessed to determine adverse impacts to the environment.

2.4 Installation Environmental Assessment

The Environmental and Ecology Staff under the Direction of Carlos F. A. Pinkham and L. Dale King, Environmental and Life Sciences Division, Material Test Directorate prepared the updated *INSTALLATION ENVIRONMENTAL ASSESSMENT FOR UNITED STATES DUGWAY PROVING GROUND, DUGWAY, UTAH.* This document was prepared as a background document against which more detailed records of environmental considerations (REC) can be compared, and to which other EA's and environmental impact statements can be tiered. Its purpose is to insure the environmental resources in and around the installation have been identified, activities on the installation are quantified, and the potential impacts of these activities are known. The report identifies potential adverse impacts so that plans can be changed to minimize or eliminate adverse impacts (Appendix C3. 1).

- Site & Vicinity Map

3.0 Site and Site Area Description

3. 1 Location

The site is located in western Utah, approximately 100 miles southwest of Salt Lake City in Tooele County (Figures 1 & 2). **Yellow Jacket Ranges** are in the northern side of the Dugway Mountain Range which are bordered to the north by Dugway Proving Ground, and to the northeast by the joint-use lands refeffed to as the Southern Triangle. The nearest towns with populations greater than 1000 people (other than the Dugway Proving Ground Post) are Wendover to the Northwest, and the Cities of Tooele and Grantsville to the Northeast. Figure 2 indicates the location and general vicinity of the area surrounding Yellow Jacket. Map M-3 identifies the approximate location of each target mine that was associated with Project Sphinx chemical munitions testing.

3.2 Past Uses

3.2.1 General

The **Yellow Jacket Ranges**, Dugway Proving Ground, are located within the Dugway Mountain Range and Great Salt Lake Desert. The land is an isolated area with semi-arid climate and experiences a wide seasonal and diurnal temperature variability. The property under consideration is in an isolated, remote location. The geology and climate have limited the region to ranching (grazing) activity, mining operations, recreational pursuits, and military uses.

3.2.2 Interpretation of Aerial Photography

A. Photo analysis and land use interpretation were performed to the northeast of the actual FUDS site partially on the Dugway Proving Ground--Southern Triangle lands, using aerial photography from 1953 and 1987. The approximate negative scale of photography is as follows:

August 1953	1" = 1,967'
June 1987 1	1" = 3,333'

The Dugway Range NE, Dugway Proving Ground SE, Camels Back Ridge SW, Table Mountain,

Dugway Range NW, Dugway Proving Ground SW, UT, USGS quadrangle maps were used as reference for the photography. No photography was available for interpretation prior to 1953.

The 1953 aerial photography indicates the bombing range however, there is no indication of chemical ordnance. Numerous impact craters are evident; and, in addition, targets are visible.

No significant change is apparent when interpreting between the 1953 and 1987 aerial photography. However, additional targets have been installed. and impact craters remain evident. There is no indication of chemical ordnance on the surface.

B. Site visits, archive searches and photographic and other investigations have determined the **Yellow Jacket Ranges** are potentially contaminated with chemical warfare materials. Once all the actual locations of the Project Sphinx CWM tests are verified, additional detailed aerial photographic analysis seems an appropriate action.

3.2.3. Map analysis

The Southern Triangle and **Yellow Jacket Ranges** are located immediately to the south of the current Dugway Proving Ground boundary. These areas can be located approximately at 40 Degrees 5 minutes and 30 seconds North and 113 Degrees 2 minutes and 30 seconds West.

The site was analyzed by referencing the following: Dugway Proving Grounds SE, 1954; Dugway Range NW, 1953; Camels Back Ridge SW, 1955; Table Mountain, 1955; and Dugway Proving Ground SW, 1954; UT, USGS 7.5 minute quadrangle maps. These maps indicate secondary roads, proving ground boundaries, target ranges and topographic features

No other maps were available for interpretation.

3.3 Current Uses

The primary usages of the **Yellow Jacket Ranges** FUDS are as active mining operations and occasional use for recreational purposes, ie backpacldng, mountain climbing, and hildng.

3.4 Demographics of the Area

A. **Center of Activity**: DPG-**Yellow Jacket Ranges** are located in the vicinity of Southern Triangle, Dugway Range & Dugway Proving Grounds, UT. The site is remote. No major activity or population centers are nearby except the above referenced military installations. Population centers relative to the site include Grantsville City, Ut, Stockton Town, Ut, and Tooele City, Ut. No significant centers of activity exist near the project location. The towns referenced above and their support facilities such as shopping, gas stations, police, etc. are the nearest centers of activity to the project location.

B. **Population Density:**

```
County: Tooele
Area: 6,919 sq.mi.
POP: 26,601
PD: 3 Persons per sq. mi.

City: Tooele City
POP: 13,887
```

```
City: Stockton Town
POP: 426

City: Grantsville City
POP: 4,500
```

Population and area are based on the U.S. Department of Commerce, Bureau of the Census, 1990 statistics, and telephone interviews.

C. **Type of Businesses:** A review of both telephone interviews and County Business Patterns (1990) assisted in developing a business profile of the area. No major businesses exist in the immediate vicinity of the project. The site is remote and rural. Business activity in and around the communities listed above is limited to small commercial support businesses such as gas stations, grocery stores, etc.

D. **Type of Industry:** No industry exists in the immediate area of the Yellow **Jacket Ranges** with the exception of active small scale mining operations. The site is considered rural.

E. **Type of Housing:** Housing in the vicinity is primarily single family housing.

F. **New Development in the Area:** No development is in the DERP-FUDS site

area.

G. **Typical Cross-section of Population:** The population cross-section of Stockton Town is 99 % white, and 1 % American Indian. The Percent under the age of 18 is 37. 1 % and over 65 years is 11.5%. The median age is 30.3.

4.0 Physical Characteristics of the Site

4.1 Geology/Physiogmhy

Southern Triangle and **Yellow Jacket Ranges,** Dugway Proving Ground are located within the Great Salt Lake Desert. The **Yellow Jacket Ranges** are located along the northern face of the Dugway Mountain Range and the Yellow Jacket, Old Ironsides, and Great Western Mines in the northern sector of the mountain range; and Southern Triangle is east of the Dugway Mountain Range. The Dugway Range is part of the Great Basin Section of the Basin and Range physiographic province. The Basin and Range province is characterized by long narrow mountain ranges, tflted fault blocks, alternating with intermountain basins partly filled with gravel and sand derived from the mountains.

The Great Salt Lake Desert is a large playa derived from the largest and by far the best known of the Pleistocene Great Basin lakes - Lake Bonneville. Present-day lakes that are remnants of Lake Bonneville are Great Salt Lake, Sevier Lake, and Lake Utah. Former levels of Lake Bonneville are indicated by shorelines and associated deltas, bars, deposits of calcareous tufa, wavecut niches in bedrock and other shoreline features (Thombury, 1965). Previous to the development of Lake Bonneville in Pleistocene time, the western deserts of Utah were subjected to the following: mid-Tertiary to present-day crustal stretching, resulting in normal and detachment faulting and creating the linear mountain ranges and desert basins with simultaneous infifling of intermountain basins with sediment derived from the mountains, and with volcanic outpourings; a mid-Tertiary regional uplift, with doming of the area as much as 5000 feet; igneous activity, with associated intrusions and huge volcanic outbursts, in mid-Tertiary (Eocene to early Miocene time); Cretaceous age dirust faulting, resulting in development of the Seiver Mountain belt (Chronic, 1989).

4.2 Soils

The site area is characterized by basin fill deposits consisting mainly of non-indurate to semiindurate terrestrial sediments and lacustrine deposits from ancient Lake Bonneville. The terrestrial deposits consist mostly of poorly sorted to moderately sorted combinations of gravel, sand, silt and clay that were derived from the rocks in the mountains. The basin **fill** also contains fine-grained lacustrine, carbonate and evaporate deposits. When the soil dries, a crust (caliche) forms on the surface. This crust is due, at least in part, to a concentration of salts in the upper 1/4 to 1-1/4 cm of soil (Pinkham, et al., 1982).

Geologic hazards:

Above normal precipitation can result in landslides and debris flows; other potential hazards include: in an earthquake, silty and sandy sediments are subject to liquefaction or hydrocompaction, clayey sediments and mudflats subject to shrinldng or swelling, salt flats subject to subsidence due to dissolution (Solomon, et al, 1992).

4-1

4.3 Hydrology

4.3.1 Surface Water

Drainage from the **Yellow Jacket Ranges** is to the north into the Great Salt Lake Desert. The surface hydrology is limited to intermittent streams which contain water only during periods of rain or snow melt.

4.3.2 Ground Water

Deep and extensive aquifers underlie the entire Great Salt Lake Desert. Water high in mineral content exists fairly close to the surface and is separated from the deeper, potable water by nearly impervious clay deposits.

The surface of the higher-quality water in the vicinity lies in a boulder bed at 5.2 m to more than 45.1 m below surface; the base extends down to about 122 m. There is also a groundwater basin aquifer in Skull Valley, but hydrologic data indicate that it is separated from the Dugway Valley-Govemment Wash Aquifer by a subsurface rock barrier. However, this subsurface rock barrier evidence is not absolute. The surface of the Skull Valley aquifer is at an elevation of 1,433 to 1,498 m Mean Sea Level, (MSL), while that of the Dugway Valley-Govemment Wash Aquifer is 1,301 to 1,325 m MSL, indicating that cross flow, if possible would be from the former to the latter.

Groundwater at depth is most likely recharged by mountain precipitation into the alluvial fans of the Stansbury, Onaqui, Sheep Rock, Cedar, Granite, and Simpson Mountains. The down gradient of the surface of the deeper aquifers is generally west-northwest within the well fields in the area of English Village and Dugway Valley. Surface water from precipitation in the broad flat valleys is unlikely to penetrate the clay deposits above the potable aquifer. Instead, evaporation causes upward leaching and surface mineral deposits (Pinkham, et al., 1982).

4.4 Weather

The site has a semi-arid climate with wide seasonal and diumal temperature variabffity typical of middle latitude continental regions. The area has an approximate mean annual temperature of 51.5'F; mean monthly temperatures are lowest in January (31.5'F) and highest in July (78.5'F). Annual

precipitation is 7.24 inches.

Wind data for the area are summarized in TABLE 4-1. Temperature and precipitation data are summarized in TABLE 4-2. Data were collected at Dugway Proving Grounds, Utah, which is approximately 16 miles northeast of the site.

CLIMATOLOGICAL DATA FOR
DUGWAY PROVING GROUNDS, UTAH1
WIND INFORMATION
TABLE 4-1

WIND DIRECTION (DEGREES)	JANUARY AVG WIND SPEED (KNOTS)	JANUARY PCT FREQ %	FEBRUARY AVG WIND SPEED (KNOTS)	FEBRUARY PCT FREQ %	MARCH AVG WIND SPEED (KNOTS)	MARCH PCT FREQ %	APRIL AVG WIND SPEED (KNOTS)	
35-010(N)	6.1	3.4	6.8	5.4	8.6	6.8	8.5	
020-M	5.9	1.9	5.9	3.1	7.4	4.8	8.4	
050-070	2.7	2.6	3.6	3.6	5.0	3.6	4.0	
080-IMP	2.7	6.4	2.8	5.9	2.9	5.5	3.1	
110-130	3.2	9.3	3.1	8.2	3.1	6.9	3.3	
140-160	4.2	13.4	4.6	12.8	4.9	12.2	5.3	1
170-190(S)	7.4	13.2	7.8	12.4	8.3	12.4	8.7	1
200-220	8.5	4.6	6.1	4.2	9.6	5.2	8.3	
230-250	3.6	2.9	4.1	3.5	5.8	4.1	6.9	
260-280(W)	4.1	5.4	4.4	4.8	6.0	5.7	6.2	
290-310	4.2	6.2	5.6	6.6	7.0	8.9	7.9	1
320-340	5.2	6.6	7.6	9.6	8.4	10.7	8.3	1
CALM		24.1		19.7		13.3		1

WIND DIRECTION (DEGREES)	MAY AVG WIND SPEED (KNOTS)	MAY PCT FREQ %	JUNE AVG WIND SPEED (KNOTS)	JUNE PCT FREQ %	JULY AVG WIND SPEED (KNOTS)	JULY PCT FREQ %	AUGUST AVG WIND SPEED (KNOTS)	
350-010(N)	7.9	5.3	7.5	5.9	5.5	3.9	5.9	
020-040	7.6	4.5	8.0	4.2	6.4	3.9	5.7	
050-070	3.7	3.8	4.6	3.9	3.8	4.1	3.4	
OWIOO(E)	3.1	5.1	3.4	4.5	3.6	5.7	3.2	
110-130	3.4	5.5	3.4	5.6	4.1	6.0	3.3	
140-160	5.2	10.5	4.8	9.7	5.8	12.3	5.4	1
170-190(S)	9.7	12.9	8.0	12.4	8.0	15.4	8.2	1
200-220	8.2	5.7	7.2	5.5	7.3	5.5	6.8	
230-250	6.3	5.3	6.0	5.6	5.6	6.1	5.7	
260-280(W)	5.8	9.7	5.6	8.5	5.3	9.2	4.9	
290-310	6.4	9.3	6.6	9.8	5.6	7.6	5.6	
320-340	7.1	10.6	6.6	11.4	5.3	7.5	5.3	
CALM		13.0		13.0		13.8		1

WIND DIRECTION (DEGREES)	SEPTEMBER AVG WIND SPEED (KNOTS)	SEPTEMBER PCT FREQ %	OCTOBER AVG WIND SPEED (KNOTS)	OCTOBER PCT FREQ %	NOVEMBER AVG WIND SPEED (KNOTS)	NOVEMBER PCT FREQ %	DECEMBER AVG WIND SPEED (KNOTS)	
350-010(N)	6.3	4.0	7.8	4.9	5.7	3.6	6.0	
020-040	6.0	2.8	8.2	3.5	5.9	2.3	5.4	
050-070	3.2	3.6	3.9	2.9	3.4	3.5	3.6	
080-100(E)	2.8	6.4	2.9	4.6	2.6	6.0	2.5	
110-130	3.2	7.3	2.8	7.8	2.8	7.3	3.0	
140-160	5.1	12.9	4.2	12.9	5.1	14.7	4.1	1
170-190(S)	8.1	12.3	8.0	12.4	7.4	14.3	7.0	1
200-220	6.5	4.2	6.2	3.4	7.1	4.2	6.3	
230-250	5.0	4.7	3.8	3.4	3.9	3.0	3.4	

260-280(W)	5.0	7.1	4.5	6.1	3.9	5.1	3.0	
290-310	5.7	9.5	5.2	9.0	4.7	6.9	4.2	
320-340	5.7	8.1	6.3	8.9	6.1	7.7	4.8	
CALM		17.1		20.3		21.4		2

1 PERIOD OF RECORD: MAY 1960 - APRIL 1990

CLIMATOLOGICAL DATA FOR
DUGWAY PROVING GROUNDS, UTAH1
TEMPERATURE AND PRECIPITATION
TABLE 4-2

Month	Temperature		Precipitation
	Average Minimum (F)	Average Maximum (F)	Average (Inches)
January	16	37	0.50
February	23	45	0.56
March	29	53	0.75
April	36	63	0.74
May	44	73	0.96
June	54	85	0.48
July	62	95	0.52
August	60	91	0.59
September	49	81	0.60
October	37	67	0.69
November	26	50	0.55
December	18	39	0.57
Average	38	65	
Annual Total			7.24

1 PERIOD OF RECORD: SEPTEMBER 1950 - MAY 1992

4.5 Ecology

The information provided for this site was compiled from the U. S. Fish and Wildlife Service and the State of Utah Department of Natural Resources, Division of Wildlife Resources.

The following federal and state listed endangered species may occur in the areas of interest. They include: Bald eagle (Haliaeetus leucephalus) and peregrine falcon (Falco peregrinus). In addition, there are four species that are federal candidates for official listing as threatened or endangered. Candidate species which may occur in the area are: Ferruginous hawk (Buteo regalis), white faced ibis (Plegadis chihi), loggerhead shrike (Lanius ludovicianus), and western snowy plover (Charadrius alexandrinus nivosus).

No additional information on the occurrence of rare or endangered species or natural communities is known at this time. This does not mean that other state or federauy-listed species may not be present within the areas of interest. An on site inspection by appropriate state and federal personnel may be necessary to verify the presence, absence or location of listed species, or natural communities if remedial action is recommended as part of the final ASR.


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5.0 Real Estate

5.1 DOD Ownership

The DOD does not appear to have formerly had a completely clear title (owned or leased) on the **Yellow Jacket Ranges.** According to information gathered by Carl Jorgenson (Interview-Appendix E), all of the mine claim areas once used as test areas in the Dugway Mountain Range were under the control of one family, the Cannon family. Representatives of this family have held patented mine claims and/or subleased the mining properties to other individuals or corporations. Permission to use these mines for Project Sphinx was likely through a verbal agreement between the owner and the government. The rectangular section of land immediately west of the DPG Southern Triangle area and bordering immediately on DPG is erroneously identified in the INPR (draft) as the Yellow Jacket Ranges. However, although concatenation is certainly possible in the buffer zone, the actual area of concern is in the northern Dugway Mountain Range, south of the area previously addressed in the INPR (Draft). This stretch of land likely is under the jurisdiction of the Bureau of Land Management, and does serve as a buffer for activities on the DPG installation. It is possible the present ownership of the buffer is under the cooperative joint-use agreement instituted between DPG and BLM.

5.2 Present Ownership

Present ownership is not determined at this time; but is understood to involve active mine claims with the Cannon families still maintaining control or leasing the property. The Bureau of land Management likely controls much of the land in the vicinity of the mines used for project Sphinx.

5.3 Significant Past Ownership other than DOD

The significant property owners have been the Bureau of Land Management and the subsequent mining grants.

6.0 OEW/CWM Site Analysis

6.1 Historical Summga of OEW/CWM Activities

6. 1.1 General

The **Yellow Jacket Ranges** were used in the 1940's as part of Project Sphinx which tested chemical munitions against cave type fortifications. It appears that all of the mine claim areas used as test areas in the Dugway Mountain Range were owned by one family and the permission to use these areas was a verbal agreement between the owner and the government. Three different mine areas were used as part of the test. The largest number of tests were conducted at the Yellow Jacket Mines which consisted of ten separate mines located in one valley area. Tests were also conducted at the Great Western Mines and at Old Ironsides Mine. See Map M-4 for locations of mine claims. No specific boundaries of the test areas have been provided, and the targets may have overlapped more than one mine claim. Additionally, short or long rounds would have impacted outside of the immediate target areas. Short and long rounds are of a specific concern because munitions from these tests have been recovered outside what is considered the test area.

6.1.2

Records of CWM activities in these areas are limited to the Project Sphinx tests recorded in *A Memorandum Leport on Attack Against Cave-Type Fortifications* (Appendix C2. 1). The following is a list of tests conducted at each mine area as part of the project.

Yellow Jacket Mines

Test No.	Munitions	No. Rounds
N16-11	7.2in Rocket CG-fill 144	
N16-12	4.2in Mortar CG-fill 480	
N16-14	4.2in Mortar CG-fifl 480	
N16-15	M79 1,000 lb Bomb CG-fill (static fired) 18	
N16-16	M79 Bomb AC-fiR 18	
N16-17	4.2in Mortar CG-fiU 1200	
N16-22	M33 Spray Tank AC-flU (dropped) 6	
N16-24	M33 Spray Tank AC-fill (dropped) 8	
P34-1	M47 100 lb Bomb H-fifl (static fired) 88	
P34-3	M33 Spray Tank H-fill (sprayed) 4	
P34-7	M33 Spray Tank H-flfl (dropped) 6	
21	M47 Bomb AVGAS-fffl (static fired) *150*	
22	M47 Bomb Butane-flU (static fired) *150*	
26	165 gal Tank gasoline-fir 12	
27	M47 Bomb Napalm-gasoline fill 120	
28	165 gal Tank Napalm-fill 6	
29	165 gal Tank Napalm-fdl 6	
31	165 gal Tank Napalm-flU 8	
33	7.2in Rocket PT Jell fill 44	

Great Western Mine

N16-20	105mm Howitzer CG-fiU 26	
P34-5	105mm Howitzer H-fdl 28	
P34-8	F7A2 Thermal Generator HD-fdl 1 (6 lb agent)	

Old Ironsides Mine

P34-13	F7A2Ibermal Generator HD-flU 1 (6 lb agent)	

Other tests in this series were conducted against Camels Back Caves located on DPG.

Conversations with the DPG Safety Office and with the DPG EOD section indicate that numerous incidents have occurred in the past where explosive and munitions residue has been recovered. In 1982 a complete bomb was reported to the EOD section. During the course of the incident, two 1,000 pound chemical bombs were recovered. One was cracked and no agent could be detected. This item was destroyed by detonation. The second item was intact and still contained its chemical agent filler. This item was transported to DPG and is still in storage at this site. Initially, it was assumed that this item had an AC fill based upon the following factors: the weight of the item, amount of fill showing in X-rays, and the fact that AC bombs of this size were dropped on the Yellow Jacket mines located not far from the incident site. Later a PINS test was conducted which indicates that the item has a mustard agent fill. This is significant because if the item has an AC fill, it landed relatively near the target area (although not in the target area). If the item is mustard filled, then it was, most likely, one of the series dropped on the Rising Sun Grid and it is representative of a considerable targeting error. This would significantly suggest an expanded area of potential chemical munitions contamination.

6.1.3 OEW Activities

No specific records have been uncovered dealing with conventional munitions use in this area. However, Mr. Jorgenson stated that he remembers one incident occurred that an 11.75 in. rocket with a live warhead was recovered in the Dugway range in the vicinity of the **Yellow Jacket Ranges.** This indicates tests were conducted in these areas which were either undocumented or the documents have not yet been uncovered. Between this type of munitions and explosive residue from chemical rounds, these mine areas must be considered potentially contaminated with OEW.

6.2 Records Review

The plan of action for the records search was to investigate regional and local archives and records centers due to their ease of access. This was followed by research at the national level.

1. National Archives and Records Agency, Suitland Facility, Suitland, MD

RG 77 - Records of the Office of the Chief of Engineers. No informat found.

RG 175 - Records of the Chemical Warfare Service. No information fou

RG 121 - Records of the Public Buildings Service. No information fou

RG 270 - Records of the War Assets Administration. No information fo

RG 338 - Records of US Army Commands. General Dugway information.

2. Washington National Records Center, Suitland, MD.

RG 121 - Records of the Public Buildings Service. No information fou

3. National Personnel Records Center, St. Louis, MO

RG 338 - Records of the United States Army Commands. Only general background information found.

RG 342 - Records of US Air Force Commands, Activities, and Organizati No information found.

4. National Archives - Rocky Mountain Region, Denver, CO

RG 77 - Records of the Office of the Chief of Engineers. No informat found.

RG 121 - Records of the Public Buildings Service. No information fou

RG 269 - Records of the General Services Administration. No informat found.

RG 270 - Records of the War Assets Administration. No information fo

RG 291 - Records of the Property Management and Disposal Service. No information found.

5. Federal Records Center, Denver, CO

RG 121 - Records of the Public Buildings Service. No information fou

RG 291 - Records of the Property Management and Disposal Service. No information found.

6. National Archives Great Lakes Region, Chicago, IL

RG 270 - Records of the War Assets Administration. No information fo

7. National Archives Centml Plains Region, Kansas City, MO

RG 77 - Records of the Office of the Chief of Engineers. No informat found.

RG 121 - Records of the Public Buildings Administration. No informat found.

RG 270 - Records of the War Assets Administration. No information fo

RG 291 - Records of the Property Management and Disposal Service. No information found.

8. Federal Records Center, Kansas City, MO

RG 77 - Records of the Office of the Chief of Engineers. No informat found.

RG 121 - Records of the Public Buildings Service. No information fou

RG 291 - Records of the Property Management and Disposal Service. No information found.

9. U. S Air Force I-Estorical Research Center, Maxwell AFB, AL
No information found.

10. U. S. Army Military History Institute, Carlisle Barracks, PA
No information found.

11. Edgewood Historical Office, Edgewood Area, Aberdeen Proving Grounds, MD.
General information only.

12. Dugway Proving Grounds, UT

Information of Real Estate history and project test reports on test conducted on the site. Also general background information.

6.3 Summary of Interviews

Appendix E contains a listing of telephone conversations and interviews. Interviews with EOD personnel associated with Dugway indicate that the area is heavily contaminated with munitions residue with occasional explosive components and complete rounds being periodically recovered.

Corps of Engineers personnel from the Sacramento and St. Louis Districts have conducted conversations with the following individuals:

6.3.1 Sacramento District Record Conversations

Martin Pendley of DPG Engineering provided these contacts:

Zip Zerek (retired), Dave Young (Range Control), Jim Keetch (former Test Officer now at Lockheed), Ron Nelson (current Test Officer), Nfitch Rice, and Will Taylor (retired).

Sergeant First Class Donald 'fburson-DPG EOD Detachment-Ditto Area, stated that past clearance for DPG was limited to visual/on-line search. This did not include the South Triangle or **Yellow Jacket Ranges**, since no rounds had been intentionally fired into the area. Yet he would not rule out the possibility of ordnance existing in these areas due to misfires intended for the White Sage Impact range located northeast of the South Triangle.

Through interviewing three of the points of contact (combined years of experience equalling 30 years), it can be summarized that, to the best of their knowledge, there were no reports of recovery (ordnance) or overshoots in the South Triangle Area.

Sonny Dewel-DPG Base OPS stated the Utah National Guard used to set up at Simpson's Springs located to the east of the South Triangle and fire into the area. Sonny found some small diameter projectiles in the Old River Stream bed (reported to the base and recovered). Sonny used to grow sheep within the South Triangle area until approximately twelve years ago. Aside from the above, no ordnance has been found.

6.3.2 Saint Louis District-Record Conversations

St. Louis District contacted a number of individuals associated with past and present activities at the Dugway installation. These individuals included Carl Jorgenson, Environmental Program Office, Dugway Proving Grounds; Melynda Petri Affairs Office, Dugway Proving Grounds; MSG Parrish, 62d EOD, Ft. Douglas, UT; SSG Pruitt, Dugway EOD Detachment SGM Eberhardt,Tech Escort, Edgewood Arsenal, MD; and Jim Keatch (General information on the Dugway installation).

Carl Jorgenson furnished the following additional list of individuals for possible future contact:

Frank Massaro, Dugway (from Cecil Echerd), Phone 801-522-5241

Don Falconer, who was at Detrick and Dugway during World War U, 301-663-0115

6.4 Site Inspection

On 21 September 1993 the site inspection of the YeRow Jacket Ranges, Old Ironsides Mine, and Great Western Mine was conducted. First, the team examined the Yellow Jacket Mine area which is located in a small valley. Yellow Jacket contains ten small mines, and the team examined the areas around each mine and the ridge line of the valley containing the mines. A large amount of munitions residue was observed, and one item which may have contained explosives was later reported to the base EOD section. The team also visited the Old Ironsides Mine area, but performed no sweep of the immediate area due to the fact that only a thermal generator was tested in this position.

The team was unable to identify the Great Western Mine where the chemical tests took place. There are several mines listed under the name Great Western and the team investigated several potential sites. None of these sites exactly matched information from the Project Sphinx report. The team did find some craters in the valley just east of the Yellow Jacket Mines FUDS. These craters appeared to have been used as demolition pits to dispose of ordnance or residue. The Great Western Mine site was the only site where a 105mm Howitzer was used. However, no 105mm projectile residue was identified at any surveyed site. Photographs of the sites visited are presented in Appendix G.

7.0 Site Evaluation

Interviews with the DPG Safety Office, the DPG EOD section, and other DPG

staff indicate that numerous past incidents have occurred at **Yellow Jacket Ranges** and vicinity where explosive and munitions residue have been recovered. In 1982 a complete bomb was reported to the EOD section. During the course of the incident, two 1,000 pound chemical bombs were recovered. One bomb, which was cracked and no agent could be detected, was subsequently destroyed by detonation. The second item was intact and still contained its chemical agent filler. This bomb was transported to DPG and is still in storage at this site. A PINS test indicated that the item was filled with mustard agent, rather than the expected AC chemical agent. An evaluation of the munitions is significant, because if the item has an AC fill, it landed relatively near the target area (although not in the target area); but if the bomb contains mustard agent, then it was, most likely, one of the series dropped on the Rising Sun Target Grid. It appears to be representative incident of considerable targeting error, and significantly suggests an expanded area for potential chemical munitions contamination. Appendix I presents the Risk Assessment Code for the FUDS.

No specific records have been uncovered dealing with conventional munitions use in the **Yellow Jacket Ranges** FUDS. However, DPG staff remember that a incident involved the recovery of an 11.75 in. rocket with a live warhead in the Dugway Mountain Range. This is a strong indication that past tests were conducted involving conventional OEW in this area which were either undocumented or the documents have not yet been uncovered.

The extensive past testing associated with Project Sphinx in the Dugway Mountain mining region is listed in paragraph 6.1.2 CWM Activities, above. The site should be considered potentially hazardous from any of the munitions listed therein.

Based upon these archive search findings, the actual documented past incidents involving both conventional OEW and CWM, and actual site visits during which surface explosive residue from chemical rounds were clearly detected, it is highly probable these mine areas are potentially contaminated with dangerous, hazardous OEW (CWM). Recommendations and Conclusions are provided in the companion Executive Summary to these Findings.

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South Triangle

Your search matched **26** of **4064** documents.
15 are presented, ranked by relevance.

1 2 [Next]

Rank Score Title/Information

1 0.97 **YELLOW JACKET TARGET AREA ASR Findings: Appendix C2.1** *YELLOW JACKET TARGET AREA ASR Findings: Appendix C2.1 . APPENDIX C2.1 .DUGWAY PROVING GROUND .ATTACK AGAINST CAVE-TYPE FORTIFICATIONS .1945 . . DEFENSE ENVIRONMENTAL RESTORATION PROGRAM .FORMERLY USED DEFENSE SITES . .INVENTORY PROJECT REPO...*

2 0.92 **YELLOW JACKET TARGET AREA ASR Findings: Sections 5-9** *YELLOW JACKET TARGET AREA ASR Findings: Sections 5-9 . 5.0 Real Estate .5.1 DOD Ownership .The DOD does not appear to have formerly had a completely clear title (owned or leased) on the Yellow Jacket Ranges. According to information gathere...*

3 0.90 **C:\HMPRO2\gifs\apec3400.htm** *C:\HMPRO2\gifs\apec3400.htm .APPENDIX C3.4 . .DRAFT ENVIRONMENTALL ASSESSMENT .BUREAU OF LAND MANAGEMENT WITHDRAWL .1990 . . . . . .DRAFT .ENVIRONMENTAL ASSESSMENT . .BUREAU OF LAND MANAGEMENT LAND WITHDRAWAL .DUGWAY PROVING GROUND .TOOELE ...*

4 0.84 **South Triangle EE/CA Management Plans UXO INVESTIGATION AND ENGINEERING EVALUATION/COST ANALYSIS** *South Triangle EE/CA Management Plans UXO INVESTIGATION AND ENGINEERING EVALUATION/COST ANALYSIS .UXO INVESTIGATION AND ENGINEERING EVALUATION/COST ANALYSIS . for .SOUTH TRIANGLE .at.TOOELE COUNTY, UTAH . . COVER PAGE .1.0 INTRODUCTION . 1....*

5 0.84 **South Triangle EE/CA Management Plans (IPMP)** *South Triangle EE/CA Management Plans (IPMP) .INITIAL PROJECT MANAGEMENT PLAN (IPMP) FOR ENGINEERING EVALUATION & COST ANALYSIS (EE/CA) . for .SOUTH TRIANGLE .at.NEAR DUGWAY PG, UTAH . . DISPOSITION OF INFORMATION/DATA FORM Page 1 COVER PAG...*

6 0.84 **South Triangle EE/CA Management Plans** *South Triangle EE/CA Management Plans .Management Plans/Work Plans . for .SOUTH TRIANGLE-DUGWAY PROVING GROUNDS .at.TOOELE COUNTY, UTAH . . INITIAL PROJECT MANAGEMENT PLAN (IPMP) FOR ENGINEERING EVALUATION & COST ANALYSIS (EE/CA) .UXO INVES...*

7 0.84 **South Triangle EE/CA** *South Triangle EE/CA . Engineering Evaluation/Cost Analysis (EE/CA) . for .South Triangle-Dugway Proving Grounds . at .Tooele County, UT . . SCOPE OF WORK . MANAGEMENT PLANS/WORK PLANS . EE/CA MAIN REPORT . DAILY SITE ACTIVITY RECORDS . . S...*

8 0.84 **SOUTH TRIANGLE OE Page** *SOUTH TRIANGLE OE Page .ORDNANCE AND EXPLOSIVES (OE) .consists of either (1) or (2) below: Ammunition, ammunition components, chemical warfare materials or explosives which have been lost, abandoned, discarded, buried, fired, thrown from de...*

9 0.84 **South Triangle CORRESPONDENCE** *South Triangle CORRESPONDENCE .CORRESPONDENCE/MEMORANDUMS . . for .South Triangle - Dugway Proving Ground .at .Tooele County, Utah . . MEMORANDUM FROM Chief, Environmental TO Commander HND, OEW Project Approval, Dated 6 May 94 . Go Back to ...*

10 0.84 **South Triangle INPR Table of Contents** *South Triangle INPR Table of Contents .INPR TABLE OF CONTENTS . for .South Triangle .at.Tooele County,UT . . INPR - Inventory Project Report .This preliminary assessment includes searches of Real Estate records to verify previous DoD owners...*

11 0.80 **South Triangle EE/CA Management Plans UXO INVESTIGATION AND ENGINEERING EVALUATION/COST ANALYSIS: APPENDIX G** *South Triangle EE/CA Management Plans UXO INVESTIGATION AND ENGINEERING EVALUATION/COST ANALYSIS:*

APPENDIX G . APPENDIX G . OSHA JOB SAFETY AND HEALTH PROTECTION POSTER . PAGE 1 . Go Back to the Table of Contents Page. ...

12 0.80 **South Triangle EE/CA Management Plans UXO INVESTIGATION AND ENGINEERING EVALUATION/COST ANALYSIS: APPENDIX F** *South Triangle EE/CA Management Plans UXO INVESTIGATION AND ENGINEERING EVALUATION/COST ANALYSIS: APPENDIX F . APPENDIX F . DUGWAY PROVING GROUND SOUTHERN TRIANGLE EE/CA WORK TASK PROPOSAL . COVER PAGE 1.O PURPOSE . PAGE 1 2.0 TECHNICAL APP...*

13 0.80 **South Triangle EE/CA Management Plans UXO INVESTIGATION AND ENGINEERING EVALUATION/COST ANALYSIS: APPENDIX A** *South Triangle EE/CA Management Plans UXO INVESTIGATION AND ENGINEERING EVALUATION/COST ANALYSIS: APPENDIX A . APPENDIX A . EMERGENCY ASSISTANCE INFORMATION . COVER PAGE EMERGENCY ASSISTANCE INFORMATION . PAGE 1 .PAGE 2 .EVACUATION ROUTE MA...*

14 0.80 **South Triangle EE/CA Management Plans UXO INVESTIGATION AND ENGINEERING EVALUATION/COST ANALYSIS: APPENDIX D** *South Triangle EE/CA Management Plans UXO INVESTIGATION AND ENGINEERING EVALUATION/COST ANALYSIS: APPENDIX D . APPENDIX D . UXO SUBCONTRACTOR RESUMES AND CERTIFICATIONS . COVER PAGE .THOMAS LIGON - SENIOR UXO SUPERVISOR . PAGE 1 .PAGE 2 .PA...*

15 0.80 **South Triangle EE/CA Management Plans UXO INVESTIGATION AND ENGINEERING EVALUATION/COST ANALYSIS: APPENDIX E** *South Triangle EE/CA Management Plans UXO INVESTIGATION AND ENGINEERING EVALUATION/COST ANALYSIS: APPENDIX E . APPENDIX E . MONTGOMERY WATSON INJURY AND ILLNESS PREVENTION PROGRAM and MEDICAL SURVEILLANCE PROGRAM . COVER PAGE I. PURPOSE . P...*

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16 0.80 **South Triangle EE/CA Management Plans UXO INVESTIGATION AND ENGINEERING EVALUATION/COST ANALYSIS: APPENDIX C** *South Triangle EE/CA Management Plans UXO INVESTIGATION AND ENGINEERING EVALUATION/COST ANALYSIS: APPENDIX C . APPENDIX C . SURVEYING AND MAPPING SUBPLAN . COVER PAGE 1.O INTRODUCTION . PAGE 1 .2.0 TASK DESCRIPTION . PAGE 1 .PAGE 2 .3.0 UX...*

17 0.80 **South Triangle EE/CA Management Plans UXO INVESTIGATION AND ENGINEERING EVALUATION/COST ANALYSIS: APPENDIX B** *South Triangle EE/CA Management Plans UXO INVESTIGATION AND ENGINEERING EVALUATION/COST ANALYSIS: APPENDIX B . APPENDIX B . FIELD DATA RECORDING FORMS OPERATIONAL FORMS ADMINISTRATIVE FORMS . COVER PAGE FIELD DATA RECORDING FORMS . PAGE 1 O...*

18 0.80 **South Triangle EE/CA Management Plans (IPMP): ANNEX D** *South Triangle EE/CA Management Plans (IPMP): ANNEX D . ANNEX D . PM-TM-MCX RESPONSIBILITY MATRIX FOR OEW PROJECTS . COVER PAGE . Go Back to the Table of Contents Page. ...*

19 0.80 **South Triangle EE/CA Management Plans (IPMP): ANNEX E** *South Triangle EE/CA Management Plans (IPMP): ANNEX E . ANNEX E . FACT SHEET . COVER PAGE . Go Back to the Table of Contents Page. ...*

20 0.80 **South Triangle EE/CA Management Plans (IPMP): ANNEX C** *South Triangle EE/CA Management Plans (IPMP): ANNEX C . ANNEX C . POINTS OF CONTACT . COVER PAGE .PAGE 2 . Go Back to the Table of Contents Page. ...*

21 0.80 **South Triangle EE/CA Management Plans (IPMP): ANNEX B** *South Triangle EE/CA Management Plans (IPMP): ANNEX B . ANNEX B . SCHEDULE . COVER PAGE . Go Back to the Table of Contents Page. ...*

22 0.80 **South Triangle EE/CA Management Plans (IPMP): ANNEX A** *South Triangle EE/CA Management Plans (IPMP): ANNEX A . ANNEX A . MAPS . COVER PAGE . Go Back to the Table of Contents Page. ...*

23 0.80 **YELLOW JACKET TARGET AREA ASR Findings: Sections 1-5** *YELLOW JACKET TARGET AREA ASR Findings: Sections 1-5 . ORDNANCE AND EXPLOSIVE WASTE .CHEMICAL SURETY MATERIALS .ARCHIVE SEARCH REPORT .FINDINGS .FOR .YELLOW JACKET RANGES .TOOELE COUNTY, UT . .DERP-FUDS SITE NO. J09UT109800 . .1.0 Introduct...*

24 0.80 **South Triangle EE/CA Scope of Work Work Task Propsals** *South Triangle EE/CA Scope of Work Work Task Propsals .Work Task Propsals . for .Southern Triangle at.Tooele County, Utah . . DISPOSITION OF INFORMATION/DATA FORM Page 1 FAX COVER SHEET from MONTGOMERY WATSON to Mike Fulford, dated August 1...*

25 0.80 **South Triangle EE/CA Scope of Work** *South Triangle EE/CA Scope of Work .Scope of Work . for .Southern Triangle .at.Tooele County, Utah . . Work Task Proposal . Go Back to the EE/CA Page. ...*

26 0.80 **Alphabetical Listing of DERP FUDS Projects** *Alphabetical Listing of DERP FUDS Projects . Q .R . RAMEY AIR FORCE BASE, Aquadilla, PR .RAPID CITY AIR TO GROUND GUNNERY RANGE, Meade County, SD .RAPID CITY PRECISION BOMBING RANGE No. 1, Butte County, SD .RAPID CITY PRECISION BOMBING RANG...*

[Prev] 1 2

SOUTH TRIANGLE

C. *Authorities*

(1) *DA has the authority to approve safety submissions*

(2) *HQ, USACE has the authority to review safety submissions*

(3) *CEHND has the authority to*
- (a) *Define all OEW scopes of work.*
- (b) *Approve OEW work, budget and schedule.*
- (c) *Award contracts to perform OEW work.*
- (d) *Manage approved funding to support OEW work.*

4. *SCHEDULES*

A. *Period of Performance*

The schedule included in Annex B covers the general sequence of events. As other projects are scheduled and funded, they will be included on this master schedule.

B. *Current Project Schedule*

A site specific project schedule will be developed by the contractors as part of the site work plans. The contractors' schedules shall be updated monthly.

5. *BUDGET AND COST ESTIMATE BASIS*

A. *Program Budget*

The program budget is generated through funding related to OEW. This project is funded under the authorities of DERP-FUDS. The programmed amounts (for OEW only) as they are currently known are:

FY	AMOUNT (x$1,000)	PURPOSE
94	468	EE/CA
94	40	CEHND In House
95	40	CEHND In House

B. *Organizational Cost Estimates*

The contractor will provide a cost estimate for each delivery order, this will be compared with CEHND's estimate. Cost data will be monitored on a monthly basis, the contractor will be required to submit monthly status reports which will include amounts billed for that month and projections for the next month.

6. *LOCAL COOPERATION PLAN*

Since the project is taking place on former DoD land, civilian agencies and communities are directly affected. USACE is responsible for coordinating with area civilians, local governments and organizations

Engineering Evaluation/Cost Analysis (EE/CA)

for

South Triangle-Dugway Proving Grounds

at

Tooele County, UT

- SCOPE OF WORK
- MANAGEMENT PLANS/WORK PLANS
- EE/CA MAIN REPORT
- DAILY SITE ACTIVITY RECORDS
-
- SAFETY & HEALTH PLANS
- CORRESPONDENCE/MEMORANDUMS
- SAMPLING & ANALYSIS REPORTS


Go Back to the Ordnance and Explosives Page.

UXO INVESTIGATION AND ENGINEERING EVALUATION/COST ANALYSIS

for

SOUTH TRIANGLE

at

TOOELE COUNTY, UTAH

Go Back to the Management Plans/Work Plans Page.

minimum loss of life to friendly forces. Project Sphinx was authorized by the Department of Defense to investigate the effectiveness of various CWM and explosive petroleum and butane mixtures in achieving this objective in the eventuality that an invasion of the Japanese home islands became necessary (USACE, 1993). One of the target areas used during Project Sphinx was the "River Bed Target Area," located along the Old River Bed immediately south of the DPG southern boundary. A set of underground fortifications was constructed on a promontory above the former river bottom in a 640-acre target area known as the "Rising Sun Target Grid."

1.2.3.3. The area known as the Southern Triangle came under the control of DPG in June, 1955 through a Special Land Use Permit (SLUP). The size of the area affected by the SLUP was increased in 1960 to its present size of 42,690 acres. The permit has since been terminated, but the area still is available to DPG on a case-by-case, right-of-way use permit (USACE, 1993). The Bureau of Land Management (BLM) owns the majority of the Southern Triangle lands, while the State of Utah owns about 10 percent of the acreage. The area is properly referred to now as the Southern Triangle Joint Use Area (STJUA). The 640-acre Rising Sun Grid, surrounded on three sides by Southern Triangle lands, is still under DPG control and security (see Figure 1-1).

1.3. POTENTIAL ORDNANCE AND EXPLOSIVE WASTE HAZARDS

1.3.0.1. Even though the Southern Triangle, as defined previously, was never used as a target for conventional or chemical ordnance tests, several such tests have been conducted against nearby target grids. Stray rounds from any of these tests (except static fire tests) could have missed their intended target area and impacted on the Southern Triangle. The remainder of this section identifies these tests, their targets, and the ordnance tested.

1.3.1. Project Sphinx

1.3.1.1. CWM activities in the Southern Triangle area include the Project Sphinx tests, which were limited to the River Bed Target Area on the Rising Sun Grid. The following is a list of munitions items used against the River Bed Target Area as part of Project Sphinx, as described in *A Memorandum Report on Attack Against Cave-Type Fortifications* (DPG, 1945).

Munitions	Number of Rounds
7.2-inch Rocket Phosgene (CG)-fill	381
4.2-inch Mortar Phosgene (CG)-fill	2,361
4.2-inch Mortar Distilled Mustard (HD)-fill	1,000
M79 1,000 lb Bomb phosgene (CG)-fill (static fired)	18
M79 1,000 lb. Bomb Distilled Mustard (HD)-fill	18
M47 100 lb Bomb Mustard (H)-fill (static fired)	1,113
M33 Spray Tank Cyanogen Chloride (CK)-fill (dropped)	10
M10 Spray Tank Mustard (H)-fill (sprayed)	17
185-gal Tank Cyanogen Chloride (CK)-fill	1

1.3.2. Project 4-55

1.3.2.1. Another series of tests, conducted in 1956, involved the firing of 4.5-inch rockets with GB-filled (Sarin) warheads against targets on the Rising Sun Grid (USACE, 1993). The following is a listing of the dates and number of rounds fired during Project 4-55.

Date	Number of Rounds Fired
February 21, 1956	33
February 27, 1956	33
February 29, 1956	33
March 12, 1956	158
March 19, 1956	156
March 27, 1956	156
April 2, 1956	158
April 9, 1956	314
April 16, 1956	312
May 30, 1956	310

1.3.3. Other Ordnance Test Activities

1.3.3.1. During the 1950s and 1960s, other ordnance tests involving chemical agents were conducted adjacent to the Southern Triangle area on the Target S Grid. This target grid is located on DPG, about two miles north of the southern installation boundary. Even though these tests did not target Southern Triangle lands, stray rounds may have impacted there.

1.3.3.2. In the 1950s, one or more battalion-size M-55 rocket launches were conducted. During these trials, the firing point was the county highway (Simpson Springs to Callao Road) and the target area was the Target S Grid on Dugway proper (Keach, 1994). The M-55 rockets would have had to travel across Southern Triangle lands to reach the impact point.

1.3.3.3. Firing trials of the "Honest John" rocket, equipped with a warhead containing M-39 (GB-filled) bomblets, were conducted at DPG during the early 1960s. The rockets were fired from the north toward the Target S Grid, and overshoots could have impacted off DPG proper onto the Southern Triangle.

1.3.3.4. In the late 1980s, trials of a simulant-filled binary chemical system (BIGEYE) were conducted from a firing point about four miles north of Granite Peak toward the Target S Grid. Approximately four square miles of Southern Triangle lands adjacent to the DPG southern boundary were used as a buffer zone for these tests (U.S. Army, 1987). Long shots from these trials could have impacted on these Southern Triangle lands.

1.4 WORK PLAN ORGANIZATION

1.4.0.1. This project-specific Work Plan has been prepared to fulfill the requirements of Task 2 of the current Delivery Order for the Southern Triangle EE/CA investigation. The sections of this Work Plan consist of separate subplans, each of which addresses a respective area of this EE/CA investigation. In addition, Appendix C contains the Mapping and Surveying Subplan generated by the UXO subcontractor for this EE/CA.

1.4.0.2. The following describe each of the subplans under which the Southern Triangle EE/CA will be conducted:

- UXO Operational/Geophysical Investigation Plan (Section 2.0) - provides procedures, methodologies, and rationales for the geophysical investigation at the Southern Triangle

- Quality Control Plan (Section 3.0) - describes the quality control procedures and inspection schedules to ensure that the data generated by the EE/CA investigation are of sufficient quality to meet the EE/CA objectives

INPR TABLE OF CONTENTS

for

South Triangle

at

Tooele County,UT

INPR - Inventory Project Report

This preliminary assessment includes searches of Real Estate records to verify previous DoD ownership or usage, and a determination of site eligibility and the need for cleanup.

NOTE: Each of the following hot links goes to a separately scanned page approximately 100 KB in size. The images are in a TIFF image format with a packbits compression.

When Viewing: The image when initially displayed will be larger then your screen. Use your external viewer software to resize the image to fit your screen.

When Printing: All images were initially scanned at 200dpi. To get the best quality printout do NOT resize the image when it is displayed by your image viewer. Resizing will degrade the quality of the printout.

Go Back to the Project Site Page.

Defens - Environmental Restoration Program

This is the only A.S.R covering South Triangle.

AF

YEL

DUG

ORDNANCE AND EXPLOSIVE WASTE

CHEMICAL SURETY MATERIALS

ARCHIVES SEARCH REPORT

FINDINGS

FOR

YELLOW JACKET RANGES

TOOELE COUNTY, UT

DERP-FUDS SITE NO. J09UT109800

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ORDNANCE AND EXPLOSIVE WASTE

CHEMICAL SURETY MATERIALS

ARCHIVE SEARCH REPORT

FINDINGS

FOR

YELLOW JACKET RANGES

TOOELE COUNTY, UT

DERP-FUDS SITE NO. J09UT109800

1.0 Introduction

1. 1 Authority

In 1980, Congress enacted the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) 42 USC 9601 et seq. Ordnance and Explosive Wastes (OEW) are included in the CERCLA definition of pollutants and contaminants that require a remedial response.

In 1983, the Environmental Restoration Defense Account (ERDA) was established by Public Law 98-212. This Congressionally directed fund was to be used for environmental restoration at Department of Defense (DOD) active installations and formerly used properties. The DOD designated the Army as the sole manager for environmental restoration at closed installations and formerly used properties. The Secretary of the Army assigned this mission to the Corps of Engineers (USACE) in 1984.

The 1986 Superfund Amendments and Reauthorization Act (SARA) amended certain aspects of CERCLA, some of which directly related to OEW contamination. Chapter 160 of the SARA established the Defense Environmental Restoration Program (DERP). One of the goals specified for the DERP is "correction of environmental damage (such as detection and disposal of unexploded ordnance) which creates an imminent and substantial endangerment to the public health or welfare or to the environment."

The DERP requires that a CERCLA response action be undertaken whenever such "imminent and substantial endangerment" is found at:

A. A facility or site that is owned by, leased to, or otherwise possessed by the United States and under the jurisdiction of the Secretary of Defense.

B. A facility or site that was under the jurisdiction of the Secretary of Defense and owned by, leased to, or otherwise possessed by the United States at the time of actions leading to contamination.

C. A vessel owned or operated by the Department of Defense.

The National Contingency Plan (NCP) was established by the Clean Water Act of 1972. The NCP has been revised and broadened several times since then. Its purpose is to provide the organizational

structure and procedures for remedial actions to be taken in response to the presence of hazardous substances, pollutants, and contaminants at a site. Section 105 of the 1980 CERCLA states that the NCP shall apply to all response actions taken as a result of CERCLA requirements.

The March 1990 National Oil and Hazardous Substances Pollution Contingency Plan given in 40 CFR part 300 is the latest version of the NCP. Paragraph 300.120 states that "DOD will be the removal response authority with respect to incidents involving DOD military weapons and munitions under the jurisdiction, custody, and control of DOD."

On April 5, 1990, U.S. Army Engineer Division, Huntsville (USAEDH) was designated as the USACE Mandatory Center of Expertise (MCX) and Design Center for Ordnance and Explosive Waste (OEW). As the MCX and Design Center for OEW, USAEDH is responsible for the design and successful implementation of all Department of the Army OEW remediations required by CERCLA. USAEDH also designs and implements OEW remediation programs for other branches of the Department of Defense when requested. In cooperation with the Huntsville Division, the U.S. Army Corps of Engineers St. Louis District has been assigned the task of preparing Archives Search Reports (ASR) for those Formerly Used Defense Sites (FUDS) suspected of Chemical Warfare Materials (CWM) contamination.

1.2 Subject

Dugway Proving Ground (DPG) was established in 1942 to develop and test chemical weapons and biological defense systems. DPG has served as the primary field test area for chemical munitions from 1942 to 1947, and again from 1950 to the present. Open air testing of chemical agents was performed at DPG until 1969, when all such activities were suspended. Since then, only chemical simulants have been tested in the open air. Conventional munitions have also been tested at this facility, and the Utah National Guard routinely uses ranges located on Dugway for training.

The **Yellow Jacket Ranges** were used in the 1940's as part of Project Sphinx, which tested chemical munitions against cave type fortifications. Three different mine areas were used as part of the tests. The largest number of tests were conducted at the Yellow Jacket Mines which consisted of ten separate mines located in one valley area. Tests were also conducted at the Great Western Mines and at Old Ironsides Mine. See Maps M-3 & M-4 for locations of chemical weapons tests and of mine claims, respectively. No specific boundaries of the test areas have been uncovered as a result of this archives search, and the targets may have overlapped more than one mine claim. Additionally, short or long rounds would have impacted outside of the immediate target areas. Short and long rounds are of a specific

concern because munitions from these tests have been recovered outside what is considered the **Yellow Jacket Ranges** test area.

1. 3 Purpose

This Archives Search Report compiles information obtained through historical research at various archives and records-holding facilities, interviews with persons associated with the site or its operations, and personal visits to the site. AR efforts were directed toward determining the possible use or disposal of chemical warfare materials on the site. Particular emphasis was placed on establishing the chemical (agent), type of munitions or container, quantities, and area of disposal. Information obtained during this process was used to develop the Conclusions and Recommendations for further action furnished by separate Executive Summary.

1.4 Scope

This investigation centered on the potential that CWM contamination could remain on the site from activities associated with Project Sphinx which tested chemical munitions against cave type fortifications. The potential locations for chemical weapons contamination on the **Yellow Jacket Ranges** FUDS are delineated on Map M-3.

This report presents the history of the site, description and characterization of the immediate surrounding area, real estate ownership information, findings of a visual field survey, and OEW (CWM) site analysis, including an evaluation of potential ordnance contamination.

- Location Map

2.0 Previous Site Investigations

2.1 Findings of Fact and Determination of Eligibility (INPR)

The 4 Feb 1993 MEMORANDUM FOR ALL MAJOR SUBORDINATE CO S (EXCEPT EUROPE AND ASIA) had as its subject the accomplishment of a Site Reconnaissance at those FUDS with Potentially Chemical Warfare Material Contamination. This action was in support of the requirement for release of the U.S. Army Chemical Material Destruction Agency (USACMDA) Interim Report to Congress on Non-Stockpile Materials. This Memorandum was signed by Col Michael H. Fellows, Chief, Environmental Restoration Division, Directorate of Military Programs; and directed, along with other items, the preparation/approval of the INPR for each listed FUDS. This preliminary assessment was to be given the highest priority.

The Dugway South Triangle and **Yellow Jacket Ranges** were DERP-FUDS included on the list. In response to this requirement, personnel from the Sacramento District performed a Site Review including site visits and interviews, prepared Fact Sheets, and drafted an INPR. A copy of these documents (draft) are included as Appendix C1.1. Review of, comment on, and signing of the INPR was transpiring during the time frame this archive search was conducted by the St. Louis District.

2.2 Historic Properties Report

Under contract CX-0001-2-0033 between Building Technology Incorporated, Silver Spring, Maryland and the I-Iistoric American Building Survey/Historic American Engineering Record, National Park Service, U.S. Department of the Interior, the Final Report entitled *Historic Properties Report, Dugway Proving Ground, Utah* was prepared for the United States Army Materials Development and Readiness Command (DARCOM) (Appendix C3.2). T'he report, dated July 1984, presented the results of an historic properties survey of Dugway Proving Ground. It was prepared to assist the Army in bringing the DPG installation into compliance with the National Historic Preservation Act of 1966 and its amendments, and related federal laws and regulations. The document provides a synopsis of the scope and methodology, the architectural and a brief history of the facility, a technological overview of the installation, identifies the significant historical properties and then categorizes the properties on DPG and sets forth preservation recommendations.

2.3 Environmental Assessment of the 6545TH TEST GROUP

In accordance with the National Environmental Policy Act of 1969, (Public Law 91-190, 1970), Air Force Regulation 19-2, and the Department of the Army Regulation 200-2 Environmental Sciences Section, Computer Sciences Corporation prepared an *Environmental Assessment OF THE 6545TH TEST GROUP (Air Force Systents Command, Hill AFB, Utah) on the Routine Operations and*

Facilities on U. S. Army Dugway Proving Ground (Appendix C3.3). This report, dated February 1990, was prepared by the Army in response to the requirement that all routine operations and missions of the USAF at DPG be assessed to determine adverse impacts to the environment.

2.4 Installation Environmental Assessment

The Environmental and Ecology Staff under the Direction of Carlos F. A. Pinkham and L. Dale King, Environmental and Life Sciences Division, Material Test Directorate prepared the updated *INSTALLATION ENVIRONMENTAL ASSESSMENT FOR UNITED STATES DUGWAY PROVING GROUND, DUGWAY, UTAH*. This document was prepared as a background document against which more detailed records of environmental considerations (REC) can be compared, and to which other EA's and environmental impact statements can be tiered. Its purpose is to insure the environmental resources in and around the installation have been identified, activities on the installation are quantified, and the potential impacts of these activities are known. The report identifies potential adverse impacts so that plans can be changed to minimize or eliminate adverse impacts (Appendix C3. 1).

- Site & Vicinity Map

3.0 Site and Site Area Description

3. 1 Location

The site is located in western Utah, approximately 100 miles southwest of Salt Lake City in Tooele County (Figures 1 & 2). **Yellow Jacket Ranges** are in the northern side of the Dugway Mountain Range which are bordered to the north by Dugway Proving Ground, and to the northeast by the joint-use lands refeffed to as the Southern Triangle. The nearest towns with populations greater than 1000 people (other than the Dugway Proving Ground Post) are Wendover to the Northwest, and the Cities of Tooele and Grantsville to the Northeast. Figure 2 indicates the location and general vicinity of the area surrounding Yellow Jacket. Map M-3 identifies the approximate location of each target mine that was associated with Project Sphinx chemical munitions testing.

3.2 Past Uses

3.2.1 General

The **Yellow Jacket Ranges**, Dugway Proving Ground, are located within the Dugway Mountain Range and Great Salt Lake Desert. The land is an isolated area with semi-arid climate and experiences a wide seasonal and diurnal temperature variability. The property under consideration is in an isolated, remote location. The geology and climate have limited the region to ranching (grazing) activity, mining operations, recreational pursuits, and military uses.

3.2.2 Interpretation of Aerial Photography

A. Photo analysis and land use interpretation were performed to the northeast of the actual FUDS site partially on the Dugway Proving Ground--Southern Triangle lands, using aerial photography from 1953 and 1987. The approximate negative scale of photography is as follows:

August 1953	1" = 1,967'
June 1987 1	1" = 3,333'

The Dugway Range NE, Dugway Proving Ground SE, Camels Back Ridge SW, Table Mountain,

Dugway Range NW, Dugway Proving Ground SW, UT, USGS quadrangle maps were used as reference for the photography. No photography was available for interpretation prior to 1953.

The 1953 aerial photography indicates the bombing range however, there is no indication of chemical ordnance. Numerous impact craters are evident; and, in addition, targets are visible.

No significant change is apparent when interpreting between the 1953 and 1987 aerial photography. However, additional targets have been installed. and impact craters remain evident. There is no indication of chemical ordnance on the surface.

B. Site visits, archive searches and photographic and other investigations have determined the **Yellow Jacket Ranges** are potentially contaminated with chemical warfare materials. Once all the actual locations of the Project Sphinx CWM tests are verified, additional detailed aerial photographic analysis seems an appropriate action.

3.2.3. Map analysis

The Southern Triangle and **Yellow Jacket Ranges** are located immediately to the south of the current Dugway Proving Ground boundary. These areas can be located approximately at 40 Degrees 5 minutes and 30 seconds North and 113 Degrees 2 minutes and 30 seconds West.

The site was analyzed by referencing the following: Dugway Proving Grounds SE, 1954; Dugway Range NW, 1953; Camels Back Ridge SW, 1955; Table Mountain, 1955; and Dugway Proving Ground SW, 1954; UT, USGS 7.5 minute quadrangle maps. These maps indicate secondary roads, proving ground boundaries, target ranges and topographic features

No other maps were available for interpretation.

3.3 Current Uses

The primary usages of the **Yellow Jacket Ranges** FUDS are as active mining operations and occasional use for recreational purposes, ie backpacldng, mountain climbing, and hildng.

3.4 Demographics of the Area

A. **Center of Activity**: DPG-**Yellow Jacket Ranges** are located in the vicinity of Southern Triangle, Dugway Range & Dugway Proving Grounds, UT. The site is remote. No major activity or population centers are nearby except the above referenced military installations. Population centers relative to the site include Grantsville City, Ut, Stockton Town, Ut, and Tooele City, Ut. No significant centers of activity exist near the project location. The towns referenced above and their support facilities such as shopping, gas stations, police, etc. are the nearest centers of activity to the project location.

B. **Population Density:**

```
County: Tooele
Area: 6,919 sq.mi.
POP: 26,601
PD: 3 Persons per sq. mi.

City: Tooele City
POP: 13,887
```

City: Stockton Town
POP: 426

City: Grantsville City
POP: 4,500

Population and area are based on the U.S. Department of Commerce, Bureau of the Census, 1990 statistics, and telephone interviews.

C. **Type of Businesses:** A review of both telephone interviews and County Business Patterns (1990) assisted in developing a business profile of the area. No major businesses exist in the immediate vicinity of the project. The site is remote and rural. Business activity in and around the communities listed above is limited to small commercial support businesses such as gas stations, grocery stores, etc.

D. **Type of Industry:** No industry exists in the immediate area of the Yellow **Jacket Ranges** with the exception of active small scale mining operations. The site is considered rural.

E. **Type of Housing:** Housing in the vicinity is primarily single family housing.

F. **New Development in the Area:** No development is in the DERP-FUDS site

area.

G. **Typical Cross-section of Population:** The population cross-section of Stockton Town is 99 % white, and 1 % American Indian. The Percent under the age of 18 is 37. 1 % and over 65 years is 11.5%. The median age is 30.3.

4.0 Physical Characteristics of the Site

4.1 Geology/Physiogmhy

Southern Triangle and **Yellow Jacket Ranges,** Dugway Proving Ground are located within the Great Salt Lake Desert. The **Yellow Jacket Ranges** are located along the northern face of the Dugway Mountain Range and the Yellow Jacket, Old Ironsides, and Great Western Mines in the northern sector of the mountain range; and Southern Triangle is east of the Dugway Mountain Range. The Dugway Range is part of the Great Basin Section of the Basin and Range physiographic province. The Basin and Range province is characterized by long narrow mountain ranges, tflted fault blocks, alternating with intermountain basins partly filled with gravel and sand derived from the mountains.

The Great Salt Lake Desert is a large playa derived from the largest and by far the best known of the Pleistocene Great Basin lakes - Lake Bonneville. Present-day lakes that are remnants of Lake Bonneville are Great Salt Lake, Sevier Lake, and Lake Utah. Former levels of Lake Bonneville are indicated by shorelines and associated deltas, bars, deposits of calcareous tufa, wavecut niches in bedrock and other shoreline features (Thombury, 1965). Previous to the development of Lake Bonneville in Pleistocene time, the western deserts of Utah were subjected to the following: mid-Tertiary to present-day crustal stretching, resulting in normal and detachment faulting and creating the linear mountain ranges and desert basins with simultaneous infifling of intermountain basins with sediment derived from the mountains, and with volcanic outpourings; a mid-Tertiary regional uplift, with doming of the area as much as 5000 feet; igneous activity, with associated intrusions and huge volcanic outbursts, in mid-Tertiary (Eocene to early Miocene time); Cretaceous age dirust faulting, resulting in development of the Seiver Mountain belt (Chronic, 1989).

4.2 Soils

The site area is characterized by basin fill deposits consisting mainly of non-indurate to semiindurate terrestrial sediments and lacustrine deposits from ancient Lake Bonneville. The terrestrial deposits consist mostly of poorly sorted to moderately sorted combinations of gravel, sand, silt and clay that were derived from the rocks in the mountains. The basin **fill** also contains fine-grained lacustrine, carbonate and evaporate deposits. When the soil dries, a crust (caliche) forms on the surface. This crust is due, at least in part, to a concentration of salts in the upper 1/4 to 1-1/4 cm of soil (Pinkham, et al., 1982).

Geologic hazards:

Above normal precipitation can result in landslides and debris flows; other potential hazards include: in an earthquake, silty and sandy sediments are subject to liquefaction or hydrocompaction, clayey sediments and mudflats subject to shrinldng or swelling, salt flats subject to subsidence due to dissolution (Solomon, et al, 1992).

4-1

4.3 Hydrology

4.3.1 Surface Water

Drainage from the **Yellow Jacket Ranges** is to the north into the Great Salt Lake Desert. The surface hydrology is limited to intermittent streams which contain water only during periods of rain or snow melt.

4.3.2 Ground Water

Deep and extensive aquifers underlie the entire Great Salt Lake Desert. Water high in mineral content exists fairly close to the surface and is separated from the deeper, potable water by nearly impervious clay deposits.

The surface of the higher-quality water in the vicinity lies in a boulder bed at 5.2 m to more than 45.1 m below surface; the base extends down to about 122 m. There is also a groundwater basin aquifer in Skull Valley, but hydrologic data indicate that it is separated from the Dugway Valley-Govemment Wash Aquifer by a subsurface rock barrier. However, this subsurface rock barrier evidence is not absolute. The surface of the Skull Valley aquifer is at an elevation of 1,433 to 1,498 m Mean Sea Level, (MSL), while that of the Dugway Valley-Govemment Wash Aquifer is 1,301 to 1,325 m MSL, indicating that cross flow, if possible would be from the former to the latter.

Groundwater at depth is most likely recharged by mountain precipitation into the alluvial fans of the Stansbury, Onaqui, Sheep Rock, Cedar, Granite, and Simpson Mountains. The down gradient of the surface of the deeper aquifers is generally west-northwest within the well fields in the area of English Village and Dugway Valley. Surface water from precipitation in the broad flat valleys is unlikely to penetrate the clay deposits above the potable aquifer. Instead, evaporation causes upward leaching and surface mineral deposits (Pinkham, et al., 1982).

4.4 Weather

The site has a semi-arid climate with wide seasonal and diumal temperature variabffity typical of middle latitude continental regions. The area has an approximate mean annual temperature of 51.5'F; mean monthly temperatures are lowest in January (31.5'F) and highest in July (78.5'F). Annual

precipitation is 7.24 inches.

Wind data for the area are summarized in TABLE 4-1. Temperature and precipitation data are summarized in TABLE 4-2. Data were collected at Dugway Proving Grounds, Utah, which is approximately 16 miles northeast of the site.

CLIMATOLOGICAL DATA FOR
DUGWAY PROVING GROUNDS, UTAH1
WIND INFORMATION
TABLE 4-1

WIND DIRECTION (DEGREES)	JANUARY AVG WIND SPEED (KNOTS)	JANUARY PCT FREQ %	FEBRUARY AVG WIND SPEED (KNOTS)	FEBRUARY PCT FREQ %	MARCH AVG WIND SPEED (KNOTS)	MARCH PCT FREQ %	APRIL AVG WIND SPEED (KNOTS)	
35-010(N)	6.1	3.4	6.8	5.4	8.6	6.8	8.5	
020-M	5.9	1.9	5.9	3.1	7.4	4.8	8.4	
050-070	2.7	2.6	3.6	3.6	5.0	3.6	4.0	
080-IMP	2.7	6.4	2.8	5.9	2.9	5.5	3.1	
110-130	3.2	9.3	3.1	8.2	3.1	6.9	3.3	
140-160	4.2	13.4	4.6	12.8	4.9	12.2	5.3	1
170-190(S)	7.4	13.2	7.8	12.4	8.3	12.4	8.7	1
200-220	8.5	4.6	6.1	4.2	9.6	5.2	8.3	
230-250	3.6	2.9	4.1	3.5	5.8	4.1	6.9	
260-280(W)	4.1	5.4	4.4	4.8	6.0	5.7	6.2	
290-310	4.2	6.2	5.6	6.6	7.0	8.9	7.9	1
320-340	5.2	6.6	7.6	9.6	8.4	10.7	8.3	1
CALM		24.1		19.7		13.3		1

WIND DIRECTION (DEGREES)	MAY AVG WIND SPEED (KNOTS)	MAY PCT FREQ %	JUNE AVG WIND SPEED (KNOTS)	JUNE PCT FREQ %	JULY AVG WIND SPEED (KNOTS)	JULY PCT FREQ %	AUGUST AVG WIND SPEED (KNOTS)	
350-010(N)	7.9	5.3	7.5	5.9	5.5	3.9	5.9	
020-040	7.6	4.5	8.0	4.2	6.4	3.9	5.7	
050-070	3.7	3.8	4.6	3.9	3.8	4.1	3.4	
OWIOO(E)	3.1	5.1	3.4	4.5	3.6	5.7	3.2	
110-130	3.4	5.5	3.4	5.6	4.1	6.0	3.3	
140-160	5.2	10.5	4.8	9.7	5.8	12.3	5.4	1
170-190(S)	9.7	12.9	8.0	12.4	8.0	15.4	8.2	1
200-220	8.2	5.7	7.2	5.5	7.3	5.5	6.8	
230-250	6.3	5.3	6.0	5.6	5.6	6.1	5.7	
260-280(W)	5.8	9.7	5.6	8.5	5.3	9.2	4.9	
290-310	6.4	9.3	6.6	9.8	5.6	7.6	5.6	
320-340	7.1	10.6	6.6	11.4	5.3	7.5	5.3	
CALM		13.0		13.0		13.8		1

WIND DIRECTION (DEGREES)	SEPTEMBER AVG WIND SPEED (KNOTS)	SEPTEMBER PCT FREQ %	OCTOBER AVG WIND SPEED (KNOTS)	OCTOBER PCT FREQ %	NOVEMBER AVG WIND SPEED (KNOTS)	NOVEMBER PCT FREQ %	DECEMBER AVG WIND SPEED (KNOTS)	
350-010(N)	6.3	4.0	7.8	4.9	5.7	3.6	6.0	
020-040	6.0	2.8	8.2	3.5	5.9	2.3	5.4	
050-070	3.2	3.6	3.9	2.9	3.4	3.5	3.6	
080-100(E)	2.8	6.4	2.9	4.6	2.6	6.0	2.5	
110-130	3.2	7.3	2.8	7.8	2.8	7.3	3.0	
140-160	5.1	12.9	4.2	12.9	5.1	14.7	4.1	1
170-190(S)	8.1	12.3	8.0	12.4	7.4	14.3	7.0	1
200-220	6.5	4.2	6.2	3.4	7.1	4.2	6.3	
230-250	5.0	4.7	3.8	3.4	3.9	3.0	3.4	

260-280(W)	5.0	7.1	4.5	6.1	3.9	5.1	3.0
290-310	5.7	9.5	5.2	9.0	4.7	6.9	4.2
320-340	5.7	8.1	6.3	8.9	6.1	7.7	4.8
CALM		17.1		20.3		21.4	2

1 PERIOD OF RECORD: MAY 1960 - APRIL 1990

CLIMATOLOGICAL DATA FOR
DUGWAY PROVING GROUNDS, UTAH1
TEMPERATURE AND PRECIPITATION
TABLE 4-2

Month	Temperature		Precipitation
	Average Minimum (F)	Average Maximum (F)	Average (Inches)
January	16	37	0.50
February	23	45	0.56
March	29	53	0.75
April	36	63	0.74
May	44	73	0.96
June	54	85	0.48
July	62	95	0.52
August	60	91	0.59
September	49	81	0.60
October	37	67	0.69
November	26	50	0.55
December	18	39	0.57
Average	38	65	
Annual Total			7.24

1 PERIOD OF RECORD: SEPTEMBER 1950 - MAY 1992

4.5 Ecology

The information provided for this site was compiled from the U. S. Fish and Wildlife Service and the State of Utah Department of Natural Resources, Division of Wildlife Resources.

The following federal and state listed endangered species may occur in the areas of interest. They include: Bald eagle (Haliaeetus leucephalus) and peregrine falcon (Falco peregrinus). In addition, there are four species that are federal candidates for official listing as threatened or endangered. Candidate species which may occur in the area are: Ferruginous hawk (Buteo regalis), white faced ibis (Plegadis chihi), loggerhead shrike (Lanius ludovicianus), and western snowy plover (Charadrius alexandrinus nivosus).

No additional information on the occurrence of rare or endangered species or natural communities is known at this time. This does not mean that other state or federauy-listed species may not be present within the areas of interest. An on site inspection by appropriate state and federal personnel may be necessary to verify the presence, absence or location of listed species, or natural communities if remedial action is recommended as part of the final ASR.


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5.0 Real Estate

5.1 DOD Ownership

The DOD does not appear to have formerly had a completely clear title (owned or leased) on the **Yellow Jacket Ranges.** According to information gathered by Carl Jorgenson (Interview-Appendix E), all of the mine claim areas once used as test areas in the Dugway Mountain Range were under the control of one family, the Cannon family. Representatives of this family have held patented mine claims and/or subleased the mining properties to other individuals or corporations. Permission to use these mines for Project Sphinx was likely through a verbal agreement between the owner and the government. The rectangular section of land immediately west of the DPG Southern Triangle area and bordering immediately on DPG is erroneously identified in the INPR (draft) as the Yellow Jacket Ranges. However, although concatenation is certainly possible in the buffer zone, the actual area of concern is in the northern Dugway Mountain Range, south of the area previously addressed in the INPR (Draft). This stretch of land likely is under the jurisdiction of the Bureau of Land Management, and does serve as a buffer for activities on the DPG installation. It is possible the present ownership of the buffer is under the cooperative joint-use agreement instituted between DPG and BLM.

5.2 Present Ownership

Present ownership is not determined at this time; but is understood to involve active mine claims with the Cannon families still maintaining control or leasing the property. The Bureau of land Management likely controls much of the land in the vicinity of the mines used for project Sphinx.

5.3 Significant Past Ownership other than DOD

The significant property owners have been the Bureau of Land Management and the subsequent mining grants.

6.0 OEW/CWM Site Analysis

6.1 Historical Summga of OEW/CWM Activities

6. 1.1 General

The **Yellow Jacket Ranges** were used in the 1940's as part of Project Sphinx which tested chemical munitions against cave type fortifications. It appears that all of the mine claim areas used as test areas in the Dugway Mountain Range were owned by one family and the permission to use these areas was a verbal agreement between the owner and the government. Three different mine areas were used as part of the test. The largest number of tests were conducted at the Yellow Jacket Mines which consisted of ten separate mines located in one valley area. Tests were also conducted at the Great Western Mines and at Old Ironsides Mine. See Map M-4 for locations of mine claims. No specific boundaries of the test areas have been provided, and the targets may have overlapped more than one mine claim. Additionally, short or long rounds would have impacted outside of the immediate target areas. Short and long rounds are of a specific concern because munitions from these tests have been recovered outside what is considered the test area.

6.1.2

Records of CWM activities in these areas are limited to the Project Sphinx tests recorded in *A Memorandum Leport on Attack Against Cave-Type Fortifications* (Appendix C2. 1). The following is a list of tests conducted at each mine area as part of the project.

Yellow Jacket Mines

Test No.	Munitions	No. Rounds
N16-11	7.2in Rocket CG-fill	144
N16-12	4.2in Mortar CG-fill	480
N16-14	4.2in Mortar CG-fifl	480
N16-15	M79 1,000 lb Bomb CG-fill (static fired)	18
N16-16	M79 Bomb AC-fiR	18
N16-17	4.2in Mortar CG-fiU	1200
N16-22	M33 Spray Tank AC-flU (dropped)	6
N16-24	M33 Spray Tank AC-fill (dropped)	8
P34-1	M47 100 lb Bomb H-fifl (static fired)	88
P34-3	M33 Spray Tank H-fill (sprayed)	4
P34-7	M33 Spray Tank H-flfl (dropped)	6
21	M47 Bomb AVGAS-fffl (static fired)	*150*
22	M47 Bomb Butane-flU (static fired)	*150*
26	165 gal Tank gasoline-fir	12
27	M47 Bomb Napalm-gasoline fill	120
28	165 gal Tank Napalm-fill	6
29	165 gal Tank Napalm-fdl	6
31	165 gal Tank Napalm-flU	8
33	7.2in Rocket PT Jell fill	44

Great Western Mine

N16-20	105mm Howitzer CG-fiU	26
P34-5	105mm Howitzer H-fdl	28
P34-8	F7A2 Thermal Generator HD-fdl (6 lb agent)	1

Old Ironsides Mine

P34-13	F7A2Ibermal Generator HD-flU (6 lb agent)	1

Other tests in this series were conducted against Camels Back Caves located on DPG.

Conversations with the DPG Safety Office and with the DPG EOD section indicate that numerous incidents have occurred in the past where explosive and munitions residue has been recovered. In 1982 a complete bomb was reported to the EOD section. During the course of the incident, two 1,000 pound chemical bombs were recovered. One was cracked and no agent could be detected. This item was destroyed by detonation. The second item was intact and still contained its chemical agent filler. This item was transported to DPG and is still in storage at this site. Initially, it was assumed that this item had an AC fill based upon the following factors: the weight of the item, amount of fill showing in X-rays, and the fact that AC bombs of this size were dropped on the Yellow Jacket mines located not far from the incident site. Later a PINS test was conducted which indicates that the item has a mustard agent fill. This is significant because if the item has an AC fill, it landed relatively near the target area (although not in the target area). If the item is mustard filled, then it was, most likely, one of the series dropped on the Rising Sun Grid and it is representative of a considerable targeting error. This would significantly suggest an expanded area of potential chemical munitions contamination.

6.1.3 OEW Activities

No specific records have been uncovered dealing with conventional munitions use in this area. However, Mr. Jorgenson stated that he remembers one incident occurred that an 11.75 in. rocket with a live warhead was recovered in the Dugway range in the vicinity of the **Yellow Jacket Ranges.** This indicates tests were conducted in these areas which were either undocumented or the documents have not yet been uncovered. Between this type of munitions and explosive residue from chemical rounds, these mine areas must be considered potentially contaminated with OEW.

6.2 Records Review

The plan of action for the records search was to investigate regional and local archives and records centers due to their ease of access. This was followed by research at the national level.

1. National Archives and Records Agency, Suitland Facility, Suitland, MD

RG 77 - Records of the Office of the Chief of Engineers. No informat found.

RG 175 - Records of the Chemical Warfare Service. No information fou

RG 121 - Records of the Public Buildings Service. No information fou

RG 270 - Records of the War Assets Administration. No information fo

RG 338 - Records of US Army Commands. General Dugway information.

2. Washington National Records Center, Suitland, MD.

RG 121 - Records of the Public Buildings Service. No information fou

3. National Personnel Records Center, St. Louis, MO

RG 338 - Records of the United States Army Commands. Only general background information found.

RG 342 - Records of US Air Force Commands, Activities, and Organizati No information found.

4. National Archives - Rocky Mountain Region, Denver, CO

RG 77 - Records of the Office of the Chief of Engineers. No informat found.

RG 121 - Records of the Public Buildings Service. No information fou

RG 269 - Records of the General Services Administration. No informat found.

RG 270 - Records of the War Assets Administration. No information fo

RG 291 - Records of the Property Management and Disposal Service. No information found.

5. Federal Records Center, Denver, CO

RG 121 - Records of the Public Buildings Service. No information fou

RG 291 - Records of the Property Management and Disposal Service. No information found.

6. National Archives Great Lakes Region, Chicago, IL

RG 270 - Records of the War Assets Administration. No information fo

7. National Archives Centml Plains Region, Kansas City, MO

RG 77 - Records of the Office of the Chief of Engineers. No informat found.

RG 121 - Records of the Public Buildings Administration. No informat found.

RG 270 - Records of the War Assets Administration. No information fo

RG 291 - Records of the Property Management and Disposal Service. No information found.

8. Federal Records Center, Kansas City, MO

RG 77 - Records of the Office of the Chief of Engineers. No informat found.

RG 121 - Records of the Public Buildings Service. No information fou

RG 291 - Records of the Property Management and Disposal Service. No information found.

9. U. S Air Force I-Estorical Research Center, Maxwell AFB, AL
No information found.

10. U. S. Army Military History Institute, Carlisle Barracks, PA
No information found.

11. Edgewood Historical Office, Edgewood Area, Aberdeen Proving Grounds, MD.
General information only.

12. Dugway Proving Grounds, UT

Information of Real Estate history and project test reports on test conducted on the site. Also general background information.

6.3 Summary of Interviews

Appendix E contains a listing of telephone conversations and interviews. Interviews with EOD personnel associated with Dugway indicate that the area is heavily contaminated with munitions residue with occasional explosive components and complete rounds being periodically recovered.

Corps of Engineers personnel from the Sacramento and St. Louis Districts have conducted conversations with the following individuals:

6.3.1 Sacramento District Record Conversations

Martin Pendlev of DPG Engineering provided these contacts:

Zip Zerek (retired), Dave Young (Range Control), Jim Keetch (former Test Officer now at Lockheed), Ron Nelson (current Test Officer), Nfitch Rice, and Will Taylor (retired).

Sergeant First Class Donald 'fburson-DPG EOD Detachment-Ditto Area, stated that past clearance for DPG was limited to visual/on-line search. This did not include the South Triangle or **Yellow Jacket Ranges**, since no rounds had been intentionally fired into the area. Yet he would not rule out the possibility of ordnance existing in these areas due to misfires intended for the White Sage Impact range located northeast of the South Triangle.

Through interviewing three of the points of contact (combined years of experience equalling 30 years), it can be summarized that, to the best of their knowledge, there were no reports of recovery (ordnance) or overshoots in the South Triangle Area.

Sonny Dewel-DPG Base OPS stated the Utah National Guard used to set up at Simpson's Springs located to the east of the South Triangle and fire into the area. Sonny found some small diameter projectiles in the Old River Stream bed (reported to the base and recovered). Sonny used to grow sheep within the South Triangle area until approximately twelve years ago. Aside from the above, no ordnance has been found.

6.3.2 Saint Louis District-Record Conversations

St. Louis District contacted a number of individuals associated with past and present activities at the Dugway installation. These individuals included Carl Jorgenson, Environmental Program Office, Dugway Proving Grounds; Melynda Petri Affairs Office, Dugway Proving Grounds; MSG Parrish, 62d EOD, Ft. Douglas, UT; SSG Pruitt, Dugway EOD Detachment SGM Eberhardt,Tech Escort, Edgewood Arsenal, MD; and Jim Keatch (General information on the Dugway installation).

Carl Jorgenson furnished the following additional list of individuals for possible future contact:

Frank Massaro, Dugway (from Cecil Echerd), Phone 801-522-5241

Don Falconer, who was at Detrick and Dugway during World War U, 301-663-0115

6.4 Site Inspection

On 21 September 1993 the site inspection of the YeRow Jacket Ranges, Old Ironsides Mine, and Great Western Mine was conducted. First, the team examined the Yellow Jacket Mine area which is located in a small valley. Yellow Jacket contains ten small mines, and the team examined the areas around each mine and the ridge line of the valley containing the mines. A large amount of munitions residue was observed, and one item which may have contained explosives was later reported to the base EOD section. The team also visited the Old Ironsides Mine area, but performed no sweep of the immediate area due to the fact that only a thermal generator was tested in this position.

The team was unable to identify the Great Western Mine where the chemical tests took place. There are several mines listed under the name Great Western and the team investigated several potential sites. None of these sites exactly matched information from the Project Sphinx report. The team did find some craters in the valley just east of the Yellow Jacket Mines FUDS. These craters appeared to have been used as demolition pits to dispose of ordnance or residue. The Great Western Mine site was the only site where a 105mm Howitzer was used. However, no 105mm projectile residue was identified at any surveyed site. Photographs of the sites visited are presented in Appendix G.

7.0 Site Evaluation

Interviews with the DPG Safety Office, the DPG EOD section, and other DPG

staff indicate that numerous past incidents have occurred at **Yellow Jacket Ranges** and vicinity where explosive and munitions residue have been recovered. In 1982 a complete bomb was reported to the EOD section. During the course of the incident, two 1,000 pound chemical bombs were recovered. One bomb, which was cracked and no agent could be detected, was subsequently destroyed by detonation. The second item was intact and still contained its chemical agent filler. This bomb was transported to DPG and is still in storage at this site. A PINS test indicated that the item was filled with mustard agent, rather than the expected AC chemical agent. An evaluation of the munitions is significant, because if the item has an AC fill, it landed relatively near the target area (although not in the target area); but if the bomb contains mustard agent, then it was, most likely, one of the series dropped on the Rising Sun Target Grid. It appears to be representative incident of considerable targeting error, and significantly suggests an expanded area for potential chemical munitions contamination. Appendix I presents the Risk Assessment Code for the FUDS.

No specific records have been uncovered dealing with conventional munitions use in the **Yellow Jacket Ranges** FUDS. However, DPG staff remember that a incident involved the recovery of an 11.75 in. rocket with a live warhead in the Dugway Mountain Range. This is a strong indication that past tests were conducted involving conventional OEW in this area which were either undocumented or the documents have not yet been uncovered.

The extensive past testing associated with Project Sphinx in the Dugway Mountain mining region is listed in paragraph 6.1.2 CWM Activities, above. The site should be considered potentially hazardous from any of the munitions listed therein.

Based upon these archive search findings, the actual documented past incidents involving both conventional OEW and CWM, and actual site visits during which surface explosive residue from chemical rounds were clearly detected, it is highly probable these mine areas are potentially contaminated with dangerous, hazardous OEW (CWM). Recommendations and Conclusions are provided in the companion Executive Summary to these Findings.


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2.1 Tierrasanta Community

Management Plans/Work Plans

for

Tierrasanta Community

at

San Diego, California

next 9 hypertext link

Go Back to the EE/CA Main Report Page.

1.0 EXECUTIVE SUMMARY

This feasibility study was conducted under contract DACA 87-86-C-0116 to determine the extent and magnitude of ordnance contamination in the Tierrasanta Community, formerly a part of Camp Elliott, San Diego, California; and to determine and critically evaluate remedial action alternatives to address the unexploded ordnance and related debris contamination caused by previous DOD related activities (Figure 1-1). In compliance with the National Environmental Policy Act, an Environmental Impact Statement has been prepared and is included as Appendix A.

The project team consisted of private contractors: The DeYoung-Johnson Group, Inc. (DJG), Williamsburg, Virginia; UXB International, Inc. (UXB), Fairfax, Virginia; and Dynamic Systems, Inc. (DSI), Reston, Virginia; assisted by and in coordination with the U.S. Army Corps of Engineers, Huntsville Division, Huntsville, Alabama; and the Los Angeles District Corps of Engineers, Los Angeles, California.

The following summarizes the results of the feasibility study:

1.1 ORDNANCE CONTAMINATION LEVELS

The project area includes 1897 acres of remaining open space. Based on an analysis of existing records, reports of previous clearance operations, and a statistical survey of randomly selected sites within the project area, ordnance contamination ranges from .28 to 29.3 items per acre on the surface and 3.0 to 90.7 items per acre in the subsurface. Approximately 87% of the ordnance contamination lies within 6 inches of the surface and 94% lies within 12 inches of the surface. Approximately 1% of the ordnance contamination constitutes a potentially explosive hazard. Ordnance items and debris consist of a wide range of World War II and Korean War weaponry from .22 caliber small arms to 155 mm howitzer rounds.

1.2 REMEDIAL ACTION ALTERNATIVES

Remedial action alternatives that were considered included both ordnance clearance and nonordnance clearance alternatives.

Ordnance clearance alternatives included: the use of electromagnetic ordnance locators in conjunction with removal of heavy brush by either manually cutting or by controlled burning; and surface visual sweeps leaving all brush in place. The heavy brush found throughout much of the project area will be a factor in the implementation and effectiveness of an ordnance clearance effort.

Nonordnance clearance alternatives included: the re-acquisition of portions of the project area by the U.S. Government; the limitation of certain types of development or zoning restrictions within an area; and restriction of an area through the use of fencing or signs.

A No Action alternative was also considered.

1.3 PREFERRED ALTERNATIVES

It was apparent that no single alternative was appropriate for the entire project area. To facilitate comparison and analysis of alternatives, the open space within the project area was divided into sub-areas based either on present use, projected future use or physical characteristics. Preferred alternatives are recommended for each sub-area.

Present or projected future land uses that are major influences in remedial action alternatives are: the proposed construction of State Rt. 52 across a portion of the project area and extending from Interstate 15 to Santee; the development of Tierrasanta Norte in the northern section of the community; the construction of the Regency Hill (La Mirage) development to the south; and the development of Mission Trails Park to the east.

Preferred alternatives for each sub-area are:

- Sub-Area A: For the 167 acres adjacent to the Naval Air Station Miramar in the north the preferred alternative is re-acquisition by the U.S. Government.

- Sub-Area B: For the 85 acres within the proposed State Route 52 right-of-way the preferred alternative is fencing along the southern right-of-way line. This will effectively isolate both Sub-Area A and Sub-Area B from the rest of Tierrasanta to the south.

- Sub-Area C: Sub-Area C is the proposed Tierrasanta Norte residential development (approximately 358 acres). Because development has started two separate actions are recommended. In areas that will remain as permanent open space (approximately 75 acres) the preferred alternative is ordnance clearance sweeps using electromagnetic ordnance locators after selective manual removal of vegetation. The preferred alternative for the remaining area is ordnance clearance sweeps using electromagnetic ordnance locators after the developer has completed clearing, grubbing and grading operations.

- Sub-Area D: Sub-Area D is the proposed Regency Hill (La Mirage) residential development in the southern tip of the project (58 acres). Because of previous grading, filling, and earthwork and because the area is not thought to be an ordnance impact area, two separate actions are recommended for various portions of this area. The graded portion which is currently being developed is not thought to contain ordnance contamination and therefore, No Action is the preferred alternative. Approximately 23 acres, which surround the developing area and form the faces for the mesa, could contain ordnance contamination. Clearance using electromagnetic ordnance locators is the preferred alternative, without brush removal.

- Sub-Area E: Sub-Area E is approximately 454 acres of undeveloped land along the eastern boundary of the project area, proposed as a

portion of the City of San Diego Mission Trails Park. Approximately one half of this area (209 acres) is presently owned by the U.S. Navy and is not eligible for funding under the DERP formerly used defense sites program. The remaining 245 acres is owned by the City of San Diego. Three (3) separate actions are recommended for various portions of this area. Approximately 56 acres within the sub-area was burned during a controlled burn in 1982 and is mostly grass covered. Clearance using electromagnetic ordnance locators is the preferred alternative here, without a need for brush removal. The preferred alternative for the remainder of Sub-Area E is ordnance clearance using electromagnetic ordnance locators after brush removal using both manual cutting and removal (129 acres) and controlled burning (60 acres).

- Sub-Area F: Sub-Area F is actually a number of smaller areas totalling 774 acres of remaining open space in the canyons adjacent to developed residential or commercial areas. The preferred alternative for Sub-Area F is ordnance clearance using electromagnetic ordnance locators after selective removal of heavy brush by manual cutting and removal. Controlled burning is not recommended for Sub-Area F.

1.4 OTHER ACTION

In addition to the listed preferred alternatives, several other actions should be considered for implementation. Ordnance clearance alternatives also should provide for a three (3) year follow-up ordnance survey plan to be implemented in one (1) year increments after completion of the initial clearance alternative. Data from the first year survey would be used to monitor and verify the effectiveness of the implemented alternative and enable the U.S. Army Corps of Engineers to determine the need for additional survey sweeps. If additional survey sweeps were conducted the results would be evaluated by the U.S. Army Corps of Engineers to determine a need for additional action.

2.6.4 EXISTING LAND USE

Slightly less than half of the remaining open space within the project area (774.83 acres) is set aside as permanent open space for the community. The balance of the open space is either privately owned and under development or is publicly owned and planned for specific uses.

A large area (approximately 358 acres) is proposed for the Tierrasanta Norte residential development near the upper central section of the project. This project is being developed by the Lusk Company and will contain approximately 2000 single family and multi-family units. This project has been approved by the City of San Diego and is scheduled to begin in 1987.

A smaller development, Regency Hill (La Mirage), consists of approximately 58 acres and rests on a hilltop at the extreme southern tip of the project area. Most earthwork has been completed in this development and there are extensive cut and fill sections. Improvements are in place including roads and streets with curb and gutter, water and sewer lines, power and street lights.

An extension of State Highway Route 52 is presently under construction from Interstate 15 to the northern end of Santo Road. Construction will terminate at that point but plans are presently under way for the extension to continue toward the east, past the projected end of Jackson Drive and beyond the northern end of Fortuna Mountain. The schedule for this construction is tentative and could be 10 to 15 years from completion. Once completed, Route 52 will effectively sever the lands north of the highway from the rest of the Tierrasanta community.

Part of the open space along the eastern boundary of the project area is included in the planned City of San Diego Mission Trails Park.

TABLE 2-1

ACCESS POINTS USED DURING AREA INSPECTION

1. The northern terminus of Santo Road.
2. The northern terminus of Via Valarta (graded but not paved).
3. The eastern terminus of Antiqua Boulevard into Tierrasanta Norte.
4. Entrance into the Greenbelt Park jogging trail at Santo Road.
5. Dirt road off Via Valarta to area north and east of Villa Vista.
6. Entrance to dirt trail on Government property at northern end of Villa Dominique.
7. Trail at the western end of Promesa Drive.
8. Eastern terminus of Clairement Mesa Boulevard.
9. Entrance to dirt trails where power lines cross Calle de Vida Drive.
10. Entrance to dirt trail where power lines cross Tierrasanta Boulevard near the entrance to Eldorado Hills.
11. Trail at southern end of La Cuenta.
12. Southern end of Santo Road east of Murphy Canyon Navy Housing.
13. Southern tip of Santo Road entrance into Regency Hill Development.

2.6.8.2 Types of Vegetation: Vegetation within the project area ranges from sparse annual grasses to dense, thorny brush, including coastal sage and chaparral. Larger trees and shrubs and some large cacti are present in the canyons. In and adjacent to developed areas there are some stands of eucalyptus trees. For this project, three types of vegetation were defined based upon their effects upon clearance efforts.

- Clear: This type refers to areas where the vegetation is low and/or sparse such that the use of hand-held electromagnetic equipment is not impeded and where the ground is clearly visible. This type of vegetation was a small percentage of the total project area and was generally in an area previously disturbed by construction or development.

- Grassy/Brushy: This type refers to areas where vegetation includes grasses and low brush that is thick enough and tall enough to impair visual location of items on the ground during a visual search. In these areas, the grass would have to be manually moved aside in a visual surface search. Grassy/Brushy vegetation is not thick enough or tall enough to seriously impede walking or the use of hand-held electromagnetic detection equipment.

- Brush/Trees: This type refers to areas where the vegetation is thick enough and tall enough to make walking and the use of hand-held electromagnetic detection extremely difficult. Removal of vegetation from areas within this classification may be required before any effective clearance effort can be conducted.

2.6.8.3 Slopes and Topography: Three degrees of slope have been defined for this project:

- Level: Includes slopes from 0 degrees up to 10 degrees.

dependent on the size of the item versus its depth and on the experience of the operator. In general terms, the Mk 26 will easily detect a 60 mm projectile to a depth of 2 feet and a 155 mm projectile to 7 feet.

The EOD technician, using the Mk 26, searched along one side of the grid line for subsurface contamination. When a contact was found, the laborer checked with his hand to determine if the contact was on or just below the surface. If the contact was buried, the EOD technician continued to test the spot with the locator until the laborer was able to dig up the contact. All excavations were accomplished by hand or with hand tools and in accordance with standard EOD procedures. An EOD technician was present to ensure safety and to verify all excavations. The items were then recorded on the survey grid data sheets.

After a contact was excavated, the EOD technician continued the search along the grid line. At the end of the grid line, the team turned and swept the other side of the grid line.

Potentially explosive items were marked and taken to a designated pickup point within the project area. The 70th EOD Detachment of the U.S. Army was called to pick up and dispose of these items.

2.7.3 DATA COLLECTION

A survey grid data sheet was used to record sample and special operation data. The data was collected on these sheets and electronically transmitted to DSI headquarters for analysis.

2.7.4 COMPLETED SURVEY SUMMARY

A total of 185 surface and subsurface grids were surveyed during the on-site survey period. Of these sites, 184 locations were randomly selected using the procedure described in paragraph 2.7.1.1. In addition, 1 one-acre grid

site was surveyed within an approximate 5 acres that had recently burned on the hillside just east of the Murphy Canyon Navy Housing in Sub-Area F to obtain information for comparison to uncleared areas. This grid site was designated "Burn 1".

2.7.4.1 Survey Grid Configuration

Grid configurations were standardized to the extent possible. A number of grids were reconfigured by the survey coordinator based on conditions at the actual grid location.

2.7.5 PROBLEMS ENCOUNTERED

2.7.5.1 Personnel

Approximately 25 local laborers were hired during the Camp Elliott survey operation. This high number was needed to sustain a full work force of 7 men during the first 3 weeks and 11 men during the last week. The most significant personnel problem was that laborers failed to report to work after their first few days on the job.

2.7.5.2 Terrain and Ground Cover

A large percentage of the survey grids were in steep terrain with thick ground cover, consisting of tall (matted down) grass, scrub brush, or thick, tall brush.

During the survey, significant degradation of capability to locate surface ordnance items visually occurred in terrain types 2, 3, 5, 6, 8, and 9. In addition, within terrain types 3, 6, and 9, the ground cover seriously impeded the ability of the Mk 26 ordnance locator operator to conduct his

survey. In fact, portions of a number of grids were not surveyed because the teams could not physically penetrate the thick brush. It is felt that this degradation in capability would also apply to any clearance operation.

2.7.5.3 Equipment

Except in areas where the brush was so tall and thick that it impeded passage, the MK 26 locator proved very effective in detecting surface ordnance items hidden under grass as well as subsurface items.

In contrast, a Geometrics 866 Magnetometer, used for comparison purposes early in the survey, was found to be totally ineffective in the project area. This was attributed to the high sensitivity of the system coupled with a high level of background magnetism in the area.

2.7.5.4 Weather

Weather was not a significant factor during the survey. Operations had to be suspended for a half day following a heavy rain that caused the steep hills to become too slippery to traverse and made excavation of subsurface contacts nearly impossible because wet soil stuck to the excavation tools.

2.7.6 SURVEY RESULTS

The results of the ordnance survey, including observed/estimated levels and types of contamination, estimated sweep rates, and estimated sweep effectiveness, will be discussed in this section.

2.7.6.1 Levels of Contamination

Based on the actual contamination found during the survey, estimates of overall contamination are discussed in the following paragraphs. The entire project area is discussed first, followed by a discussion of each sub-area. The contamination levels for each sub-area and the total area are the average of the observed levels from survey grids within the sub-area or total area. When ordnance-related contamination is discussed, it is important to understand that the ordnance-related levels include any man-made, metallic items, regardless of size or vintage, which is or could be perceived to be of explosive or military origin. Figure 2-12 shows the survey grids where ordnance-related contamination was found during the survey.

2.7.6.1.1 Observed Surface Contamination

Two methods were used to measure surface contamination. First, a visual search by a line-abreast team backed up by an EOD-qualified supervisor was performed. Then, a subsurface search was conducted on a portion of the same area using a Mk 26 ordnance locator. The Mk 26 was operated by an experienced technician assisted by a laborer. The Mk 26 ordnance locator team found many items on the surface that had been missed by the visual search team, primarily because of widespread, thick grass cover.

Table 2-4 displays the numbers of ordnance-related, nonordnance-related, and total items located on the surface visually, by the Mk 26 locator in each sub-area, and in the total area.

In terms of items located per acre over the total area, the average density was 28.1 items per acre.

TABLE 2-4

SURFACE CONTAMINATION ITEM COUNTS

SUBAREA	GRIDS SURVEYD *	ORDNANCE-RELATED		NONORDNANCE-RELATED		TOTAL		GRAND TOTAL ***
		VISUAL **	LOCATOR	VISUAL	LOCATOR ***	VISUAL **	LOCATOR ***	
A	21	146	13	1	14	147	27	174
B	9	5	0	0	5	5	5	10
C	37	617	78	0	61	617	139	756
E	27	242	4	3	27	245	31	276
F	91	211	25	8	252	219	277	496
TOTAL	184	1221	120	12	359	1233	479	1712

* Excludes Burn 1

** Excludes Burn 1 data

*** Excludes Rocks and Burn 1 data

Note: Sub-Area D not surveyed.

2.7.6.1.2 Observed Subsurface Contamination

Subsurface contamination was measured using a Mk 26 ordnance locator operated by an experienced EOD technician. The operator was assisted by a laborer with excavation tools. Table 2-5 below shows the subsurface items located during the survey.

Throughout the undeveloped areas of the project site, the density of subsurface man-made contacts averaged 43.0 items per acre.

TABLE 2-5

SUBSURFACE CONTAMINATION ITEM COUNTS

SUB-AREA	GRIDS SURVEYED	ORDNANCE-RELATED	NONORDNANCE-RELATED	TOTAL
A	21	46	13	59
B	9	45	9	54
C	37	318	64	382
E	26	9	11	20
F	90*	103	170*	273*
TOTAL	183*	521	267*	788*

*Excludes Burn 1 and Grid 193 (Grid 193 was excluded because a gas line, traversing the area, generated misleading locator contacts).

Note: Sub-Area D not surveyed.

2.7.6.2.4 Comparison of Search Rate With Other Survey/Clearance Operations

To reduce the variability in the clearance rates realized during any one range clearance operation, as many factors as possible that affect clearance rate must be controlled. Where factors cannot be controlled (e.g., the number of sample grids at Camp Elliott covered with grass and bushes), the data collection system must include provisions to record all conditions at each sample grid. Failure to record all relevant conditions at each sample grid makes comparison of data from different clearance operations difficult and makes predictions of required levels of effort for future clearance operations highly speculative.

With these caveats in mind, clearance rates from four prior clearance operations have been compared with surface visual clearance rates from Camp Elliott in Table 2-9. In addition to the clearance rates, two other important factors for each operation are listed: contamination density and terrain type.

TABLE 2-9

COMPARISON OF SURFACE CLEARANCE RATES FROM DIFFERENT RANGES

RANGE	CONTAMINATION DENSITY (I/A)		TERRAIN	MAN-HOURS/ACRE		
	MINIMUM	MAXIMUM		MIN.	AVG.	MAX.
ELLIOTT Random Grids Visual	0	178	Hilly/ Bushy	1.05	3.27	10.85
CUDDEBACK Effectiveness Grids	575	10,119	Flat/ Sand	1.30	3.24	13.75
Random Grids w/o subsurf.	0	1,500	Flat/ Sand	5.15	10.74	22.36
KAHOOLAWE	3.1	17.7	Rocky/ Bushy & Grassy/ Valley	5.00	5.98	9.09
PUTNAM	5.6	724	Flat/ Clay	2.80	7.80	75.27

The significance of the rates presented lies mainly in their value for predicting the time and manpower it will take to clear some new range. Note the considerable variability between the maximum and minimum rates reported. Yet, note that the average clearance rates were similar for Camp Elliott, Cuddeback (effectiveness grids), and, to some extent, Kahoolawe. Also note the reported contamination density levels and terrains. Although these seem to influence surface clearance rates considerably at some ranges, no effect could be detected at Camp Elliott, except as described in paragraph 2.7.6.2.1.

During the 1984 and 1985 U.S. Navy surface clearance operations, 31.36 and 33.03 man-hours per acre, respectively, were reported for clearance. Analysis of the reports reveals several factors that preclude a reasonable comparison between these reported search rates and those observed during the 1986 survey. The most significant of these factors is that transient travel time between a central mustering point to the work site is included. Also, it is suspected that rest periods, lunch breaks, etc. are also included. In contrast, the 1986 survey data search rate included only the elapsed time taken by the search team in the actual survey grid.

2.7.6.3 Search Effectiveness

The ordnance survey was not designed to determine the estimated clearance effectiveness that could be expected in any future clearance. This estimate is, however, considered an essential element in the analysis of alternatives for the Camp Elliott project and is briefly discussed in the following paragraphs.

2.7.6.3.1 Surface Visual Search Effectiveness

As indicated in the terrain mapping, a large portion of the project area was covered with thick grass and dense brush. Visual detection of surface items was severely impeded by this type of ground cover. Also, a number of items were located on the surface with the Mk 26 ordnance locator in areas that had

been visually searched. Based on these facts and the collective range clearance experience of the DSI and UXB personnel involved in the survey, the projected actual surface search effectiveness, expressed as the probability that an item on the surface will be visually detected on the first pass over an area, will range between 20% and 35%, depending on the density of the grass or brush.

2.7.6.3.2 Subsurface Electromagnetic Search Effectiveness

The Mk 26 ordnance locator is designed to find large ferrous items subsurface. Experience supports an estimate of approximately 95% probability of detection for a single pass. This probability of detection has been attained in terrain where the operator has the ability to easily position the locator probe. However, much of the surface in the Camp Elliott project area is covered with thick grass and dense brush that inhibits the operator from proper probe positioning. In addition, a relatively high magnetic background in the Project Area leads to a higher false contact rate. Despite the capability of the Mk 26 to dampen or screen out geodetic interference, the Mk 26 operator must be highly trained to reduce false contacts. Based on these factors and on the range clearance experience of the UXB Mk 26 operators used during the survey, a conservative level of effectiveness range that could be reasonably expected to be attained during clearance of the project area is displayed by terrain type in Table 2-10.

TABLE 2-10

ESTIMATED LEVELS OF EFFECTIVENESS PER TERRAIN TYPE

Terrain Type	Percent of Terrain Type Within Project Area	Estimated Level of Effectiveness Without Vegetation Clearance (Percent)
1	5	90%-95%
2	4	85%-95%
3	6	65%-75%
4	1	80%-85%
5	13	70%-75%
6	18	50%-65%
7	1	75%-80%
8	3	65%-75%
9	49	45%-50%

Given the acreage percentage and the estimated level of effectiveness for each terrain type, the projected subsurface search effectiveness that we believe could be attained over the entire area without brush removal or other preparation ranges between 50% and 65%. The results of data from a special grid in Burn 1 reflect an improvement of 55% for surface and 39% for combined surface/subsurface in the time required to survey the area. Although not quantified, an increase in visual and locator detection effectiveness could also be expected in some portion of all sub-areas if the dense grass and brush were burned or removed before the start of a clearance operation. Manual removal of some or all of the heavy brush in the project area would improve the ability of the ordnance locator operator to maneuver and correctly position the locator probe. It is believed that this pre-clearance preparation also would improve the overall effectiveness of the clearance and reduce the time/cost required to complete the effort. For example, if a manual brush removal effort were initiated in terrain classified as type 3, 6 or 9 that reduced the brush density to a level such that the terrain type could then be classified as type 2, 5, or 8, the projected effectiveness of the subsurface search effort would improve from a range of 40 to 50% to a range of approximately 70 to 75%.

2.7.6.3.3 Comparison of Search Effectiveness with Other Survey/Clearance Operations

Considering the caveats discussed in paragraph 2.7.6.2.4, once again, surface effectiveness probabilities from two prior survey/clearance operations are compared with those estimated for the Camp Elliott survey. They are shown in Table 2-11.

TABLE 2-11

COMPARISON OF SURFACE CLEARANCE EFFECTIVENESS FROM DIFFERENT RANGES

RANGE	CONTAMINATION DENSITY (I/A)	TERRAIN	SEARCHER SPACING INTERVAL (FT)	AVERAGE SEARCH EFFECTIVENESS (PROBABILITY)
ELLIOTT Random Grids Visual	28.1	Hilly/ Bushy	5-6	.2 - .35
CUDDEBACK Effectiveness Grids	3027 10220	Flat/ Sand	21 5	.79 .89
KAHOOLAWE	30.0 38.6	Open	22 12	.84 .89
	3.1 7.4	Rocky/ Bushy	6 3	.74 .77
	17.7	Grassy/ Valley	3	.52

Besides the differences among the different operations evident from the table, i.e., terrain and contamination, the effectiveness measures at Kahoolawe were obtained by seeding test areas with representative ordnance scrap. Effectiveness was then measured as the percentage of seeded items that were recovered by the searchers on a single pass over each test area. At Cuddeback, the effectiveness was derived by making multiple passes over the same area (4 passes). The first pass effectiveness was completed as the percentage of all contamination recovered.

From paragraph 2.6.8.4, the terrain type that most closely approaches that encountered at Camp Elliott is the grassy/valley designation at Kahoolawe. There is however, no meaningful basis for comparison because the severity of terrain/ground cover at Camp Elliott is significantly worse than this designation. Accordingly, the conservative estimate made by the project team is believed to be justifiable.

During the 1984 and 1985 U.S. Navy clearance operations, SEP was reported as 70.00% and 90.11%, respectively. These measures were derived by seeding the search area and measuring the first pass success rate in locating the seeded items. In comparing these numbers with the project team estimates of effectiveness, two major factors must be considered. First, the procedure of seeding an area as a valid measure of clearance effectiveness is questionable because the seeded item would not have been subjected to the effects of overgrowth, erosion, etc. and in some terrain the placement of the item would leave evidence as to its location. Secondly, the question of item definition, i.e., what constitutes an ordnance item, comes into play. The seeded items in the 1984 and 1985 clearance sweeps were reported to consist of primarily ordnance rounds (37 mm projectiles, 75 mm APC, 81 mm mortars, and various projectile fuses). Location of these types of ordnance items on the surface is considerably more probable than the location of a projectile fragment. For these reasons, once again, the conservative team estimate is considered warranted for planning purposes.

2.7.6.4 Comparison of Survey Results with Previous Clearance Operations

The results of the 1986 ordnance survey conducted in the Camp Elliott project area are compared with the results of previous clearance operations in Table 2-12 in terms of contamination densities. Because of the different procedures used (clearance versus survey), it is difficult to derive meaningful conclusions from a comparison. The survey records significantly higher item-per-acre density than was previously reported, which may be accounted for, in part, by the conservative nature of the survey. Any item that was or could be perceived as being ordnance-related was labeled as such.

The lower incidence of hazardous items (3.7% in 1985 versus 1.02% in 1986) may reflect the results of previous clearance operations and may also be explained by the larger overall area investigated in the survey. In other words, the previous clearances, particularly the 1984 and 1985 clearances, were concentrated around areas of known contamination (portions of Sub-Areas C, E, and F) in contrast to the 1986 survey, which also included sampling of outlying areas.

TABLE 2-12

COMPARISON OF SURVEY RESULTS WITH PREVIOUS CAMP ELLIOTT CLEARANCE OPERATIONS

Year Type Operation Organization	1973 Clearance Army (Ft. MacArthur)	1984 Clearance Navy (EODMU3)	1985 Clearance Navy (EODMU3)	1986 Clearance DJG, Inc.
SURFACE				
Number of Ordnance-Related Items Found on Surface	93	147	158	1,343
Number of Acres Searched	800	326	322.4	185
General Location	Western Slopes of Fortuna Mountain	Sub-Areas C, E, F	Sub-Areas C, E, F*	Sub-Areas A,B,C,E,F
Estimated Ordnance Items/ Acre—Surface	.116	.451	.467 avg. 1.18 max.	9.5 avg. 151 max.**
SUBSURFACE				
Number of Ordnance-Related Items Found Subsurface	No Subsurface Search	31	56	521
Number of Acres Searched		5.4 Reported	None Reported	20
General Location		Roads & Trails in C,E,F	Roads & Trails in C,E,F	Sub-Areas A,B,C,E,F
Estimated Ordnance Items/ Acre-Subsurface		Insuffi-cient Data***	Insuffi-cient Data***	28.4
HAZARDOUS				
Percent of Hazardous Ordnance Items Found	Insuffi-cient Data ***	Insuffi-cient Data***	3.7	1.02

* Entire Villa Trinidad/Villa Martinique Canyon area, Greenbelt Park, parts of wooded perimeter of Admiral Baker Field, Granada Canyon, and open space adjacent to Murphy Canyon Navy Housing.

** The higher item/acre count may result from differences in interpretation of what is ordnance related.

*** The clearance documentation did not contain specific information on ordnance or hazardous items per acre and/or there was not sufficient data in the reports to clearly determine these numbers.

2.8 NATURE AND EXTENT OF THE PROBLEM

2.8.1 INTRODUCTION

From data collected in the field during this study and from reviewing data from previous sweeps within the former Camp Elliott boundary, it is apparent that ordnance items and related debris are scattered through most of the project area. Records indicate there were 41 training sites within Camp Elliott including tank and artillery ranges, mortar firing ranges, grenade courts, obstacle courses and ranges for rocket firing and rifle ranges. Of these training areas, 25 were large arms firing ranges. No specific maps could be found indicating exact locations of the ranges, but evidence of some of the sites have been located on the ground and through aerial photographs.

Most of the tank and artillery training was conducted from two main areas, the Main Camp Elliott Training Center and the Jacques Farm Camp Tank Training Center at the southern tip of the project area. At the Main Camp, activities included anti-tank training and mortar and grenade training as well as small arms firing. At Jacques Farm Camp, the activities included both tank training and other, smaller support weapons training. Light and medium artillery training was probably conducted at both sites.

2.8.2 WEAPONS AND ORDNANCE USED AT CAMP ELLIOTT INVOLVED A WIDE RANGE OF TYPES, INCLUDING:

- 37 mm anti-tank guns: These guns were used both as anti-tank weapons mounted on wheeled assemblies or could be mounted on tanks themselves. The mobile two-wheeled assemblies were favorite weapons with the Marines in the South Pacific early in the war, but were phased out towards the end of the war and replaced by heavier, more effective weapons.

- 75 mm guns: These guns were used both as anti-tank weapons mounted on half-track assemblies and also as tank weapons mounted on the tanks themselves. The guns fired both armor-piercing (AP) capped rounds and high-explosive (HE) rounds. The half-track assemblies were used at the Main Camp Elliott Training Center at the anti-tank ranges. One range was located at the northeast end of the camp outside of this project area, but the impact areas were probably within the project site. The tank mounted assemblies were used at the Jacques Farm Camp Training Center.

- 60 mm and 81 mm mortars: These weapons were mobile and impact sites were discovered at several scattered locations around the project area. The mortar training included the firing of live rounds and inert practice rounds. During the ordnance survey, tail fins and nose fuzes were found on the surface and a number of inert rounds were found buried in upright positions just as they had impacted in apparently soft ground. Usually where one round was found sub-surface there were multiple rounds located. The rounds uncovered during the field work for this study were inert, but the presence of similar impact areas will be a factor in the time and effort required for clearance. The fact that live rounds may exist cannot be discounted.

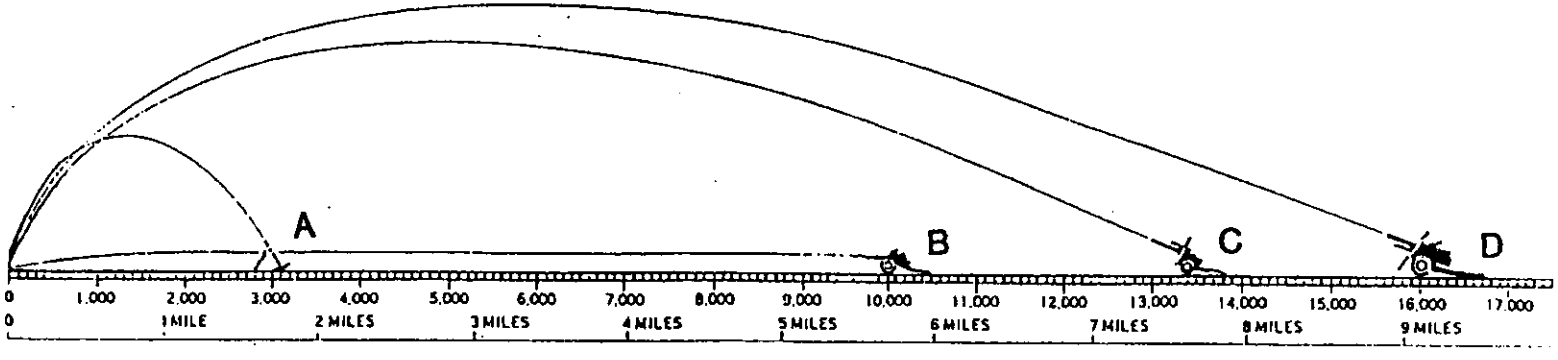
- 105 mm and 155 mm howitzers: The 105 mm howitzer was classed as light artillery; the 155 mm howitzer was one of two weapons classed as medium artillery during World War II, and is believed to be the heaviest weapon used at Camp Elliott. Both live, high-explosive and inert-filled practice rounds were fired. Exact firing locations are not known, but from ordnance located during previous sweeps and known firing distances of the weapons, it has been concluded that these weapons were probably fired from two general locations; one near the Main Camp Elliott Training Center; and one on the high mesa west of Jacques Farm Camp in the Regency Hill (La Mirage) area. It is believed that firing from both locations was in the direction of

A. U.S. 81 MM MORTAR

B. U.S. 37 MM ANTI TANK GUN

C. U.S. 105 MM HOWITZER

D. U.S. 155 MM HOWITZER



EXPLOSIVE ORDNANCE SURVEY
TIERRASANTA COMMUNITY
SAN DIEGO CALIFORNIA

Figure 2-13
COMPARATIVE RANGES OF TYPICAL RANGES USED AT CAMP ELLIOTT

Fortuna Mountain, although ordnance debris indicates a number of impact sites at shorter distances between the firing site and Fortuna Mountain.

- 2.36 inch and 3.5 inch rockets: World War II saw a rebirth of the use of rockets by the U.S. Military. The much publicized 2.36 inch "bazooka" gave the individual foot soldier an anti-tank weapon with the striking power of artillery. As the war progressed, the 2.36 inch rocket was replaced by the 3.5 inch rocket launcher. Several impact sites were discovered as well as parts of a number of isolated single rounds.

- 4.2 inch mortar: The 1985 Navy sweeps found some 4.2 inch mortar rounds. These were found in one general location (approximately a 30 acre area) within the Tierrasanta Norte property.

- Other ordnance items: Other items and debris from military activities included small arms rounds (.22 cal., 30 cal., and .50 cal.) and expended shells, fragments, and at least two base plates from anti-personnel mines (training, non-explosive).

Figure 2-13 illustrates typical weapons used at Camp Elliott and their comparative ranges.

2.8.3 NON-ORDNANCE ITEMS

The project area is littered with a number of metallic and non-metallic items, including reinforcing bars, barbed wire, banding, cans and containers, and ammunition such as .22 cal. and shotgun shells that could be non-military items. Most of these items are not hazardous but will effect the time and effort required for a cleanup operation.

3.1.7 ALTERNATIVE 7: No Action.

While this alternative is intended primarily for comparison in the analysis of an alternative, it could be appropriate for areas felt to have no or extremely low ordnance contamination. This alternative is appropriate for areas that have already been graded and where substantial earthwork has been performed or for areas not believed to have been impact areas. The No Action alternative could be feasible in a portion of Sub-Area D.

3.2 DESCRIPTION OF ALTERNATIVES RELATIVE TO EACH SUB-AREA:

Information that was gathered from the records review, the area inspection, the ordnance survey, and the public workshop that was held in the Tierrasanta community were used to evaluate alternative actions relative to specific Sub-Areas. Each alternative was reviewed relative to a specific Sub-Area in order to determine if its application would effectively address the ordnance contamination problem. Major issues that were addressed during this evaluation included: existing ordnance contamination levels and the potential risk hazard to the community; the current and proposed future use of the area; the ordnance clearance effectiveness of a particular alternative; the effect of the alternative on the community and the local environment; the implementation cost; and the long term benefits from implementation of a specific alternative.

During the early evaluation process it was possible to eliminate certain alternatives from further consideration for some Sub-Areas. This section discusses alternatives considered for each Sub-Area and identifies those selected for in-depth evaluation. An analysis of selected alternatives and the resulting effects on the parameters identified is contained in paragraph 4.

3.2.1 SUB-AREA A

Sub-Area A is currently under multiple ownership, with parcels being owned by the U.S. Navy (63.49 ac.), the Unified School District of San Diego (66.24 ac.), and CALTRANS (37.61 ac.). The area is currently landlocked with no public access except for dirt trails. The use of the area is primarily recreational by hikers and off-road all terrain vehicles.

The development of remedial action alternatives for Sub-Area A is dependent upon one major external influence, the construction of Route 52. If Route 52 is extended from Santo Road to Santee, Sub-Area A will be isolated from the Tierrasanta community. There are no plans for the extension of either Santo Road or Jackson Drive beyond the Route 52 extension at this time. If the area was isolated by the new highway, with fences along the right-of-way, it is possible that ordnance clearance would not be required. Because Route 52 is still in the planning phase and has not yet been funded, both ordnance clearance and nonordnance clearance alternatives were considered.

3.2.1.1 Ordnance Clearance Alternatives

Sub-Area A is predominantly grassy with over 70% being terrain types 2, 5, or 8. This thick grass would make surface visual sweeps difficult and the ordnance clearance effectiveness would be anticipated to be extremely low. For this reason a surface visual sweep was not considered in depth. The grass would not significantly hinder the use of electromagnetic ordnance locators. There are also areas within this Sub-Area where heavy brush will have to be removed to facilitate ordnance clearance. Because of the presence of a vernal pool complex and other environmentally sensitive elements within this sub-area, burning was eliminated as a method of brush removal.

The method considered to be the most effective, should ordnance clearance be required, is the electromagnetic surface and subsurface clearance assisted, where necessary, by manual cutting and removal of heavy brush.

- **Environmental Issues**: Environmental effects of any remedial action alternatives have been evaluated for both clearance and nonclearance alternatives. Environmental effects range from simple excavating causing land disturbances; the removal of brush by either cutting or burning; and, the effects of fencing.

- **Local Public Opinion**: Because much of the project area is within an existing residential community (in excess of 6,000 units) the concerns of the residents cannot be ignored. Public opinion is evaluated based upon community response and discussions during the records search and area inspection, meetings with the Tierrasanta Community Council and community leaders, and response to an information bulletin distributed within the community (additional information contained on page A-93 of Environmental Assessment).

- **Federal, State, and Local Restrictions**: This parameter includes the effects of regulation which may restrict or control corrective alternatives. Time required for submittal and approvals for permits and procedures is a factor. Resulting cost factors are not considered as a part of this parameter, but will be reflected as a part of the economic feasibility assessment.

4.2 ANALYSIS OF IDENTIFIED ALTERNATIVES FOR SUB-AREA A (FIGURE 4-1)

4.2.1 REACQUISITION, THROUGH LAND SWAPS, OF PROPERTY BY THE U.S. GOVERNMENT FOLLOWED BY FENCING TO RESTRICT ACCESS OF THE GENERAL PUBLIC.

4.2.1.1 Public Safety

Implementation of this alternative is not expected to alter the potential safety threat to persons entering the property. The current severity of a hazard occurrence is estimated to result in severe injury or death. Also,

the probability of a hazard occurrence happening is estimated to be unlikely but reasonably expected. While implementation of this alternative would not alter the severity or probability of a hazard, it should make it more difficult to gain entry into the sub-area because of the fencing barrier and the security levels present at Miramar Naval Air Station. In addition to the implementation measures presented, the proposed construction of Route 52, when complete, should increase public safety by isolating this sub-area from access. Since there is a high potential for ordnance contamination on adjoining properties outside the project area, this alternative would afford more public protection than an isolated ordnance removal effort without fencing.

4.2.1.2 Economic Feasibility

The U.S. Navy currently owns 63.49 acres (37.94 percent) within Sub-Area A (Figure 4-2). The remaining acreage in Sub-Area A is owned by the San Diego Unified School District (66.24 acres) and the California Department of Transportation (CALTRANS - 37.61 acres). The U.S. Navy and the San Diego Unified School District have discussed land swaps involving the school district's acreage within Sub-Area A. If a land exchange is made instead of an outright purchase, all direct costs should be eliminated.

4.2.1.3 Technical Feasibility

Available funds and willing sellers are the principal factors affecting the implementation of this alternative. Since the San Diego Unified School District and the U.S. Navy have previously discussed land exchanges involving property within Sub-Area A, acquisition problems should be minimized. Also, once construction of State Route 52 is complete, CALTRANS should be receptive to selling residual parcels outside of the Route 52 right-of-way.

The land use plan for East Miramar (Figure 4-3) indicates that all lands within Sub-Area A should be acquired. This plan states that Route 52 will form the southern boundary of Miramar Naval Air Station and that the Navy should dispose of all holdings located south of the highway. The plan also states that current Navy intentions are to acquire properties north of proposed Route 52 through land exchanges. Once acquisition is complete the primary land use for this area will continue as an Air Installation Compatible Use Zone. Secondary land uses could include a military maneuver/grazing area and an environmental constraining area.

The Tierrasanta Community Plan currently uses the proposed Route 52 right-of-way as its northern boundary line. Therefore, the physical barrier formed by Route 52 and the passive uses proposed through the East Miramar land use plan, should be compatible and supportive of the Tierrasanta Community Plan.

4.2.1.4 Environmental Issues

The biological resources found within Sub-Area A would not be affected by the implementation of this alternative.

Two prehistoric archaelogical sites are located within this sub-area (SDi-4634 and SDi-1194), however, the impacts associated with the implementation of this alternative would not impact this cultural resource.

The aesthetic quality of Sub-Area A should not be affected by the implementation of this alternative. Considering current proposals by CALTRANS, a fence would be constructed along both right-of-way boundaries (north and south) as proposed Route 52 is constructed.

Air quality is considered good and should not be degraded by the implementation of this alternative.

Water quality and increased erosion potential will not be impacted by this Alternative. Recreational access, however, will be precluded through implementation but, this impact is not considered adverse since current recreational use is minimal. Also, once Route 52 is completed, the entire sub-area will be separated from the Tierrasanta community.

4.2.1.5 Local Public Opinion

In general, area residents favored the property purchase and fencing by the U.S. Government. Approximately 60 percent of those responding to the questionnaire either favor or strongly favor the repurchase alternative while 69 percent ranged from strongly in favor to neutral on restricting the sub-area through fencing. Aside from controlled burning, the combined repurchase/fencing alternative received the largest (40 percent) unfavorable response. Many of these felt that since all of Sub-Area A was owned by the government (U.S. Navy, CALTRANS, San Diego Unified School District) there was no need to spend additional money when fencing and posting of warning signs would be sufficient.

4.2.1.6 Federal, State, and Local Regulations

It is concluded that the implementation of this proposed alternative will comply with all applicable federal, state, and local laws, regulations, and executive orders. This compliance also extends to regulations which may restrict or control corrective alternatives.

The implementation of this alternative will comply with all federal and state acquisition policies which govern the purchase of property including applicable relocation benefits. Further, fence construction will be in accordance with specifications established by CALTRANS.

4.2.2 REMOVAL OF ORDNANCE BY ELECTROMAGNETIC SURFACE AND SUBSURFACE SWEEPS IN CONJUNCTION WITH BRUSH REMOVAL BY MANUAL CUTTING

Since the U.S. Navy currently owns a portion of Sub-Area A (Figure 4-2, 63.49 acres) it was eliminated from alternative analysis because of ineligibility under the DERP formerly used defense sites program.

4.2.2.1 Public Safety

The removal of surface and subsurface ordnance will provide a significant reduction in risk to public safety within the sub-area but because of contamination hazards on adjoining lands, overall public safety risk will remain high. Implementation of this alternative, while not significantly altering the severity of the hazard (resulting in severe injury or death), it does lower the probability of a hazard occurrence. The probability of a hazard occurrence following implementation of this alternative will change from remote (unlikely but can reasonably be expected) to improbable (unlikely to occur but possible). This reduction in hazard probability represents the lowest defined level that can be obtained. While this alternative would reduce the effect on public safety, caution should be exercised in the implementation of a manual brush removal program. Brush removal personnel should be advised of precautionary measures when working within an ordnance contaminated area. Also, while this alternative may reduce the probability of a hazard occurrence, it only represents a small number of acres in comparison to the surrounding area which could pose an equal or greater threat to public safety.

4.4.3.5 Local Public Opinion

The greatest unfavorable response was expressed against the no action alternative. Over 75 percent of the people responding felt strongly against implementation of this alternative because the area is being developed and contains open public space areas.

4.4.3.6 Federal, State, and Local Regulations

Not applicable.

4.5 ANALYSIS OF IDENTIFIED ALTERNATIVES FOR SUB-AREA D (FIGURE 4-6)

4.5.1 REMOVAL OF ORDNANCE BY ELECTROMAGNETIC SURFACE AND SUBSURFACE SWEEPS LEAVING ALL VEGETATION IN PLACE

4.5.1.1 Public Safety

While the implementation of this alternative will not improve the areas improbable hazard probability level ranking, which is the lowest level that can be obtained, it will confirm whether ordnance contamination exists and if so at what level. It has been theorized that since this area probably functioned as a firing site in addition to being graded and improved, that ordnance contamination does not present a threat to public safety. However, no verifiable evidence has been obtained which confirms this opinion. Also, if ordnance contamination is found, levels could vary significantly between areas that have been graded and improved and areas containing steep landscaped slopes.

4.5.1.2 Economic Feasibility

Implementation costs associated with this alternative have been greatly influenced by the fact that the area will not require vegetation removal. The per acre costs to perform a surface and subsurface electromagnetic sweep without vegetation removal will range between $2272 and $6636 depending on the number of sweep teams. Time requirements for implementation also are dependant on the number of sweep teams, ranging from 0.44 months for ten teams to 4.36 months for one team. Based on these ranges the total estimated implementation cost and time required for this alternative is: one team - 4.36 months at a cost of $387,250.00; five teams - 0.87 months at a cost of $162,413.00; and, ten teams - 0.44 months at a cost of $132,617.

4.5.1.3 Technical Feasibility

Implementation of this alternative should further the Tierrasanta Community Plan by reducing the potential for ordnance hazards within developing residential areas. Considering the extensive grading, landscaping and infrastructure work that is complete, effectiveness levels could reasonably be expected to range from 70 to 95 percent. More specifically, effectiveness levels should range from 90 to 75 percent for the graded and improved areas to 75 to 80 percent for the steep slopes which surround this sub-area. While the Mk 26 ordnance locator is designed to find ferrous items, false contacts could result from installed utility lines and an above-ground irrigation system along the steep slope areas. An option which could compensate for this problem would be the use of a metal detector ("dish head") locator. Because of its design, this type of locator could survey areas adjacent to metal pipes and extending laterally approximately one foot. Contact areas could then be marked for additional subsurface detection using the Mk 26.

4.5.1.4 Environmental Issues

Because the entire area either has been graded or landscaped, and no additional ground disturbance is proposed, implementation of this alternative

would have no effect on existing vegetation. Since residential development should begin in the near future no additional adverse or beneficial impacts would be expected. Also, habitat values have already been reduced to little value and consequently implementation of this alternative would have no impact on wildlife.

No federally endangered species or sensitive resources are expected to occur in this sub-area and therefore, no adverse or beneficial impacts are expected. Also, the U.S. Navy owned and managed (fenced) vernal pool habitat area immediately adjacent to and north of this sub-area, will not be effected by implementation of this alternative.

No cultural resources have been recorded within this sub-area and therefore, no adverse impacts should result from this alternative.

Since no vegetation removal is proposed the only possible impact on aesthetics may result from the removal of landscaped vegetation to permit excavation of discovered ordnance. However, the application of acceptable transplanting standards should minimize any potential impact.

Air quality within this sub-area is considered good, and should not be degraded through implementation of this alternative.

While no vegetation removal is proposed it may become necessary to remove landscaped vegetation to permit excavation of discovered ordnance. Considering the potential isolated nature of this action, no water quality or erosion problems should result.

This sub-area does not contain any existing or proposed recreational uses and therefore, will not be impacted by this alternative. Also, through implementation of this alternative, the socioeconomic conditions of the area should improve through reduced threats to public safety.

4.5.1.5 Local Public Opinion

Initially this alternative was not considered for analysis but based on comments received at the 29 April 1987 Public Workshop and the 3 December 1987 Public Meeting, area citizens favor a surface and subsurface electromagnetic sweep.

4.5.1.6 Federal, State and Local Regulations

It is concluded that this proposed alternative will comply with all applicable federal, state and local laws, regulations and executive orders. This compliance also extends to regulations which may restrict or control corrective alternatives.

4.5.2 NO ACTION

4.5.2.1 Public Safety

Since this area is thought to have functioned as a firing site, in addition to being graded for road and utility improvements, ordnance contamination should not present a threat to public safety. However, no verifiable evidence has been obtained which confirms this opinion.

4.5.2.2 Economic Feasibility

Not applicable.

4.5.2.3 Technical Feasibility

This alternative will not affect land use considerations within the area since grading and infrastructure improvements have already been made.

5.7.3 FOLLOW-UP SURVEYS:

In addition to the listed preferred alternatives, an ordnance clearance plan should provide for a follow-up ordnance survey (10 percent sample) to be conducted approximately one (1) year after completion of the initial clearance effort. Such a survey would monitor and/or verify the clearance effectiveness attained from implementation of the preferred alternative and the need for additional clearance action. The need for additional follow-up ordnance surveys should be decided based on the analysis of the first follow-up survey.

5.7.4 OPEN SPACE UNDER PRIVATE OWNERSHIP:

- While the Feasibility Study recommends an electromagnetic surface and subsurface sweep of all permanent/dedicated open space areas, the undeveloped open space that is privately owned may contain ordnance contamination. Since this contamination could be a potential problem these areas should be included in the ordnance clearance. The clearance of these areas should be of the same nature and extent as the publicly owned open spaces. Prior to the clearance effort, right-of-entry from individual property owners must be obtained. Also, property owners will have to assist in the location of underground utilities. Should any property owner refuse right-of-entry they would still have the option of privately contracting for a subsurface clearance sweep. Reimbursement of private contracting costs incurred by the property owner will not be provided by the U.S. Government.

5.8 ECONOMIC SUMMARY OF ALTERNATIVES

5.8.1 A summary of costs and implementation time for the removal of conventional explosive ordnance is as follows:

Sub-Area	Alternative	Cost*	Time (mos.)**
A	Reacquistion (land-swap)	-0-	4
B	Fencing and Signs	$ 6,600	1
C	Electromagnetic Sweeps with Brush Removal	$1,870,000***	9***
D	Electromagnetic Sweeps with No Vegetation Removal	$ 65,000	.5
E	Electromagnetic Sweeps with Brush Removal and Controlled Burns	$1,211,000	5.5
F	Electromagnetic Sweeps with Brush Removal	$6,416,000	30
	Three (3) Follow-up Surveys	$1,395,000	
	Open Space Under Private Ownership	$ 230,000	
Total		$11,193,600	

* Represents five clearance teams

** Time requirements are estimated and do not reflect the concurrent implementation of certain preferred alternatives.

*** Will vary with phasing of Tierrasanta Norte

5.9 MITIGATION OF ENVIRONMENTAL EFFECTS:

5.9.1 The following is a brief summary of the Environmental Commitments.

- Re-vegetation of burned/cleared areas within the project area has been determined to be of little value to wildlife and in minimizing erosion. The common practice of seeding with annual grasses, especially exotics such as rye-grass, after controlled burns has often proved counterproductive. Grass root structures exhibit a reduced binding effect on the soil, increasing first post-fire season water loss, and after out-competing native shrub species, increasing long term soil loss. Scott, Williams and Rhea (1970) found grass

PREFACE

This report describes all United States Army Corps of Engineers ("USACE") and United States Army Engineering Division , Huntsville, Alabama operations associated with removal of UneXploded Ordnance ("UXO") from a former Department of Defense ("DoD") property and serves to certify the site has been swept in accordance with approved work plans.

It provides a brief summary of the initial site assessment, as reported by the firms performing the ordnance survey, risk assessment, and analysis of clearance alternatives from a feasibility/desirability point of view. This summary of the pre-contract survey is included to point out how the results of the initial investigation contributed to problems encountered during the course of UXO removal operations. Therefore, the findings reported in this document may serve as "lessons learned" for planning and conducting future removal activities.

There are five sections and one appendix in this report. A description of each section follows.

Section One - Introduction contains:

- Contract time frame parameters,
- Historical background of the site,
- Prior clearance efforts,
- A description of the project area,
- Environmental/ecological factors and considerations,
- Reasons for the cleanup,
- A summary of the Statement of Work,
- A report on previous related submittals and citation of government authorization,
- Aims and objectives of the project, and
- The technical approach used to perform the clearance.

This section describes contract specifications. Any differences between the specifications and what actually occurred are reported in Section Two. Appendices accompany this report; they consist of various pieces of documentation that illustrate and provide specific detail of different aspects of the project.

Section Two - Technical Effort contains:

- Contract equipment and facilities
- Grid layout procedures
- Brush removal procedures
- UXO operational procedures

Lessons learned are addressed. Included also are descriptions of equipment and facility peculiarities and listings of equipment and facilities used.

Section Three - Area specific information contains:

- Overview with site map
- Contract duration and timeline with major events/milestones
- Table of subarea totals and contract totals
- Compiled contract biological tables

Section Four - Summary contains:

- A recapitulation of significant topics previously addressed and an overall project performance assessment.

Section Five - Conclusion contains:

- Final evaluation of data covered and/or addressed, including discussions of problem areas/lessons learned leading to recommendations.
- Recommendations for improvements to the system and/or future similar projects, drawn from conclusion of lessons learned.
- Attachment (1) - a copy of the letter of completion
- Attachment (2) - a copy of the certificate of clearance

Appendix (1) - Site specific clearance information contains:

- A general description
- Biological discussion of the specific area
- Significant items for each section
- Problems encountered
- USACE Preparatory Inspection
- USACE Initial Inspection
- USACE Final Inspection
- Ordnance Preparatory Inspection
- Ordnance Initial Inspection
- Ordnance Final Inspection
- Area map
- Grid information

1.0 INTRODUCTION

Environmental Chemical Corporation ("ECC") was awarded Contract Number DACA87-90-C-0052 to perform "ordnance clearance" actions on that portion of the Former Department of Defense Property, Camp Elliott, now called the Tierrasanta Community of San Diego, California. The project was completed with several modifications through the Unites States Army Engineering Division, Huntsville Alabama. Administration was under the auspices of the United States Army Engineering District, Los Angeles, California.

1.1 Contract time frame Parameters.

The Tierrasanta Ordnance Removal Contract Notice to Proceed was received and signed by ECC November 29, 1990. Contract duration was for 917 consecutive days from that date and was scheduled to end May 30, 1993. ECC received a unilateral contract extension until August 23, 1993 (81 days) for weather delays (Modification P00009).

1.2 Historical Background.

1.2.1 Former Military Use

Camp Elliott became operational during the World War I when the United States Army used it for artillery and machine gun training. The contract area was transferred to the United States Navy in 1941 and was home for several commands, including the Fleet Marine Force Training Center, West Coast; and the Troop Training Unit of the Amphibious Training Command for the Pacific Fleet. The base provided encampments, bivouac areas and forty-one firing ranges. These ranges were used for tank, anti-tank, artillery training, demolition training, mines, raw explosives and for parachuting practice. Additionally, from 1941 to 1944, schools were formed there for infantry, scout, mortar, and sniper education. The base and ranges were used for training on every type of weapon in the Marine inventory until 1944, when they moved to Camp Pendleton. After the Marine move, the Navy continued to operate the base as the Training and Distribution Center until 1946, then the Retraining Command from 1947 until 1960.

1.2.2 Transition to Civilian Use

When Camp Elliott closed in 1960, much of its land was doled out to different military services for ownership. The Navy declared 13,277 of the original 30,500 acres "excess" and transferred this area to the General Services Administration ("GSA") for disposal. The "excess" was disposed of through land exchanges, grants and sales, and San Diego City officials acquired much of it for public use and development.

1.2.3 Tierrasanta

Land sold to developers from the former Camp Elliott acquisitions included what is now the active and somewhat exclusive suburb of Tierrasanta. Homes and shopping centers adorn the canyon tops (mesas) that spread throughout the community.

1.2.4 Future Plans

Future development calls for more residential, recreational, and educational facilities. Hiking and bicycling trails already exist in most canyons where contract clearance operations took place.

1.3 Prior Clearance Efforts

There were four previous attempts at locating and removing ordnance from portions of Tierrasanta prior to this contract. A ordnance sweep by both Navy and Marine Explosive Ordnance Disposal ("EOD") units (one each) was conducted in the mid 1960's, but in 1983 a tragic mishap occurred. Three young Tierrasanta children were playing in one of the canyons near their homes, when they found a object that was later confirmed to be an unexploded 37mm round. According to accident investigators, one of the children beat on the munition in such a way as to allow its malfunctioning fuze to function, causing the round to detonate. Two of the children were killed by the explosion and the third seriously injured.

The accident raised public awareness, creating an outcry for action to rid the canyons of the UXO. The U.S. Navy EOD Mobile Unit Three performed two searches, one in 1984 and one in 1985, but it was obvious that a thorough search with magnetometers was necessary.

Like the past UXO sweeps, these done in the 80's were mostly visual, due to thick brush which was not removed, precluding a thorough magnetic sweep. Electronic searches were restricted to roadways, paths and trails. As a result, few items were found, compared to the large number of items recovered during ECC's contract. Additionally, not all of the Tierrasanta affected areas were covered; some sectors where facilities were built were not swept. The reports on these later sweeps concluded with an admission that many more ordnance items would be found, due to soil erosion factors and changing vegetation patterns. The reporting officials' recommended corrective action was to merely keep educating Tierrasanta residents on ordnance awareness.

1.4 Previous related submittals.

In 1986 the survey for the "Report of Ordnance Contamination, Risk Assessment, and Clearance Alternative Analysis on the Former Camp Elliott" was conducted and published for the U.S. Army Engineering Division, Huntsville. DJG, Inc., Dynamic Systems, Inc., and UXB International, Inc., collaborated on the survey and report.

Survey sites were selected by establishing maximum and minimum project coordinates and using a random number generator to establish the coordinates of the areas to be investigated. Grids were made as large as possible (one acre, with .12 acre subsectors designated for subsurface investigation) to increase the probability of locating ordnance while maximizing the precision of the survey data.

The report indicated the site survey coordinator, "given considerable latitude," altered survey grids when conditions such as slope, ground cover, or roads required a change in grid coordinates. Only a small percentage (two sweep lanes, one on either side of each grid line) of the grid was checked subsurface, using magnetometers for detection. The author also noted during the survey, significant degradation of capability to locate items on the surface or below surface when steep terrain and/or heavy vegetation were encountered. Much of the project area consisted of grids with such topography.

Estimates of overall ordnance contamination were derived by averaging the observed levels from survey grids within the subarea or total area. "Ordnance-related contamination levels" were defined by the report as "...any man-made, metallic item, regardless of size or vintage, which is or could be perceived to be of explosive or military origin." An assumption was made that contamination was homogeneously distributed within each grid. Items found by electronic methods, in the small portion of the sample grids, were projected throughout the grid area.

Nineteen hazardous items were found on or below the surface of the survey grids. To project the contamination levels for the entire 1,838.93 acres of the affected area, the contractor extrapolated by taking the number of located rounds and averaging them out over the acreage total. The conclusion was that 263 hazardous items would be recovered--180 on the surface and 83 subsurface.

Ancillary conclusions included an estimate of 0.8% of the materials remaining could be induced to high-order detonation, given the proper circumstances, and that the risk to the public was very small, based solely on the estimate of the amount of hazardous contamination remaining.

During the contract clearance, ECC exceeded the initial survey estimates in every category. ECC recovered more hazardous ordnance in the first five months of the contract than was predicted for the entire Tierrasanta area. Table (1) in Section 3 of this report documents far greater quantities of ordnance, Ordnance Explosive Waste ("OEW") and scrap were recovered than predicted by the initial survey. More importantly, more than 18 times the predicted number of hazardous rounds were recovered and disposed of, posing a considerably higher risk to the public than was originally projected by the 1986 Risk Assessment Report.

1.5 Reasons for Clean-up

During WWII and the Korean War periods, Camp Elliott was home to more than 250,000 troops performing maneuvers and gunnery training. Significant numbers of the fired projectiles, rockets, mortars and other ordnance items failed to function as designed. The deaths of the two children in 1983, combined with the development on the former military property, brought an increase in public pressure to make the open space around their dwellings safe. Clearances both before and after the children's mishap, uncovered sufficient quantities of UXO to warrant further investigations into the amount of contamination remaining in the environs of Tierrasanta. A Feasibility Study of remedial Action Alternatives, combined with an Environmental Impact Survey was performed in 1988. The subsequent reports, statements, and associated documents were the basis for a Record of Decision (ROD), dated 17 Oct 1988. The ROD supported the combination of alternatives recommended by the previous documents. The land mass was divided into subareas to facilitate comparison and analysis of alternatives. The report and ROD proposed different actions be employed for the various subareas. Two sectors were parts of federal properties, so fencing in these lands to deny access was deemed the appropriate remedy. Based on the final objective to protect public health, safety and welfare, the remaining four subareas, totaling 1,364 acres, received plans for ordnance clearance sweeps using electromagnetic locators.

1.6 Affected Project Area

The San Diego California community of Tierrasanta is located on the U.S. Geological Survey map "La Mesa, California". The community lies within the following coordinates; 32° 47' 30" to 32° 50' 45" north; 117° 04' to 117° 07' west (227,000 to 247,000 N. and 1,733,000 to 1,750,000 E. California State Plane Coordinates). The community occupies the southern-most portion of the former Camp Elliott. Its northern boundary is Highway 52, the northeastern boundary is the San Diego Second Aqueduct, the southeastern boundary is the San Diego River Valley, the southern boundary is Friars Road and the western boundary is Interstate 15.

Areas swept for UXO were mostly canyons and gorges; with residences, industrial and commercial establishments, schools, roads and recreational facilities built on surrounding mesas. During the contract period, the community consisted of more than 7,000 homes, office complexes, commercial establishments and other structures.

1.7 Statement of Work

"The objective of this contract is to provide services for the removal of unexploded ordnance and related debris contamination caused by previous DoD related activities on a portion of the former Camp Elliott Training Range." The previous statement, from Section B-1 of the contract, defined the work accomplished under this contract.

Submittals required under this contract are listed in Section 1300 page 4 of the contract. Environmental Chemical Corporation ("ECC") has complied with all requirements without exception throughout the course of the contract, with this report being the final item required by the contract.

Technical Instructions for the Tierrasanta Ordnance Removal contract were drawn from and paralleled the Remedial Action Preferred Alternatives cited in the April 27, 1988 Final Engineering Report and Environmental Impact Statement.

Electromagnetic ordnance locators capable of locating ordnance and ordnance debris to a depth of three feet were required to be used. A systematic approach whereby subareas were divided into search grids no greater than 100 feet by 200 feet was necessary. Records of ordnance materials recovered were to be kept, and a map depicting the grids had to be maintained.

Diagnosis of UXO had to be performed by fully qualified UXO technicians. Items deemed OEW or UXO and safe to transport were to be moved to a safe holding area for removal by the 70th Ordnance Detachment (U.S. Army EOD unit positioned at the Point Loma U.S. Navy Facility). Those materials deemed not safe to move were to be marked and protective measures taken by ECC, as appropriate, until the USACE Contracting Officer or representative notified the 70th Ordnance Detachment, and the item was disposed of by detonation. OEW scrap was to be certified by a UXO technician as explosive-free and periodically removed from a collection point to the local Defense Reutilization and Marketing Office ("DRMO").

Visual sweeps by a UXO specialist of each grid where brush clearance was required were to be conducted prior to brush clearance operations. Ordnance locator sweeps to three foot depths were to be done in each grid; sweeps in grids requiring brush removal were to be accomplished after brush clearance. Access to suspect OEW to perform diagnosis procedures were to be done manually with non-sparking excavation tools. Any accesses beyond the three foot depth required Contracting Officer notification. ECC conducted test sweeps in at least

five percent of the grids previously swept by UXO teams were also required. The government's representative was to perform acceptance checks of selective grids. Any hazardous UXO found during the latter check or location of scrap items equal to 20 percent or greater of the total items found on previous sweeps would be cause for rejection of the grid(s) and for the contractor to re-sweep the grid(s) at no additional cost to the government.

Selective brush clearing was to be in concert with environmental, ecological and archaeological protection measures, while providing for effective UXO sweep activities. Removal or chipping of cut vegetation was to be done within 72 hours after the cutting to avoid infestations by Eucalyptus Tree Borers. In general, trees and shrubs were to be thinned to allow a minimum of three feet wide by six feet high access, and a minimum of three feet wide by three feet high around remaining plants. Certain plants and trees considered sensitive, endangered or those that provide habitats for protected wildlife were to be marked by a qualified biologist. Protective measures ranging from limited pruning to no cutting activities at all were to be employed on those marked, depending on the species of the vegetation and its respective mitigation requirements. Vernal pool complexes and their associated watersheds were not to have vegetation removed prior to UXO detection activities. Suspect ordnance items located within these waterworks were not to be excavated prior to coordination with the Contracting Officer. Critical phasing of operations had to coincide with selected vegetation's seed producing cycle and reproductive cycles of guarded/endangered species.

A controlled burn of dense foliage was to be accomplished on a 60 acre designated area, followed as close as practical by an ordnance locator sweep. This controlled burn, however, never took place due to the reasonable objections of the Fire Marshall.

Another recommended remedial alternative, which subsequently became a contract requirement, was to erect fencing along the southern right-of-way of the proposed State Route 52, so as to effectively isolate 85 acres from the rest of Tierrasanta to the south. Fencing materials, to include barbed wire outriggers, were to meet government specifications. An electronic ordnance locator search, a visual sweep, and brush removal, where appropriate and indicated on plans, along the fence line was required prior to fence installation.

Other Contract Direction took the form of optional areas to be swept for UXO. These were sub-areas within Tierrasanta still under U.S. government control and ownership. The original contract stipulated the government would pay ECC an additional fee to do the optional acres, if there were sufficient funds and time remaining after performing ordnance removal in those areas owned by the city and intermingled with private and commercial establishments.

2.0 TECHNICAL EFFORT

2.1 Organization

The Project Manager provided overall planning, command and control of operations, coordination with professional support (biologist, archaeologist, surveyor), and directed subcontractors.

The Operations Supervisor, or Senior UXO Supervisor, assigned work areas, ensured sweeps were conducted efficiently and in accordance with safety requirements, reviewed daily records, monitored brush removal activities and maintained liaison with the 70th Ordnance Detachment and the USACE Site Representative.

ECC's Quality Control and Safety staff monitored all site operations, wrote and enforced Contractor Safety Plans, checked and passed or rejected all project work and administered the sweep effectiveness program.

The medical personnel (First-Aid Specialists) maintained the medical supplies, provided first-aid treatment for minor injuries, were trained to rendered life sustaining first-aid in the event of major mishaps and maintained liaison with local emergency medical services. They were equipped with two-way radios to maintain communication with team leaders and cellular phones for calls to rescue units, should the need arise. The medical personnel positioned themselves in the field during operations, with four-wheel drive vehicles to serve as ambulances if necessary.

ECC's surveyor plotted, located and marked all grids for sweep teams using California State Plane Coordinates to plot grid coordinates.

The Biologist, on-site full time for the duration of the project, developed and implemented the environmental protection plan, performed extensive site monitoring, ensured environmental mitigation commitments and provided professional support during the entire operation to ensure minimum impact upon endangered species and their habitat. In addition, the biologist actively participated in relocating poisonous snakes encountered by the teams during their field work, as well as the mitigation of the many bees encountered as teams worked through the thick vegetation.

The Archaeologist was present during those times when brush removal or UXO sweep activities occurred in, or in the vicinity of the two cultural resource sites within the contract boundaries. The archaeologist monitored all work within 50 feet of the resource site boundaries, and re-surveyed and further defined the boundaries as necessary.

The United States Army 70th Ordnance Detachment, stationed at Point Loma California disposed of ordnance deemed too hazardous to transport off site, and removed to their holding area for later disposal, those items that were safe enough to transport. ECC's UXO personnel flagged UXO items deemed unsafe to move and awaited arrival of the Detachment technicians. Items deemed safe to transport were moved to a holding area within the work site and removed daily by Detachment technicians.

2.2 Equipment and Facilities:

2.2.1 Personal Protective Equipment:

ECC's original Contractor Safety Program specified minimal Personal Protective Equipment ("PPE") for field operations. These minimum requirements were: (1) Long sleeve coveralls/shirts, (2) long trousers/coveralls, (3) suitable boots, (4) Gloves, (5) Eye protection, (6) Hearing protection, where necessary, (7) Hard hats.

This minimum protection was modified over the course of the contract to include: (1) Kevlar chaps for chain saw protection, (2) Snake leggings, (3) Back braces, (4) Wrist braces, (5) Poison Oak protective suits, (6) Barrier creams, (7) Bee suits, (8) Snake sticks and other equipment deemed necessary.

This equipment provided the necessary protection required by the terrain and job hazards. During the course of the contract, ECC worked 2 years 10 months, logging over 369,000 man hours with only one serious accident, when a brush laborer was cut on the wrist by a chain saw. It should be noted the employee injured in this accident recovered fully, and returned to work.

The poison oak habitat presented a uniquely hazardous situation on this contract. PPE and SOP's had to be specifically developed to deal with this hazard. Before workers were allowed to work in this habitat, they were required to apply a commercially available barrier ointment. A rubberized rain suit was donned as an outer garment over heavy coveralls, and surgical gloves were worn under heavy rubber gloves. Suited up in this manner, workers were restricted in the amount of time they could work, and the work had to be done during the "cooler" seasons. Finally, when work in the habitat was done for the day, workers processed through a decontamination "hot line", then applied a post-exposure cream. Personnel who were extremely allergic to poison oak were prohibited from working in this environment. These measures proved cumbersome (bulky) and uncomfortable (hot), but poison oak related injuries were relatively few and almost always traced to a failure to fully follow required procedures. Work productivity suffered, because employees could not work in the suits for extended periods due to heat related injury, and movement with the added clothing was difficult.

Different types of eye protection were tried over the course of the contract until ECC finally settled on UVEX wrap-around and tinted glasses for the brush crew and Pro-optics impact resistant glasses for UXO sweepers. Chain saw and chipper operators were provided with wire-mesh goggles and face shields for added protection from high velocity, airborne particles (wood chips).

An abundance of poisonous snakes were encountered during the course of this contract. To afford personnel added protection from potential bites, snake leggings were purchased and issued to all field workers. Additionally, workers on each brush and UXO team received training from the Biologist in the proper use of the company supplied snake stick and transportation bucket so the snake could be removed without injury to either workers or the snake (most species are protected by law).

When UXO Sweep Teams worked heavy impact areas (sectors of ordnance concentration), they often encountered high volumes of ordnance scrap. To prevent frequent stopping to transport handfuls of these small pieces to a holding area and to free team members' hands for continued sweeping, leather bags and belts were fabricated and issued to sweep teams. These "frag bags," as they were called, were worn around technicians' waists and would hold 5-10 pounds of scrap.

2.2.2 Sweep Team Equipment:

Sweep teams were issued job specific equipment in addition to their PPE. This equipment included transportation vehicle, ordnance locators, excavation tools, two-way radio, trailer mounted field toilet, trash containers, marking flags/stakes/streamers, lane lines and reels, water cooler, first aid kit, warning signs, snake stick and snake container.

The single most important piece of team equipment was the UXO locator. ECC originally intended to use MK-26 locator to perform all electronic sweeps, and work plans and other documents specified that particular model. This was before ECC realized all detector production was diverted to the U.S. military for operation Desert Storm in Kuwait.

With the assistance of the USACE, ECC was able to procure two MK-26 detectors on short notice, which were issued to ECC's Quality Control personnel and used to check sweep team work. After careful testing of numerous commercially available ferrous locators (including commercially available White detectors), the Shonstedt Dual Fluxgate Magnetometer was chosen to equip the sweep teams. Contract specifications required ferrous metal ordnance detection to three feet below the surface and the Shonstedt met that specification with acceptable accuracy and reliability. While the Schonstedt is light weight, versatile, easily maintained and its 1 inch diameter probe allowed investigation into very small areas and dense vegetation, it has two drawbacks: (1) The instrument does not have a handle suitable for long term daily use and (2) There was no indication when battery power was low or exhausted.

To resolve these drawbacks, ECC technicians fabricated make-shift handles with some degree of success but the lack of a ergonomic handle has caused several repetitive motion injuries among operators and continues to be a problem. To avoid the possibility of operating a Shonstedt with low or no battery power, ECC required batteries be replaced at the beginning of each work day. Later, the detectors were modified to use Ni-cad rechargeable batteries.

2.2.3 Brush Crew Equipment:

Brush crews were issued job specific equipment in addition to their PPE. This equipment included transportation vehicle, chain saws, power hedge trimmers, pruning shears, weed cutters, pick, shovel, pitch fork, two-way radio, trailer mounted field toilet, trash containers as necessary, marking flags/stakes/streamers, water cooler, first aid kit, council fire swatter flap, Pulaski's, back pack pumps, and snake stick with container.

All natural areas in southern California are susceptible to fire in late summer. ECC was concerned with the selection of the proper power equipment, complete with necessary protective devices, to ensure fire risk was at a minimum both for the protection of personnel and property of the surrounding community. All ECC gasoline powered equipment was designed for field use and met or exceeded U.S. Forestry Department requirements. ECC cut brush using gasoline powered equipment, in the natural areas of Tierrasanta, for 2 years and 10 months without starting a fire.

ECC equipped a separate maintenance truck to transport gasoline and oil for saws to the field and to conduct maintenance and repairs of the equipment. The truck would position itself in the general area of brush removal operations, usually at the top of the canyon being worked. A full-time small engine mechanic, equipped with power degreaser, compressor, sharpening grinder and other hand tools would perform major motor overhauls, chain sharpening and repairs required to keep the saws running during sustained, full-time use.

Two medium size brush chippers were employed on the contract, to satisfy the requirement that brush be chipped within 72 hours of cutting. A major problem was positioning the chipper close enough to the work areas to avoid having to hand carry cut brush a long distance. ECC was prohibited from any driving off of existing roads, so most chipper movement was labor intensive and accomplished by hand. These heavy machines were winched down and up steep canyons, following the brush operation during the course of the contract. ECC developed SOPs to safely accomplished this movement using winches powered by chain saw motors, blocks, safety ropes and cables.

2.2.4 Facilities:

In November 1990, ECC established a field administrative/operational site as directed by the USACE in area F-10N, adjacent to Antigua Blvd. This site consisted of a 100' x-100' gravel fenced compound, three single wide trailers, one metal storage container, trash dumpster and gravel parking area for the 40 employees originally employed on this contract. Power, water, telephone service was provided at this site and waste water was stored and removed by pumping truck because there was no direct sewer access.

In December 1990, resident complaints concerning the location and aesthetic impact of the compound caused the USACE and City of San Diego to start planning to move ECC's compound to a less controversial location for the duration of the contract. Mutual agreement of new site location was reached by the Corps and the Tierrasanta Community Council and in June 1991 ECC moved into the new location at the end of Clairemont Mesa Blvd. ECC remained in this location for the remainder of the contract. The old location was graded and restored to its previous condition.

The new location was larger and supported the exponential growth the contract experienced over the next 2 years. The compound eventually accommodated three single wide trailers, three large metal storage boxes, parking for 20 contract vehicles, 2 brush chippers, 20 trailer mounted field toilets, three USACE vehicles and over 160 employees. A copy of the Clairemont Mesa Blvd. site plan (Figure (1)) is included at the end of this section.

2.3 Operations

As written the contract contained restrictions impacting contract field operations. One major restriction limited vehicle access within the contract area to existing roads and trails. ECC was not allowed to drive off existing roads and no existing roads were allowed to be intentionally widened, forcing ECC to use time and manpower intensive methods for moving equipment such as chippers to work sites.

Critical project phasing was required to accommodate the various reproduction cycles of endangered, threatened, and candidate species of flora and fauna. The most critical phasing coincided with the seed production cycle of the San Diego Mesa Mint and the nesting cycles of the Least Bell's Vireo and the California Gnatcatcher. In the Vernal Pool complexes and associated watersheds, as another example, ordnance searches were performed only between the months of August through November, or before the first measurable rain, whichever occurred first.

The controlled burn operation was described and governed by this Clearing Plan. Sixty out of an original total of 454 acres in area E-2 were to be burned off, in accordance with the "County of San Diego: Tierrasanta Ordnance Survey Prescribed Fire Plan." Islands of vegetation remaining within the designated burn area were not to be disturbed until the second year of project implementation so they could provide shelter for wildlife displaced by the burn. This plan was never implemented due to logistic, public and environmental concerns.

2.3.1 Grid Layout Procedures:

ECC's Surveying Team for this contract consisted of a qualified surveyor and a rodman. This team calculated and plotted all grid corners to conform with contract specifications (grids no larger than 100' x 200') using California State Plane coordinates. Grids were laid out over separate geographical search areas in a manner that minimized the total number of grids in that area. (ECC discovered using different grid orientation for each geographic area created problems when areas shared boundaries. Additionally, using the maximum allowable size of 100' x 200' for grids made it harder to accurately locate individual grid corners in dense brush and resulted in more unfinished grids at the end of the work day. ECC modified both the grid orientation and size on the Camp Elliott contract resulting in (1) easier to locate grids stakes resulting in less team confusion and lost time. (2) Fewer partially completed grids in each work day with the 100' x 100' grids and (3) more standardized equipage with all lane lines the same length.)

Grids were established using Theodolite instrumentation for accuracy, location and grid position verification. The plans allowed for sub-grids if conditions such as steep terrain required it. These would be delineated by stakes and/or lines, and would be moved as work was completed in a sub-grid in a leap-frog fashion to the next contiguous sub-grid, so as to ensure all areas were searched.

Grid corners were marked with four foot wooden lathe stakes and a "whisker nail" which was placed next to each stake in case it became dislodged. (At the beginning of the contract ECC surveyors had to consistently re-survey in stakes, which "disappeared" over night. In some instances the stakes were actually in place, but up to 15 of the stakes had been "scrambled" and were no longer in the correct numerical sequence. Placing the small whiskers at each stake assisted in the rapid relocation of stakes.) Fluorescent orange paint was sprayed onto the upper six inches of each stake and an orange streamer tied around the top portion to assist in visual location in the dense brush. Grid stakes were numbered in succession with black felt tip (non-water soluble ink) markers to delineate unique grid corner numbers, corresponding to the master map maintained and updated by ECC Quality Control.

necessary measures were taken to ensure the safety of exposed personnel and property. Brush removal work was re-located to another area or temporarily halted until the suspect danger was averted, depending upon the severity of the hazard and the mitigation actions.

2.3.3 UXO Operations:

Sweep Team Standard Operating Procedures ("SOP's") required all site personnel attend a training course, prior to assignment, tailored to instruct the positive identification of major ordnance assemblies and the associated hazards.

As originally planned (but radically modified within the first five days of field operations), the visual sweep was conducted by first locating the survey stakes of the assigned grids. Next, range markers were placed providing visual reference points for the sweep lines. Teams walked on line towards the range markers searching for ordnance. UXO Sweep Team Leaders walked behind team members keeping the sweep line straight, ensuring personnel intervals allowed overlapping visual coverage, and other command functions. When ordnance was found on the surface, the sweep line stopped and the Team Leader identified the item. If the item was determined to be safe to move, it was moved to a safe holding area, otherwise it was clearly marked and remained in place. When the sweep pass was complete, sweepers leapfrogged the range markers and reorganized for the next sweep.

In early November 1990, while sweeping the proposed compound location for ordnance in accordance with the work plans, project management determined field operations as proposed in ECC Contractor Work Plans and just described were impractical. ECC initially proposed sweep crews would visually sweep a grid, then magnetically sweep the grid marking subsurface contacts, stopping when necessary to cut brush for an effective sweep. In the initial sweeps to clear the compound area, so many contacts were encountered (over 75 in less than 100 square feet) the stakes used to mark the contacts interfered with sweeping. ECC workers were forced to excavate contacts as they were located. Workers stopped so frequently to excavate contacts they had no time for brush clearing. It was determined to be more cost effective to hire laborers to clear the brush prior to attempting a magnetic sweep, allowing the magnetometer operators to concentrate on sweeping and excavating. At this time ECC and the USACE determined the visual sweep occurred when the grid was being cleared of brush by the UXO technician assigned to monitor the brush removal crew.

The Sweep Effectiveness Program ("SEP") was established with the expressed purpose of measuring the quality and accuracy of the sweeps. Items simulating ordnance (6 inch pieces of pipe) were marked and placed in a random pattern in the grids to be swept that particular day. The Operations Supervisor would monitor returning sweep teams for these simulators. If the simulator(s) were not located and returned, the sweep team would be required to re-sweep the grid. Results of the program were be reported in the daily Contractor Quality Control Report.

Subareas to be swept were chosen after collaboration between the Operations Supervisor, the Biologist, Surveyor and the Brush Supervisor to ensure environmental mitigation commitments were met, survey stakes were in place and sufficient vegetation had been removed for an effective ordnance search.

The UXO sweep team traveled to the assigned location and located the grid stakes corresponding to the numbers on their sheet(s). Nylon line, 3/8" in diameter, would be pulled from reels and strung from stake-to-stake to delineate the search boundaries of the grid. Then team members would then lay out additional lines to establish sweep lanes for electronic searches.

The UXO Sweep Team size and composition, by labor category, varied. At times a team had as many as 7 or 8 members, although the standard team number was 6. In those instances when there were more than 6, one or two members would be charged with running lines within the grids to delineate lanes, 3 to 5 feet wide, staying ahead of those operating magnetometers. When there were fewer than 5 team members, individuals would work the lines themselves as they operated the electronic locators.

The contract was originally written to allow "magnetometer operators" (personnel who were not graduates of military EOD school) to operate magnetometers and excavate contacts under the supervision of a UXO technician. For the first two years of the contract, UXO sweep teams consisted of two UXO technicians and four magnetometer operators. (Note: Current USACE Request For Proposals also have provisions for magnetometer operators.)

During this period, sweep procedures emphasized safety from a qualifications and exposure standpoint. Regardless of the exact composition, as a minimum, the team was always headed up by a UXO Supervisor with at least 7 years military EOD experience and at least one UXO Specialist with over three years military EOD experience. Whenever team members (Magnetometer Operators) visually detected surface suspect OEW/UXO, the Team Leader was called. Non-essential personnel were evacuated to a safe distance, (NOTE: For safety, all UXO work stopped when community residents walked, jogged or cycled through the exclusion area, until the pedestrians were beyond the danger zone) if the item was determined to be hazardous, and appropriate remedial actions applied. For subsurface electronic anomaly detection events ("ring offs"), magnetometer operators were allowed to dig down to the point where the metallic object could be potentially identified. At that time the Magnetometer Operator stopped digging and the UXO Supervisor and/or the UXO Specialist continued the excavation, following ECC's Technical and Management Plan prescribed procedures. The Magnetometer Operator continued sweeping the designated lane until advised otherwise. When the item was exposed and identification and diagnosis made, the proper course of action was specified. If it was obvious to the Magnetometer Operator and UXO personnel the article was metal scrap (non-explosive pieces), the material could be picked up and removed by the Operator. (Magnetometer Operators received the same ECC provided ordnance recognition and identification training given to UXO technicians.)

In December 1992, after two years of operation without a single UXO incident, and after receiving continuous written comments with regard to the satisfactory safety of the operation, the USACE determined it was not safe for non-UXO personnel to excavate contacts, ordering ECC to immediately stop the practice. Additional USACE letters followed, further restricting field operational methods and ECC contract management.

Problems were encountered when metallic, ferrous (non-ordnance) objects were in or near the grids and were stationary. Material such as sprinkler pipelines, steel-reinforced concrete slabs, and chain link fencing played havoc with the sensitive magnetometers. Since they do not discriminate ordnance from non-ordnance items, magnetometers would "ring off" when in close proximity to any ferrous substance. Specialists learned to move the instrument away from these fixed objects slowly and listen for an audible tone anomaly in reverse. That is, they tried to listen for a distinct break between the tone given off by the fixed metal object and the normal tone when not over or near any ferrous material. If such a noise occurred, the technicians would excavate to determine what was subsurface. This procedure was necessary to assure a thorough sweep, but often caused delays due to the slowness of its actions.

The amount of interference caused by ferrous metal trash also caused significant problems and slowed sweeping considerably. Over 142,000 pounds of metal trash was hauled out of canyons and taken into the compound for proper disposal. Items such as bed springs, auto wheel rims, grandstand bleacher seats and much more had been thrown into or buried in ravines in the past and had to be dug up/removed from shallow burial sites and/or vegetation over growth to prevent interference with magnetometers. This was necessary so technicians could confirm no ordnance was below the item. On one occasion, two technicians picked and dug through six inches of hard packed ground, 4 to 6 inches of asphalt and discovered a 15 yard length piece of chain-linked fencing. This, of course, had to be excavated to confirm there were no further contacts below.

Ordnance debris in the form of fragmentation was tedious to remove. If a round had functioned (detonated) upon impact and/or after penetration into the ground, it usually fragmented into many small pieces. These bits never kept a uniform spread pattern. When technicians came across this situation, as they often did, they spent as much as 2 to 3 hours digging in one spot removing the pieces. Pieces would be dug up, then technicians checked the hole with magnetometers. The "ring off" would occur, and the operator had to keep digging to uncover more fragments. This process would be repeated many times until all of the scrap was removed, as indicated by no more "ring offs." This practice was required because live ordnance rounds had been found below existing fragmentation patterns.

There were many instances in which grids contained numerous rocks/boulders with ferrous properties. These rocks caused a magnetometer reaction identical to an actual ferrous metal object and required investigation. Often the area would have layers of this "metallic" rock to undetermined depths. ECC UXO Sweep Teams would maintain standards by digging these

bulky items up until there would be no more audible indications from the magnetometer or they reached the contract required 3 foot depth, whichever occurred first.

The contract required the removal of all ferrous material. At the end of the workday, Sweep Teams hauled in their day's finds in garbage cans, weighed them on warehouse scales and deposited the trash into a commercial dumpster. A vendor would empty the container weekly or as necessary when full.

OEW scrap such as fragmentation, empty carcasses of rounds, spent fuzes, and cartridge cases were weighed, examined by Quality Control to verify their contents "explosives free", then stored in a centralized bin. When then bin was full the contents would be reinspected, certified "explosives free" by the Senior UXO Supervisor and transported to the DRMO for disposal.

Operation of magnetometers varied in small degrees among technicians, but several aspects remained constant due to the mechanics and engineering of the instrument. Experience showed the optimum effectiveness for detecting subsurface objects was obtained by holding the tip of the "Shonstedt's" probe from 1 to 3 inches off the ground with the sensitivity switch at the halfway point, between full intensity and off. ECC worked with two different series of Shonstedt Magnetic Locator, the GA/52B and the GA/52C. The improved 52C had a larger diameter probe and a somewhat deeper aural tone. It performed better than the 52B by discriminating more of the stray or background interferences from authentic ferrous material.

Excavation procedures rapidly evolved as it was determined excavation without a magnetometer was difficult, because often contacts were small enough to be missed while removing dirt. It was discovered the most expeditious method of prosecuting a contact was to excavate a small amount of dirt, then check the hole for the contact. This process continues until the contact is sighted in the hole, or no longer in the hole, which is when the search moves to the removed dirt until the item is recovered.

At the end of each work day, UXO Sweep Team Leaders gave the Operations Supervisor grid sheets for the areas completed during that day. Grid information provided by Team Leaders included ordnance found (by nomenclature), weight of OEW scrap, weight of trash/scrap removed, date the grid was completed and all other pertinent information necessary to determine the area was adequately swept. Weights and ordnance amounts on the sheets were verified and initialed by the USACE Site Representative on the sheet for payment purposes. This grid information was then entered into the contract computer data base, color coded into the master QC map, scheduled for inspection, and copies were made for inclusion in the daily Contract Quality Control Report. After the grid was inspected and approved by the ECC Quality Control Specialist, the grid would be turned over to the USACE Quality Assurance representative for his verification evaluation. The preceding train of transactions was a perpetual (on-going) process.

2.3.4 Unusual Events:

While sweeping a grid in area F-2W, a pipe bomb was discovered. The device had failed to function and ended up in one of the canyons in which a ECC UXO Sweep Team was working. The make-shift wick (fuse) had burned down to the screw-on cap of the bomb and extinguished itself before igniting the core charge. This improvised explosive device was made from a piece of a 3 inch diameter galvanized steel pipe with threaded end caps. A hole had been drilled in one of the caps end for installing the wick. Because it was a improvised device, the San Diego Police Bomb Squad responded instead of the 70th Ordnance Detachment, and rendered the item safe by explosively removing one of the end caps, causing the bomb to spin around and spill its explosive contents on the ground. Bomb squad technicians cleaned up all residue and transported it to their facility.

On another occasion, a brush removal crew happened upon what appeared to be a shallow grave. San Diego County Sheriff's Department officials came to the site and excavated but found nothing. In a similar situation, the remnants of what might have been a satanic cult meeting place was discovered by an ECC UXO Sweep Team in area F-2W. Police investigators were brought on the scene who concluded the paraphernalia left at the scene were probably hoaxes. The USACE Huntsville Safety Representative collected some of the artifacts as evidence of the find.

ECC also found some unusual military ordnance items. In F-2W ECC found four 20mm "parachute" rounds. The rounds have shroud lines extending from nose cavities and the remnants of a small parachute (the bulk of the fabric had decayed over the years of exposure). Samples were sent to Picatinny Arsenal New Jersey and the Marine Corps EOD Unit at Camp Pendleton California, however these agencies were unable to identify the item. ECC kept one for UXO training purposes, it is on display in ECC's small showcase.

Environmental Chemical Corporation
Tierrasanta Ordnance Removal Contract
Site Layout

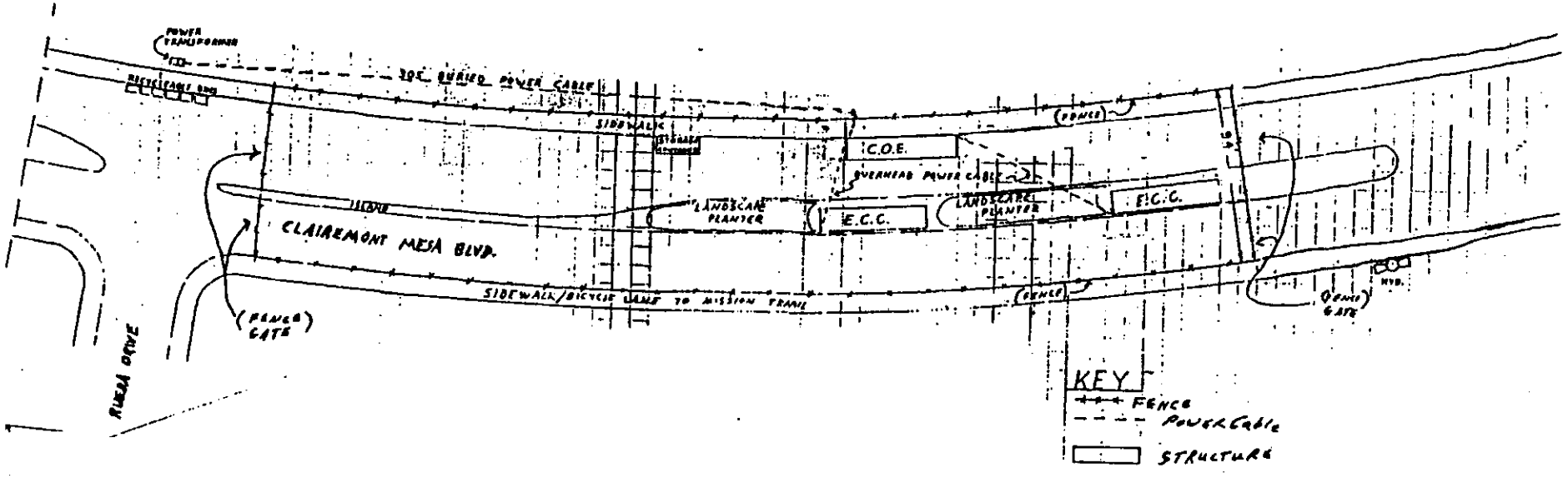


Figure (1)

3.0 AREA SPECIFIC INFORMATION

3.1 Overview

This section contains a review of area and grid specific information gathered over the duration of the contract. Because of the amount of material, the area specific information is organized in Appendix (1) and included as a separate binder. The contract area was subdivided into 32 contract geographic specific areas (in Appendix (1) areas F-8E and F-8W were combined, as were F-2E, F-2M and F-2W). The original contract numbering system has been maintained were possible, and when necessary for clarity ECC has added additional designations to provide more specific location information. This was done to allow rapid location of any of the 4,471 search grids the contract was divided into. A reduced area map with labeled sub-areas is included in this section (Figure (2)).

3.2 Background

The contract area was originally broken into subareas, with those areas receiving designations such as "C" or "F-5". After ECC subdivided the contract search area into numbered search grids (contract maximum of 100 by 200 foot), with each of the three phases of work in each grid receiving a specific activity number for USACE tracking purposes (visual sweep, brush clearance and magnetic sweep), we realized it would facilitate location of a specific grid and activity number if each search area was given a more specific designation. ECC established a numbering system where geographically unique areas received a unique designation. For example the contract designated two geographically separate areas as "F-5" (located in the east/southeast corner of the contract). ECC designated each geographical area separately by adding a "N" and "S" (for north and south) after the original area designation, giving each area a new "unique" designation. These areas are now known as "F-5N" and "F-5S" respectively.

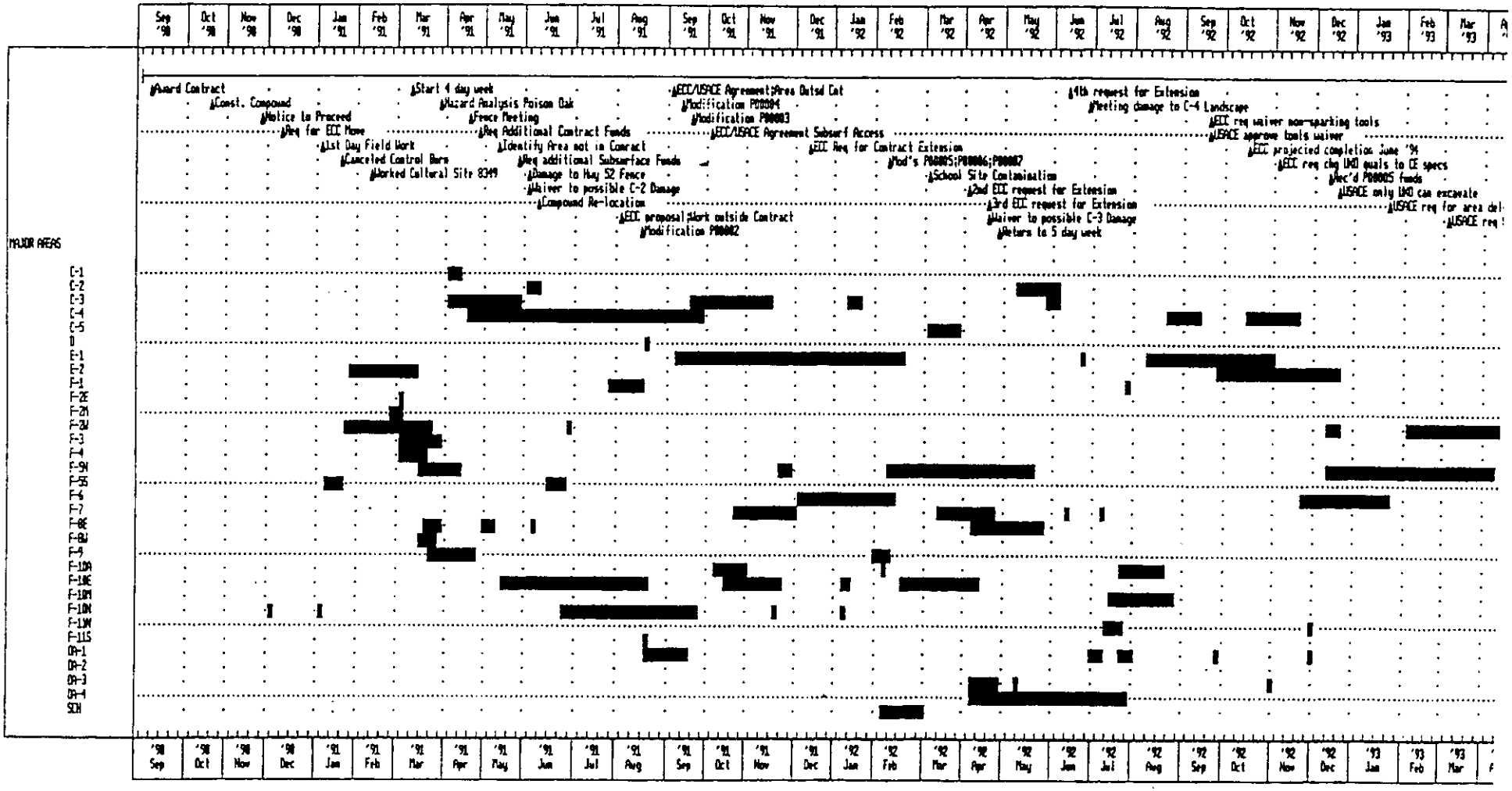

Award Contract
Const. Compound
Notice to Proceed
Req for ECC Move
1st Day Field Work
Canceled Control Burn
Worked Cultural Site 8349
Start 4 day week
Hazard Analysis Poison Oak
Fence Meeting
Req Additional Contract Funds
Identify Area not in Contract
Req additional Subsurface Funds
Damage to Hwy 52 Fence
Waiver to possible C-2 Damage
Compound Re-location
ECC proposal
Work outside Contract
Modification P00002
ECC/USACE Agreement
Modification P00004
Modification P00003
ECC/USACE Agreement Subsurf Access
ECC Req for Contract Extension
Mod's P00005;P00006;P00007
School Site Contamination
2nd ECC request for Extension
3rd ECC request for Extension
Waiver to possible C-3 Damage
Return to 5 day week
4th request for Extension
Meeting damage to C-4 Landscape
ECC req waiver non-sparking tools
USACE approve tools waiver
ECC projected completion June '94
ECC req chg UXO equals to CE specs
Rec'd P00005 funds
USACE only UXO can excavate
MAJOR AREAS

Figure (3)

As depicted in the timeline and because of environmental restrictions, ECC phased work in most of the major areas over the three year life of the contract. ECC completed 56,260,239 square feet (1,291.56 acres) of the contract 73,169,246 square feet (1,679.73 acres), including 22 of the 32 contract areas and a portion of 9 other areas between November 30, 1990 and August 19, 1993. ECC did no contract work in area OA-2. Specific information on each geographic area contained in Appendix (1) is broken down as follows:

- A general description
- Biological discussion of the specific area
- Significant items for each section
- Problems encountered
- USACE Preparatory Inspection
- USACE Initial Inspection
- USACE Final Inspection
- Ordnance Preparatory Inspection
- Ordnance Initial Inspection
- Ordnance Final Inspection
- Area map
- Grid information

A synopsis of the important totals for each geographic area and the contract is summarized below:

Table 1: Area Subtotals of ordnance and scrap cleared;

Area	Small Arms (Each)	Other Than (Each)	OEW Scrap (Pounds)	Scrap (Pounds)	Area (Sq/Ft)
C-1	7	0	16.0	250.0	127850
C-2	40	1	120.0	2004.0	318790
C-3	169	19	704.3	2492.0	1813519
C-4	134	70	3582.3	2801.0	2500535
C-5	23	28	657.0	2246.0	396265
D	0	0	0.0	42.0	1427971
E-1	267	170	5992.3	1314.0	6097730
E-2	311	67	1924.5	28779.0	9512621
F-1	23	4	65.4	1827.0	8773448

Area	Small Arms (Each)	Other Than (Each)	OEW Scrap (Pounds)	Scrap (Pounds)	Area (Sq/Ft)
F-2	537	217	2163.4	6580.4	4547700
F-3	12	3	108.5	500.5	785000
F-4	0	0	0.0	544.3	466147
F-5N	1123	196	3093.0	6579.0	5291525
F-5S	0	0	3.0	3127.2	1483664
F-6	417	11	243.0	8503.5	4310815
F-7	36	81	768.0	3759.0	1009590
F-8	165	17	183.8	11934.5	1292522
F-9	105	2	15.9	1542.0	1900440
F-10A	30	67	3688.0	431.5	1232520
F-10E	277	29	1471.0	9401.1	4124407
F-10M	33	20	1278.8	840.0	769588
F-10N	64	12	232.5	2890.2	1277660
F-11N	0	0	0.0	1743.0	2101118
F-11S	0	0	0.0	4.0	377035
OA-1	0	2	3.3	4237.5	4969440
OA-2 (Area not swept)	0	0	0.0	0.0	211520
OA-3	3	0	0.0	854.5	1317908
OA-4	10	0	7.7	34844.5	4194084
SCH	1	0	0.0	2181.5	537834
Contract Totals	3787	1016	26321.7	142253.2	73169246

3.4 Contract Biology Information

The following reports are in addition to the area specific biology report included in each area. These tables provide a comprehensive list of the Tierrasanta biological makeup and represent the most detailed study of this biological diverse area to date.

3.4.1 Reptiles and Amphibians

The list which follows is an actual list of species photographed, captured and/or seen within the Tierrasanta Ordnance Removal Project area in the period of time between the 1st of January, 1991 to 15 May, 1994. Other species are expected to be found within the project area, but these should be considered more secretive or less common than those listed below.

REPTILES AND AMPHIBIANS,
TIERRASANTA ORDNANCE REMOVAL PROJECT
(1 July, 1994)

Common Name	Scientific Name	Habitats
Amphibians:		
garden slender salamander	Batrachoseps pacificus	R,RE
western toad	Bufo boreas	R,C,RE
Pacific treefrog	Hyla (Pseudacris?) regilla	R,RE
bullfrog*	Rana catesbeiana	R
western spadefoot	Scaphiopus hammondii	C,CS
African clawed frog*	Xenopus laevis	R
Reptiles::		
western box turtle*	Terrapene ornata	C
leopard tortoise*	Geochelone pardalis	R
California legless lizard	Aniella pulchra	C
orangethroat whiptail	Cnemidophorus hyperythrus	C,CS,DIS
California whiptail	Cnemidophorus tigris	DIS,G
western skink	Eumeces skiltonianus	R,R/C,R/CS
southern alligator lizard	Gerrhonotus multicarinatus	R,C,CS,DIS
coast horned lizard	Phrynosoma coronatum	CS,CS/C
western fence lizard	Sceloporus occidentalis	R,C,CS,RE,DIS
granite lizard	Sceloporus orcutti	(Rocky)C/CS
side-blotched lizard	Uta stansburiana	C,CS,DIS,G
western blind snake	Leptotyphlops humilis	C,CS(VP)
coastal rosy boa	Lichanura trivirgata	C,DIS
California black-headed snake	Tantilla planiceps	G
night snake	Hypsiglena torquata	R,C,CS
California kingsnake	Lampropeltis getulus	C,CS,RE,DIS
patch-nosed snake	Salvadora hexalepis	CS
western yellow-bellied racer	Coluber constrictor mormon	CS,R
chaparral whipsnake	Masticophis lateralis	C,CS,G
red coachwhip	Masticophis flagellum	G,RES
San Diego gopher snake	Pituophis melanoleucus	C,CS,RE,DIS
glossy snake	Arizona elegans	C,CS
two striped garter snake	Thamnophis hammondii	R,R/CS
red diamond rattlesnake	Crotalus ruber	C,CS
southern Pacific rattlesnake	Crotalus viridis helleri	C,CS,G,DIS

Key to the Habitats

C - chaparral	CS - coastal sage scrub	VP - vernal pool area
G - grassland	DIS - disturbed	R - riparian
RE - residential	* - non-native species	

3.4.2 Mammals

The list which follows is a compilation of species observed, captured, photographed or for which skeletal remains have been discovered within the Tierrasanta Ordnance Removal Project area in the period of time from the 1st of January, 1991 to 15 May, 1994. Other species are expected to be found within the project area. The scope and purpose of the project did not, however, mandate trap and release proceedures to census mammals. The listing which follows is thus incomplete. Representation by individuals of the Rodentia, Chiroptera and Insectivora (usually ascertained by such activities) is thus lower than expected.

MAMMALS,
TIERRASANTA ORDNANCE REMOVAL PROJECT
(1 July, 1994)

Common Name	Scientific Name	Habitat
opossum	Didelphis marsupialis	all
ornate shrew	Sorex ornatus	CS,G
Townsend mole	Scapanus townsendii	DIS
California myotis	Myotis californicus	all
small-footed myotis	Myotis subulatus	R (rock crevices)
big brown bat	Eptesicus fuscus	all
Brazilian free-tailed bat	Tadarida brasiliensis	all
brush rabbit	Sylvilagus bachmani	C
desert cottontail	Sylvilagus auduboni	all
black-tailed jackrabbit	Lepus californicus	C,CS
California ground squirrel	Spermophilus beecheyi	(rocky)C,CS,DIS,G
Botta pocket gopher	Thomomys bottae	DIS, CS
agile kangaroo rat	Dipodomys agilis	C,CS,G
California pocket mouse	Perognathus californicus	C,CS
California mouse	Peromyscus californicus	C,CS
deer mouse	Peromyscus maniculatus	C,CS
dusky-footed woodrat	Neotoma fuscipes	R,C,CS
desert woodrat	Neotoma lepida	CS
Norway rat	Rattus norvegicus	all
coyote	Canis latrans	C,CS,R,DIS
gray fox	Urocyon cinereoargenteus	C,CS,G
raccoon	Procyon lotor	C,CS,R,DIS
striped skunk	Mephitis mephitis	R,C,CS,DIS
bobcat	Felis rufus	C,CS,R
mule deer	Odocoileus hemionus	C,CS,R,DIS

Key to the Habitats

C - chaparral	CS - Diegan coastal sage scrub	R - Riparian
G - grassland	DIS - disturbed habitats	

3.4.3 Birds

The list which follows is a compilation of the bird sightings within the Tierrasanta Ordnance Removal Project during the period of time from 1 January, 1991 to 15 May, 1994. These sightings were compiled with the assistance of Jeff Wells, part-time biologist for ECC on the Tierrasanta contract. Anecdotal records of species occurrences were not included. Breeding bird information is reported based on detection of actual nest sites. Other sightings from the nearby area (e.g. the San Diego River and Admiral Baker Field) are not included. It is expected that a number of additional species could be added to this list with a concerted effort, or one dedicated to the task of birding.

BIRDS
TIERRASANTA ORDNANCE REMOVAL PROJECT
(1 July, 1994)

Common Name	Scientific Name	Habitats
pied-billed grebe	Podilymbus podiceps	P
Am. white pelican	Pelecanus erythrorhynchos	MG
double-crested cormorant	Phalacrocorax auritus	MG
great blue heron	Ardea herodius	MG,R
green-backed heron	Butorides striatus	R
great egret	Casmerodius albus	O,P
snowy egret	Egretta thula	P
mallard	Anas platyrhynchos*	R
blue-winged teal	Anas discors	R
gadwall	Anas strepera	R
ruddy duck	Oxyura jamaicensis	P
turkey vulture	Cathartes aura	MG,C,CS
white-tailed kite	Elanus caeruleus	G,CS
osprey	Pandion haliaetus	MG,C,CS
northern harrier	Circus cyaneus	C,CS
sharp-shinned hawk	Accipiter striatus	C,CS,R
Cooper's hawk	Accipiter cooperii*	C,CS,R,E
red-shouldered hawk	Buteo lineatus*	R,E
red-tailed hawk	Buteo jamaicensis*	C,CS,R,E
golden eagle	Aquila chrysaetos	MG,C,CS
American kestrel	Falco sparvarius*	C,CS,R
merlin	Falco columbarius	MG,R
peregrine falcon	Falco peregrinus	CS
California quail	Callipepla californica*	C,CS
black-crowned night-heron	Nycticorax nycticorax	R
sora	Porzana carolina	R
American coot	Fulica americana*	R
killdeer	Charadrius vociferus*	R,DIS
greater yellowlegs	Tringa melanoleuca	R,O
spotted sandpiper	Actitis macularia	R,P
ring-billed gull	Larus delawarensis	MG,O
California gull	Larus californicus	MG,O
western gull	Larus occidentalis	MG,O
rock dove - X	Columba livia*	DIS
mourning dove	Zenaida macroura*	C,CS,R,DIS
greater roadrunner	Geococcyx californianus	C,CS

Common Name	Scientific name	Habitats
barn owl	Tyto alba*	R,DIS
long-eared owl	Asio otus	CS
great horned owl	Bubo virginianus*	R
western screech owl	Otus kennicottii	R(oak)
common poor-will	Phalenoptilus nuttallii	CS,C
lesser nighthawk	Chordeiles acutipennis*	C,CS
Vaux's swift	Chaetura vauxi	MG,C,CS
chimney swift - V	Chaetura pelagica	O,MG
white-throated swift	Aeronautes saxatalis	MG,C,CS
Anna's hummingbird	Calypte anna*	C,CS,R,E
Costa's hummingbird	Calypte costae	CS,DIS
calliope hummingbird	Stellula calliope	CS
black-chinned hummingbird	Archilochus alexandri	C,CS
rufous hummingbird	Selasphorus rufus	C,CS,R
Allen's hummingbird	Selasphorus sasin	R
belted kingfisher	Ceryle alcyon	R
red-naped sapsucker	Sphyrapicus nuchalis	C,CS
Nuttall's woodpecker	Picoides nuttallii*	C,CS,R
downy woodpecker	Picoides pubescens	R
acorn woodpecker	Melanerpes formicivorus	R(oak)
northern flicker	Colaptes auratus*	C,CS,R
olive-sided flycatcher	Contopus borealis	R
western wood pewee	Contopus sordidulus	C,CS,R,DIS
Hammond's flycatcher	Empidonax hammondii	R,E
Pacific slope flycatcher	Empidonax difficilis*	C,CS,R,E
black phoebe	Sayornis nigricans*	C,CS,R,E,DIS
Say's phoebe	Sayornis saya*	C,CS,DIS
ash-throated flycatcher	Myiarchus cinerascens*	C,CS,R
tropical kingbird - V	Tyrannus melancholicus	C,CS
Cassin's kingbird	Tyrannus vociferans	C,CS,G,R
western kingbird	Tyrannus verticalis*	C,CS,G,R
horned lark	Eremophila alpestris	G
tree swallow	Tachycineta bicolor	MG,C,CS,R,DIS
violet-green swallow	Tachycineta thalassina	MG,C,CS,R,DIS
n. rough-winged swallow	Stelgidopteryx serripennis*	C,CS,R,DIS
cliff swallow	Hirundo pyrrhonota*	C,CS,R,DIS
barn swallow	Hirundo rustica	R,DIS
scrub jay	Aphelocoma coerulescens*	C,CS
American crow	Corvus brachyrhynchos*	MG,C,CS,G
common raven	Corvus corax*	MG,C,CS

Common Name	Scientific Name	Habitats
plain titmouse	Parus inornatus	DIS, P
mountain chickadee - U	Parus gambeli	(R)
verdin	Auriparus flaviceps	C,CS
bushtit	Psaltriparus minimus*	C,CS,R,E
rock wren	Salpinctes obsoletus	C,CS
canyon wren	Catherpes mexicanus	MG
Bewick's wren	Thryomanes bewickii*	C,CS,R
house wren	Troglodytes aedon*	R
ruby-crowned kinglet	Regulus calendula	R,C
blue-gray gnatcatcher	Polioptila caerulea	R
California gnatcatcher	Polioptila californica*	C,CS
western bluebird	Sialia mexicana	R,DIS
Swainson's thrush	Catharus ustulatus	R,C
hermit thrush	Catharus guttatus	R,C,E,DIS
American robin	Turdus migratorius	R,E,DIS
wrentit	Chamaea fasciata*	C,CS,R
northern mockingbird	Mimus polyglottos*	C,CS,R,DIS
California thrasher	Toxostoma redivivum*	C,CS,R
American pipit	Anthus rubescens	G
cedar waxwing	Bombycilla cedrorum	R,DIS
phainopepla	Phainopepla nitens*	R,C,CS,DIS
loggerhead shrike	Lanius excubitor*	C,CS,DIS
European starling - X	Sturnus vulgaris*	C,CS,R,DIS
solitary vireo	Vireo solitarius	R
Hutton's vireo	Vireo huttoni	R
warbling vireo	Vireo gilvus	R
black and white warbler - U	Mniotila varia	R
orange-crowned warbler	Vermivora celata*	R,C,CS
Nashville warbler	Vermivora ruficapilla	R
yellow warbler	Dendroica petechia	R,C
yellow-rumped warbler	Dendroica coronata	C,CS,R,E,DIS
black-throated gray warbler	Dendroica nigrescens	R,E
Townsend's warbler	Dendroica townsendi	R,E
hermit warbler	Dendroica occidentalis	R,P
black and white warbler	Mniotilta varia	R,P
common yellowthroat	Geothlypis trichas*	R
Kentucky warbler - A	Oporornis formosus	R
Wilson's warbler	Wilsonia pusilla	R,C
yellow-breasted chat	Icteria virens	C
summer tanager - U	Piranga rubra	R,DIS
western tanager	Piranga ludoviciana*	R,E,DIS

Common Name	Scientific Name	Habitats
rose-breasted grosbeak	Pheucticus ludovicianus	R
black-headed grosbeak	Pheucticus melanocephalus*	R,C,E
blue grosbeak	Guiraca caerulea	R,C
lazuli bunting	Passerina amoena*	C
rufous-sided towhee	Pipilo erythropthalmus*	C,CS,R
California towhee	Pipilo crissalis*	C,CS,R,E,DIS
black-chinned sparrow	Spizella atrogularis	CS,C
rufous-crowned sparrow	Aimophila ruficeps*	C,CS
chipping sparrow	Spizella passerina	R,C,CS
Brewer's sparrow - V	Spizella breweri	C,CS
lark sparrow	Chondestes grammacus*	C,CS,G
sage sparrow	Amphispiza belli	CS
savannah sparrow	Passerculus sandwichensis*	C,CS,G
grasshopper sparrow	Ammodramus savannarum	G
fox sparrow	Passerella iliaca	R,C
song sparrow	Melospiza melodia*	R,C,CS,E,DIS
Lincoln's sparrow	Melospiza lincolnii	R,C,CS
swamp sparrow	Melospiza georgiana	R
golden-crowned sparrow	Zonotrichia atricapilla	C,CS
white-crowned sparrow	Zonotrichia leucophrys	R,C,CS,DIS
dark-eyed junco	Junco hyemalis	R,DIS,C
red-winged blackbird	Agelaius phoeniceus*	R
tri-colored blackbird	Agelaius tricolor*	DIS,R
western meadowlark	Sturnella neglecta	G,CS,DIS
Brewer's blackbird	Euphagus cyanocephalus	DIS,G
brown-headed cowbird	Molothrus ater*	R,DIS
hooded oriole	Icterus cucullatus*	C,CS,R
northern oriole	Icterus galbula*	R,C,CS,E,DIS
purple finch	Carpodacus purpureus	DIS,G,CS
house finch	Carpodacus mexicanus*	C,CS,R,G,DIS
Lawrence's goldfinch	Carduelis lawrencei	CS
lesser goldfinch	Carduelis psaltria*	CS,C,R,G,DIS
American goldfinch	Carduelis tristis	G,DIS,C,CS,R
house sparrow - X	Passer domesticus*	DIS,G,CS

KEY:

Occurrence

U - uncommon	A - accidental record	X - non-native species
	V - seasonal vagrant	
	* - breeds in Project area	

Habitat

C - chaparral	CS - coastal sage scrub	G - grassland
E - eucalyptus	DIS - disturbed vegetation	MG - Mission Gorge
O- overhead	R - Riparian	P - Pond

3.4.4 Special Interest Plant Species

The list which follows is a compilation of the "sensitive" species which have been found within the project area. The concept of sensitive in this case is applied to species which have received recognition from either Federal or California State authorities aa being endangered, threatened, or are presently being considered for protected status. Numerous other studies have been done in the San Diego area with respect to locally occurring plant species. A compilation of locally occurring species encountered during project activity would be incomplete at best, and with the naming of numerous varieties and subspecies of the locally occurring species, a tedious chore beyond the scope of the project.

SPECIAL INTEREST PLANT SPECIES
TIERRASANTA ORDNANCE REMOVAL PROJECT
1 July, 1994

Common Name	Scientific Name	Status	Habitats
spiny rush	Juncus acutus sphaerocarpus	CEQA	R
Orcutt's brodiaea	Brodiaea orcutti	C-2	VP
summer holly	Comarostaphylis diversifolia	C-2	SMC
variegated dudleya	Dudleya variegata	C-2	G,CSS
coast barrel cactus	Ferocactus viridescens	C-2	CSS,SMC
San Diego thorn-mint	Acanthomintha ilicifolia	C-1/CE	G/CSS
willowy monardella	Monardella linoides	C-2/CE	S
San Diego mesa mint	Pogogyne abramsii	FE/CE	VP

Key

Habitat

VP - vernal pool	G - grassland	CSS - coastal sage scrub
R - riparian	S - sandy canyon bottom	SMC - southern mixed chaparral

Status

C-1 - Category 1, Federal
C-2 - Category 2, Federal
CE - Endangered, State (California)
FE - Endangered, Federal
CEQA - must be considered when producing California environmental documents

4.0 SUMMARY:

ECC was contracted by the United States Army Corps of Engineers Huntsville Division Mandatory Center of Expertise and Design Center for Ordnance Explosive Waste to locate and remove unexploded ordnance on a portion of the Formerly Used Defense Site, Camp Elliott. This property, used by the military from WW-I through the Korean Conflict, saw troops performing a variety of training scenarios, using practically every type of ground-launched or placed munition in the inventory during those times. The southern part of Camp Elliott was returned to the City of San Diego and became the community of Tierrasanta. The death of two neighborhood children, caused by a detonating UXO (37mm projectile) found in a canyon near their homes, caused a public outcry to rid the area of these dangers. A feasibility study and risk assessment performed on the affected area by another commercial firm, prior to the removal contract, fell far short of estimating the amount of both hazardous UXO and non-hazardous OEW and associated residue that would be recovered by a removal project.

The project was implemented November 29, 1990 and expired August 23, 1993. Area not swept by that time was completed under the Camp Elliott Ordnance Removal Contract by April 1994, one month ahead of the projected schedule.

Previous attempts to clear the Tierrasanta environs of explosive hazards were only partially successful, because large scale brush removal and subsurface magnetic detection was not performed and many pieces of ordnance went undetected.

After contract award, ECC developed a set of detailed work plans to govern its operation. The plans were contract deliverables and served as guides for field operations. ECC project management employed an experienced staff of specialists to head up the various disciplines contractually required for a successful completion. These professionals were instrumental in publishing the first complete set of work plans for a USACE managed civilian (commercial contract) ordnance removal project.

The remedial approach chosen was tailored to fit the "preferred alternatives" suggested by the initial ordnance investigation/assessment of the site. An 85 acre portion of the project area, still under government ownership, was to be fenced off so as to deny access to unauthorized persons (civilian citizens). A separate smaller plot was to be burned off then electronically swept (this portion of the contract encountered problems and was ultimately canceled). Hopes were that some of the UXO would detonate when exposed to the fire's heat. The balance of the landscape was to receive a combination of visual and electronic ordnance searches, performed by qualified UXO personnel.

Work plans specified personnel qualifications, site specific environment protection requirements, accident prevention, select clearing methods, quality control program elements, and UXO field search and removal activities. Several departures and/or reversals from work plans and stipulations were made, as they pertain to operational procedures and remediation methodologies. These departures include:

Anticipated UXO sweep procedures were modified when the amount of material projected in the assessment report proved to be substantially under estimated.

Hand cutting/clearing was done in lieu of the controlled burn, because of city ordinance prohibitions.

UXO sweep team size and composition changed as USACE decisions were made regarding technician qualifications.

Laborers were hired to remove brush when managers realized the increased item detection rates required considerably more time to excavate and more brush removal to allow excavation than initially estimated.

Other less significant policies and procedures were modified to oblige specific situation dictates. Some personal protective equipment and tool changes occurred to abate potential safety and health maladies. Most pronounced of all changes made, and disconcerting to ECC contract managers, was the imposition of safe separation distances between UXO sweep teams and other contract personnel late in the contract, required by the on-site USACE Huntsville representative.

Ecological mitigation was a constant priority throughout the course of this project. ECC, utilizing the talents of its professional biologist, received plaudits for the work employees did to preserve, protect, and restore the habitats of the flora and fauna in the Tierrasanta area. Selective brush clearance was done with prudence and was critically phased with plant and animal life cycles.

There were several significant contract modifications. Among the most important was the addition of area to be swept for UXO. Modifications P0004, P0006 and P0007 added 119 grids and 1,392,490 square feet to the contract. This additional area was located in C-2, C-3, C-4, C-5 and the school area. The identification and sweeping of the additional area made Tierrasanta significantly safer (and cleaner). ECC located and removed 53 hazardous small arms items, 34 hazardous large items, 786.5 pounds of OEW scrap and 5,829.5 pounds of trash from the add-ons.

Brush removal was done with U.S. Forestry Service approved equipment and in accordance with Forestry Service procedures. Initially, crews were led by experienced Forestry Service

personnel. Brush cutting was closely monitored to ensure contract requirements and approved work procedures were followed to ensure sufficient vegetation was removed to allow for a comprehensive ordnance investigation. A UXO technician was assigned to each brush crew to perform visual surface sweeps for ordnance, and provide positive identification of items discovered by the crew.

During the contract, UXO technicians located and removed more than 4,803 items of hazardous ordnance (3,787 small arms and 1,016 larger munitions), 26,321 pounds of ordnance (OEW) debris, and 142,253 pounds of trash.

A number of unusual events took place during the contract. Noteworthy among them were the discoveries of a pipe bomb, a satanic cult meeting place, cultivated marijuana plants and the appearances of a shallow grave.

The Quality Control program was a great benefit to project performance. Grid inspections, the "Sweep Effectiveness Program", safety surveillance, DRMO turn-in monitoring and work documentation were all instrumental to project success.

ECC's comprehensive accident prevention program and Safety Officers were responsible for a nearly accident free project. ECC logged 369,266.5 contract manhours with 34 lost time accidents, a average of one lost time accident every 5.22 man-years. There were no explosive mishaps. Workers caught and relocated more than 700 poisonous rattlesnakes, worked on extremely steep gradients, contended with harmful insects and encountered other physical and climatic challenges. At the height of the contract, more than 80 chain saws and 2 chippers were operated daily. A fleet of 20-plus vehicles traversed hundreds of cumulative miles of unimproved, often treacherous roadways. With the right combination of safety awareness briefings, suggestion programs, safety specialist surveillance, equipment condition monitoring, total supervisor involvement, hazard abatement initiatives, well-written work plans and most importantly, the proper attitudes in the minds of employees, ECC pridefully experienced a historically minimal amount of employee injuries.

5.0 CONCLUSIONS

Information presented in this section is drawn from and based upon experiences, lessons learned and outcomes as a result of performing this contract. A contrast is also drawn between projections the initial assessment reported and actual events witnessed throughout the project.

Planning for the Tierrasanta Ordnance Removal project was formulated based on conclusions and recommendations cited in the initial assessment report for the Tierrasanta area. There is strong speculation among ECC project managers that some of the problems encountered during the formulation and conduct of the contract could have been averted if a more substantial investigation had been performed. A random sample formula was constructed from which test grids were chosen. This mathematical model probably might have, if followed, provided desired results. However, the random sequencing of performing tests was abandoned by those conducting the survey for a more convenient order. Instead of surveying the grids chosen by the random process, regardless of the conditions existing within the areas, they apparently opted for grids in which vegetation was minimal and its topography was more comfortable to work. The downside of this method could probably have contributed to the small amount of ordnance that the report projected would be recovered during a removal operation.

5.1 Recommendations

Subsurface analysis of sites for potential UXO removal contracts in the future should be comprehensive enough so as to accurately estimate the amount of contamination in the overall vicinity. It is understood that sampling is the means for determining levels; however, either better mathematical models, more refined sampling techniques or some other methodologies should be employed to minimize errors in projecting ordnance contamination throughout a given geographic location.

Other factors should be investigated when attempting to arrive at a reasonable estimate. There may be a direct correlation between topography, weather conditions, surface erosion, etc. and ordnance density.

When work must proceed in remote areas, some appropriate method of delivering heavy equipment (chippers) to the job site should be allowed. An inappropriate amount of time was spent moving the chipper by hand, because the contract did not permit driving any vehicle off existing roads.

ENVIRONMENTAL CHEMICAL
CORPORATION

ECC Remediation Services

Phone: (619) 576-0107 • FAX (619) 576-1329
4909 Murphy Canyon Road, Suite 110 • San Diego, CA 92123

June 6, 1994

ECC TIERRASANTA CONTRACT: DACA87-90-C-0052
Serial Number #121

DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
San Diego Resident Office
P.O. Box 2300
Oceanside, California 92051

ATTN: Mr. D. Moore

SUBJECT: Letter of Completion for the Tierrasanta Ordnance Removal Contract

Dear Mr. Moore,

As specified in the Tierrasanta Ordnance Removal Contract DACA87-90-C-0052, Environmental Chemical Corporation ("ECC") has completed ordnance sweep operations in all areas included in the contract, and identified by your office as requiring sweeping. This includes area swept under this contract and the area swept under the Camp Elliott Ordnance Removal Contract (DACA87-92-D-0126), but originally included in the Tierrasanta contract.

During the period of contract performance (November 29, 1990 through August 24, 1993 for DACA87-90-C-0052; August 23, 1993 through May 2, 1994 for DACA87-92-D-0126) ECC swept 1,904.24 acres, locating and removing 171,559.9 pounds of ferrous debris, 28,491.7 pounds of ordnance scrap, 3,991 hazardous small arms and 1,066 hazardous items larger than small arms.

This area has been swept for ordnance, as required in contract DACA87-90-C-0052, to a depth of three feet, using magnetometers approved for use by the United States Army Corps of Engineers ("USACE"). All ordnance and related debris located during clearance operations has been removed from the work site and disposed of in accordance with contract requirements. This does not mean, nor should it be construed to mean, that ECC certifies 100% of the hazardous ordnance has been located and removed from the project area.

Sincerely,

Richard Posey
Director ECC EOD Division

Attachment (1): Letter of Completion, copy

Certificate Of Ordnance Clearance

This Certificate Stipulates That:

Environmental Chemical Corporation is an established and recognized Ordnance Explosive Waste Disposal Company

A trained Unexploded Ordnance Disposal Team has conducted the ordnance search and clearance in accordance with the requirements stipulated in the attached statement of work.

All ordnance and related debris located during clearance operations by Environmental Chemical Corporation during the period November 29, 1990 to May 2, 1994 has been removed from the work site and disposed of in accordance with contract requirements.

USACE Los Angles District	Tierrasanta/Camp Elliott Ordnance Removal Contract	June 6, 1994
Issued to	Project	Date

Richard Posey
Director ECC EOD Division

The issue of this certificate does not mean, nor should it be construed to mean, that ECC will certify that 100% of the ordnance has been located and removed from the project area

SEARCH AREA: C-1

General:

Search Area C-1 is located at the extreme northern edge of the contract. C-1 consists of 18 search grids, numbered 1792 through 1799 and 6057 through 6066. Total area swept is approximately 127,850 square feet. Terrain is relatively flat with sparse brush. A Preparatory Inspection was accomplished April 2, 1991, a Initial Inspection was conducted April 3, 1991 and a Final Inspection was conducted April 30, 1991. All grids passed the Quality Control and Quality Assurance checks. The area was swept April 3 and 4, 1991. Please refer to the attached database report for ordnance amounts, scrap totals, grid finish dates, and individual grid square foot totals.

Biological:

Area C-1 is a very small, lightning bolt-shaped area of land adjacent to what has become State Road 52 (SR-52). Heavily disturbed and devoid of native vegetation, this area provided cover and food for seed-eating birds (primarily house finches and mourning doves) coast horned lizards and ants. Work progressed rapidly through the area and one precaution protected the horned lizards which were found in the area; they were captured and stored for the day at ambient temperature, protected from direct sunlight and released at the end of the day.

Significant Items:

No UXO items larger than small arms were found in this area, and all small arms were found on the eastern end of C-1.

Problems Encountered:

There were no problems encountered while working in this area.

PREPARATORY INSPECTION CHECKLIST

CONTRACT NO: DACA87-90-C-0052 DATE: 4-02-91

TITLE: Tierrasanta Ordnance Removal SPECS SECTION: 01400.5.1

MAJOR DEFINABLE SEGMENT OF WORK: Grid Clearance Area C

A. PERSONNEL PRESENT:

	Name	Position	Company
1.	C. Conner	Safety/Q.C.	ECC
2.	R. Hogue	Surveyor	ECC
3.			
4.			
5.			

B. TRANSMITTALS NUMBER & ITEM CODE COMMENTS 1. _____ 2. _____

C. HAVE ALL ITEMS BEEN APPROVED? YES [X] NO [ ]

D. WHAT ITEMS HAVE NOT BEEN APPROVED?

	Item	Status
1.		

E. ARE ALL MATERIALS ON SITE? YES [X] NO [ ]

E-I. HAVE ALL THE MATERIALS ON SITE BEEN APPROVED? YES [X] NO [ ]

E-II. ITEMS NOT ON THE SITE OR NOT APPROVED:

1. _____ 4. _____
2. _____ 5. _____
3. _____ 6. _____

TEST REQUIRED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS:

	Test	Specification Paragraph
1.		
2.		
3.		

F. ACCIDENT PREVENTION PREPLANNING - JOB HAZARD ANALYSIS (SPD FORM 210-R)
HAS A JOB HAZARD ANALYSIS BEEN APPROVED? YES [X] NO [ ]

F-I. OPERATIONAL EQUIPMENT CHECKLIST (SPD FORM 150):
ATTACHED FOR:

1. _____ 3. _____
2. _____ 4. _____

_____
QUALITY CONTROL - PRIME CONTRACTOR

_____
QUALITY CONTROL - SUBCONTRACTOR

ORDNANCE REMOVAL PROJECT PREPARATORY INSPECTION CHECKLIST

CONTRACT NO: DACA87-90-C-0052 DATE: 4-02-91

TITLE: Tierrasanta Ordnance Removal

MAJOR DEFINABLE SEGMENT OF WORK: Grid Clearance Inspection Area C

A. PERSONNEL PRESENT:

Name	Position	Company
1. C. Conner	Safety/Q.C.	ECC
2. R. Hogue	Surveyor	ECC
3.		
4.		

B. MAJOR DEFINABLE GEOGRAPHIC AREA: C. adrr

C. ENVIRONMENTAL CONSIDERATIONS:

1. ARE ALL SENSITIVE HABITATS ADEQUATELY MARKED/DEFINED? YES [X] NO [ ]

2. COMMENTS: There is no sensitive habitat in this sweep area.

D. SURVEY CONSIDERATIONS:

1. IS THE AREA ADEQUATELY DEFINED BY THE SURVEYOR? YES [X] NO [ ]

2. ARE THE GRIDS MARKED AND IDENTIFIABLE? YES [X] NO [ ]

3. COMMENTS:

E. GENERAL COMMENTS: The sweep area is clear and should present no problems.

INSPECTOR

INITIAL INSPECTION CHECKLIST

CONTRACT NO: DACA87-90-C-0052 DATE: 4-03-91

DESCRIPTION & LOCATION OF WORK INSPECTED: GRID CLEARANCE C

SPECS SECTION: 01400.5.2

REFERENCE CONTRACT DRAWINGS: _____

A. PERSONNEL PRESENT

NAME	POSITION	COMPANY
1. A. Marks	Operations Supervisor	ECC
2. C. Conner	Safety/Q.C.	ECC
3. _____		
4. _____		

B. ARE THE MATERIALS BEING USED IN STRICT COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS? YES [X] NO [ ]

IF NOT EXPLAIN: _____

_____

C. PROCEDURES AND/OR WORK METHODS WITNESSED ARE IN STRICT COMPLIANCE WITH THE REQUIREMENT OF THE CONTRACT SPECIFICATIONS. YES [X] NO [ ]

IF NOT EXPLAIN: _____

_____

D. WORKMANSHIP IS ACCEPTABLE. YES [X] NO [ ]

STATE AREAS WHERE IMPROVEMENT IS NEEDED: _____

_____

_____

E. SAFETY VIOLATIONS AND CORRECTIVE ACTION TAKEN: _____

_____

_____

_____
QUALITY CONTROL OFFICER

_____
PROJECT MANAGER

ORDNANCE REMOVAL PROJECT INITIAL INSPECTION CHECKLIST

CONTRACT NO: DACA87-90-C-0052 DATE: 4-03-91

TITLE: Tierrasanta Ordnance Removal

MAJOR DEFINABLE SEGMENT OF WORK: Grid Clearance Inspection Area C

A. PERSONNEL PRESENT:

Name	Position	Company
1. A. Marks	Operations Supervisor	ECC
2. C. Conner	Safety/Q.C.	ECC
3.		
4.		

B. MAJOR DEFINABLE GEOGRAPHIC AREA: C

C. WAS A ORDNANCE REMOVAL PROJECT PREPARATORY INSPECTION CONDUCTED?
YES [X] NO [ ]

D. ARE THE WORK CREWS PREFORMING THE FOLLOWING ACTIVITIES IN ACCORDANCE WITH CONTRACT SPECIFICATIONS?

1. VISUAL SWEEP YES [X] NO [ ]
2. BRUSH CLEARANCE YES [X] NO [ ]
3. MAGNETIC SWEEP YES [X] NO [ ]
4. COMMENTS: Area is clear of brush. Crew is finding a lot of construction debris.

E. GENERAL COMMENTS: In addition to the designated search area, ECC is magnetically sweeping the designated fence line.

INSPECTOR

ORDNANCE REMOVAL PROJECT FINAL FOLLOW-UP INSPECTION CHECKLIST

CONTRACT NO: DACA87-90-C-0052 DATE: 4-30-91

TITLE: Tierrasanta Ordnance Removal

MAJOR DEFINABLE SEGMENT OF WORK: Grid Clearance, Area C Sub-area 1

A. PERSONNEL PRESENT:

Name	Position	Company
1. C. Conner	Safety/Q.C.	ECC
2. J. Anelle	Quality Assurance	COE
3.		
4.		

B. MAJOR DEFINABLE GEOGRAPHIC AREA: C Sub-area 1

C. WAS A ORDNANCE REMOVAL PROJECT PREPARATORY INSPECTION CONDUCTED?
YES [X] NO [ ]

D. WAS A INITIAL PROJECT INSPECTION CONDUCTED? YES [X] NO [ ]

E. DID THE WORK CREWS PREFORMING THE FOLLOWING ACTIVITIES IN ACCORDANCE WITH CONTRACT SPECIFICATIONS?

1. VISUAL SWEEP YES [X] NO [ ]
2. BRUSH CLEARANCE YES [X] NO [ ]
3. MAGNETIC SWEEP YES [X] NO [ ]

4. COMMENTS: Brush clearance was not required in this area.

G. WAS THE AREA QUALITY CONTROL CHECKED? YES [X] NO [ ]

F. IS ALL THE FOLLOWING REMOVED:

1. GRID STAKES YES [X] NO [ ]
2. ENVIRONMENTAL MARKING YES [X] NO [ ]
3. OBJECT IDENTIFICATION FLAGS YES [X] NO [ ]

G. IS THE AREA RETURNED TO ITS ORIGINAL CONDITION? YES [X] NO [ ]

H. COMMENTS: Fence line stakes for the southern fence were left in place. All work is complete and satisfactory.

C. Conner 4-30-91
INSPECTOR

FINAL FOLLOW UP INSPECTION REPORT

REPORT NO: 00006
DATE: 04-30-91

PROJECT: Tierrasanta Ordnance Removal CONTRACT NO: DACA87-90-C-0052

PROJECT MANAGER: E. Cash

CONTRACTOR: Environmental Chemical Corporation

FEATURE OF WORK: Grid Clearance
ACTIVITY NO: 01792 through 01799, 05108 through 05115, 08388 through 08395.

A. PERSONNEL PRESENT:

Name	Position	Company
1. C. Conner	Safety/Q.C.	ECC
2. J. Anelle	Quality Assurance	COE

B. IS WORK COMPLETED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS:
YES [X] NO [ ]

IF NO EXPLAIN: _____

C. IS WORKMANSHIP ACCEPTABLE? YES [X] NO [ ]

IF NO EXPLAIN: _____

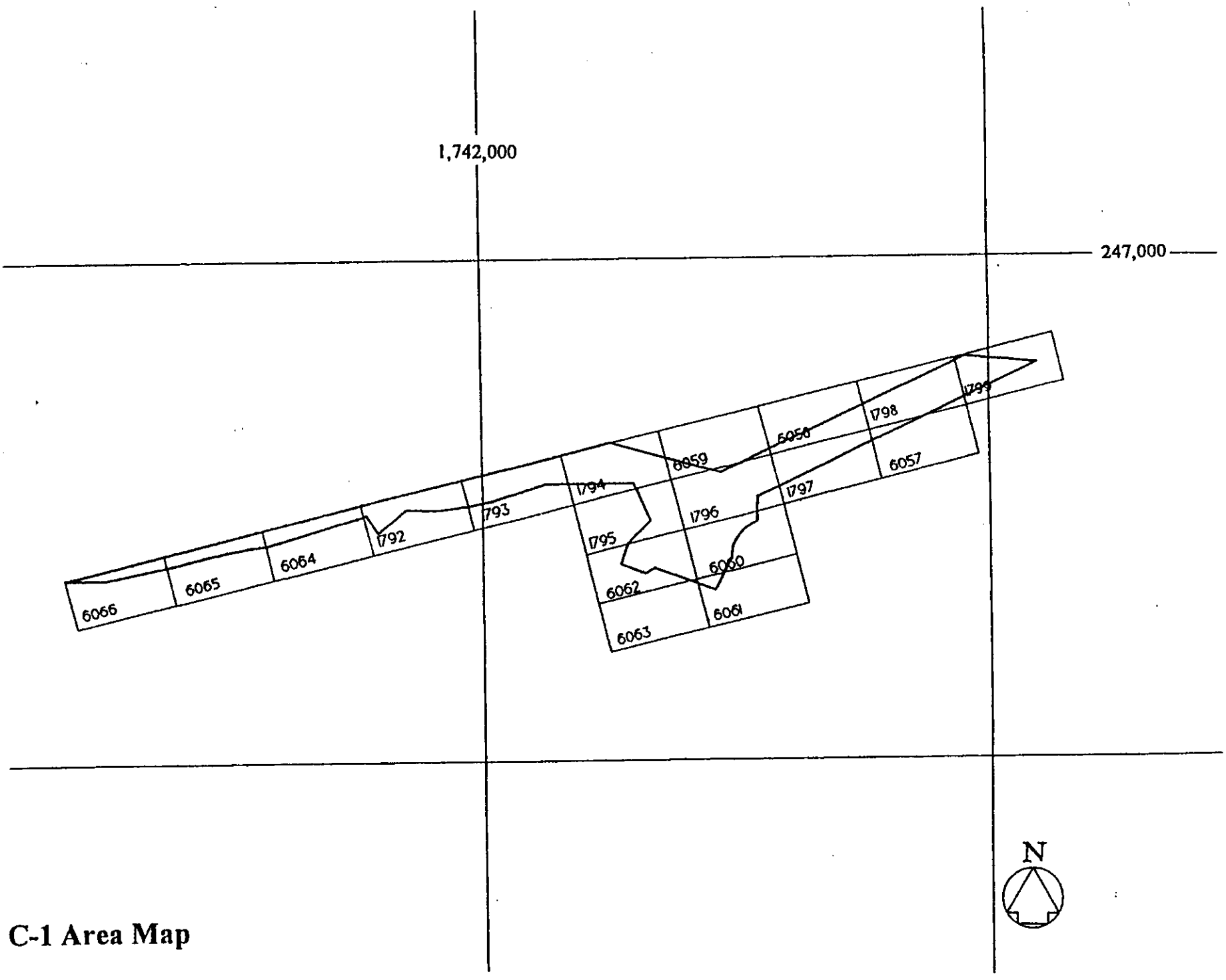
D. SAFETY VIOLATIONS AND CORRECTIVE ACTION TAKEN: None

E. QUALITY CONTROL INSPECTIONS CONDUCTED: Provided on attached sheet.

C. Conner 4-30-91
QUALITY CONTROL OFFICER

E Cash 4-30-91
PROJECT MANAGER

ACTIVITY NO.	PERSON CONDUCTING INSP.	RESULTS
1792	C. CONNER QC	NEGATIVE
1793	C. CONNER QC	NEGATIVE
1794	C. CONNER QC	NEGATIVE
1795	C. CONNER QC	NEGATIVE
1796	C. CONNER QC	NEGATIVE
1797	C. CONNER QC	NEGATIVE
1798	C. CONNER QC	NEGATIVE
1799	C. CONNER QC	NEGATIVE
5108	C. CONNER QC	NEGATIVE
5109	C. CONNER QC	NEGATIVE
5110	C. CONNER QC	NEGATIVE
5111	C. CONNER QC	NEGATIVE
5112	C. CONNER QC	NEGATIVE
5113	C. CONNER QC	NEGATIVE
5114	C. CONNER QC	NEGATIVE
5115	C. CONNER QC	NEGATIVE
8388	C. CONNER QC	NEGATIVE
8389	C. CONNER QC	NEGATIVE
8390	C. CONNER QC	NEGATIVE
8391	C. CONNER QC	NEGATIVE
8392	C. CONNER QC	NEGATIVE
8393	C. CONNER QC	NEGATIVE
8394	C. CONNER QC	NEGATIVE
8395	C. CONNER QC	NEGATIVE


1,742,000
247,000
6066
6065
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1792
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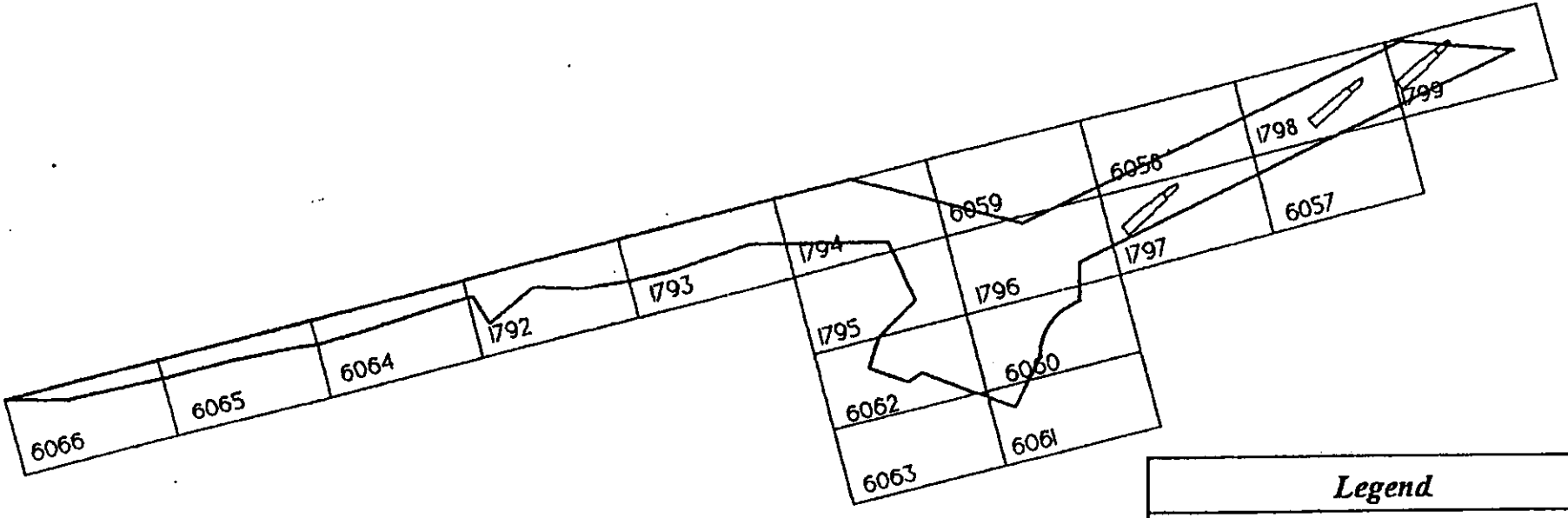
6061
N

C-1 Area Map



Legend	
1739	= Small Arms were found in the grid
1737	= Other Than Small Arms were found in the grid
	= Grid was not Swept
1760 *	= Check area write-up for additional information

C-1 Ordnance Map

Grid No	# Grids	Major Area	Team	Small Arms	Other	OEW Scrap	Scrap	Date Finished	Date OA'd	Bip'd	Square Feet	
1792	1	C-1	CASWELL	0	0	0.0	10.0	04/04/91	04/09/91	0	8200	
1793	1	C-1	CASWELL	0	0	0.0	10.0	04/04/91	04/09/91	0	10000	
1794	1	C-1	CASWELL	0	0	0.0	10.0	04/04/91	/ /	0	14550	
1795	1	C-1	CASWELL	0	0	0.0	10.0	04/04/91	/ /	0	4700	
1796	1	C-1	CASWELL	0	0	0.0	25.0	04/04/91	/ /	0	17850	
1797	1	C-1	CASWELL	2 1 50 CAL, 1 30 CAL	0	6.0	10.0	04/04/91	/ /	0	10000	
1798	1	C-1	CASWELL	2 .50 CAL	0	4.0	50.0	04/04/91	04/09/91	0	14050	
1799	1	C-1	CASWELL	3 2 50 CAL, 1 22 CAL	0	6.0	15.0	04/04/91	04/09/91	0	7000	
6057	1	C-1	CASWELL	0	0	0.0	25.0	04/03/91	/ /	0	2200	
6058	1	C-1	CASWELL	0	0	0.0	25.0	04/03/91	/ /	0	6000	
6059	1	C-1	CASWELL	0	0	0.0	10.0	04/03/91	/ /	0	1490	
6060	1	C-1	CASWELL	0	0	0.0	10.0	04/03/91	/ /	0	9500	
6061	1	C-1	CASWELL	0	0	0.0	0.0	04/03/91	/ /	0	700	NO WEIGHT RECOVERED IN THIS GRID
6062	1	C-1	CASWELL	0	0	0.0	10.0	04/03/91	/ /	0	8500	
6063	1	C-1	CASWELL	0	0	0.0	0.0	04/03/91	/ /	0	50	NO WEIGHT WAS RECOVERED IN THIS GRID
6064	1	C-1	CASWELL	0	0	0.0	10.0	04/03/91	/ /	0	4800	
6065	1	C-1	CASWELL	0	0	0.0	10.0	04/03/91	/ /	0	5000	
6066	1	C-1	CASWELL	0	0	0.0	10.0	04/03/91	/ /	0	3260	
*** Total ***												
	18			7	0	16.0	250.0				127850	

SEARCH AREA: C-2

General:

Search Area C-2 is located at the extreme northeastern edge of the contract. C-2 consists of 36 grids totaling approximately 318,790 square feet, of this amount 154,650 square feet in 15 grids was added to the contract. The terrain was graded relatively flat and landscaped. The main portion required no brush clearance, however some areas adjacent to the pipeline on the eastern border did require minimal brush removal before clearance. A significant amount of construction debris from the surrounding structures was discovered buried at this site, making magnetic sweeping extremely difficult. Sweep teams were ordered to remove all metallic materials from the grid, instead of positively identifying and marking deep/large items in place, resulting in a increase in recovered scrap. A Preparatory Inspection was accomplished May 16, 1991, a Initial Inspection was conducted June 3, 1991 and a Final Inspection was conducted July 22, 1992. All grids passed the Quality Control and Quality Assurance checks. Two grids were initially swept June 4, 1991, then because of the amount of damage being done to the landscaping, ECC withdrew until May 11, 1992. A meeting was held and it was determined ECC would not be held liable for damage to the landscaping (ECC letter serial #33 of June 5, 1991). The final grids were completed June 9, 1992. Please refer to the attached database report for ordnance amounts, scrap totals, grid finish dates, and individual grid square foot totals.

Biological:

Area C-2 has been totally landscaped. No biological comments are applicable to the Contract vis-a-vis this area.

Significant Items:

One fuze was found in this area, and 40 small arms. The items were scattered along the western and southern portions of this area. There were no areas of centralized density.

Problems Encountered:

Damage to the landscaping while removing the buried construction debris required a mutual agreement of understanding and C-2 encompassed significant area not included in the original contract bid.

PREPARATORY INSPECTION CHECKLIST

CONTRACT NO: DACA87-90-C-0052 DATE: 5-16-91

TITLE: Tierrasanta Ordnance Removal SPECS SECTION: 01400.5.1

MAJOR DEFINABLE SEGMENT OF WORK: Grid Clearance Area C subarea 2

A. PERSONNEL PRESENT:

Name	Position	Company
1. C. Conner	Safety/Q.C.	ECC
2. E. Nelson	Safety/Q.C.	ECC
3.		
4.		
5.		

B.

TRANSMITTALS NUMBER & ITEM	CODE	COMMENTS
1.		
2.		

C. HAVE ALL ITEMS BEEN APPROVED? YES [X] NO [ ]

D. WHAT ITEMS HAVE NOT BEEN APPROVED?

Item	Status
1.	

E. ARE ALL MATERIALS ON SITE? YES [X] NO [ ]

E-I. HAVE ALL THE MATERIALS ON SITE BEEN APPROVED? YES [X] NO [ ]

E-II. ITEMS NOT ON THE SITE OR NOT APPROVED:

1. _____ 4. _____
2. _____ 5. _____
3. _____ 6. _____

TEST REQUIRED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS:

Test	Specification Paragraph
1.	
2.	
3.	

F. ACCIDENT PREVENTION PREPLANNING - JOB HAZARD ANALYSIS (SPD FORM 210-R)
HAS A JOB HAZARD ANALYSIS BEEN APPROVED? YES [X] NO [ ]

F-I. OPERATIONAL EQUIPMENT CHECKLIST (SPD FORM 150):
ATTACHED FOR:

1. _____ 3. _____
2. _____ 4. _____

C. Conner 5-20-91
QUALITY CONTROL - PRIME CONTRACTOR

QUALITY CONTROL - SUBCONTRACTOR

ORDNANCE REMOVAL PROJECT PREPARATORY INSPECTION CHECKLIST

CONTRACT NO: DACA87-90-C-0052 DATE: 5-16-91

TITLE: Tierrasanta Ordnance Removal

MAJOR DEFINABLE SEGMENT OF WORK: Grid Clearance Inspection Area C subarea 2

A. PERSONNEL PRESENT:

Name	Position	Company
1. C. Conner	Safety/Q.C.	ECC
2. E. Nelson	Safety/Q.C.	ECC
3.		
4.		

B. MAJOR DEFINABLE GEOGRAPHIC AREA: C subarea 2

C. ENVIRONMENTAL CONSIDERATIONS:

1. ARE ALL SENSITIVE HABITATS ADEQUATELY MARKED/DEFINED? YES [X] NO [ ]

2. COMMENTS: No sensitive area exist in the canyon.

D. SURVEY CONSIDERATIONS:

1. IS THE AREA ADEQUATELY DEFINED BY THE SURVEYOR? YES [X] NO [ ]

2. ARE THE GRIDS MARKED AND IDENTIFIABLE? YES [X] NO [ ]

3. COMMENTS: Additional area has been identified to the north and south of the contract area. This area has been surveyed and passed to the COE for action.

E. GENERAL COMMENTS: Initial analysis has indicated that sweep crews need to conduct complete sweeps of this area to preclude missing ordnance that could have been graded over by landscaping crews.

C. Conner 5-20-91
INSPECTOR

ORDNANCE REMOVAL PROJECT INITIAL INSPECTION CHECKLIST

CONTRACT NO: DACA87-90-C-0052 DATE: 6-03-91

TITLE: Tierrasanta Ordnance Removal

MAJOR DEFINABLE SEGMENT OF WORK: Grid Clearance Area C subarea 2

A. PERSONNEL PRESENT:

Name	Position	Company
1. J. Anelle	Quality Assurance	COE
2. A. Marks	Project Supervisor	ECC
3. E. Nelson	Safety/Q.C.	ECC
4.		

B. MAJOR DEFINABLE GEOGRAPHIC AREA: Area C subarea 2

C. WAS A ORDNANCE REMOVAL PROJECT PREPARATORY INSPECTION CONDUCTED?
YES [X] NO [ ]

D. ARE THE WORK CREWS PREFORMING THE FOLLOWING ACTIVITIES IN ACCORDANCE WITH CONTRACT SPECIFICATIONS?

1. VISUAL SWEEP YES [X] NO [ ]
2. BRUSH CLEARANCE YES [X] NO [ ]
3. MAGNETIC SWEEP YES [X] NO [ ]
4. COMMENTS: Area was a cultivated and landscaped. No brush clearance was required.

E. GENERAL COMMENTS: Area has a lot of construction debris.

E. Nelson
INSPECTOR

INITIAL INSPECTION CHECKLIST

CONTRACT NO: DACA87-90-C-0052 DATE: 6-03-91

DESCRIPTION & LOCATION OF WORK INSPECTED: Area C subarea 2

SPECS SECTION: 01400.5.2

REFERENCE CONTRACT DRAWINGS: _____

A. PERSONNEL PRESENT

NAME	POSITION	COMPANY
1. J. Anelle	Quality Assurance	COE
2. A. Marks	Project Supervisor	ECC
3. E. Nelson	Safety/Q.C.	ECC
4.		

B. ARE THE MATERIALS BEING USED IN STRICT COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS? YES [X] NO [ ]

IF NOT EXPLAIN: _____

C. PROCEDURES AND/OR WORK METHODS WITNESSED ARE IN STRICT COMPLIANCE WITH THE REQUIREMENT OF THE CONTRACT SPECIFICATIONS. YES [X] NO [ ]

IF NOT EXPLAIN: _____

D. WORKMANSHIP IS ACCEPTABLE. YES [X] NO [ ]

STATE AREAS WHERE IMPROVEMENT IS NEEDED: _____

E. SAFETY VIOLATIONS AND CORRECTIVE ACTION TAKEN: _____

E. Nelson
QUALITY CONTROL OFFICER

PROJECT MANAGER

FINAL FOLLOW UP INSPECTION REPORT

REPORT NO: 00014
DATE: 07-22-92

PROJECT: Tierrasanta Ordnance Removal CONTRACT NO: DACA87-90-C-0052

PROJECT MANAGER: R. Whitbeck

CONTRACTOR: Environmental Chemical Corporation

FEATURE OF WORK: Grid Clearance
ACTIVITY NO: 2330 through 2339, 3257, 5646 through 5655, 6573, 8926 through 8935, 9853, 14034 through 14048, 15034 through 15048, 16034 through 16048.

A. PERSONNEL PRESENT:

Name	Position	Company
1. E. Nelson	Safety/Q.C.	ECC
2. T. Collister	Safety/Q.C.	ECC

B. IS WORK COMPLETED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS:
YES [X] NO [ ]

IF NO EXPLAIN: _____

C. IS WORKMANSHIP ACCEPTABLE? YES [X] NO [ ]

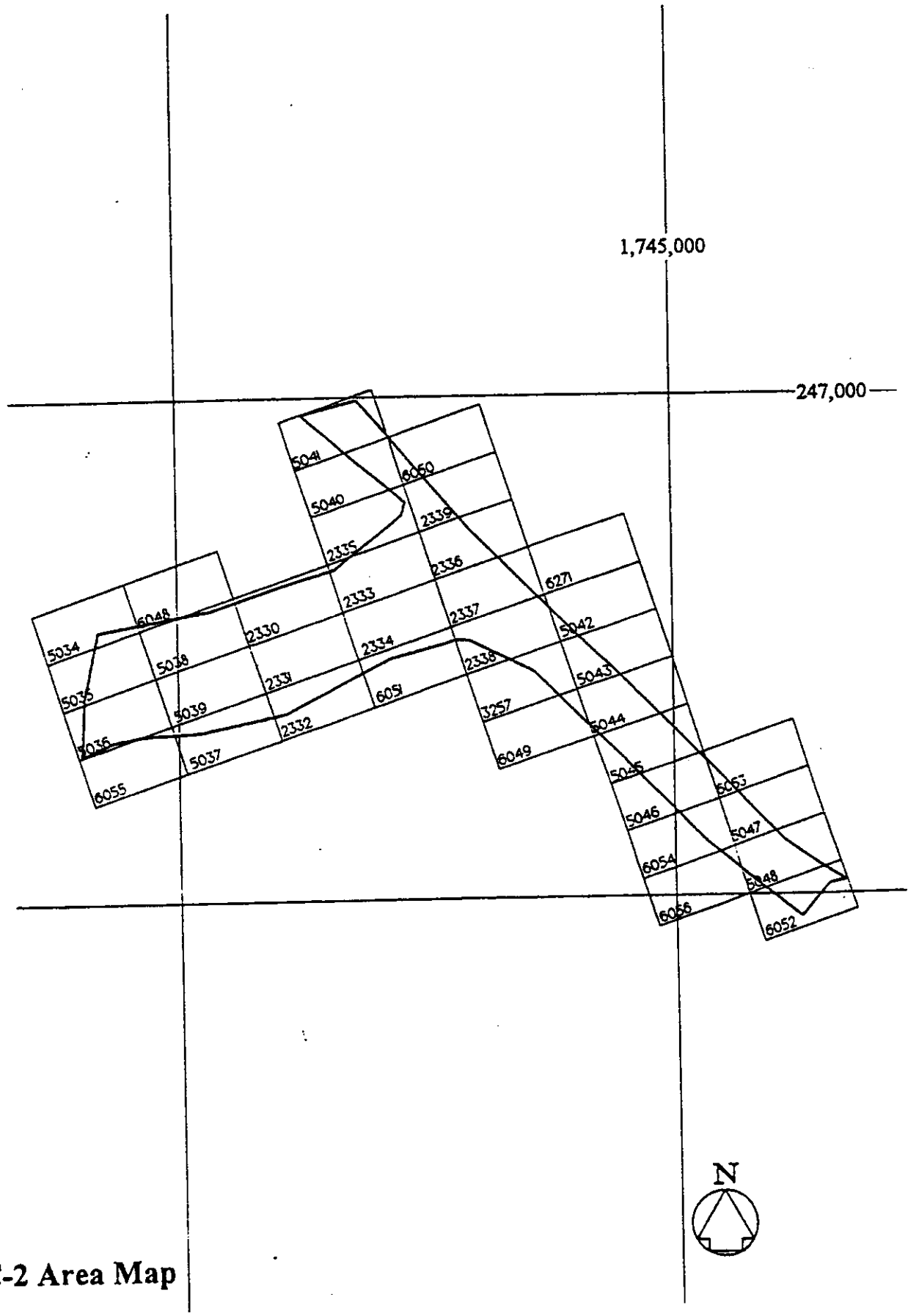
IF NO EXPLAIN: _____

D. SAFETY VIOLATIONS AND CORRECTIVE ACTION TAKEN: None

E. QUALITY CONTROL INSPECTIONS CONDUCTED: Provided on attached sheet.

QUALITY CONTROL OFFICER

PROJECT MANAGER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3257
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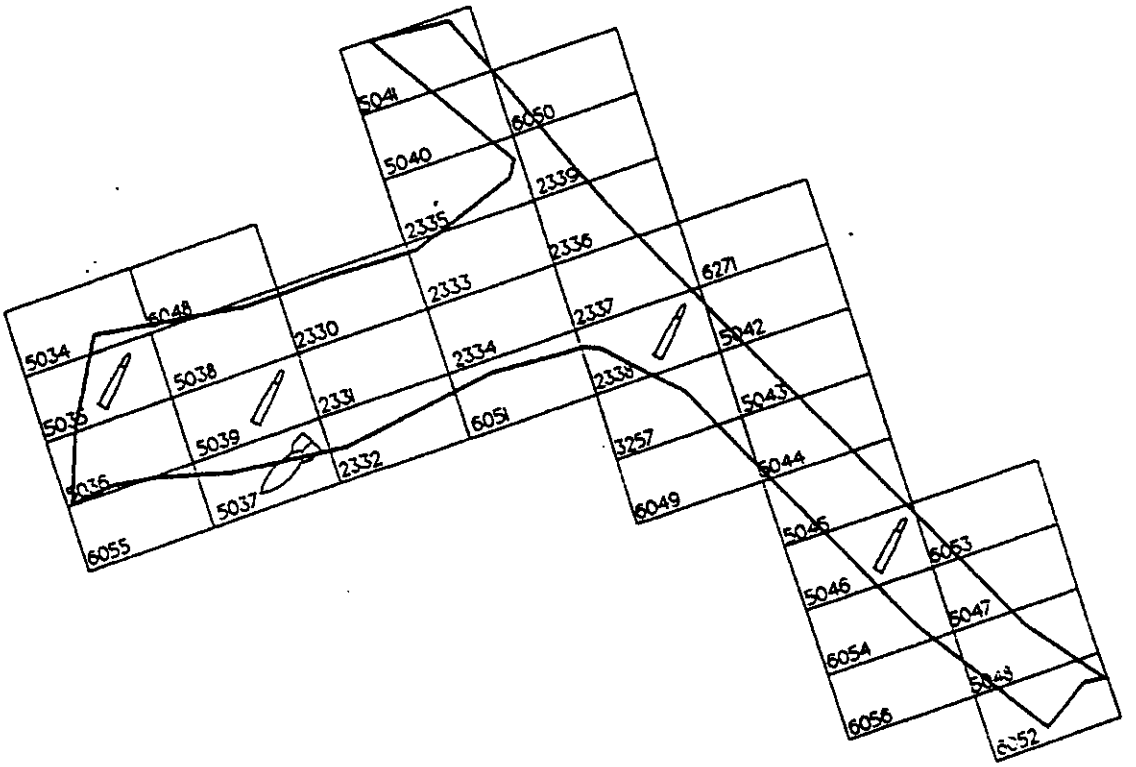
6056
6052
N

C-2 Area Map



Legend	
1939	= Small Arms were found in the grid
737	= Other Than Small Arms were found in the grid
	= Grid was not Swept
1760 *	= Check area write-up for additional information

C-2 Ordnance Map

Grid No	# Grids	Major Area	Team	Small Arms	Other	OEW Scrap	Scrap	Date Finished	Date OA'd	Bip'd	Square Feet	
2330	1	C-2	JOSEY	0	0	19.0	65.5	06/04/92	/ /	0	2500	
2331	1	C-2	JOSEY	0	0	0.0	57.0	06/04/92	/ /	0	20000	
2332	1	C-2	JOSEY	0	0	0.0	31.0	06/02/92	06/29/92	0	8800	
2333	1	C-2	JOSEY	0	0	0.0	16.0	06/08/92	/ /	0	19400	
2334	1	C-2	JOSEY	0	0	0.0	67.0	06/09/92	/ /	0	20000	
2335	1	C-2	JOSEY	0	0	0.0	36.0	06/05/92	/ /	0	4300	
2336	1	C-2	JOSEY	0	0	0.0	322.0	05/14/92	/ /	0	11350	
2337	1	C-2	JOSEY	0	0	46.0	83.0	05/13/92	/ /	0	16150	
2338	1	C-2	JOSEY	20 .22 CAL	0	0.0	196.0	05/13/92	/ /	0	16700	
2339	1	C-2	JOSEY	0	0	0.0	130.0	05/15/92	/ /	0	6750	
3257	1	C-2	JOSEY	0	0	0.0	19.0	05/12/92	/ /	0	7850	
5034	1	C-2	DAILEY	0	0	0.0	50.0	06/04/91	10/09/91	0	1800	
5035	1	C-2	DAILEY	1 .50 CAL	0	0.0	50.0	06/04/91	10/09/91	0	12100	
5036	1	C-2	JOSEY	0	0	0.0	35.0	05/28/92	/ /	0	16500	
5037	1	C-2	JOSEY	0	1 1914 FUZE	0.0	63.0	06/02/92	/ /	0	7500	
5038	1	C-2	JOSEY	0	0	0.0	196.0	05/29/92	10/09/91	0	19300	COMPLETED 6-11-91 BY DAILEY. NEW TEAM ORDERS ARE TO REMOVE ALL MATERIAL SO THEY DUG THE REMAINING MATERIAL UP.
5039	1	C-2	JOSEY	10 .22 CAL	0	0.0	87.0	06/02/92	/ /	0	20000	
5040	1	C-2	JOSEY	0	0	0.0	37.0	05/15/92	/ /	0	5900	
5041	1	C-2	JOSEY	0	0	33.0	20.0	05/15/92	/ /	0	10000	
5042	1	C-2	JOSEY	0	0	0.0	91.0	05/13/92	07/15/92	0	1450	
5043	1	C-2	JOSEY	0	0	3.0	34.5	05/12/92	07/15/92	0	6250	
5044	1	C-2	JOSEY	0	0	1.0	13.0	05/08/92	07/15/92	0	11150	
5045	1	C-2	JOSEY	0	0	0.0	20.5	05/08/92	07/15/92	0	13000	
5046	1	C-2	JOSEY	1 .50 CAL PROJ	0	5.5	37.0	05/11/92	07/15/92	0	11900	
5047	1	C-2	JOSEY	0	0	7.0	12.0	05/13/92	/ /	0	6000	
5048	1	C-2	JOSEY	0	0	0.0	5.0	05/11/92	/ /	0	11800	
6048	1	C-2	JOSEY	0	0	0.0	0.0	05/29/92	/ /	0	450	
6049	1	C-2	JOSEY	0	0	0.0	0.0	05/08/92	/ /	0	1600	
6050	1	C-2	JOSEY	0	0	0.0	37.0	05/15/92	/ /	0	2300	
6051	1	C-2	JOSEY	0	0	0.0	78.0	06/09/92	/ /	0	5800	
6052	1	C-2	JOSEY	0	0	0.0	0.0	05/08/92	/ /	0	10000	
6053	1	C-2	JOSEY	0	0	5.5	47.0	05/11/92	/ /	0	1230	ENTRY ERROR CORRECTED 12/21/94, MISSED 5.5 LBS OEW SCRAP
6054	1	C-2	JOSEY	0	0	0.0	8.0	05/11/92	/ /	0	7000	
6055	1	C-2	JOSEY	0	0	0.0	10.5	05/28/92	/ /	0	850	
6056	1	C-2	JOSEY	0	0	0.0	0.0	05/11/92	/ /	0	1100	
6271	1	C-2	JOSEY	0	0	0.0	50.0	05/13/92	/ /	0	10	
*** Total ***												
	36			40	1	120.0	2004.0				318790	

SEARCH AREA: C-3

General:

Search Area C-3 is located at the northern end of the contract. C-3 consists of 130 grids totaling approximately 1,813,519 square feet, of this amount 83,800 square feet in 9 grids was not originally included in the contract. The terrain is relatively flat in the northern half of the area where a dry drainage creek bed is found. There is a large steep ridge running east-west along the entire length of this area, rising to a relatively level plateau on the southern portion. The east, north and west of this area is bordered by road, and the south boundary is developed. This area required major brush clearance, and included a significant amount of poison oak in the dry creek and along the ridge.

A Preparatory Inspection was accomplished April 8, 1991, a Initial Inspection was conducted April 10, 1991 and a Final Inspection was conducted July 8, 1992. All grids passed the Quality Control and Quality Assurance checks. The majority of this area was completed by May 1991. ECC cleared the northwest corner in September/October 1991, and the area in the southwest corner not originally in the contract in May of 1992. Before working in this area ECC required release of liability for damage to landscape (refer to ECC letter to the Parks Department dated April 22, 1992 and ECC letter serial #072 of April 22, 1992). Please refer to the attached database report for ordnance amounts, scrap totals, grid finish dates, and individual grid square foot totals.

Biological:

For whatever reason, Area C-3 was one of the richest biotic communities within the project area. Only F-6 rivalled the area for number of animal species. What makes C-3 interesting is that it is only one fourth the size of F-6 and does not display its older and more complex vegetation make-up. In fact, the eastern portion of C-3 was only recently planted with sapling willows and rip-rap has been installed to protect the northern slope of the canyon for approximately one-half its length. There is a new housing complex due north of the canyon and a slightly older cluster of apartments to the south. All of this notwithstanding, a small group of deer (4) could regularly be seen in the canyon.

Coyote, bobcat, raccoon and skunk were regular visitors. In late April of 1991 a one day bird census produced 63 species of birds and both red-shouldered and red-tailed hawks nested in adjacent eucalyptus trees. California ground squirrels (Spermophilus beecheyi) provide food for red diamond rattlesnakes while numerous smaller rodents provide the fodder for southern Pacific rattlers. This was the first canyon in which rosy boas (Lichanura trivirgata) were found and over 50% of all of the reptile and amphibian species recorded from the project were discovered in the canyon.

Significant Items:
A significant amount of hazardous ordnance was recovered from this area, including 3 75MM High Explosive rounds (2 without fuze and 1 with) 2 75MM shrapnel rounds with explosive charges, 4 other 75MM shrapnel rounds without charges, and 1 75MM shrapnel round with black powder were recovered. One 37MM round of French origin was discovered and blown in place. Additionally, 169 rounds of small arms including blanks, tracer and incendiary rounds in .30 and .50 caliber were recovered.

Problems Encountered:

Steep slopes, poison oak, building debris and irrigation pipes caused sweep teams considerable trouble.

PREPARATORY INSPECTION CHECKLIST

CONTRACT NO: DACA87-90-C-0052 DATE: 4-08-91

TITLE: Tierrasanta Ordnance Removal SPECS SECTION: 01400.5.1

MAJOR DEFINABLE SEGMENT OF WORK: Grid Clearance Area C (sub area 3)

A. PERSONNEL PRESENT:

	Name	Position	Company
1.	A. Marks	Assistant Operations	ECC
2.	C. Conner	Safety/Q.C.	ECC
3.			
4.			
5.			

B. TRANSMITTALS NUMBER & ITEM CODE COMMENTS

1.
2.

C. HAVE ALL ITEMS BEEN APPROVED? YES [X] NO [ ]

D. WHAT ITEMS HAVE NOT BEEN APPROVED?

	Item	Status
1.		

E. ARE ALL MATERIALS ON SITE? YES [X] NO [ ]

E-I. HAVE ALL THE MATERIALS ON SITE BEEN APPROVED? YES [X] NO [ ]

E-II. ITEMS NOT ON THE SITE OR NOT APPROVED:

1. 4.
2. 5.
3. 6.

TEST REQUIRED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS:

	Test	Specification Paragraph
1.		
2.		
3.		

F. ACCIDENT PREVENTION PREPLANNING - JOB HAZARD ANALYSIS (SPD FORM 210-R)
HAS A JOB HAZARD ANALYSIS BEEN APPROVED? YES [X] NO [ ]

F-I. OPERATIONAL EQUIPMENT CHECKLIST (SPD FORM 150):
ATTACHED FOR:

1. 3.
2. 4.

C. Conner 4-9-91
QUALITY CONTROL - PRIME CONTRACTOR

QUALITY CONTROL - SUBCONTRACTOR

ORDNANCE REMOVAL PROJECT PREPARATORY INSPECTION CHECKLIST

CONTRACT NO: DACA87-90-C-0052 DATE: 4-08-91

TITLE: Tierrasanta Ordnance Removal

MAJOR DEFINABLE SEGMENT OF WORK: Grid Clearance Inspection Area C (sub area 3)

A. PERSONNEL PRESENT:

	Name	Position	Company
1.	A. Marks	Assistant Operations	ECC
2.	C. Conner	Safety/Q.C.	ECC
3.			
4.			

B. MAJOR DEFINABLE GEOGRAPHIC AREA: C south of the fence.

C. ENVIRONMENTAL CONSIDERATIONS:

1. ARE ALL SENSITIVE HABITATS ADEQUATELY MARKED/DEFINED? YES [X] NO [ ]

2. COMMENTS: All willows and oak trees are flagged.

D. SURVEY CONSIDERATIONS:

1. IS THE AREA ADEQUATELY DEFINED BY THE SURVEYOR? YES [X] NO [ ]

2. ARE THE GRIDS MARKED AND IDENTIFIABLE? YES [X] NO [ ]

3. COMMENTS:

E. GENERAL COMMENTS: Most of this area is clear and should present no problems to the sweep team.

C. Conner 4-9-91
INSPECTOR

ORDNANCE REMOVAL PROJECT INITIAL INSPECTION CHECKLIST

CONTRACT NO: DACA87-90-C-0052 DATE: 4-10-91

TITLE: Tierrasanta Ordnance Removal

MAJOR DEFINABLE SEGMENT OF WORK: Grid Clearance Inspection Area C Sub Area 3

A. PERSONNEL PRESENT:

	Name	Position	Company
1.	C. Conner	Safety/Q.C.	ECC
2.	E. Nelson	Safety/Q.C.	ECC
3.			
4.			

B. MAJOR DEFINABLE GEOGRAPHIC AREA: C Sub Area 3

C. WAS A ORDNANCE REMOVAL PROJECT PREPARATORY INSPECTION CONDUCTED?
YES [X] NO [ ]

D. ARE THE WORK CREWS PREFORMING THE FOLLOWING ACTIVITIES IN ACCORDANCE WITH CONTRACT SPECIFICATIONS?

1. VISUAL SWEEP YES [X] NO [ ]
2. BRUSH CLEARANCE YES [X] NO [ ]
3. MAGNETIC SWEEP YES [X] NO [ ]

4. COMMENTS: Area will not require a lot of brush clearing.

E. GENERAL COMMENTS: Open space not included in the required search area has been identified in this area. COE was notified.

C Conner
INSPECTOR

INITIAL INSPECTION CHECKLIST

CONTRACT NO: DACA87-90-C-0052 DATE: 4-10-91

DESCRIPTION & LOCATION OF WORK INSPECTED: GRID CLEARANCE C SUB AREA 3

SPECS SECTION: 01400.5.2

REFERENCE CONTRACT DRAWINGS: _____

A. PERSONNEL PRESENT

	NAME	POSITION	COMPANY
1.	C. Conner	Safety/Q.C.	ECC
2.	E. Nelson	Safety/Q.C.	ECC
3.			
4.			

B. ARE THE MATERIALS BEING USED IN STRICT COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS? YES [X] NO [ ]

IF NOT EXPLAIN: _____

C. PROCEDURES AND/OR WORK METHODS WITNESSED ARE IN STRICT COMPLIANCE WITH THE REQUIREMENT OF THE CONTRACT SPECIFICATIONS. YES [X] NO [ ]

IF NOT EXPLAIN: _____

D. WORKMANSHIP IS ACCEPTABLE. YES [X] NO [ ]

STATE AREAS WHERE IMPROVEMENT IS NEEDED: _____

E. SAFETY VIOLATIONS AND CORRECTIVE ACTION TAKEN: _____

C. Conner
QUALITY CONTROL OFFICER

E. Carl
PROJECT MANAGER

ORDNANCE REMOVAL PROJECT FINAL FOLLOW-UP INSPECTION CHECKLIST

CONTRACT NO: DACA87-90-C-0052 DATE: 1-23-92

TITLE: Tierrasanta Ordnance Removal

MAJOR DEFINABLE SEGMENT OF WORK: Grid Clearance, C-3

A. PERSONNEL PRESENT:

Name	Position	Company
1. C. Conner	Safety/Q.C.	ECC
2. T. Collister	Safety/Q.C.	ECC
3.		
4.		

B. MAJOR DEFINABLE GEOGRAPHIC AREA: C-3

C. WAS A ORDNANCE REMOVAL PROJECT PREPARATORY INSPECTION CONDUCTED?
YES [X] NO [ ]

D. WAS A INITIAL PROJECT INSPECTION CONDUCTED? YES [X] NO [ ]

E. DID THE WORK CREWS PREFORMING THE FOLLOWING ACTIVITIES IN ACCORDANCE WITH CONTRACT SPECIFICATIONS?

1. VISUAL SWEEP YES [X] NO [ ]
2. BRUSH CLEARANCE YES [X] NO [ ]
3. MAGNETIC SWEEP YES [X] NO [ ]
4. COMMENTS: Poison oak hindered clearance operations, area is finally complete.

G. WAS THE AREA QUALITY CONTROL CHECKED? YES [X] NO [ ]

F. IS ALL THE FOLLOWING REMOVED:

1. GRID STAKES YES [X] NO [ ]
2. ENVIRONMENTAL MARKING YES [X] NO [ ]
3. OBJECT IDENTIFICATION FLAGS YES [X] NO [ ]

G. IS THE AREA RETURNED TO ITS ORIGINAL CONDITION? YES [X] NO [ ]

H. COMMENTS: Area is complete and clear, all work is satisfactory.

C. Conner
INSPECTOR

FINAL FOLLOW UP INSPECTION REPORT

REPORT NO: 00009
DATE: 01-23-92

PROJECT: Tierrasanta Ordnance Removal CONTRACT NO: DACA87-90-C-0052

PROJECT MANAGER: E. Cash

CONTRACTOR: Environmental Chemical Corporation

FEATURE OF WORK: Grid Clearance
ACTIVITY NO: 01807 through 01863, 01865 through 1907, 3247, 05123 through 05179, 05181 through 05223, 06563, 08403 through 08459, 08461 through 08503, 09843

A. PERSONNEL PRESENT:

Name	Position	Company
1. C. Conner	Safety/Q.C.	ECC
2. T. Collister	Safety/Q.C.	ECC

B. IS WORK COMPLETED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS:
YES [X] NO [ ]

IF NO EXPLAIN: _____

C. IS WORKMANSHIP ACCEPTABLE? YES [X] NO [ ]

IF NO EXPLAIN: _____

D. SAFETY VIOLATIONS AND CORRECTIVE ACTION TAKEN: None

E. QUALITY CONTROL INSPECTIONS CONDUCTED: Provided on attached sheet.

C. Conner
QUALITY CONTROL OFFICER

Rudolf Gerlach
PROJECT MANAGER

ORDNANCE REMOVAL PROJECT FINAL FOLLOW-UP INSPECTION CHECKLIST

CONTRACT NO: DACA87-90-C-0052 DATE: 07-08-92

TITLE: Tierrasanta Ordnance Removal

MAJOR DEFINABLE SEGMENT OF WORK: Additonal Area C-3

A. PERSONNEL PRESENT:

Name	Position	Company
1. E. Nelson	Safety/Q.C.	ECC
2. T. Collister	Safety/Q.C.	ECC
3.		
4.		

B. MAJOR DEFINABLE GEOGRAPHIC AREA: Additional Area C-3

C. WAS A ORDNANCE REMOVAL PROJECT PREPARATORY INSPECTION CONDUCTED?
YES [X] NO [ ]

D. WAS A INITIAL PROJECT INSPECTION CONDUCTED? YES [X] NO [ ]

E. DID THE WORK CREWS PREFORMING THE FOLLOWING ACTIVITIES IN ACCORDANCE WITH CONTRACT SPECIFICATIONS?

1. VISUAL SWEEP YES [X] NO [ ]
2. BRUSH CLEARANCE YES [X] NO [ ]
3. MAGNETIC SWEEP YES [X] NO [ ]
4. COMMENTS: _____

G. WAS THE AREA QUALITY CONTROL CHECKED? YES [X] NO [ ]

F. IS ALL THE FOLLOWING REMOVED:

1. GRID STAKES YES [X] NO [ ]
2. ENVIRONMENTAL MARKING YES [X] NO [ ]
3. OBJECT IDENTIFICATION FLAGS YES [X] NO [ ]

G. IS THE AREA RETURNED TO ITS ORIGINAL CONDITION? YES [X] NO [ ]

H. COMMENTS: _____

E. Nelson
INSPECTOR

FINAL FOLLOW UP INSPECTION REPORT

REPORT NO: 00013
DATE: 07-08-92

PROJECT: Tierrasanta Ordnance Removal CONTRACT NO: DACA87-90-C-0052

PROJECT MANAGER: R. Whitbeck

CONTRACTOR: Environmental Chemical Corporation

FEATURE OF WORK: Grid Clearance
ACTIVITY NO: 14011 through 14015, 14030 through 14033, 15011 through 15015, 15030 through 15033, 16011 through 16015 and 16030 through 16033.

A. PERSONNEL PRESENT:

Name	Position	Company
1. E. Nelson	Safety/Q.C.	ECC
2. T. Collister	Safety/Q.C.	ECC

B. IS WORK COMPLETED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS:
YES [X] NO [ ]

IF NO EXPLAIN: _____

C. IS WORKMANSHIP ACCEPTABLE? YES [X] NO [ ]

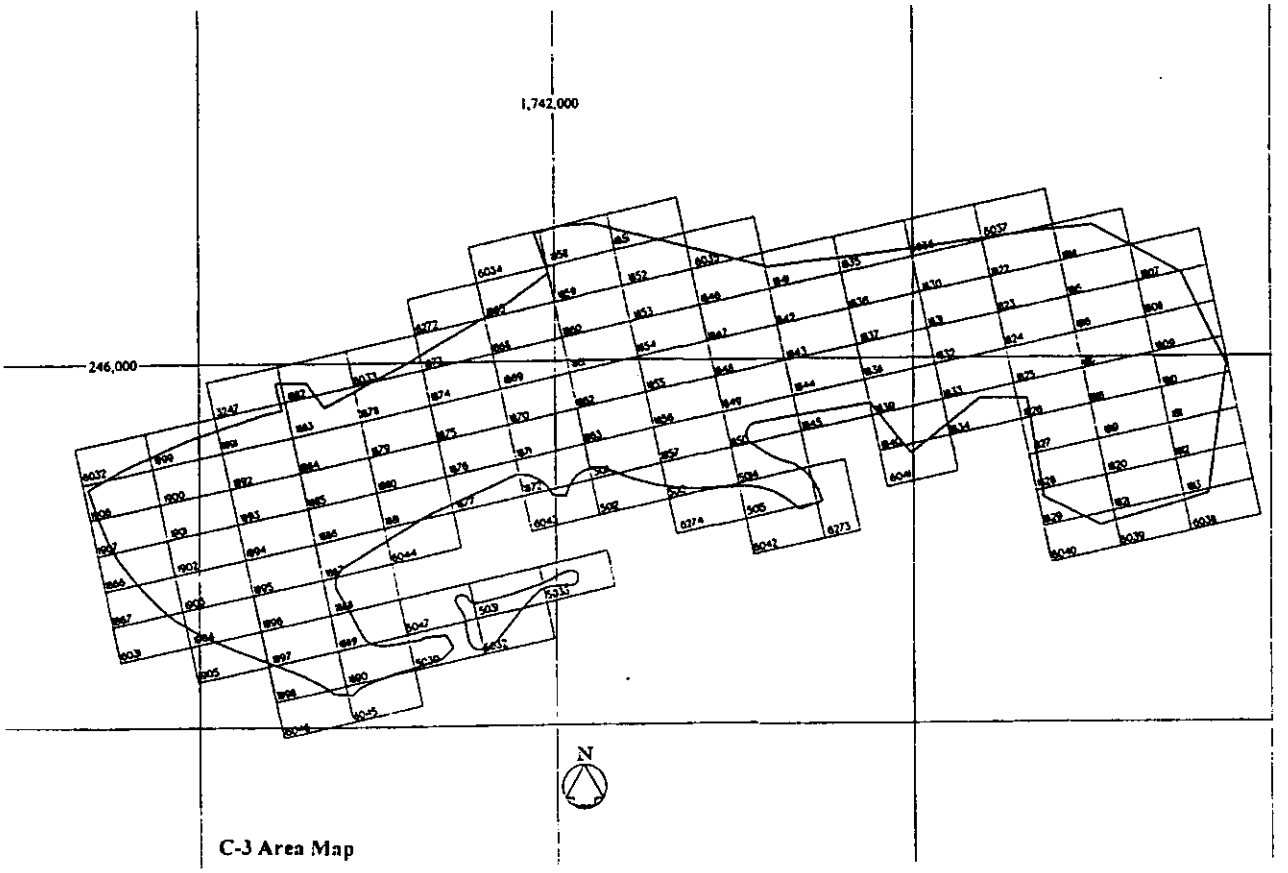
IF NO EXPLAIN: _____

D. SAFETY VIOLATIONS AND CORRECTIVE ACTION TAKEN: None

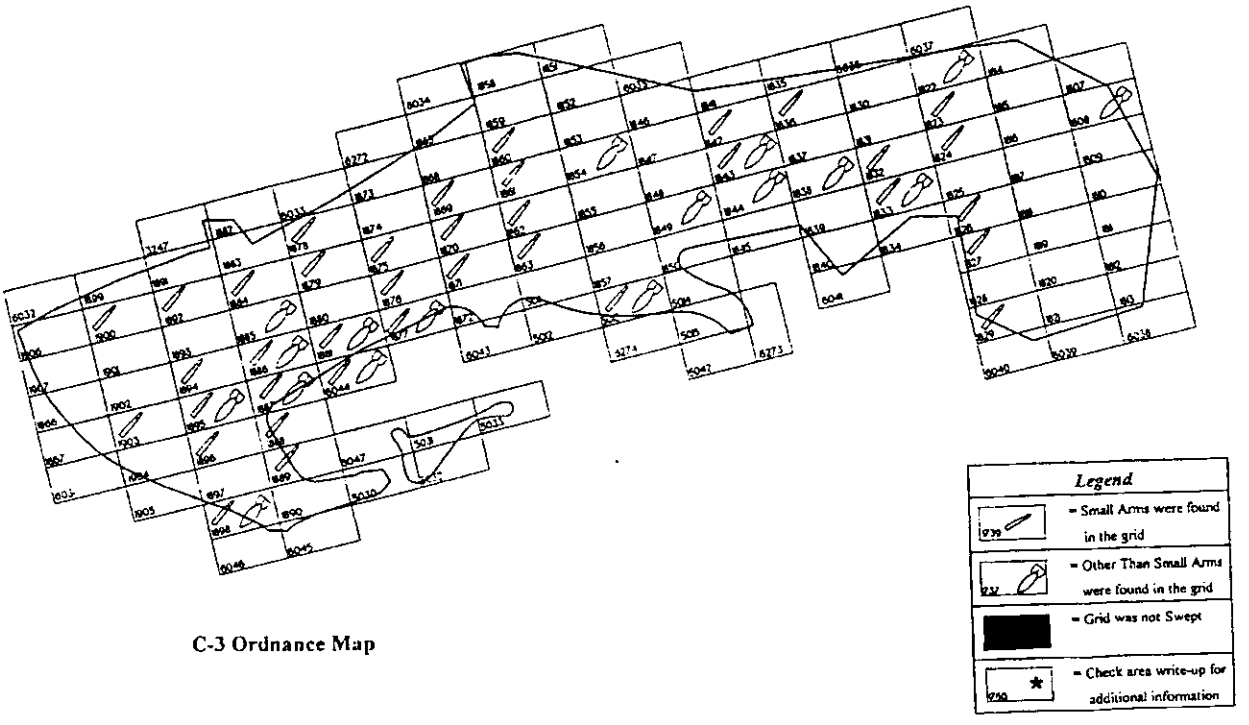
E. QUALITY CONTROL INSPECTIONS CONDUCTED: Provided on attached sheet.

QUALITY CONTROL OFFICER

PROJECT MANAGER



C-3 Area Map



C-3 Ordnance Map

Grid No	# Grids	Major Area	Team	Small Arms	Other	OEW Scrap	Scrap	Date Finished	Date QA'd	Rip'd	Square Feet
1807	1	C-3	CASWELL	0	0	0.0	20.0	04/16/91	05/01/91	0	5650
1808	1	C-3	CASWELL	0	1 75MM HE W/FUZE	0.0	8.0	04/16/91	05/01/91	0	13500
1809	1	C-3	CASWELL	0	0	7.0	10.0	04/17/91	05/01/91	0	16200
1810	1	C-3	CASWELL	0	0	0.0	10.0	04/17/91	05/20/91	0	18300
1811	1	C-3	CASWELL	0	0	15.0	6.0	04/11/91	/ /	0	16500
1812	1	C-3	CASWELL	0	0	5.0	7.0	04/11/91	05/20/91	0	12800
1813	1	C-3	CASWELL	0	0	20.0	20.0	04/08/91	/ /	0	8800
1814	1	C-3	CASWELL	0	0	0.0	20.0	04/16/91	05/20/91	0	14600
1815	1	C-3	CASWELL	0	0	0.0	18.0	04/16/91	05/20/91	0	20000
1816	1	C-3	CASWELL	0	0	3.0	10.0	04/17/91	/ /	0	20000
1817	1	C-3	CASWELL	0	0	4.0	10.0	04/17/91	05/20/91	0	20000
1818	1	C-3	CASWELL	0	0	11.0	19.0	04/15/91	/ /	0	20000
1819	1	C-3	CASWELL	0	0	10.0	10.0	04/11/91	05/20/91	0	20000
1820	1	C-3	CASWELL	0	0	7.0	11.0	04/09/91	05/20/91	0	20000
1821	1	C-3	CASWELL	0	0	7.0	9.0	04/08/91	/ /	0	20000
1822	1	C-3	CASWELL	0	1 75MM CANISTER ROUND	5.5	7.0	04/22/91	05/08/91	0	19450
1823	1	C-3	LEATHERWOOD	1 .50 CAL PROJ.	0	6.0	43.0	01/16/92	/ /	0	20000
1824	1	C-3	LEATHERWOOD	1 .50 CAL PROJ.	0	22.5	55.0	01/16/92	/ /	0	20000
1825	1	C-3	CASWELL	0	0	14.0	2.0	04/18/91	05/13/91	0	20000
1826	1	C-3	CASWELL	3 2- 22 CAL, 1- 50 CAL	0	12.5	2.0	04/15/91	05/13/91	0	18630
1827	1	C-3	CASWELL	1 .50 CAL TRACER	0	15.0	6.0	04/10/91	05/13/91	0	17700
1828	1	C-3	CASWELL	0	0	5.0	6.0	04/10/91	05/13/91	0	18300
1829	1	C-3	CASWELL	1 .50 CAL INCEND	0	7.0	11.0	04/09/91	05/13/91	0	14300
1830	1	C-3	CASWELL	0	0	4.0	27.0	04/23/91	05/08/91	0	20000
1831	1	C-3	CASWELL	0	0	5.0	30.0	04/23/91	05/08/91	0	20000
1832	1	C-3	LEATHERWOOD	2 .50 CAL PROJ	0	28.0	0.0	01/13/92	/ /	0	20000
1833	1	C-3	CASWELL	2 .50 CAL PROJ	1 75MM SHRAP W/CHRG	9.0	4.0	04/30/91	05/20/91	0	20000
1834	1	C-3	CASWELL	0	0	9.0	4.0	04/30/91	05/20/91	0	7500
1835	1	C-3	CASWELL	0	0	0.0	20.0	04/25/91	05/08/91	0	5400
1836	1	C-3	CASWELL	6 .30 CAL BLANK	0	5.0	20.0	04/25/91	05/09/91	0	20000
1837	1	C-3	CASWELL	0	0	7.0	65.0	04/29/91	/ /	0	20000
1838	1	C-3	CASWELL	0	1 75MM SHRAP W/CHRG	9.0	4.0	04/30/91	05/09/91	0	20000
1839	1	C-3	CASWELL	0	0	12.0	0.0	05/01/91	05/16/91	0	20000
1840	1	C-3	CASWELL	0	0	4.0	82.0	05/02/91	05/16/91	0	14870
1841	1	C-3	CASWELL	0	0	0.0	20.0	04/25/91	05/09/91	0	9400
1842	1	C-3	CASWELL	16 .30 CAL BLANK LIVE	0	4.0	10.0	04/24/91	05/09/91	0	20000
1843	1	C-3	CASWELL	1 .30 CAL BLANK	1 75MM CANISTER W/CHG	6.0	10.0	04/24/91	05/09/91	0	20000
1844	1	C-3	CASWELL	0	1 75MM SHRAPNEL	7.0	45.0	05/06/91	05/16/91	0	20000
1845	1	C-3	CASWELL	0	0	0.0	25.0	05/06/91	05/16/91	0	11800
1846	1	C-3	CASWELL	0	0	0.0	5.0	05/13/91	/ /	0	18550
1847	1	C-3	CASWELL	0	0	4.0	5.0	05/13/91	/ /	0	20000
1848	1	C-3	CASWELL	0	0	4.0	2.0	05/08/91	/ /	0	20000
1849	1	C-3	CASWELL	0	1 75MM SHRAP W/BLK PDR	10.0	20.0	05/07/91	05/16/91	0	20000
1850	1	C-3	CASWELL	0	0	6.0	19.0	05/07/91	05/16/91	0	11900
1851	1	C-3	CASWELL	0	0	0.0	6.0	05/13/91	/ /	0	4100
1852	1	C-3	CASWELL	0	0	0.0	5.0	05/13/91	/ /	0	18550
1853	1	C-3	CASWELL	0	0	0.0	10.0	05/09/91	/ /	0	20000
1854	1	C-3	CASWELL	0	1 75MM SHRAPNEL	4.0	4.0	05/09/91	/ /	0	20000
1855	1	C-3	CASWELL	0	0	4.0	2.0	05/08/91	/ /	0	20000
1856	1	C-3	CASWELL	0	0	4.0	2.0	05/08/91	05/13/91	0	20000

Grid No	# Grids	Major Area	Team	Small Arms	Other	OEW Scrap	Scrap	Date Finished	Date OA'd	Bip'd	Square Feet	
1857	1	C-3	CASWELL	0	0	8.0	42.0	05/14/91	05/16/91	0	20000	
1856	1	C-3	DAILEY	0	0	0.0	20.0	04/16/91	05/14/91	0	18100	
1859	1	C-3	DAILEY	0	0	0.0	20.0	04/16/91	05/14/91	0	20000	
1860	1	C-3	LEATHERWOOD	2 1- 50 CAL, 1- 30 CAL	0	6.0	12.0	11/14/91	/ /	0	20000	
1861	1	C-3	DAILEY	17 16- 30 CAL, 1 50 CAL	0	10.0	8.0	04/15/91	/ /	0	20000	
1862	1	C-3	DAILEY	4 1-30 CAL, 3- 50 CAL	0	16.0	0.0	04/11/91	/ /	0	20000	
1863	1	C-3	DAILEY	9 8-30 CAL, 1-50 CAL	0	15.5	0.5	04/10/91	05/13/91	0	20000	
1865	1	C-3	DAILEY	0	0	0.0	13.0	04/22/91	05/14/91	0	8500	
1866	1	C-3	DAILEY	0	0	0.0	25.0	05/22/91	05/30/91	0	12700	
1867	1	C-3	DAILEY	0	0	0.0	29.0	05/22/91	05/30/91	0	7600	
1868	1	C-3	DAILEY	0	0	0.0	13.0	04/22/91	05/14/91	0	20000	
1869	1	C-3	LEATHERWOOD	1 .50 CAL PROJ	0	0.0	28.0	10/15/91	/ /	0	20000	
1870	1	C-3	DAILEY	1 .50 CAL	0	7.5	0.5	04/18/91	/ /	0	20000	
1871	1	C-3	DAILEY	1 .50 CAL	0	54.0	2.0	04/18/91	/ /	0	20000	
1872	1	C-3	DAILEY	0	0	11.0	9.0	04/17/91	05/13/91	0	17700	
1873	1	C-3	DAILEY	0	0	0.0	29.5	04/23/91	05/14/91	0	14760	
1874	1	C-3	LEATHERWOOD	0	0	8.0	31.0	10/10/91	/ /	0	20000	
1875	1	C-3	DAILEY	1 .50 CAL	0	10.0	0.0	04/24/91	05/29/91	0	20000	
1876	1	C-3	DAILEY	1 .50 CAL	0	15.0	0.0	04/24/91	05/29/91	0	20000	
1877	1	C-3	DAILEY	1 .50 CAL PROJ	1 75MM HE	3.0	0.0	04/25/91	05/29/91	0	11200	
1878	1	C-3	LEATHERWOOD	1 .30 CAL BLNK	0	0.0	97.0	10/10/91	/ /	0	19700	
1879	1	C-3	LEATHERWOOD	16 .30 CAL BLNK	0	33.0	14.0	10/08/91	/ /	0	20000	
1880	1	C-3	DAILEY	0	0	10.0	1.0	04/30/91	/ /	0	20000	
1881	1	C-3	DAILEY	8 8-30 CAL	1 75MM HE	13.5	3.5	04/25/91	05/29/91	0	18740	FOUND 1 75MM HE ON 4-25-91
1882	1	C-3	LEATHERWOOD	0	0	0.0	15.0	10/01/91	/ /	0	3300	
1883	1	C-3	LEATHERWOOD	0	0	0.0	106.0	10/07/91	/ /	0	17000	
1884	1	C-3	LEATHERWOOD	2 .50 CAL PROJ	0	4.0	118.0	10/02/91	/ /	0	20000	
1885	1	C-3	DAILEY	0	1 75MM SHRAPNEL	5.0	0.0	05/06/91	05/29/91	0	20000	
1886	1	C-3	DAILEY	2 1- 50 CAL, 1- 30 CAL	1 75MM D/F	10.0	5.0	05/02/91	05/29/91	0	20000	
1887	1	C-3	DAILEY	1 CARTRIDGE UNKNOWN	1 75MM CANISTER D.F.	17.0	5.0	05/01/91	05/29/91	0	13900	
1888	1	C-3	DAILEY	1 .50 CAL	0	3.0	3.5	05/16/91	05/29/91	0	400	
1889	1	C-3	DAILEY	1 .50 CAL	0	3.0	3.5	05/20/91	07/01/92	0	6700	
1890	1	C-3	DAILEY	0	0	2.0	26.0	05/21/91	07/01/92	0	18040	
1891	1	C-3	LEATHERWOOD	0	0	0.0	19.0	09/30/91	/ /	0	15830.	
1892	1	C-3	LEATHERWOOD	1 .30 CAL BLNK	0	0.3	22.0	10/01/91	/ /	0	20000	
1893	1	C-3	DAILEY	0	0	0.0	22.0	05/09/91	/ /	0	20000	
1894	1	C-3	DAILEY	1 .30 CAL BLANK	0	12.0	0.0	05/08/91	05/30/91	0	20000	
1895	1	C-3	DAILEY	22 .30 CAL BLANK	1 75MM D/F	17.0	0.0	05/07/91	05/30/91	0	20000	
1896	1	C-3	DAILEY	1 .50 CAL	0	3.0	3.5	05/20/91	/ /	0	20000	
1897	1	C-3	DAILEY	0	0	2.0	3.0	05/21/91	05/30/91	0	19820	
1898	1	C-3	DAILEY	1 .50 CAL	1 75MM SHRAP.	2.0	3.0	05/21/91	/ /	0	11300	
1899	1	C-3	LEATHERWOOD	0	0	0.0	23.0	09/23/91	/ /	0	10600	
1900	1	C-3	CASWELL	1 .50 CAL PROJ	0	7.0	22.0	09/24/91	/ /	0	20000	
1901	1	C-3	LEATHERWOOD	0	0	6.0	235.0	09/26/91	/ /	0	20000	
1902	1	C-3	DAILEY	0	0	0.0	29.5	05/13/91	05/30/91	0	20000	
1903	1	C-3	DAILEY	19 18-.30 CAL,1-.50 CAL	0	10.5	8.0	05/15/91	/ /	0	20000	
1904	1	C-3	DAILEY	0	0	1.5	29.0	05/15/91	/ /	0	18000	
1905	1	C-3	DAILEY	0	0	2.0	3.0	05/21/91	05/30/91	0	5100	
1906	1	C-3	DAILEY	0	0	0.0	40.0	05/23/91	05/30/91	0	17400	
1907	1	C-3	DAILEY	0	0	0.0	40.0	05/23/91	05/30/91	0	16000	

Grid No	# Grids	Major Area	Team	Small Arms	Other	OEW Scrap	Scrap	Date Finished	Date OA'd	Bip'd	Square Feet	
3247	1	C-3	LEATHERWOOD	0	0	0.0	4.5	10/01/91	/ /	0	850	
5011	1	C-3	DAILEY	0	0	3.0	7.5	04/09/91	05/13/91	0	19000	
5012	1	C-3	DAILEY	0	0	3.0	4.5	04/09/91	05/13/91	0	5100	
5013	1	C-3	CASWELL	16 .30 CAL & .50 CAL	1 37MM FRENCH HE	8.0	60.0	05/14/91	05/16/91	4	16200	BIP #4 BLEW 1 37MM FRENCH ROUND ON 14 MAY 1991 FOUND 11 .30 CAL BLANK, 2 .50 CAL INCEND, 2 50 CAL TRACER, 1 .30 CAL TRACER.
5014	1	C-3	CASWELL	0	0	0.0	10.0	05/15/91	05/16/91	0	8800	
5015	1	C-3	CASWELL	0	0	0.0	10.0	05/15/91	05/16/91	0	7800	
5030	1	C-3	ALLEN	0	0	0.0	10.0	05/28/92	/ /	0	9930	
5031	1	C-3	ALLEN	0	0	6.0	10.0	05/28/92	06/30/92	0	8040	
5032	1	C-3	ALLEN	0	0	0.0	21.0	05/28/92	06/30/92	0	6530	
5033	1	C-3	ALLEN	0	0	0.0	224.0	05/29/92	06/30/92	0	2400	
6031	1	C-3	DAILEY	0	0	0.0	25.0	05/22/91	/ /	0	840	
6032	1	C-3	LEATHERWOOD	0	0	0.0	10.0	09/25/91	/ /	0	2700	
6033	1	C-3	DAILEY	0	0	0.0	29.5	04/23/91	/ /	0	3370	
6034	1	C-3	DAILEY	0	0	0.0	20.5	05/30/91	/ /	0	500	
6035	1	C-3	CASWELL	0	0	0.0	5.0	05/13/91	/ /	0	3900	
6036	1	C-3	CASWELL	0	0	0.0	8.0	04/22/91	/ /	0	2400	
6037	1	C-3	CASWELL	0	0	0.0	10.0	04/22/91	/ /	0	270	
6038	1	C-3	CASWELL	0	0	0.0	10.0	04/08/91	/ /	0	820	
6039	1	C-3	CASWELL	0	0	8.0	12.0	04/08/91	/ /	0	4000	
6040	1	C-3	CASWELL	0	0	7.0	11.0	04/09/91	/ /	0	1830	
6041	1	C-3	CASWELL	0	0	1.0	20.0	05/02/91	/ /	0	710	
6042	1	C-3	CASWELL	0	0	0.0	0.0	05/15/91	/ /	0	180	
6043	1	C-3	DAILEY	0	0	0.0	0.0	04/17/91	/ /	0	1900	
6044	1	C-3	DAILEY	1 .50 CAL	3 75MM HE	19.0	14.5	04/29/91	/ /	0	1950	
6045	1	C-3	ALLEN	0	0	0.0	0.0	05/28/92	/ /	0	1140	
6046	1	C-3	ALLEN	0	0	0.0	0.0	05/28/92	/ /	0	470	
6047	1	C-3	ALLEN	0	0	0.0	0.0	05/28/92	/ /	0	2100	
6272	1	C-3	DAILEY	0	0	0.0	7.0	04/22/91	/ /	0	25	
6273	1	C-3	CASWELL	0	0	0.0	0.0	05/15/91	/ /	0	434	
6274	1	C-3	CASWELL	0	0	0.0	0.0	05/16/91	/ /	0	140	
*** Total ***												
	130			169	19	704.3	2492.0				1813519	

Former Camp Elliot, California

The Army Corps of Engineers (COE) successfully completed one of the first removals of military ordnance from public lands in the country. By the time the cleanup effort was completed, the COE removed 4,000 small arms pieces, 28,000 pounds of ordnance explosive waste, and 171,000 pounds of non- explosive scrap from a suburban community.

Tierrasanta, Mission Trails Regional Park and East Elliott were once part of Camp Elliott, an installation that operated as an artillery training range during World War II and the Korean War. Today more than 10,000 homes occupy this community, a suburb of San Diego, California.

On December 10, 1983, three young boys were playing in the open space at the end of a cul-de-sac in Tierrasanta, when they discovered what appeared to be a rusty piece of metal. Two of the boys were killed when they attempted to knock the top off this 37-millimeter high explosive shell. The public reacted angrily, and community organizations and elected officials wanted to know how it happened and if it could happen again.

The Navy immediately responded to this incident by removing ordnance at the surface, and conducting preliminary investigations of the area. The COE took over the project to conduct a Feasibility Study to determine cleanup alternatives. The COE developed a comprehensive environmental protection plan to guide the cleanup. The plan demonstrated sensitivity to community concerns regarding aesthetics and habitat conservation, in addition to providing protection for sensitive species.

Sensitive species protection was a major issue in this cleanup because of the number of endangered and threatened species in the area. The Tierrasanta Ordnance Removal Project incorporated the protection of the California gnatcatcher into its work plan two years before it was placed on the threatened species list by the U.S. Fish and Wildlife Service. The project team made a great effort to protect the habitats, including stopping work in the gnatcatcher's nesting areas during their breeding period from March to July.

The COE also conducted an outreach campaign consisting of several public meetings and workshops designed to inform and involve the community about the ongoing cleanup project and how it could affect them.

Monthly project updates are given at the town council meetings, which also provide ample opportunities for the public to ask questions. A public information meeting is also held twice a year to allow the media to ask questions. Congressional representatives Randy "Duke" Cunningham and Lynn Schenk were very involved in the restoration process and presented congressional awards to the project managers at the completion ceremony on June 7, 1994.

In June 1994, the Tierrasanta Ordnance Removal Action project was completed. The COE began focusing its restoration efforts on Mission Trails Regional Park, adjacent to the Tierrasanta site, which is home to several endangered and threatened species, and the largest urban park west of the Mississippi.

Cleanup Success Story

/* Written 6:46 am Mar 14, 1995 by angelg@osiris.cso.uiuc.edu in osiris:news.osd.d
/* ---------- "Cleanup Success Story" ---------- */

10 Cleanup Success Stories:

1) CHARLESTON NAVAL BASE THEME: PUBLIC INVOLVEMENT

In March 1994, the Charleston Naval Base was successful in converting their Technical Review Committee (TRC) to a Restoration Advisory Board (RAB). The RAB held its first meeting in March 1994, and meets monthly. The RAB has 22 members including U.S. Fish and Wildlife; State Fish and Wildlife, local redevelopment authority; Naval Shipyard and Naval Air Station; EPA; SC Dept. of Health and Environmental Control; NOAA; SC Coastal Council; and the Naval Supply Center. The RAB provides input to the BRAC Cleanup Team regarding investigation and cleanup priorities and the Base. The RAB has a strong and diverse citizen membership who are willing to open dialogue with the community by disseminating information to community churches, homeowner associations, and neighborhoods. They are raising community concerns in an open and accepted forum.

2) NAVAL AIR WEAPONS STATION POINT MUGU, CALIFORNIA THEME: ACCELERATING CLEANUP

Naval Air Weapons Station (NAWS) Point Mugu contains an extensive lagoon and salt marsh that is one of the largest coastal wetlands ecosystems in California, providing a unique natural habitat to a wide variety of plant and animal life. Within the boundaries of the main base is habitat for 6 listed, I proposed and 15 candidates for state or federal threatened or endangered species. Eight sites are undergoing remedial investigation/feasibility study (RI/FS). In May of 1994, the Navy received preliminary RI data indicating high metals concentrations in the area of two former plating waste pits. In addition, an annual census was completed indicating a pair of federally listed endangered California light-footed clapper-rail were nesting near the site. The clapper-rail has not been identified as breeding in the area since the late 1980's - its return to the area is significant.

3) NAVAL COMMUNICATION STATION, STOCKTON, CA THEME: TECHNOLOGY

Naval Communication Station (NCS) is located within the ecologically sensitive Sacramento/San Joaquin Delta (Delta) of California. The Navy has evaluated one innovative characterization technology, and two innovative treatment technologies to mitigate DDT contamination in soil at NCS Stockton. The Delta is ecologically sensitive because it lies at the confluence of two major California rivers, is the largest source of drinking water in California, and provides the habitat for several threatened and endangered species. The Navy has characterized the volume and extent of DDT above cleanup levels using innovating immunoassay technology, excavated the DDT contaminated soil, and evaluated innovative technologies to remove or destroy the DDT.

4) ROCKY MOUNTAIN ARSENAL THEME: ACCELERATING CLEANUP

The cleanup of chemical manufacturing washout lagoons and wastewater at Rocky Mountain Arsenal (RMA) proved to be a huge success on several fronts. RMA combined accelerated cleanup, the use of innovative technology, dynamic community involvement, and regulatory participation to exceed the requirements of meeting installation restoration goals. Located in the greater metropolitan area of Denver, Colorado, RMA was

able to construct and operate an incinerator to destroy about 15 million gallons of hazardous wastewater. To date, over 6.8 million gallons of wastewater has been treated; the total project is estimated to cost $120 million. The unique challenges at RMA required implementing an innovative and dynamic community relations program. These efforts show that even controversial and unpopular techniques can be accepted if the community is involved.

5) DOVER AFB, DELAWARE THEME: PARTNERING AND ACCELERATING CLEANUP

Dover AFB (DAFB) representatives have found ways to save both time and money while remediating a major contaminant plume at their facility via the use of several innovative treatment technologies simultaneously. DAFB has a solvent plume underlying the facility that covers approximately 1/2 mile, including portions of the military housing area. Until recently, regulators wanted cleanup of the plume to drinking water standards, even though the water is not used for (domestic) uses. However, due to a partnership involving EPA and the Air Force, DAFB will be home to several innovative treatment technology demonstrations that will accelerate the time and greatly reduce the cost involved in remediating the plume while partnering two agencies.

6) KEESLER AFB, MISSISSIPPI THEME: PARTNERING

Headquarters Air Education and Training Center - Environmental Restoration Branch (HQ AETC/CEVR), Pacific Northwest Laboratories (PNL), the Mississippi Department of Environmental Quality (MDEQ), and the U.S. Environmental Protection Agency (EPA) in Region 4 began an informal partnering relationship while investigating environmental contamination at the Keesler Air Force Base. The partnering initiative streamlined the investigation of a 5-mile sewer line project and completed the investigation to the satisfaction of the Air Force and regulatory agencies. The investigation was completed 250 days ahead of schedule with project savings totaling over $1 million. For fiscal year 1995, the informal partnering will be incorporated in 9 or 10 projects for HQ AETC/CEVR. Incorporating partnering over the next 10 years is estimated to reduce environmental investigation costs by almost $15 million.

7) DEFENSE DISTRIBUTION REGION WEST TRACY FACILITY, CA THEME: TECHNOLOGY

The Defense Distribution Region West (DDRW) Tracy facility opened in 1942 as a subdepot to the Oakland Army Quartermasters Depot. In 1980, groundwater at the Tracy facility was found to be contaminated with trichloroethene (TCE) and tetrachloroethylene (PCE). In 1994, the facility remediated some groundwater problems with plans to remediate the rest. The Tracy facility began Interim Remediation Measures (IRM) in Fall 1992, with a system designed to treat groundwater contaminated with PCE and TCE. The system contained six groundwater extraction wells, an air stripper, and three gravity fed injection wells. After only 3 months of operation, three injection wells failed as a result of physical changes in the treated water caused by the air stripping process. The three failed wells have been replaced with two infiltration galleries, one equipped with a chimney drain. This new process offers many advantages over the old system.

8) FORMER CAMP ELLIOT, TIERRASANTA, SAN DIEGO
THEME: ACCELERATING CLEANUP

Tierrasanta, Mission Trails Regional Park and East Elliot were once part of Camp Elliot, an installation that operated as an artillery training range during World War II and the Korean War. Today, more than 10,000 homes occupy this community. In December 1983, two children

were killed when they discovered unexploded ordnance in the Tierrasanta community. To date, the U.S. Army Corps of Engineers (COE) has removed more than 5,000 pieces of high explosive unexploded ordnance from approximately 800 acres in the Tierrasanta community. In 1994, the Tierrasanta ordnance removal action project was completed, and the COE began focusing its cleanup efforts on Mission Trails Regional Park, home to several endangered and threatened species, and the largest urban park west of the Mississippi River. The city of San Diego, the County, and the COE have worked together to accelerate the removal project by requiring land and keep the public informed of the dangers of unexploded ordnance while conducting the cleanup efforts.

9) HICKAM AIR FORCE BASE/HAWAII
THEME:TECHNOLOGY

Hawaii's remote location, abundance of endangered plants and animals, and its commitment to preserving its precious land and environment, has provided the staff at Hickam Air Force Base (AFB) an ongoing challenge to find innovative ways to clean up its environment despite a shortage of environmental remediation industries local to the area. The Hawaii Department of Health (HDOD) and Hickam AFB 15th Air Base Wing Environmental Restoration Program representatives recognized this challenge resulting in their co-sponsorship of the First Hawaii National Technologies Conference: Remediation and Environmental Monitoring which took place in September, 1994. This conference attracted worldwide participation including federal regulators from the U.S. Environmental Protection Agency (EPA), the head of EPA Region 9, state; city and county regulators; U.S. Department of Defense (DoD) representatives; and private industry. EPA officials praised the state and the Air Force for showcasing the evolution of innovative technologies in the remediation and environmental monitoring fields. Because of its strategic location in the Pacific Ocean, Hawaii is positioned to become the hub for innovative treatment technologies in the Pacific Rim.

10) ST. PAUL DISTRICT, U.S. ARMY CORPS OF ENGINEERS MARINE CORPS AIR STATION, YUMA, ARIZONA THEME: TECHNOLOGY

Faced with tight budgets and the need for quick results, several DoD installations have employed innovative sampling techniques and on-site mobile laboratories.

In January 1994, the Marine Corps Air Station (MCAS) Yuma Project team met to develop an approach to rescue an Installation Restoration (IR) program that was 18 months behind schedule. The project team included representatives of Southwest Division, Naval Facilities Engineering Command, San Diego; MCAS Yuma; EPA Region 9; and the Arizona Department of Environmental Quality. The team decided to use cone penetrometer testing (CPT) paired with four on-site mobile laboratories to generate real-time data for soil and groundwater samples. By providing analytical data in such a short time, a phased investigation approach was not needed. A phased approach often causes the long delays association with 60 day off-site laboratory turnaround periods and work plan submittal and approval periods.

DATE: 12/16/94 12:32:25 PM
FROM: ragusom@AM@ZEUS
SUBJECT: A genuine success story

Some good news for Ms. Goodman. Diane Sisson with the Army Corps of Engineers informed me that the Army has officially adopted an environmental code. They are the only Service who has Implemented this, therefore they can accurately track environmental contracts and can provide specific answers regarding Superfund or DERP contracts. Thanks to our workgroup, and the support of Ms. G., this action took only 6 months to Implement. Without Ms. G, it would have taken 2 years. The Army Is especially proud of the fact that they used their

available resources instead of creating a whole new database to track this information. Reporting will go back to October 94, therefore we will have an entire year of good data.

This is a genuine success story for the small business work group and the Army. Without everyone interfacing and Ms. Goodman's help, the environmental code might never have been implemented. Hopefully the other Services will follow suit, and we can show the Congress and the rest of the world how much money is spent to clean up DoD sites, and how much of those funds go to their constituents, especially small business. This is the first step in that direction, and a good example of reinventing government. Let's call V.P. Gore!

B. PAST-TRACK CLEANUP

A key part of the Presidents five-point community reinvestment plan is devoted to the development of a common-sense, fast-track approach to environmental cleanup. The Administration continues to be committed to a fundamental redesign of the cleanup process based on an approach that eliminates needless delays while protecting human health and the environment. It is an approach that emphasizes speedy assessment, teamwork, and responsiveness to the community. On September 9, 1993, the Department of Defense issued implementing guidance on the following key elements of the fast-track cleanup initiative:

1. Establish a Cleanup Team at Every Base

-Teamwork is critical to improving the way we clean up bases. Cleanup teams have been established at every major closing or maligning base, consisting of members from DoD, EPA and the state environmental agency, Those teams completed training in November, 1993.

--One of the teams' first tasks was to conduct a "bottom-up review" of the base environmental cleanup program. The initial cleanup plans were completed in April, 1994, One of the major points of the cleanup plan is to not only be protective of human health and the environment but also to consider reuse priorities in developing cleanup schedules.

--The cleanup teams have been empowered to accelerate, cleanup by conducting reviews simultaneously rather than sequentially. Together these steps are speeding up the planning, construction, and full implementation of an appropriate cleanup remedy so that property can be turned over for economic development.

The Administration also recognizes the, importance of involving the community in the cleanup planning and execution process. DoD is establishing a Restoration Advisory Board at all closing bases to keep community members closely involved with the base cleanup process.

2. Make Clean Parcels Available,

--Under the Presidents plan, environmental assessments are now being performed quickly enough to identify all clean parcels of property on a base within 18 months so they can be made immediately available for reuse. For parcels with an identified user, the assessment is being done in 9 months,

--In many instances, communities are able to lease, property while cleanup is being conducted.

--Removal and interim remedial actions are being used to get rid of "hot spots" and to give priority to parcels with potential for quick reuse. Future land-use scenarios are being factored into the cleanup process in accordance with existing law.

3. Speed the National Environmental Policy Act Process

--The National Environmental Policy Act (NEPA) protects communities from the dangers of environmental hazards. The strict standards of NEPA must still be met, but should not be an impediment to effective reuse of closing military bases.

--DoD has adopted the Administration's goal of completing documents required by NEPA within twelve months from the date a community submits its final reuse plan.

--The signed NEPA document is being used for both closure and reuse, and the NEPA analyses being performed today are being based upon communities' reuse plan.Historically, NEPA documents took anywhere from 24 to 36 months to prepare.

4. Indemnification

--In 1993, the Administration worked with the Defense authorization and Appropriations committees to revise language in the FY93 act to clarify future liability for contamination.

/* End of text from osiris:news.osd.dusd.success.cleanup */

ORDNANCE REMOVAL

For Dave

TIERRASANTA COMMUNITY

SAN DIEGO, CALIFORNIA

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SECTION B

SUPPLIES OR SERVICES AND PRICES/COSTS

1.0 TECHNICAL REQUIREMENT

The Contractor, as an independent Contractor and not as an agent of the Government, shall furnish, on the terms and conditions more particularly described herein, the management, labor, facilities, equipment and materials (except as specified herein to be furnished by the Government) necessary for and incidental to the performance of the work set forth below:

2.0 OBJECTIVE

The objective of this contract is to provide construction services for the removal of unexploded ordnance and related debris contamination caused by previous DOD related activities on a portion of the former Camp Elliott Training Range. This action will minimize, to the extent possible, any post-clearance danger from unexploded ordnance to human health and the environment.

3.0 BACKGROUND

Camp Elliott was operated as a tank, anti-tank, and artillery training practice range during the World War II-Korean War era. The portion of the Reservation that now encompasses Tierrasanta was declared surplus property and transferred to developers in 1968. The community now consists of over 6000 residential units plus ancillary office, commercial and public service facilities. An additional 200 acres of the site to be cleared is presently owned by the Navy.

4.0 GENERAL STATEMENT OF SERVICES

This contract shall consist of furnishing all plant, labor, materials, and equipment and performing all work for clearance of unexploded ordnance and related debris. The work shall include location and identification of unexploded ordnance, removal of ordnance debris and other metallic debris, identification and protection of environmentally sensitive areas, and selective manual removal of vegetation.

SECTION B - SUPPLIES OR SERVICES AND PRICES

PRICE SCHEDULE

Item No.	Estimated Quantity	Unit	Unit Price	Estimated Price
Tierrasanta Ordnance Clearance				
Clearance of Former DOD Property (approx. 1200 acres)	1	Job	LS	$_____
0001 Ordnance Sweep (Surface and Subsurface)	1	Job	LS	$_____
00002 Biological and Archeological Monitoring	1	Job	LS	$_____
0003 Brush Clearing	1	Job	LS	$_____
0004 Location/Removal of Hazardous UXO	324	each	$_____	$_____
0005AA Removal of Ordnance Related Debris from Surface	10,680	each	$_____	$_____
0005AB Removal of Ordnance Related Debris from Subsurface	29,870	each	$_____	$_____
0005AC Removal of Non-Ordnance Related Debris from Surface	19,340	each	$_____	$_____
0005AD Removal of Non-Ordnance Related Debris from Subsurface	14,650	each	$_____	$_____
0006 Fencing	1	Job	LS	$_____
TOTAL BASE BID				$_____

Options (To be exercised within 730 days after Notice to Proceed by the Contracting Officer)

Clearance of Navy Property (approx. 200 acres)	1	Job	LS	$_____

0007 Ordnance Sweep (Surface and Subsurface)	1	Job	LS	$____
0008 Biological and Archeological Monitoring	1	Job	LS	$____
0009 Brush Clearing	1	Job	LS	$____
0010 Location/Removal of Live Ordnance	55	each	$____	$____
0011AA Removal of Ordnance Related Debris from Surface	1850	each	$____	$____
0011AB Removal of Ordnance Related Debris from Subsurface	5150	each	$____	$____
0011AC Removal of Non-Ordnance Related Debris from Surface	3340	each	$____	$____
0011AD Removal of Non-Ordnance Related Debris from Subsurface	2530	each	$____	$____
TOTAL OPTIONAL BID ITEM				$____

NOTE: Full funding for the Base Bid is not available. Full authorization and funding will be sought. Approximately $ 3.0 million is available for fiscal year 1990.

1.3.1 Technical and Management Plan

The contractor shall prepare and submit for approval a technical and management plan. The plan shall provide details of the approach, methods, and operational procedures to be employed at the ordnance remediation site. The plan shall describe the brand of ordnance locators to be used, the composition and management of sweep teams, the diagnosis procedures to be used in identifying hazardous UXO, the method of transporting ordnance to the safe holding area, the location of the safe holding area, the proposed layout of the grid system, the proposed schedule of search, the proposed design for protective works, and the Contractor's quality control procedures.

1.3.2 Final Report

The contractor shall prepare and submit a Final Report covering all operations and activities conducted under this contract and certify that the site has been swept in accordance with these specifications. The report shall include the maps and records specified in paragraphs ORDNANCE SEARCH PREPARATION and QUALITY CONTROL.

PART 2 PRODUCTS

2.1 ORDNANCE LOCATORS

The Contractor shall use an electromagnetic ordnance locator capable of locating ordnance buried to a depth of at least 3 feet. The Government will use a Forster Mark 26 ordnance locator for quality assurance checks.

PART 3 EXECUTION

3.1 ORDNANCE SEARCH PREPARATION

3.1.1 Priority of Search

The Contractor shall clear subareas in order of priority as described below and as indicated, when possible, subject to the environmental constraints described in SECTION 01510 ENVIRONMENTAL PROTECTION:

1. Subarea F
2. Subarea C
3. Subarea D
4. Subarea E

3.1.2 Grid System

A planned, systematic approach shall be utilized to search the subareas. Operations shall only be conducted during daylight hours. The contractor shall divide each subarea into search grids. The grids shall be established for safety and ease of operation by using factors such as orientation, existing landmarks, ground cover, etc. The Contractor shall maintain a map showing the grids and maintain records of ordnance and ordnance-related debris found designated by grid number, type, and quantity.

3.2 SWEEP PROCEDURES

3.2.1 General

Diagnosis procedures of OEW/UXO shall be accomplished by an UXO Specialist. If diagnosis reveals the OEW/UXO is safe to move to a safe holding area, this shall be accomplished by an UXO Specialist. UXO items will be picked up at the safe holding area by the 70th Ordnance Detachment on a routine basis. If diagnosis reveals the OEW/UXO is not safe to move, the item shall be marked with a multicolored flag affixed to stake. The stake shall be at least four feet high and the flag shall be at least one-foot square. The Contracting Officer shall be immediately contacted for removal of the hazardous UXO. The Contracting Officer will contact the 70th Ordnance Detachment. The Contractor shall determine whether the UXO presents an immediate hazard to personnel and/or property due to the explosion potential and separation distance and shall construct protective works if the UXO is determined to be hazardous and Government personnel cannot immediately respond. Non-hazardous scrap 3 inches or greater in any dimension shall be removed from the grid and placed in a collection point. Non-hazardous scrap, less than 3 inches in size, shall be left on the ground surface. Non-hazardous scrap shall be periodically removed from the collection point and turned in to the DRMO Scrapyard, 3368 Harvard Drive, National City (619-556-8286). Non-ordnance related debris that interferes with operation of the ordnance locators shall become the property of and shall be disposed of by the Contractor.

3.2.2 Surface Sweep

A surface sweep of each grid where brush clearance is required shall be conducted prior to brush clearance operations. The interval between walking searchers shall not exceed 12 feet. A shorter interval may be required due to terrain, vegetation, and/or contamination density.

3.2.3 Subsurface Sweep

A subsurface sweep, to a depth of 3 feet, of each grid shall be conducted with an ordnance locator. In the grids requiring brush clearance, the subsurface sweep shall be conducted after the specified brush clearance operations. Access shall be gained to suspect subsurface OEW/UXO to perform diagnosis procedures utilizing non-sparking tools. Personnel exposure shall be minimized during this operation.

3.2.4 Explosive Ordnance Disposal (EOD) Procedures

The 70th Ordnance Detachment (EOD), Naval Submarine Base, San Diego, CA (619) 553-8500, will apply EOD procedures to UXO, as required. The EOD Team Leader will coordinate with the Contractor's safety specialist prior to any disposal actions on site. The EOD Team Leader has final authority on disposal procedures applied to UXO.

3.3 QUALITY CONTROL

2.2 Mission Trailer Regional Park

QUALITY CONTROL

Test sweeps for search effectiveness shall be conducted by the Contractor. Test grids shall be selected in the most probable areas for having ordnance, i.e., those areas where a significant amount of ordnance items were located on previous sweeps. At least five percent of the grids shall be selected for test sweeps. Test sweeps shall be conducted with an ordnance locator by individuals not involved in the original subsurface sweep of that grid. Any materials encountered shall be disposed of as specified for the original sweep. The results of these test sweeps shall be documented in the same manner as the original sweeps.

3.4 QUALITY ASSURANCE

An acceptance check shall be performed by representatives of the Contracting Officer. The number of grids to be checked shall be determined by the Contracting Officer.

3.5 MEASUREMENT AND PAYMENT

The Contractor shall separately report hazardous ordnance, ordnance related items removed from the surface, ordnance related items removed from below the surface, non-ordnance related items removed from the surface, and non-ordnance related items removed from below the surface. Separate payment will be made for these types of items and payment will be made by the item. Non-ordnance related debris shall only be removed if it interferes with operation of ordnance locators; no payment will be made for removal of non-ferrous material. No payment will be made for removal of debris (ordnance or non-ordnance) that is smaller than 3 inches in length in the longest direction.

--End of Section--

NAL ENVIRONMENTAL ASSESSMENT

for

MISSION TRAILS REGIONAL PARK

at

SAN DIEGO, CALIFORNIA

3.0 EXECUTIVE SUMMARY

APPENDICES

Go Back to the Environmental Assessment Page.

1.0 PURPOSE AND NEED OF ACTION

1.1 INTRODUCTION

This Environmental Assessment (EA) is for the ordnance removal at the former Camp Elliott which is now a portion of the Mission Trials Regional Park. The U.S. Army Corps of Engineers intends to develop an ordnance removal program aimed at locating and removing the unexploded ordnance. Camp Elliott was operated as a military artillery training camp from 1940 to 1960. As a result of the military training activities, unexploded ordnance exists in many areas throughout the Study Area. The objective of this study is to evaluate the potential environmental impacts due to the proposed ordnance removal.

1.2 PROJECT HISTORY

The former Camp Elliott was operated as a Marine Corps training center from 1940 to 1944, then turned over to the Navy which continued to use the site for training activities. The site was used as infantry training, miscellaneous specialist schools, and tank and artillery training during World War II and the Korean War. The mountains and mesas were primary target areas from firing points to the north and south. In 1960, approximately 13,277 acres of the original 32,000 acres were declared excess. As a result, ownership of the property was transferred to the General Services Administration (GSA). The property was disposed of through land exchanges, grants and sales between 1960 and 1963. A portion of the 13,277 acres (approximately 2,100 acres) is the subject of this EA.

1.3 LOCATION

The Study Area is located within the City of San Diego, east of the community of Tierrasanta (Figure 1-1). The Study Area is bounded on the west by the San Diego County Water Authority (SDCWA) aqueduct, on the south by the San Diego River, on the east by Sycamore Road and on the north by undeveloped Navy and private property.

1.4 JURISDICTION

Jurisdictions having authority over property within the Study Area include the U.S. Navy, the City of San Diego, San Diego State University, the San Diego Unified School District, Brehm Communities, and the San Diego County Water Authority. Figure 1-2 shows the jurisdictional boundaries of the property owners holding land within the Study Area.

The U.S. Navy has approximately 600 acres located in the north and northwestern sectors of the Study Area. The northern parcel is in the vicinity of proposed SR 52 and will most likely be acquired by Caltrans. The two northeastern parcels are currently in escrow with the City of San Diego. Escrow is expected to close in 1996. The proposed Jackson Drive extension passes through both Navy parcels and is adjacent to the San Diego Unified School District property. (Refer to Figure 9-1, Land Use Map.)

The City of San Diego has property located adjacent to and within the Study Area. The City is in the process of purchasing the Navy's property. The City is also in the process of preparing the East Elliott Community Planning Area Plan. (Refer to Figure 9-1, Land Use Map.) The City's community planning area encompasses the same area as identified by Brehm Communities' project boundary. The portion of land is located along the northeast boundary of the Study Area and is also in the vicinity of the proposed path of SR 52. The City's remaining land will be used for implementing the Mission Trails Regional Park Master Plan.

San Diego State University owns approximately 491 acres located in the central northeastern portion of the Study Area including Fortuna Mountain and its eastern slope. The University uses their property as a study area for students and researchers to observe native California plant and animal species. The Park's Master Plan includes plans for a nature interpretive center and botanical garden for this area.

The San Diego Unified School District owns 13 acres located along the southwestern boundary of the Study Area situated between the Navy's two parcels. The District had plans for the land to be used for a future elementary school. The District intends to sell or exchange the land to either a public or private agency.

Brehm Communities' property includes a small piece of land located along the northeastern boundary of the Study Area. This same piece of land is also within the City of San Diego's East Elliott Planned Community Area and is also in the vicinity of the proposed SR 52 highway.

The San Diego County Water Authority, though it does not hold fee title over property within the Study Area, retains discretionary approval over activities occurring within the easement for the Second San Diego Aqueduct. This easement is located along the western boundary of the Study Area.

1.5 OVERVIEW OF THE STUDY AREA

The Study Area is currently the Mission Trails Regional Park. The park consists mainly of dirt trails used by hikers, joggers and mountain bicyclists. Motorized vehicles are not allowed on the Study Area and there is no on-site parking. There are currently no public facilities in the Study Area.

The predominant features of the Study Area are Fortuna Mountain and the many tree-lined canyons that exist throughout the area. The Study Area can be characterized as very hilly with many areas inaccessible due to rugged terrain and thick vegetation. There is running water in the canyons during spring time. A wide variety of plant and animal species occur within the Study Area.

1.6 NEED FOR THE PROJECT

This project is authorized as part of the Defense Environmental Restoration Program (DERP) as described in section 160, Environmental Restoration of Comprehensive Environmental Response Compensation and Liability Act (CERCLA). One of the goals of this program is the "correction of other environmental damage (such as detection and disposal of unexploded ordnance) which creates an imminent and substantial endangerment to the public health or welfare or to the environment." The U.S. Army Corps of Engineers was designated as the executive agent for the Department of Defense in implementing the program.

1.7 STUDY OBJECTIVES

This EA addresses the environmental impacts of proposed ordnance removal alternatives. Consideration is given to public safety, environmental effects, local public opinion, and compliance with Federal, State, and local regulations. The proposed mitigation measures and alternative actions are evaluated regarding potential environmental impacts; either beneficial or adverse.

The objective of this study is to evaluate the potential impacts of the proposed ordnance clearance on the human environment. The EA has been prepared in accordance with the National Environmental Policy Act (NEPA) and Army Regulations (AR) 200-2. The environmental considerations include potential impacts in the following issue areas:

biology
cultural
geology
air quality
land use
visual
transportation
noise
agriculture
socioeconomics
public safety

The document is formatted so that each issue area addresses affected environment, environmental consequences and mitigation measures. Public involvement was integrated into the EA process so that concerned citizens and agencies could voice their concerns early during the EA preparation. The results of the public involvement activities are presented in Section 4.0 of this report.

2.0 PROJECT ALTERNATIVES

2.1 INTRODUCTION

In order to assess potential environmental impacts, five alternatives have been identified for investigation. The intention of this study is to evaluate the potential environmental impacts of each alternative and identify the preferred alternative. The five alternatives are:

Alternative 1: Electromagnetic subsurface and surface visual sweeps in conjunction with approximately 60 - 65 percent brush/vegetation removal, "Brushing";

Alternative 2: Electromagnetic subsurface and surface visual sweeps in conjunction with controlled burns, "Controlled Burning";

Alternative 3: Electromagnetic subsurface and surface visual sweeps where possible, leaving brush/vegetation in place, "Intact Vegetation";

Alternative 4: No action; and

Alternative 5: Electromagnetic subsurface and surface visual sweeps in conjunction with approximately 35 percent brush/vegetation removal, "Reduced Brushing" (preferred alternative)

The alternatives are described in greater detail in following sections.

2.2 PROJECT DESCRIPTION

Technical information on the procedures for each alternative is based on the Feasibility Study of Remedial Action Alternatives for Conventional Explosives Ordnance Items on the Former Camp Elliott, San Diego, California, Final Engineering Report and Environmental Report and Environmental Impact Statement. Additional technical information was provided by the U.S. Army Corps of Engineers.

Based on physical ordnance sampling conducted by the Corps in October 1990, it has been determined by the Corps that areas east of Fortuna Mountain do not contain ordnance and will be excluded from ordnance removal activities. Final boundary for areas to be swept will be determined during the design of clearance operations.

According to the existing prescribed clearance approach, sweeps will be performed by sectioning off certain portions of the area into grids. These grids are typically 100 feet by 200 feet. Once sectioned off, two methods will be utilized for clearance.

The first method is by surface visual sweep. Simply stated, crews will walk the area in an attempt to locate any ordnance on the ground surface. This may include ordnance that is either lying on the surface or is partially buried.

The second method is an electromagnetic subsurface sweep. This method involves using the Mark 26, an advanced metal detector. The Mark 26 is a hand-held device, requiring no special support equipment. Operation of the Mark 26 requires passing its detector head over the ground surface. The sweep is conducted by walking with the equipment in a similar fashion to the surface visual sweep. As metal is detected, an evaluation will be made as to the ordnance status, followed by its removal.

The primary requirement for use of the Mark 26 is that the base of the devise has to be within a few inches of the ground surface to be effective in locating ordnance. This requirement is the primary reason that vegetation clearance and controlled burns are alternatives under investigation.

Once located, ordnance will either be removed from the site or in special circumstances where safe removal is not possible, ordnance will be detonated on site. Based on the Tierrasanta project experience, on-site detonation is expected to be minimal. If on-site detonation is required the procedure is as follows: local police and fire departments are notified; the area is evacuated; roads are closed and the piece of ordnance is sandbagged and detonated. Other protective measures will be applied as necessary to protect utilities, sensitive plant and wildlife species and cultural resources.

Disturbance from on-site detonation of ordnance can vary depending on many factors, such as soil type, depth of the ordnance and the size of the ordnance. The size of the area of disturbance can be reduced through protective measures. The largest ordnance expected to be found in the area is 155 mm. A five-foot wide area is believed to be the maximum disturbance that will occur as a result of on-site detonation. The largest ordnance to be detonated during the Tierrasanta project was 37 mm, which left a disturbance area of two-

feet in diameter and one foot in depth. The following is a discussion of the specific technical requirements of each of the evaluated alternative actions.

2.3 ALTERNATIVE 1: BRUSHING

This alternative utilizes electromagnetic subsurface and surface visual sweeps in conjunction with brush/vegetation removal.

The vegetation removal will be conducted selectively, removing approximately 60 - 65 percent of the vegetation in each sectioned area. Selective cutting is defined as removing every other plant so that the area maintains its vegetation integrity. Plants will be cut to the ground, leaving the root system in place. According to the defined clearance procedures under this alternative, a space at least three feet wide is required between remaining plants. Additionally, a six-foot wide access path will be cut on approximately 100 feet centers to perform the clearance and subsequent ordnance sweep.

2.4 ALTERNATIVE 2: CONTROLLED BURNING

This alternative involves electromagnetic subsurface and surface visual sweeps in conjunction with controlled burns.

Controlled burns are an equally effective method of vegetation clearance. The controlled burns would probably be conducted in larger areas than the defined clearance grids. The burn criteria would be based on current controlled burn practices defined by the San Diego County Air Pollution Control District and the City of San Diego Fire Department.

Once burned, the area may still require some clearance to access the areas. The extent of this additional vegetation clearance depends on the extent of the burn and the amount of remaining vegetation. However, it would not exceed the amount of clearance prescribed in Alternative 1.

3.0 EXECUTIVE SUMMARY

3.1 PREFERRED ALTERNATIVE

Five alternatives were evaluated in detail for this environmental assessment. The technical approach for Alternatives 1-4 was based on the Feasibility Study of Remedial Action Alternatives for Conventional Explosive Ordnance Items on the Former Camp Elliott site, San Diego, CA; Final Engineering Report. Evaluations of the original four alternatives during the pre-draft investigation and subsequent reviews, when applied to the entire Study Area, represented impacts that could not be satisfactorily mitigated. Therefore, a reduced vegetation cutting alternative (Alternative 5) was investigated as a means of developing the preferred alternative. Alternative 5 (preferred alternative) was derived from the environmental analysis of Alternatives 1-4 and experience gained from the Tierrasanta Ordnance Removal Project.

3.2 MITIGATION PLANNING

Because of the complexities of the sensitive biological resources occurring within the Study Area, it became apparent that specific mitigation planning would have to occur to reduce impacts. The preferred alternative satisfies that requirement for much of the Study Area, however, there are many specific areas that have circumstances that require varying degrees of mitigation. This mitigation includes identifying areas that may, for instance, be impacted by timing or percent of vegetation removed. In these certain areas, mitigation is applied to meet the requirements of the circumstance.

The approach to identifying impacts and applying mitigation was initiated by conducting intensive biology surveys. These surveys included directed, seasonal surveys for both sensitive plant and sensitive wildlife species. A vegetation type and density survey was also performed. Following the surveys, the data on sensitive species were compared to the vegetation and density data.

To further determine mitigation strategies, a matrix was developed that cross references all vegetation types and their density with all identified sensitive species (Table 3-1). Using the matrix, potential impact areas could be identified and preliminary mitigation applied. The

3.2.11.3 MS. Moderate Sensitivity

Some of these zones contain archaeological study areas that require testing prior to the undertaking of any action within the Study Area. It appears that most study areas within this zone, however, will either qualify for treatment under the Sparse Lithic Scatter Program, or will require no further work based on previous subsurface testing results.

3.3 ENVIRONMENTAL CONSEQUENCES

3.3.1 Cumulative Impacts

Completion of the proposed ordnance removal project at Mission Trails Regional Park will potentially result in adverse impacts to the sensitive California gnatcatcher. The residual impacts (i.e., those remaining after mitigation measures have been applied) are expected to be at a greatly reduced level relative to those which may be expected as a result of "unmitigated" project activities. However, these reduced, residual impacts may, when combined with residual impacts as a result of completion of other planned projects in the foreseeable future, potentially create a cumulative adverse impact to the gnatcatcher which is not as minor as the sum of each of the constituent impacts. Expected adverse residual impacts to the gnatcatcher are described below for several projects in the vicinity of Mission Trails which are in the planning stages and which are reasonably certain to be constructed. These projects are also described in terms of timing on Table 3-2. A summary of identified impacts for these projects is listed on Table 3-3.

The proposed Caltrans State Route 52 East expansion project is expected to have residual adverse impacts to the gnatcatcher. The proposed mitigation for this project involves the recommended revegetation of over 52 acres to offset loss of 88 acres of gnatcatcher habitat (Caltrans, 1988). Based on a generalized regeneration time of three to five years for coastal sage scrub vegetation, short-term residual adverse impacts to the gnatcatcher as a result of construction of this project is expected.

4.0 PUBLIC INVOLVEMENT

4.1 PUBLIC INVOLVEMENT PROCESS

The Mission Trails Environmental Assessment has involved considerable communication and coordination with jurisdictions, government agencies, citizens groups and interested parties. Communication with agencies and the community has been maintained through a series of public involvement meetings and numerous individual meetings and briefings. The intention of the public involvement program was to develop a process by which all affected agencies and citizens could become involved in the project in its beginning stage. The goal of this program was to identify concerns in the beginning and integrate those concerns into the EA process. The following public involvement objectives were developed prior to the project initiation:

- To establish and maintain the credibility of the overall assessment and response effort, including the need to address concerns regarding safety and environmental restoration;
- To inform and educate the public as to how the ordnance removal activities could be undertaken, possible impacts on the environment, and how any potential problems might be mitigated;
- To accurately identify and consider the values and concerns of the public, government agencies and nearby land owners; and,
- To integrate public views and agency policy with technical data into the overall mitigation approach.

4.2 AGENCY COORDINATION

Presentations to key agencies were made in the beginning of the project. The first agency meeting was held at the Navajo Community Planning Group on November 19, 1990. The goal was to discuss the project and to announce an upcoming agency/public meeting designed specifically for the EA. The Navajo Planning Group represents the communities of San Carlos, Allied Gardens and Del Cerro. These are the communities south of the Study Area.

9.0 LAND USE

9.1 AFFECTED ENVIRONMENT

9.1.1 Existing Land Use - Study Area

Mission Trails Regional Park lies approximately three miles east of Interstate 15 and five miles north of Interstate 8. The entire park, for which this EA is only a portion of, includes five sections: Lake Murray, Cowles Mountain, Mission Gorge, West Fortuna Mountain and East Fortuna Mountain. The Study Area encompasses the West Fortuna Mountain and East Fortuna Mountain sections of the park and a portion of the Mission Gorge area. The Study Area is presently owned by five jurisdictions: U.S. Navy (600 acres), San Diego State University (SDSU) (491 acres), San Diego Unified School District (13 acres), Brehm Communities, and the City of San Diego. See Figure 1-2, Jurisdictional Boundary Map. The San Diego County Water Authority (SDCWA) retains discretionary approval over its right-of-way (ROW) though it does not hold fee title to the property.

Existing land use for this Study Area of the Mission Trails Regional Park includes jogging, hiking, rock climbing, equestrian and biking trails and picnicking. San Diego State University Biological Study Area is located on the northern portion of Fortuna Mountain. There are also transmission lines crossing the Study Area, as well as the SDCWA ROW for the Second San Diego Aqueduct and related utility maintenance roads.

9.1.2 Existing Surrounding Land Use

Existing land uses near the Study Area are representative of suburban residential and commercial communities in the Southern California region. They include primarily single and multiple family residential uses, with supporting neighborhood commercial, open space, recreation, and public facilities. See Figure 9-1, Land Use. The predominant character of these communities is that of low density residential neighborhoods. Commercial areas are limited and include only those uses needed to support the existing and planned residential uses. Major transportation routes leading to the Study Area include Interstate 15, Route 52, Interstate 8, Friars Road, and Clairemont Mesa Boulevard.

There are three existing communities and two planned communities that are adjacent to the proposed Study Area. The existing communities include Tierrasanta, located adjacent to the western boundary of the Study Area, Rancho Mission Canyon, located near the southwest boundary and the City of Santee, located near the eastern boundary of the site. The only area directly adjacent to the Study Area is a portion of Tierrasanta. The remaining communities range in distance from 1/2 mile to 1 mile. Future development includes the two planned Brehm Communities, East Elliott and Silver Ridge, which will be located along the northeast boundary of the Study Area, just north and to the west of the City of Santee. A starting date for construction on these two communities is dependent on the City of San Diego's approval of the plans. The U.S. Navy owns property to the north of the Study Area consisting of open space.

9.1.3 Proposed Land Use

Mission Trails Regional Park has several proposed development areas within the Study Area boundaries, according to the Park's 1985 Master Development Plan. Proposed park facilities for the East Fortuna Mountain area of the park include a nature interpretive center, a natural history museum, an ecological monitoring station and a small auditorium. Also proposed is a 20-acre native species botanical garden, to be located near the Mission Dam Historical Site, as well as an equestrian center.

Proposed recreational facilities for the West Fortuna Mountain area of the park is a basic services/multi-use center in the center of the area, which would be used in conjunction with the group camping/special events area located northwest of the proposed facility, to host various group events. Also proposed is an archery range to be located adjacent to the basic service/multi-use center, as well as increased picnic and open play areas on the plateau west of the valley, along the western boundary of the park.

Park facilities proposed for the Mission Gorge area of the park include a visitor center, interpretive facilities and a ranger headquarters and park maintenance/storage complex northeast of the intersection of Father Junipero Serra Trail Road and Mission Gorge Road. Related concessions would offer naturalist books and field guides, bicycle rentals, convenience, and picnicking supplies, etc. Northwest of this area are plans for family and group picnic areas clustered about a future 2,500 to 3,000-seat outdoor amphitheater with the San Diego River and Gorge as a scenic backdrop. The third subarea (northwest of the

INVENTORY PROJECT REPORT

for

MISSION TRAILS REGIONAL PARK (CAMP ELLIOT)

at

SAN DIEGO, CA

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PART I - PROJECT DESCRIPTION

PROJECT DESCRIPTION
MISSION TRAILS REGIONAL PARK (CAMP ELLIOTT)
SAN DIEGO, CALIFORNIA
PROJECT NO. J09CA006702

1. INTRODUCTION

At the request of the Huntsville Division of the United States Army Corps of Engineers, the Los Angeles District contracted Nasland Engineering to conduct a visual site inspection of a portion of the former Camp Elliott on 25 March 1988. The purpose of this visual inspection was to assess possible unsafe debris, hazardous or toxic waste, or unexploded ordnance.

2. PROJECT DESCRIPTION

An ordnance removal project is proposed. In order to perform an ordnance removal project, the site must be cleared enough to visually inspect the surface, and to use the subsurface metal detector equipment to scan to a depth of 3 feet below the surface.

3. DESCRIPTION OF SITE

a. The project site consists of approximately 2100 acres and is located on a portion of the former Camp Elliott in San Diego, California. Except for the improvements within the utility easements and the Aqueduct easement the site is in its original state. The City of San Diego has acquired most of the land, and is in the process of acquiring approximately 693 more acres. The land is being acquired from the Navy (680 acres) and the San Diego Unified School District (13 acres).

b. There are signs posted prohibiting access to vehicles. However, the site is easily accessible to motorcycles and 4 wheel drive vehicles. There are places where motorcycles have made courses on the hills and 4 wheel drive vehicles are often seen on the dirt roads that cross the site. This is also an area that joggers like to use.

c. From the records reviewed, there are no reports of any injury from the project site due to unsafe debris, hazardous or toxic waste, or ordnance. However, the city of San Diego Fire Department records indicate that in 1984 and 1985 they responded and recorded 8 military ordnance items found near Fortuna Mountain. Also, this area is adjacent to the Tierrasanta project site where 2 youths were killed and others were injured from detonation of a high explosive item. Since the 1973 explosive ordnance survey checked only the surface and this area has not been checked since, it is possible that the elements have uncovered more ordnance.

Attachment 2 - DD Form 1391 (Cost Estimate)

FEASIBILITY STUDY (FS)

for

MISSION TRAILS REGIONAL PARK

at

SAN DIEGO, CA

- **ED PROJECT REVIEW AND COMMENT INSTRUCTIONS**

MEMORANDUM from Chief, Environmental Restoration Division, Directorate of Military Programs to COMMANDER(s) HND and SPD, dated 5 JAN 1990 "Signed"

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PROJECT DESCRIPTION
MISSION TRAILS REGIONAL PARK (CAMP ELLIOTT)
SAN DIEGO, CALIFORNIA
PROJECT NO. J09CA006702

1. INTRODUCTION

At the request of the Huntsville Division of the United States Army Corps of Engineers, the Los Angeles District conducted a visual site inspection of a portion of the former Camp Elliott on 25 March 1988. The purpose of this visual inspection was to assess possible unsafe debris, hazardous or toxic waste, or unexploded ordnance.

2. PROJECT DESCRIPTION

A Feasibility Study is proposed, consisting of surface and subsurface test sweeps and completion of an Environmental Impact Statement (EIS). The presence of high explosives is confirmed at this site.

3. DESCRIPTION OF SITE

a. The project site consists of approximately 2100 acres and is located on a portion of the former Camp Elliott in San Diego, California. Except for the improvements within the utility easements and the Aqueduct easement the site is in its original state. The City of San Diego has acquired most of the land, and is in the process of acquiring approximately 693 more acres. The land is being acquired from the Navy (680 acres) and the San Diego Unified School District (13 acres).

b. There are signs posted prohibiting access to vehicles. However, the site is easily accessible to motorcycles and 4 wheel drive vehicles. There are places where motorcycles have made courses on the hills and 4 wheel drive vehicles are often seen on the dirt roads that cross the site. This is also an area that joggers like to use.

c. From the records reviewed, there are no reports of any injury from the project site due to unsafe debris, hazardous or toxic waste, or ordnance. However, the city of San Diego Fire Department records indicate that in 1984 and 1985 they responded and recorded 8 military ordnance items found near Fortuna Mountain. Also, this area is adjacent to the Tierrasanta project site where 2 youths were killed and one was injured from detonation of a high explosive item. Since the 1973 explosive ordnance survey checked only the surface and this area has not been checked since, it is possible that erosion has uncovered more ordnance.

SITE SURVEY SUMMARY SHEET
FOR
PROJECT NO. J09CA006702

1. SITE NAME: Mission Trails Regional Park (Camp Elliott), California.

2. LOCATION: In the City of San Diego, San Diego County, California.

3. DESCRIPTION OF PROBLEM: The terrain is heavily contaminated with ordnance. At Tierrasanta, a residential area which is adjacent to Mission Trails Regional Park, two youths were killed and one was critically injured on 10 December 1983 by the explosion of a 37mm high explosive projectile that they had found.

4. SITE HISTORY: Camp Elliott was obtained by the Navy in 1940. The Camp (approximately 30,500 acres) was used as a training base for Marines from 1940 to 1944. In 1944 the Navy took possession and used Camp Elliott as a training and distribution center until 1960. In 1960, approximately 13,277 acres were transferred to General Services Administration (GSA) as excess. The property was disposed of through land swaps, grants, and sales between 1960 and 1963. No restrictions were placed upon the development of the property and no known hold harmless clauses were included in the land transfers.

5. AVAILABLE STUDIES: A.) Report of Tierrasanta clearance Operation, 9 January 1984 through 27 April 1984, by the Explosive Ordnance Disposal Mobile Unit Three, Naval Amphibious Base, Coronado, San Diego, California. B.) Feasibility Study of Remedial Action Alternatives for Conventional Explosive Ordnance Items on the Former Camp Elliott, San Diego, California, Final Draft Engineering Report and Environmental Impact Statement 16 October 1987, by The DeYoung Johnson Group Inc. (DJG), P.O. Box 197, Williamsburg, VA 23187, and Dynamic Systems, Inc., 12030 Sunrise Valley Dr., Suite 400, Reston, VA 22091, and UXB International, Inc, 1275 K Street NW, Suite 1203, Washington DC, 20005. C.) The City of San Diego Fire Department, Engineering and Development Department Field Notes, Job Description and Location - Camp Elliott Shell Locations.

6 CATEGORY OF HAZARDS: Unexploded ordnance.

7. BASIS FOR DETERMINATION OF DOD RESPONSIBILITY: The property was formerly owned by the DOD. The unexploded ordnance on the site is clearly the result of DOD's usage of the site. No known restrictive covenants or hold harmless agreements were included in the land transfers that disposed of the property.

8. POINTS OF CONTACT DISTRICT: Mr. Lee Jauman, Los Angeles District/(213) 894-2865

9. STATUS: The site is currently owned by the City of San Diego, and is planned for use as a park and recreation area.

10. DESCRIPTION OF PROPOSED REMEDIAL ACTION: Feasibility study to determine density and extent of contamination, and recommend preferred alternatives for ordnance clearance, and completion of an EIS.

11. ESTIMATED COST: $1,272,000

Attachment 2 - DD Form 1391 (Cost Estimate)

1. COMPONENT	FY 19	MILITARY CONSTRUCTION PROJECT DATA	2. DATE
ARMY			30 May 1989

3. INSTALLATION AND LOCATION	4. PROJECT TITLE
Former Camp Elliott San Diego, California	Defense Environmental Restoration Project (DERP)

5. PROGRAM ELEMENT	6. CATEGORY CODE	7. PROJECT NUMBER	8. PROJECT COST ($000)
		J09CA006702	$1,272

9. COST ESTIMATES

ITEM	U/M	QUANTITY	UNIT COST	COST ($000)
Estimated Cost				
Feasibility Study				$672.
Environmental Impact Statement				$600.
				$1,272.

10. Description of Proposed Construction

Feasibility Study and Environmental Impact Statement for confirmed ordnance contamination of former artillery range.

CONTAMINATION SUMMARY
FOR
PROJECT NO. J09CA006702

This report presents the results of a preliminary determination phase (PDP) investigation at a portion of the former Camp Elliott, in the City of San Diego, in southern California. Because of concern that contamination may have occurred as the result of Department of Defense (DOD) activities at the former Camp Elliott, the Huntsville Division of the United States Army Corps of Engineers (COE) authorized the PDP investigation under the Defense Environmental Restoration Program (DERP). Nasland Engineering was retained to conduct the investigation under Delivery Order No. 0002 of Contract No. DACA 09-87-D-0016.

The former Camp Elliott was operated from 1940 until 1960. In 1960 approximately 13,277 acres of the original 32,000 acres were declared excess. As a result, ownership of the property was transferred to the General Services Administration (GSA). The property was disposed of through land swaps, grants, and sales between 1960 and 1963. A portion of the 13,277 acres, (approximately 2,100 acres), is the subject of this report. The City of San Diego has acquired most of this property and is in the process of acquiring the rest of the property for the Mission Trails Regional Park for a park and recreational area.

Following an initial background review and site visit, the western slopes of Fortuna Mountain were identified as the area of highest contamination. The information for the project area is limited, however, there was a clearance sweep of this area in 1973. The 1973 Explosive Ordnance Clearance Sweep was conducted from 16 October to 30 november 1973. This was a visual surface sweep, a total of 933 ordnance-related items were found.

Additional information was collected from the Feasibility Study of Remedial Action Alternatives for Conventional Explosive Ordnance items on the Former Camp Elliott, San Diego, California Final Draft Engineering Report and Environmental Impact Statement 16 October 1987. The Feasibility Study deals with another area of the former Camp Elliott namely Tierrasanta. Tierrasanta is adjacent to the Mission Trails Regional Park and has had several surface and subsurface sweeps conducted to remove ordnance related items. The most recent sweeps were a direct result of the 1983 accident that killed 2 youths and critically injured one more when a 37mm high explosive projectile that they had found exploded. Both areas, Tierrasanta and Mission Trails Regional Park, were part of a special training center on Camp Elliott. It was in these areas that the Marines conducted artillery and anti-tank training. Information on firing sites was not available. The locations of the actual firing sites are not known but they have been approximated by DeYoung Johnson Group, Inc. (DJG) as shown in Figure 2-16. Using these firing site locations, target areas can be projected to show the areas most likely to have contamination. The western slopes of Fortuna Mountain are within the area most likely to be contaminated.

The San Diego Fire Department in 1984 and 1985 responded to 3 reports of possible ordnance near Fortuna Mountain. A total of 8 military rounds (7 each/75mm armour piercing rounds, 1 each/105 high explosive) were found. In the Tierransanta area they responded approximately 81 times and found 393 ordnance related items. This is not a complete list of all the items that have been found. This is merely an example of what was found between 1 January 1984 to 26 April 1984 and 15 July 1985 to 25 September 1985 by the San Diego Fire Department.

Site Name Camp Elliott
Site Location San Diego, Ca.
DERP Project # I09CA006702
RAC III-A — RAC 2

Rater's Name Bill Chaffin
Organization CEHND

Revised: 14 Aug 89

APPENDIX A
RISK ASSESSMENT PROCEDURES FOR
ORDNANCE AND EXPLOSIVE WASTE (OEW)

OEW RISK ASSESSMENT:

The OEW risk assessment is based upon documented evidence consisting of records searches, reports of Explosive Ordnance Detachment actions, and field observations, interviews, and measurements. These data are used to assess the risk involved based upon the hazards identified at the site. The risk assessment is composed of two factors, hazard severity and hazard probability.

Any field activities should be made with the assistance of qualified EOD personnel.

Part I. Hazard Severity. Hazard severity categories are defined to provide a qualitative measure of the worst credible mishap resulting from personnel exposure to various types and quantities of unexploded ordnance items.

TYPE OF ORDNANCE

A. Conventional Ordnance and Ammunition

	YES VALUE	NO VALUE	VALUE
Small Arms (.22 cal - 20mm)	(4)	0	4
Medium/Large Caliber (over 20mm)	(10)	0	10
Ammunition, Inert (Contains No Explosives	(0)	0	0
Ammunition, Blank or Practice	(4)	0	4
Bombs, Explosive	10	0	—
Bombs, Practice, Fused	6	0	—
Grenades, Mines	(10)	0	10
Grenades, Mines, Practice, Fused	(6)	0	6

	YES VALUE	NO VALUE	VALUE
Detonators, Blasting Caps	10	0	—
Rockets, Missiles	(10)	0	10
Demolition Charges	8	0	—

Conventional Ordnance and Ammunition ORS Value (Maximum of 10). 10

B. Pyrotechnics

	YES VALUE	NO VALUE	VALUE
White Phosphorus	5	0	—
Pyrolusite	4	0	—
Flares	(2)	0	2
Smoke Rounds and Bombs	1	0	—

Pyrotechnics Value (Maximum of 5). 2

C. Bulk High Explosives (Bulk explosives not an integral part of conventional ordnance).

	YES VALUE	NO VALUE	VALUE
Primary or Initiating Explosives (Lead Styphnate, Lead Azide, Nitroglycerin, Mercury Azide, Mercury Fulminate, etc.)	10	0	—
Booster, Bursting or Fuse Explosives (PETN, Compositions A, B, C, Tetryl, TNT, RDX, HMX, HBX, Black Powder, etc.)	5	0	—
Military Dynamite	5	0	—
Less Sensitive Explosives (Ammonium Nitrate, Favier Explosives, etc.)	3	0	—

High Explosives Value (Maximum value of 10). 0

D. Propellants

	YES VALUE	NO VALUE	VALUE	
Solid or Liquid Propellants	6	0	—	0

E. Chemical Weapons/Agents

	YES VALUE	NO VALUE	VALUE
Toxic Chemical Warfare Agents (GB, VX, H, HD, BZ, ___, etc.)	25	0	—
Vomiting Agents (DA, DM, DC, etc.)	10	0	—
Tear Agents (CNS, CNB, BBC, CS, etc.)	5	0	0

Chemical Weapons Value (Maximum 25) 0

Total Ordnance and Explosive Waste Characteristics Value (Total = A + B + C + D + E with a Maximum value of 56). 12

TABLE 1

HAZARD SEVERITY

Description	Category	Value
CATASTROPHIC	I	≥21
CRITICAL	II	≥13 <21
MARGINAL	(III)	≥ 5 <13
NEGLIGIBLE	IV	< 5

* Apply Hazard Severity to Table 3.

Part II. Hazard Probability. The probability that a hazard has been or will be created due to the presence and other rated factors of unexploded ordnance or explosive materials on a formerly used DOD site.

AREA, EXTENT, ACCESSIBILITY OF CONTAMINATION

A. Locations of Contamination

	YES VALUE	NO VALUE	VALUE
Within Tanks, Pipes, Vessels or Other confined locations.	5	0	—
On the surface or within 3 feet.	(5)	0	5
Inside walls, ceilings, or other parts of Buildings or Structures.	4	0	—
Subsurface, greater than 3 feet in depth.	(3)	0	3

Value for location of UXO. (Maximum Value of 5). 5

B. Distance to nearest inhabited locations or structures likely to be at risk from OEW site (roads, parks, playgrounds, and buildings).

Distance to Nearest Target	VALUE
Less than 1250 feet	(5)
1250 feet to 0.5 miles	4
0.5 miles to 1.0 mile	3
1.0 mile to 2.0 miles	2
2.0 miles to 5.0 miles	1
Over 5.0 miles	0

Distance to Persons Value (Maximum Value of 5). 5

C. Numbers and types of Buildings within a 2 mile radius measured from the hazardous area, not the installation boundary.

Number of Buildings	VALUE
0	0
1 to 10	1
11 to 50	2
51 to 100	3
101 to 250	4
251 or Over	(5)

Number of Buildings Value (Maximum Value of 5). 5

D. Types of Buildings

	VALUE
Educational, Child Care, etc.	(5)
Residential, Hospitals, Hotels, etc.	(5)
Commercial, Shopping Centers, etc.	(5)
Industrial Warehouse, etc.	4
Agricultural, Forestry, etc.	3
Detention, Correctional	2
Military	1
No Buildings	0

Types of Buildings Value (Maximum Value of 5). 5

E. Accessibility to site refers to the measures taken to limit access by humans or animals to ordnance and explosive wastes. Use the following guidance:

Barrier	Assigned Value
A 24-hour surveillance system (e.g., television monitoring or surveillance by guards or facility personnel) which continuously monitors and controls entry onto the facility;	0

or

Barrier	Assigned Value
An artificial or natural barrier (e.g., a fence combined with a cliff), which completely surrounds the facility; and a means to control entry, at all times, through the gates or other entrances to the facility (e.g., an attendant, television monitors, locked entrances, or controlled roadway access to the facility).	0
Security guard, but no barrier	1
A barrier, (any kind of fence) but no separate means to control entry	2
Barriers do not completely surround the facility	3
No barrier or security system	(5)

Accessibility Value (Maximum Value of 5). 5

F. Site Dynamics - This deals with site conditions that are subject to change in the future, but may be stable at the present. Examples would be excessive soil errosion by beaches or streams, increasing land development that could reduce distances from the site to inhabitated areas or otherwise increase accessability.

	VALUE
None Anticipated	0
Expected	(5)

(Maximum Value of 5) 5

Total value for hazard probability. Sum of Values A through G. (Not to exceed 35). Apply this value to Hazard Probability Table 2 to determine Hazard Level. 30

MISSION TRAILS ORDNANCE REMOVAL

for

FORMER CAMP ELLIOT

at

SAN DIEGO, CA

- **ED PROJECT REVIEW AND COMMENT INSTRUCTIONS**

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SCOPE OF WORK UNEXPLODED ORDNANCE SUPPORT FORMER CAMP ELLIOT (MISSION TRAILS PARK) SAN DIEGO CA

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2.0 OBJECTIVE

3.0 DESCRIPTION OF SERVICES

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SCOPE OF WORK
SURVEYING (FORMER CAMP ELLIOTT)
MISSION TRAILS PARK
SAN DIEGO CA

1.0 BACKGROUND AND GENERAL STATEMENT OF WORK

1.1 The work required under this Scope of Work (SOW) falls under the Defense Environmental Restoration Program (DERP). Unexploded explosive ordnance exists on property that was formerly owned by Department of Defense (DOD). This SOW requires surveying to be accomplished on the property listed below.

1.2 Definitions:

1.2.1 Unexploded explosive ordnance (UXO) is an item of explosive ordnance (bombs, artillery and mortar shells, rocket ammunition, small-arms ammunition, landmines, grenades, and other munitions) which has failed to function as designed or has been abandoned or discarded and is still capable of functioning causing injury to personnel or damage to material.

1.2.2 UXO Specialist: A graduate of the US Naval Explosive Ordnance Disposal (EOD) School, Indian Head MD

1.2.3 The job site foreman for this project will be a representative from the US Army Engineer Division, Huntsville.

1.3 Description of project area: Mission Trails Park is part of the former Camp Elliott, which was used during WWII for weapons training.

2.0 OBJECTIVES

2.1 Safely survey twenty-five 1 acre plots, starting on or about September 8, 1990 and completing prior to 20 September 1990.

2.2 Provide a labor crew to provide support to the job site foreman between the estimated dates of 8-20 September 1990.

3.0 DESCRIPTION OF SERVICES

3.1 (TASK ONE) SURVEY AND MAP ONE-ACRE PLOTS

3.1.1 The contractor shall furnish one surveying crew to survey and map twenty-five 1 acre plots. The plots shall be 435 by 100 feet.

3.1.2 The surveying crew will be accompanied by a government furnished UXO Specialist and magnetometer to sweep all locations where stakes will be driven into the ground and instruments will be placed to assure no subsurface UXO will be disturbed.

3.1.3 The boundary of each 1 acre plot shall be marked with contractor furnished non-biodegradable, white, 6-inch marking tape, secured with contractor furnished stakes.

SOW Survey

3.1.3.1 The government will furnish a map showing the location of the twenty-five plots.

3.1.4 The surveying crew shall provide all the necessary equipment to accomplish the surveying task.

3.1.5 The surveying crew shall provide a 4-wheel drive vehicle capable of transporting the surveying crew and labor crew, personal and surveying equipment to the survey sites.

3.1.6 The surveying crew shall be at least 3 plots ahead of the government sweeping teams.

3.2 (TASK TWO) PROVIDE LABOR CREW

3.2.1 The contractor shall provide a 4-person labor crew to support the job site foreman. The contractor shall provide an all-terrain vehicle for the work crew's use during the accomplishment of the following job tasks:

3.2.1.1 Immediately after the first 1 acre plot has been plotted, members of the work crew shall measure and mark 3-foot lanes, within the 1 acre plots, with government-furnished biodegradable marking tape and contractor furnished wooden stakes.

3.2.1.1.1 Upon completion of the magnetometer sweep of each 1 acre, plot, members of the work crew shall collect the contractor wooden stakes, leaving the biodegradable marking tape and the boundary markings in place.

3.2.1.2 Members of the work crew shall perform hand excavation, under the direction of an UXO Specialist, to locate buried UXO.

3.2.1.3 Members of the work crew shall collect pieces of non-UXO related debris in the plots, as directed by the job site foreman.

3.2.1.4 Members of the work crew shall provide other labor support to the job site foreman, as directed.

3.2.2 The following prerequisites are established for the labor crew:

3.2.2.1 English speaking.

3.2.2.2 Licensed to operate 4-wheel drive and all-terrain vehicles.

3.2.2.3 Physically able to perform intensive manual labor.

3.2.2.4 Familiar with the Mission Trails, Tierrasanta, and San Diego area.

4.0 PUBLIC AFFAIRS

4.1 The contractor shall not make available or publicly disclose any data generated or reviewed under this contractor unless specifically authorized by the contracting officer (CO). When approached by any person or entity requesting information about the subject of this contract, the contractor shall refer to the CO for response. Reports and data generated under this contract shall become the property of the government and distribution to any other source by the contractor is prohibited unless authorized by the CO.

DRAFT

SCOPE OF WORK
UNEXPLODED ORDNANCE SUPPORT
FORMER ~~CAMP ELLIOTT (MISSION~~ TRAILS PARK)
SAN DIEGO CA

1.0 BACKGROUND AND GENERAL STATEMENT OF WORK

1.1 The work required under this Scope of Work (SOW) falls under the Defense Environmental Restoration Program (DERP). Unexploded explosive ordnance (UXO) exists on property that was formerly owned by the Department of Defense (DOD). This SOW requires UXO Specialist Support to conduct an UXO sampling of the Mission Trails Park.

1.2 The job site foreman for this project will be a representative from the US Army Engineer Division, Huntsville.

1.3 Description of project area: Mission Trails Park is a part of the former Camp Elliott, which was used during WWII for weapons training. UXO have been recovered from this area.

2.0 OBJECTIVE

2.1 Safely conduct a surface/subsurface sweep of twenty-five 1 acre plots for UXO, between the approximate period 7-21 Sep 90, to provide sampling data for future removal action.

3.0 DESCRIPTION OF SERVICES

3.1 (TASK ONE) PROVIDE UXO TEAM AND EQUIPMENT

3.1.1 The contractor shall provide an UXO Team which shall consist of an UXO Supervisor, 2 UXO Specialists and a team recorder.

3.1.2 The UXO Team shall provide two magnetometers to be used in the location of subsurface UXO.

3.1.3 The UXO Team shall provide an UXO Specialist(s) and magnetometer(s) to support a government-furnished survey team and labor crew who will survey and plot the twenty-five 1 acre plots.

3.1.4 The UXO Team shall provide support to the job site foreman in searching the 1 acre plots for UXO. This shall entail the location, excavation, and identification of UXO.

3.1.5 The UXO Team Recorder, a non-UXO Specialist, shall maintain a daily journal of operations which shall include the identification of each 1 acre plot, the time taken by the surveying crew to survey each plot, a map overlay showing each 3-foot lane, the identification/location/depth of each UXO and/or non-UXO item located, the time required to clear each 1 acre plot noting the vegetation and terrain, daily temperature ranges and climatic conditions, other pertinent data determined by the job site foreman, and any problems encountered. The UXO Team recorder shall also take photographs of UXO encountered and they shall become enclosures to the journal.

SOW UXO

3.1.6 The following prerequisities are established for the UXO Team:

3.1.6.1 The UXO Supervisor and UXO Specialists shall be graduates of the US Naval Explosive Ordnance Disposal (EOD) School, Indian Head MD.

3.1.6.2 The UXO Supervisor shall have served at least 10 years in active duty military EOD assignments, of which 5 years shall have been in supervisory positions and have supervised UXO land clearance operation teams.

3.1.6.3 The UXO Specialists shall have served at least 3 years in active duty military EOD assignments and participated in UXO land clearance operations.

3.1.6.4 Members of the UXO Team are not required to be certified UP of 29CFR 1910.120e(i) for this project.

3.1.6.5 One member of the UXO Team shall be certified by the Red Cross to administer first aid.

3.2 (TASK TWO) SUBMIT DAILY JOURNAL OF OPERATIONS

3.2.1 The contractor shall submit 4 copies of the daily journal of operations to US Army Engineer Division, Huntsville, ATTN: R.Nore, PO Box 1600, Huntsville AL 35807-4301.

3.2.1.1 The daily journal of operations report, with photographs, shall arrive at the aforementioned office, NLT 14 calendar days upon completion of the onsite work.

4.0 PUBLIC AFFAIRS

4.1 The contractor shall not make available or publicly disclose any data generated or reviewed under this contractor unless specifically authorized by the Contracting Officer (CO). When approached by any person or entity requesting information about the subject of this contract, the contractor shall refer to the CO for response. Reports and data generated under this contract shall become the property of the government and distribution to any other source by the contractor is prohibited unless authorized by the CO.

5.0 SPECIAL INSTRUCTIONS

5.1 The UXO Team shall not be performing render-safe or disposal procedures of any encountered UXO. EOD Support will be furnished by local military EOD.

6.0 GOVERNMENT-FURNISHED PERSONNEL AND EQUIPMENT

6.1 Job site foreman

6.2 Contractor survey crew and labor crew

6.3 Hand held radios and cellular telephone

6.4 4-wheel drive vehicles

6.5 Stakes and biodegradable marking tape

6.6 2 non-sparking shovels and knives

6.7 Containers for storage of liquids

6.8 100m rope

6.9 Buckets for collection of scrap

6.10 1 ea Mk26 Ordnance Locator

6.11 Binoculars, compass, tape measure, caution tape

6.12 Marking flags

2.3 Fort Ord Multi-Range Area (MRA)

DRAFT

HUMAN FACTORS APPLICATIONS, INC.
EXPLOSIVE ORDNANCE DISPOSAL DIVISION

ORDNANCE AND EXPLOSIVE WASTE (OEW)
SITE OPERATIONS

FORT ORD
WORK PLAN
and
ACCIDENT AND PREVENTION PLAN

CONTRACT NUMBER: DACA87-92-D-0133
DELIVERY ORDER # 0015
CLIENT NAME: U.S. Army Corps of Engineers
PRIME CONTRACTOR: Human Factors Applications, Inc.
PROJECT TITLE OEW Sampling Early Release Parcels
PROJECT LOCATION Fort Ord, California

DATE PREPARED:_____ **PREPARED BY:**_____

Richard Theil

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ACTION PLAN

Environmental Restoration Acceleration
Fort, Ord

Prepared by:

Directorate of Engineering and Housing and
Directorate of Base Realignment and Closure, Fort Ord;

Sacremento District
U.S. Army Corps of Engineers;

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1.0 INTRODUCTION

1.1 Acceleration Action Plan Purpose

This Acceleration Action Plan for Installation Characterization and Remediation for Fort Ord, California was prepared to set forth a strategy for cleaning up soil and Groundwater contamination quickly and adequately to meet objectives of the National Contingency Plan, CERCLA regulations, and Base Realignment and Closure (BRAC). Fort Ord is on the National Priorities List of contaminated sites (Superfund) that requires the installation to be characterized and remediated to a condition that does not pose unacceptable risks to public health or the environment. The installation is also a BRAC facility designated by the Department of Defense (DOD) as a property to be deactivated and made available for other governmental agency usage as well as for sale to private entities.

The purpose of this Acceleration Action Plan also is to identify a strategy to facilitate cleanup and re-use consistent with the objectives of the above laws and regulations. This strategy is designed to meet the needs of the regulatory agencies overseeing the characterization and remediation activities as well as meeting the local community socioeconomic need to turnover property for reuse as quickly as possible. The strategy presented in this Plan is not inconsistent with the acceleration measures suggested by the U.S. Environmental Protection Agency's (USEPA) draft Superfund Acceleration Cleanup Model.

This strategy must result in meeting the following objectives:

1. Characterization and remediation of contaminated sites identified within the installation to levels that meet local, state and federal regulations and are protective of human health and the environment.

2. Allocate and expend resources to cleanup those sites that pose the greatest risk to human health and the environment while concurrently expending resources on sites that can 1) be cleaned up quickly in keeping with reuse goals and objectives and 2) be verified as clean and turned over to government agencies or sold to private entities for use and further development.

1.2 Acceleration Action Plan Contents

Section 2 of this plan provides an overview of the characterization/remediation history, site conditions and the types of soil and Groundwater contamination, and a discussion of CERCLA and BRAC objectives including methods to blend objectives together to achieve acceptable results. Section 3 discusses the CERFA process for conducting clean parcel assessments. A flow chart for conducting the CERFA assessments is also presented and discussed in Section 3. Section 4 presents a discussion of current measures that are being used to accelerate the cleanup process and future characterization and remediation activities. Section 4 also describes the current participation by local, state, and federal regulatory agencies involved with the installation and the installation's strategy for assessing and determining which parcels may be considered clean and may be excessed. Section 5 presents a scheduling and funding discussion. Section 6 addresses the dynamics of the plan.

2.0 ACCELERATION ACTION PLAN STRATEGY

2.1 Characterization/Remediation History

Since the first site characterization conducted in 1985 at the Fritzsche Army Airfield Burn Pit, the Fort Ord-Environmental Office has been proactive in the investigation of potential contaminated sites. Prior to completion of the Federal Facilities Agreement (FFA), signed in November 1990, Fort Ord had conducted 16 site characterizations and identified 2 operable units (OUs), which are currently in the

advanced stages of the Remedial Investigation/Feasibility Study (RI/FS) process. Additionally, one interim remedial measure (IRM) has been conducted to protect drinking water supplies from chemicals leaching from the former landfill facility. Groundwater contamination from this landfill was the driving force behind the listing of Fort Ord on the National Priorities List. The FFA structured the RI/FS program for Fort Ord following standard guidelines for a phased approach. This phased approach, shown on Figure 1, resulted in significant site characterization prior to evaluation of potential contaminant transport mechanisms, and also lumped all potential contaminated sites into the full RI/FS process.

In early 1991, when Fort Ord was identified as a potential installation for BRAC listing, the Fort Ord Environmental staff, Sacramento District, U.S. Army Corps of Engineers (USAGE), and the A-E (Harding Lawson Associates), referred to as the Fort Ord Team, developed an alternative approach to the standard RI/FS, and submitted a revised work plan to the regulatory agencies proposing this alternative approach. The alternative approach, termed a Risk-Based Approach (described in Section 4.1), was presented to the parties to the FFA in the Summer 1991. It was approved in the Fall of 1991, and is currently being implemented. Existing remediation activities, such as the pilot soil vapor extraction system and the OU-I soil bioremediation program, have also been incorporated into this plan for basewide application.

A brief discussion of soil and Groundwater conditions at Fort Ord is necessary to help understand means of accelerating remediation activities.

Although Fort Ord covers approximately 44 square miles, the few soil types present generally consist of sand deposits. As a result, the soil is generally porous and amenable to remediation technologies which favor good soil permeability. For example, in situ soil vapor extraction has been tested in a pilot program at a hydrocarbon gasoline contamination site. Using shallow excavation techniques and deep soil vapor extraction, over 95 percent of the released gasoline was recovered from the soil and safely disposed, and no Groundwater contamination occurred. Because of the relative homogeneity of sandy soils at Fort Ord, this and other techniques will be applicable for remediation of other sites.

However, because of the sandy nature of the soils, mobile contaminants migrate fairly quickly into the upper Groundwater system. In many places at Fort Ord, vertical barriers between aquifers are limited and Groundwater contamination can occur at great depths. The average depth to water for much of Fort Ord is in excess of 150 feet and in many places the first major clay barrier between aquifers does not occur until 600 to 700 feet below ground level. The Groundwater systems are complex and difficult to characterize and once contamination occurs, may be difficult to remediate. Additionally, extensive salt water intrusion occurs along the coast resulting in further difficulty for characterization and cleanup of potential Groundwater contamination.

Preliminary evaluation of installation activities that could pose potential environmental problems has identified 39 sites and 2 operable units for investigation under CERCLA and an additional 6 sites requiring evaluation under the RCRACERCLA integration requirements. These sites can be segregated into three groups on the basis of the types of contaminants which may be present 1) petroleum hydrocarbons, 2) solvents, metals, or pesticides, or 3) combinations of these components. The majority of the sites appear at this time to be soil contamination problems, principally the petroleum hydrocarbon type. The remainder of the site contains soils with either solvents or metals or combinations of petroleum hydrocarbons with solvents and metals. Groundwater contamination is generally from solvents or petroleum hydrocarbons. A listing of potentially contaminated sites is included as Appendix A.

3.0 CERFA CLEAN PARCEL ASSESSMENT

Public Law 102-426, the Community Environmental Response Facilitation Act, addresses aspects of clean parcel assessment and was signed into law on October 19, 1992. This legislation requires the Federal Government to identify by April 1994, real property where no hazardous substance, including petroleum products or their derivatives, was stored for one year or more, released, or disposed. In addition, the legislation clarifies the definition of remedial action taken under CERCLA, and requires that remedial action be expedited to mitigate adverse economic effects on the community while facilitating environmental protection. The United States Government remains responsible for conducting any remedial action or corrective action necessary to protect human health and the environment. The identification of uncontaminated property that is part of a facility on the National Priorities List is not completed until concurrence from the USEPA is obtained. Concurrence from appropriate State officials is required for facilities that are not so listed. Appendix B identifies parcels that are anticipated for CERFA clean parcel assessment.

The following paragraphs discuss the major aspects of CERFA and how it applies to clean Parcel assessment at Fort Ord.

Figure 2 is a flow chart depicting the steps for identifying and excessing clean parcels and facilities at Fort Ord. The flow diagram also identifies the general steps for excessing parcels on which hazardous materials have been stored, released, or disposed. The CERFA process can be reviewed in four basis steps, including:

1. Identify candidate clean parcels;
2. Conduct clean parcel assessment activities;
3. Document assessment results;
4. Prepare disclosure/statement-of-condition and FOST documentation.

Candidate clean parcels are identified through a thorough review of existing information about the historical use of a parcel. Site investigation reports, current site use, and Department of the Army records (e.g., USATHAMA Enhanced Preliminary Assessments) are reviewed to identify parcels where there is evidence that hazardous materials were stored one year or more, released, or disposed. The purpose of this step is to identify and remove from the clean parcel assessment process those parcels on which hazardous substances were obviously stored, released, or disposed.

The second step is to conduct the CEREA clean parcel assessment activities. These activities include search of federal records and state or local title documents, aerial photograph evaluations, visual inspection of the parcel/facility in question, an evaluation of the nature and history of adjacent properties (both on-post and off-post), and interviews with knowledgeable individuals associated with a parcel. The focus of these assessments is to identify whether past activities occurred at a parcel that could have resulted in storage, release, or disposal on the parcel. The enhance timely identification of clean parcels and maximize the potential for rapid parcel transfer, parcels may further subdivided to remove non-clean portions.

Documenting the results of the CERFA assessment is a significant step in making property available Lfor transfer. The documentation will be developed by considering appropriate state and 10cal requirements for property transfer. The purpose of this step is two-fold. Firstly, to comply with the specific CERFA requirements and to protect the Federal Government from inappropriate claims regarding future discoveries of hazardous substances on a parcel. Secondly, to provide to those who may acquire the parcel an adequate amount of information about the history of the parcel to minimize

difficulties in the legal transfer to title.

The last step in the process is to comply with other property transfer requirements that are technically outside the CERFA process, but which are a necessary step in the actual transfer. Disclosure and statement-of-condition information will be compiled and made available. This will include documenting any evidence of the presence of potential contaminants, including asbtsto, lead-based paint, or unexploded ordnance The POST documentation, as discussed in Section 4.2.5, will also be prepared. Following the Preparation of the FOST documentation, the parcel will be available for transfer.

Figure 3 presents a proposed schedule for conducting CERFA activities at Fort Ord. The initial phase of activities contains a work plan to describe the specific steps for implementing CERFA at Fort Ord. It is anticipated that the work plan will be completed in May 1993 ~o110`ving review and approval of the work plan by the COE, Department of the Army, and appropriate regulatory agencies, the assessment activities will commence. The assessment activities will continue through Summer and Fall 1993. During this time period, CERFA documentation will be in preparation. The results of the final clean parcel assessments will be documented in early 1994. Fort Ord expects to receive concurrence by the USEPA in early 1994 and to complete all necessary activities on schedule by Apri1 19, 1994.

4.0 NPL ACCELERATION MEASURES

Acceleration measures at the NPL sites consist of those currently being implemented and those to be employed in the near future. These measures are discussed in detail below. Table I presents a matrix showing the various acceleration measures being used or proposed for the Fort Ord program and their applicability to the sites being investigated.

4.1 Current Acceleration Measures

4.1.1 Risk Based and Rolling Approach

The classical RI/FS approach is a stepped approach in which the RI first evaluates the Potential source areas and then, using data generated in the source area investigations, looks at potential receptors and the associated contaminant migration pathways. A review of remedial alternatives is presented in the FS following completion of the RI report. This approach tends to result in a lengthy process with work at some locations retarded by more complex and time-consuming work at other sites. Ultimately operable units are developed to minimize the potential time conflicts between sites with different investigation requirements, but this step can take several years and phases of work.

To reduce This lengthy process, the approach developed for Fort Ord simultaneously evaluates both migration pathways for potential receptors and the potential source areas. This approach has been termed a risk-based approach since it emphasizes an initial understanding of potential receptors of contaminated soil or water and their associated risks rather than just studying sites. Site investigations are then prioritized on the basis of the types of possible contaminants and potential impact to receptors. Additionally, each potential source area is evaluated independently, based on the prioritization and as funding allows, using an approach termed the Rolling RI.

The Rolling RI approach for each site establishes the potential source area as site characterization activities progress independently for other sites. Since basewide studies to understand the overall hydrogeology, soils, and background chemistry are proceeding concurrent, but independently, the source area characterization schedules do not need to be tied to other activities. Therefore, as a phase of work is completed for a site, the appropriate report can be generated and the site can proceed into the next phase of work, independent of the progress of other site characterization activities. This

approach allows clean sites to be more quickly identified and lesser contaminated sites to be cleaned up quickly while other more contaminated sites undergo additional Rolling RI activities.

One benefit of this approach is that some sites mill not need to complete the classic RI/FS approach and are deleted or cleaned prior to reaching the FS stage. Sites that require an FS still be handled similarly to the Rolling RI; unless grouped with other sites into an operable unit, independent FS schedules mill be used to accelerate site cleanups.

4.1.2 Other Current Acceleration Actions

In addition to this alternative approach, several other actions are being used to accelerate site investigations:

- Next phase work plans are included as appendices to the individual RI site reports, eliminating the need for extra documents and the associated regulatory review.
- Regulatory review is accelerated by conducting summary presentations of site investigation results to resolve potential controversial issues.
- Accelerated document review with the USACE Automated Review Management System (ARMS) is used to store and transmit comments, ultimately decreasing review times by accelerating comment transmittal. The regulatory agencies will use this system to provide timely comments to the Army and the A-E. Additionally, standardized report formats will be used to make the review process as routine as possible.
- Innovative investigation techniques are also used to accelerate the investigation process. Several techniques that have proved successful are the use of surface geophysics to delineate landfill or subsurface hydraulic barriers and the use of specialized drilling methods (e.g., Hydropunch) to minimize the number of time-consuming and expensive deep wells. Pilot soil borings that can be quickly drilled and then geophysically logged and converted to piezometers are regularly used to provide hydrogeologic data.
- Because of the large number of sites with similar types of potential contaminants, guidelines were established for investigating similar potential sources. These guidelines provide consistency from site to site and simplify the review process. The guidelines are negotiated with and approved by the regulatory agencies prior to work plan development.
- Site Elimination Actions (SEA) are conducted as part of the investigation approach. For sites with little or no contamination, SEAs are conducted as part of the investigation to show that the site does not present a risk to human health or the environment. An example of a SEA is utilization of a technique referred to as investigation by excavation. If a limited area of contamination is suspected, the bounds of the contamination are determined by excavation. Excavation ceases when soil contaminant levels reach a predetermined target level, which has been calculated prior to excavation, using risk assessment procedures, as being protective of human health and the environment. Excavation to the calculated target levels allows the site to be cleaned up during the investigation phase, followed-up by a report to verify site completion. For sites where data suggest that contamination is not a problem, the site data are evaluated using a Screening Risk Assessment (SRE). The SRE is used to show that residual levels or non-detect levels are protective of human health. This assessment only evaluates conservative exposure sceneries and is therefore quickly produced, is cost-effective, and amenable to short review time. This process helps identify clean parcels that were originally included as sites to be investigated.

4.2 Future Acceleration Measures

This section describes the measures that the Fort Ord Team believes are critical to further accelerate

characterization and remediation activities at the installation. These are techniques that have yet to be employed at the installation and will require continued cooperation and approval of the regulatory agencies prior to implementation.

4.2.1 Remedial Technologies Screening

There are numerous technoloSiu that are potentially applicable to the various types of soil and Groundwater contamination thought to be present at the installation. Also, there are numerous technologies that will not be applicable or cost-effective at the installation because of the type, nature, and extent of contamination and the soil, geologic, and hydrologic conditions specific to sites within the installation. Furthermore, the concept of the Rolling RI (Section 4.1) is such that an FS will be prepared for each site as its Rl is completed and approved by the regulatory agencies. The site-specific RI will be followed by a site-specific FS rather than the more traditional approach where the FS that addresses all sites is presented in one document that is not prepared until all of the RI information has been collected.

Taking the above factors into consideration, a Remedial Technologies Screening (RTS) will be conducted with the goals to be 1) identify those remedial technologies that might be suitable for the various types of contaminants present in soil and groundwater considering site-specific conditions and 2) eliminate those technologies that are not suitable. The RTS is intended to eliminate most of the unsuitable technologies early and enables the site-specific FS to focus only on those technologies that are potentially suitable for that site and its specific contamination problems and site conditions.

The screening of the technologies in the RTS will be performed in accordance with applicable sections of the Army's guidance document AR200-2 and the USEPA's feasibility study guidance. A draft RTS will be provided to the regulatory agencies for review and comment and the document will also h provided to the public for review and comment. The comments will be incorporated into a final RTS.

The final RTS will be used as a primary guidance document when preparing the Site-specific FS. Only those technologies identified in the final RTS for that type of contamination problem will be considered for screening and subsequent combination into remedial action alternatives for evaluation in the site-specific FS. This will significantly reduce the amount of time required to prepare, review, and approve the site-specific FS.

Another method to accelerate the characterization/remediation process is to prepare standard remedial design packages for similar soil and/or groundwater remedies. Because of the relatively uniform sandy soil conditions and the similarity of many of the contamination problems (hydrocarbons), standard remedial design packages can be applied to many of the sites.

The approach will be to develop a standard design package for each of several remedial alternatives for the soil and groundwater. For example, a standard remedial design package witl be prepared for bioremediation of hydrocarbon contaminated soils at the Fritzsche Army Airfield Soil Treatment Facility when soil excavation and offsite biological treatment is the selected remediation for a site. If the selected remediation is situ soil venting to remove the hydrocarbons, then the standard design package for that remedial alternative would be used for that site. It is planned that the standard remedial design package to be used at a site will include a site-specific addendum containing changes or specific conditions that adapts the general design package to the site's unique conditions.

Each standard remedial design package will be submitted for regulatory agency review and approval. Review and comment by the public is not necessary at this point because that will occur during review of the Enhanced Feasibility Study described in Section 4.2.3 below.

Each standard remedial design package, when amended to tailor it to the specific conditions for that site, will provide sufficient detail to serve as a bid package to preselected remedial contractors (see Section 4.2.4). Most of these design packages will be kept fairly simple, and will be easy to follow and implement.

The goal of developing the standard remedial design packages and having them preapproved by the regulatory agencies is to reduce the time required between selection of a remedy at the Enhanced FS/Proposed Plan stage (discussed below) and the design and approval of the remedy; this also simplifies the design approval process. Achieving these goals will result in acceleration of the schedule for this portion of the process and will enable Medial construction to begin sooner.

4.2.3 Enhanced Feasibility Study

As previously discussed, each site, where applicable will have its own FS. A continuation of the Rolling FS approach is to enhance the FS, which evaluates the suitable remedial alternatives based on technologies from the Remedial Technologies Screening, to include the Proposed Plan (the selected remedial alternative for the site) and the previously described standard remedial design package (with site-specific addendum) This enhanced FS will be submitted to the regulatory agencies for review and comment and, after incorporation of the comments, quick approval from the regulatory agencies.

The goal of the enhanced FS is to make the regulatory agency and public review and comment period shorter ID that the evaluation (FS), selection (Proposed Plan), and design (Standard Remedial Design Package) can be reviewed at once rather than sequentially. This will greatly reduce the time required for approval of a site's remediation and accelerates this portion of the process.

Further acceleration measures will be achieved utilizing the enhanced FS, because once it is approved by the regulatory agencies, the standard design package will be sent to preselected contractor for bidding while the Record of Decision (ROD) for the site is being prepared and approved. By the time the ROD for the site is approved, the contractor bids will have been evaluated and the contractor selected so that remedial construction will begin promptly, which will accelerate the process.

4.2.4 Preselected Remedial Contractors

Again, because of the similarity of site conditions and contamination problems, only a limited number of different remediations are likely to be needed to cleanup the various installation sites. Preselecting licensed contractors with the capabilities to bid and construct there remedies will significantly reduce the time required to authorize a contractor to begin work in the field.

There are three options for managing preselection of the remediation contractors. These include Fort Ord, the Sacramento District USACE, or the A-E. These options assume that the party managing the preselection will also contract with the preselected contractors, conduct the bidding for each site, select the contractor, and manage the remediation.

It is envisioned that the companies suitable for prese}ection as remediation contractors could include large national multicapability companies, teams of smaller companies with complementary capabilities, and small local companies with specialities or specific capabilities.

4.2.5 EBST/FOST Approach

Under current guidance from the California Base Closure Committee (CBCC), composed of representatives from the LISEPA, California EPA, and the DOD, clean parcels would require a pre-disposal evaluation. The purpose of this evaluation, termed an Environmental Baseline Survey for

Transfer (EBST), is to assess the possible presence, or absence, of environmental contamination within a proposed "clean" area of the installation. The process includes public and regulatory agency participation.

An EBST must be prepared for each property transfer. The EBST is based primarily on existing environmental data with additional data being gathered if needed. Regulatory agencies will be notified at the initiation and completion of the EBST and will be consulted throughout its preparation. The EBST includes:

- identification of the parcel being proposed for transfer;
- a description of current and past activities on the parcel;
- a description of hazardous substance/waste management practices at the parcel based on review of information and records available to DOD and regulatory agencies;
- a report of visual inspections of the parcel noting the location of sewer lines, runoff patterns, evidence of environmental impacts, or other observations that might indicate a release of hazardous materials; and
- identification of sources of contamination on the installation which could migrate to the parcel.

Upon Completion of the EBST,and a prerequisite to disposal of property, a Finding of Suitability of Transfer (FOST) must be completed. The FOST must include a finding by a Senior Environmental Army official of either:

- the requirements under Section 120(h)(3) of CERCLA as amended by the Superfund Amendments and Reauthorization Act of 1986, have been met for this parcel because the EBST has concluded that no known reportable quantity releases has occurred, or
- no hazardous substances known have been released or disposed of on the parcel were Stored for 1 year or more.

The FOST is a DOD document and dpes not include nor require signature by or the concurrence of regulatory agencies. Input by the agencies to this process is provided at the EBST level.

5.0 SCHEDULE AND FUNDING

5.1 Current Schedule

Highlights from the current negotiated FFA schedule for Fort Ord are shown on the schedule comparison table in Section 5.2 below and graphically on Figure 1.

The baseline (FFA) basewide RI/FS schedule incorporates all currently known information about potential contaminated sites at Fort Ord based OR a literature search of relevant documents and interviews with identified pertinent individuals. New sites may be added if further information and investigation warrants inclusion in the RI/FS process.

5.2 Schedule Acceleration

An accelerated schedule, Revision 1, was developed by the installation in May 1991 to address BRAC concerns. This acceleration was achieved through 1) reducing contracting periods resulting from competitively soliciting each phase of the work effort, and procuring only one firm to carry out all necessary actions up to construction contract award, and 2) by eliminating a formal submittal of an installation-wide planning document midway through all field work, and replacing it with individual submittals tailored to each site or identified OU (the Rolling RI approach). With the cooperation of the Fort Ord Team, approximately 12 months were eliminated from the baseline schedule. Through the

approval process for the basewide RI/FS work plan, the FFA signatories have agreed to the Revision I schedule and the Army is committed to achieving it. The Revision I schedule coincides with the congressionally mandated schedule to complete the RI/FS document in three years (PL102-190). Highlights of the accelerated Revision I schedule are also shown on the schedule comparison table.

The accelerated Revision I schedule has not been formally negotiated with the FFA parties. Th>e November 1990 FFA schedule is still binding.

Further acceleration will be realized if the acceleration measures within this plan are implemented. This Revision II accelerated schedule is shown on the comparison table and graphically on Figure 1.

SCHEDULE COMPARISON					
Draft Final RI/FS	Final RI/FS	Final Proposed Plan	Final ROD	Start Remedial Action	Complete Remedial Action
1. 15 Nov 95	15 Dec 95	15 Jun 96	1 Mar 97	15 Feb 00	15 Sep 03
2. 15 Nov 94	15 Dec 94	15 Jun 95	1 Mar 96	15 Feb 99	15 Sep 02
3. 15 Sep 94	15 Oct 94	15 Oct 94	1 Mar 95	1 Jul 95	30 Aug 98
1. November 1990 FFA schedule 2. May 1991 Revision I schedule (PL-102-190) 3. Revision II schedule					

With the acceleration measures presented in this acceleration plan, Fort Ord believes the schedule can be reduced 30 percent to 40 percent over the original FFA baseline schedule pending availability of funds. This acceleration will allow currently contaminated property at Fort Ord to be available for possible real estate transactions in the 1998 timeframe - a schedule reduction of at least four years.

5.3 Schedule Assumptions

Achieving and maintaining the Revision II schedule assumes that extensions for further review of documents be kept to a minimum by all parties. Additional study areas identified or currently identified areas requiring further investigation because of unforeseen circumstances may also severely affect the accelerated schedule.

5.4 Funding

The Revision II schedule requires that funding be made available on schedule and in the requested amounts. A depiction of currently funded and yet-to-be funded activities for acceleration of the Fort Ord environmental remediation project is shown on Figure 4. The figure assumes that current and future acceleration measures previously described are implemented and that all requested funding is provided on time and in the full amounts. Slippage of funding dollars and timing of receipt will result in at least a one-for-one slippage of activity scheduling. Activities such as contracting procedures, contractor re-mobilization and property clearance procedures may result in a day-for-day impact.

6.0 DYNAMICS OF THE PLAN

This plan is in no way a static and in-place pathway to environmental restoration at Fort Ord. It is meant to be a vehicle and stepping stone to develop and sustain dynamic approaches to all facets of the environment restoration program. Keying on Deputy Assistant Secretary of Defense Thomas E. Baca's November 14, 1991 challenge to the installation and the regulatory community, Fort Ord will strive to be "not a model installation, but an installation that makes models" in environmental

restoration. Fort Ord will continue to develop new approaches and adopt or adapt those successful approaches used by other BRAC installations.

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Management Plans/Work Plans

for

FORT ORD

at

Fort Ord, CA

NOTE: Each of the following hot links goes to a separate home page which contains hot links to separately scanned pages approximately 100 KB in size. The images are in a TIFF image format with a packbits compression.

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1. GRID LOCATION & SITE BOUNDARY SURVEY PLAN, Contract # DACA87-92-0133, Nov, 1993
2. WORK PLAN and ACCIDENT PREVENTION PLAN, Contract # DACA87-92-D-0133
3. ACTION PLAN, March 12, 1993


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WORK PLAN
FORT ORD

1.0 INTRODUCTION

1.1 Human Factors Applications, Inc. (HFA)is under contract to the U. S. Army Corps of Engineers, Huntsville Division (CEHND), Huntsville, Alabama, to provide unexploded ordnance (UXO) services for Fort Ord. This UXO Work Plan (WP) and Accident Prevention Plan (APP) [see Appendix A] describe the overall scope of the project, the general methodology to be used, and the specific UXO site requirements.

2.0 BACKGROUND

2.1 Fort Ord is located along the Pacific Ocean in northern Monterey County, California, approximately 100 miles south of San Francisco, shown on Figure 1. Fort Ord occupies approximately 28,000 acres adjacent to Monterey Bay (a national marine sanctuary) and the cites of Marina, Seaside, Sand City, Del Rey Oaks, and Monterey. The Southern Pacific Railroad and State Highway I (also known as State Route 1) cross the western seaion of Fort Ord, separating the beachfront from the majority of the installation. Fort Ord is bordered on the east by undeveloped land. More specific background on each site is located in Appendix B. Summary of Site Specific Evaluation conducted by St. Louis District, U.S. Army Corps of Engineers (USACE).

2.2 Fort Ord was established in 1917 when the government purchased 15,809 acres near what is now the East Garrison Area. It was used as a maneuver area and field target range for the 11th Cavalry and the 76th Field Artillery. No improvements were made until 1938 when permanent buildings were constructed. In August, 1940, Camp Ord was designated Fort Ord and the post was expanded to more than 20,000 acres. During World War II, the post was a staging area for many fighting divisions and units. Following World War II, the post was the home of the 4th Infantry Division which trained soldiers for the Korean conflict.. In 1957, Fort Ord was designated U.S. Army Training Center, Infantry. During the early 1960s, Fritzsche Army Airfield (FAAF) was completed. In 1974, the training center was deactivated and the 7th Infantry Division occupied the installation. Currently, there are three major developed areas within Fort Ord: the Main Garrison, the East Garrison, and FAAF.

2.3 Objective

The objective of this OEW sampling operation is to ascertain the presence or absence of UXO in the early release sites by February 4, 1994.

Figure 1 Fort Ord, Monterey County, California

3.0 SITE CONDITION

3.1 Geology/Physiography

The OEW sampling will be conduced through block sampling on 15 sites distributed throughout Fort Ord as shown in Figure 2.

3.2 Topography

3.2.1 Fort Ord is located within the California Coast Ranges Seaion of the Pacific Border physiographic province. The Coast Ranges are characterized by a linear system of nearly parallel ranges. They are generally geosynclinal in structure with subsequent folding and faulting in late

Pliocene.

3.2.2 From the west, Monterey Bay is bordered by outcrops of Pleistocene and recent coastal beach and dune deposits which are in turn bordered by Pleistocene stabilized dunes inland. The stabilized dunes cover roughly onehalf the area of Fort Ord. The Aromas Sandstone occasionally outcrops within the stabilized dunes area, as well as underlies the stabilized dunes. The Alluvial deposits occur on Toro Creek and sporadically throughout the area.

3.2.3 The Paso Robles Formation and the Aromas Sandstone have high potential erosion hazard. The Paso Robles and Aromas are even more susceptible to induced erosion under disturbed conditions.

3.2.4 The topography of Fort Ord is dome like; the center of the installation has the greatest elevation, while the boundaries are low-lying areas. The most notable topographical features are the coastal dunes and the steep slopes in the eastern portion of the installation, both of which have high erosion potential.

3.3 Weather

A Monterey weather summary is as follows:

	Monthly Max Temp.	Monthly Min Temp.	Total Precipitation (Inches)
January	69	34	2.20
February	69	41	6.30
March	70	44	3.99

Figure 2 Site Distribution

3.4 Ecology

3.4.1 The information provided for Fort Ord has been compiled from the U.S. Fish and Wildlife Service and the California Department of Fish and Game Natural Diversity Data Base.

3.4.2 Federally endangered and threatened species found on Fort Ord are the western snowy plover (Charadrius alexandrines nivosus), American peregrine falcon (Falco peregrinus anatum), southern sea otter (Enhydra lustris nereis), Smith's blue butterfly (Euphilotes enoptes smithi), and the sand gilia (Cilia tenuiflora ssp. arenaria). The California linderiella (Linderiella occidentalis), Monterey spineflower (Chorizanthe pungens var. pungens), and the robust spineflower (Chorizanthe robusta var. robusta) are listed as proposed species for endangered status. The Fort Ord military reservation also has known occurrences of 18 federally-listed candidate species.

3.4.3 In addition to the above mentioned species, the state also lists the prarie falcon (Falco mexicus), Hutchinson's larkspur (Delphinium hutchinsoniae), Monarch butterfly (Danaus plexippus), Santa Cruz m~croseris (Microseris decipiens), Salinas harvest mouse (Reithrodontomys megalotis distichhis), and tidewater goby (Eucyclobius newberryi) as sensitive species found in the Fort Ord area.

3.4.4 The federal and state government recognizes several sensitive communities on and near Fort Ord. They include: Central Maritime Chaparral, Valley Needlegrass Grassland, Monterey Pine Forest, Central Dune Scrub, and Northern Coastal Salt Marsh.

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U.S. Army Corps of Engineers, Huntsville Division
Contract DACA87-92-0133
Delivery Order Number 015

FORT ORD

GRID LOCATION AND SITE BOUNDARY SURVEY PLAN

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FORT ORD

GRID LOCATION AND SITE BOUNDARY SURVEY PLAN

1.0 OBJECTIVE

The objective of the Grid Location and Site Boundary Survey is to locate and mark the location of each grid and establish the boundaries of each site identified in the scope of work.

2.0 SURVEY PLAN

2.1 The survey will begin on or about 6 December 1993 to establish the location of sampling grids in each site. The survey will be conducted by two teams of HFA personnel using standard military grid map, series V895S, Edition 5 DMATC, Fort Ord and Vicinity, and the site grid coordinates provided in the OEW Archives Search Report, October 1993, as revised during the site visit. The team will be augmented with portable Global Positioning Systems (GPS) to provide an added degree of accuracy and efficiency. GPS, when properly applied, can provide accuracy in the neighborhood of + or - 5 meters.

2.2 Each team will consist of one UXO Supervisor and one UXO Specialist, equipped with a magnetometer, compass, GPS, wood and metal marking stakes, and the necessary maps to locate and plot the location of each grid as it is established. Teams may operate in different sites simultaneously in order to complete as many grids as possible before close of business on 17

December.

2.2.1 Using the grid coordinates (which represent the center of the site) and the site description provided in the Archives Search Report, the survey team will locate and mark the center of the site. The outer boundaries of the site wilt be located and marked using the grid coordinates developed by HFA. Center point markers will be painted with fluorescent RED paint, and boundary markers will be indicated by stakes painted with alternating bands of fluorescent RED and WHITE paint. Vinyl colored flagging tape may be affixed to the stakes or nearby vegetation to enhance the visibility of the marker and to aid in relocating the areas.

2.2.2 Survey grids will be randomly located and marked with a 'primary stake' driven into the ground at the southeast corner of each grid. This stake will be metal and painted with fluorescent ORANGE paint. From this base point, the remainder of each grid corner will be determined and marked with wood stakes, also painted with fluorescent ORANGE paint. The nominal dimensions of all grids will be 100' by 100', except in those areas where this size would not be adequate or would not achieve the desired results. In these situations, grids will be laid out which best meet the requirements of the site. These areas are expected to be sites in which the entire acreage is to be sur eyed or has an irregular shape.

2.2.3 Survey grids will be separated by at least 200' whenever possible. When the site does not allow this minimum spacing, or if the entire acreage is to be surveyed, grids will be established accordingly.

2.3 Site Specific Surveys

The following paragraphs list in detail each site to be surveyed and the numbers and general location of grids to be established. T he priority of sites to be surveyed is outlined in the Scope of Work under paragraph 3.3.1.1.

2.3.1 Site 1, Flame Thrower Range

(seven acres vicinity FR 069591)
Sample 1 acre- 4 100' x 100' grids. See Figure 2.

2.3.2 Site 2, Chemical Training Area

(25 acres vicinity FR 075575 to 078577: between intersection of Fifth and Eight Street and intersection of Imjin and Eighth, *adjacent to Abrams Park Housing Area and confinement facility)* Sample 5 acres - 20 100' x 100' grids. See Figure 3.

2.3.3 Site 4, CBR Training Area

(20 acres vicinity of FR 090552)
Sample 5 acres - 20 100' x 100' grids. See Figure 2.

2.3.4 Site 5, South of East Garrison

(30 acres vicinity of FR 133565)
Sample 7 acres - 28 100' x 100' grids. See Figure 5.

2.3.5 Site 6, Mine and Booby-Trap Area

(two acres vicinity FR 0685931)

Sample 2 acres - 8 100' x 100' grids. See Figure 2.

2.3.6 Site 7, Mine and Booby-Trap Area

(4 acres vicinity FR 092567)
Sample 4 acres - 16 100' x 100' grids. See Figure 1.

2.3.7 Site 8, Mine and Booby-Trap Area

(2 acres vicinity of FR 099567)
Sample 2 acres - 8 100' x 100' grids. See Figure 2.

2.3.8 Site 9, Mine and Booby-Trap Area

(2 acres vicinity of FR 108544)
Sample 2 acres - 8 100' x 100' grids. See Figure 1.

2.3.9 Site 11, Demolition Training Area

(15 acres vicinity of FR 131548, 134548)
Sample 5 acres - 20 100' x 100' grids. See Figure 5.

2.3.10 Site 13 A and B. Mortar Range

(255 acres vicinity grid square FR 092561, and FR 087585 to 095561)
Sample 5 acres at 13A - 20 100' x 100' grids, and 25 acres at 13B - 100 100' x 100' grids. See Figures 2 and 1, respectively.

2.3.11 Site 14 and 15, selected portions of Naval Gunfire Impact Area

(305 acres)
Sample 40 acres - 160 100' x 100' grids. See Figure 4.

2.3.12 Site 18, Location of 100 lb. Bomb

(15 acres vicinity of FR 090567)
Sample 5 acres - 20 100' x 100' grids. See Figure 1.

2.3.13 Site 19, Rifle Grenade Range Area

(20 acres vicinity of FR 127548, southern slope of firing points at the top of the hill) Sample 5 acres - 20 100' x 100' grids. See Figure 5.

2.3.14 Site 20, Recoilless Ride Area

(7 acres vicinity of FR 059561, north of Gigling Rd *adjacent to Stilwell Barracks Family Housing Area, Commissary, Main Gate, and State Hwy)* Survey 3 acres - 12 100' x 100' grids. See Figure 2.

2.3.15 Trainfire Ranges 1 through 17

(915 acres along Monterey Bay)
Sample 15 acres - 60 100' x 100' grids. See Figure 3.

FIGURE 1: SITES 7, 9, 13b, & 18
FIGURE 2: SITES 4, 6, 8, & 13A

FIGURE 3: SITE 2 & TRAINFIRE RANGES 1 - 17
FIGURE 4: SITES 14 & 15
FIGURE 5: SITES 5, 11, & 19

3.0 SITE SAFETY REQUIREMENTS

3.1 Prior to driving any stake, the ground where the stake will be driven will be checked with a magnetometer. If a magnetic anomaly is detected, the position of the stake location will be moved and re-checked with the magnetometer until a clean area is found. UNDER NO CIRCUMSTANCES WILL ANYTHING BE DRIVEN INTO THE GROUND (1) WITHOUT CHECKING THE AREA WITH A MAGNETOMETER, OR (2) IN AN AREA WHERE A MAGNETIC ANOMALY IS LOCATED.

3.1.1 UXOs located on the surface during the course of this survey WILL NOT BE MOVED OR DISTURBED. UXO will be plotted and its location reported to Maj Fil for disposition.

3.1.2 Under no circumstances will any intrusive activity be undertaken during this survey.

3.1.3 Personnel will follow the two man rule at all times and they will remain within sight of one another at all times while operating in the field.

3.1.4 Radio checks will be conducted each morning prior to commencing the day's operations. Frequent radio checks will be made throughout the day to ensure continued radio contact.

3.1.5 Team Leaders will notify each other and Range Control whenever they enter or leave the site, particularly in those sites which are located in isolated areas of the post. Hand held radios will be provided by Fort Ord Range Control.

3.1.6 Each vehicle will be equipped with a fire extinguisher and a first aid kit.

3.1.7 All requests for emergency services will be directed through Mr. Roy Durham by dialing 408-242-4281, or by calling Range Control directly via the radio. Personnel will remain on the line and follow the directions of Mr. Durham or his representative until the situation is resolved.

3.1.8 All fires, no matter how small, will be reported to Range Control. HFA personnel will attempt to contain the fire as long as it is safe to do so; they will remain in the area to assist fire fighters when they arrive on scene.

3.1.9 Due to the shortness of daylight during this period, and given the rough terrain, Team Leaders will be particularly mindful to allow sufficient time to exit the site before the onset of darkness.

4.0 EQUIPMENT REQUIREMENTS

4.1 All equipment has been transferred from the Tooele Project Site, DO #007, to Fort Ord for use during the survey. Additions to this equipment list will be necessary for the grid layout and boundary survey.

4.2 The following additions of equipment will be procured locally or purchased and shipped directly to the site.

4.2.1 1 ea. cellular telephone

4.2.2 2 ea. vehicles

4.2.3 3 cases of marking paint (red, orange, and white)

4.2.4 2000 wood stakes, 3/4 x 3/4 x 36

4.2.5 650 metal stakes (some are available locally at Fort Ord Range Control)

4.2.6 1 carton vinyl flagging (orange)

4.2.7 2 ea. 8 lb. sledge hammers

4.2.8 GPS system

5.0 PERSONNEL REQUIREMENTS

5.1 This project will require one Project Manager, two UXO Supervisors, and two UXO Specialists. All personnel assigned to this project have been previously assigned and approved to perform work on delivery orders under this contract.

5.1.1 Project Manager

5.1.1.1 Richard Thiel

5.1.2 UXO Supervisors

5.1.2.1 Stanley Ryley

5.1.2.2 Arthur Smith

5.1.3 UXO Specialists

5.1.3.1 Fred Jensen

5.1.3.2 Andrew Schutt

HFA PRICE QUOTE WORKSHEET FOR MEDIUM-SIZED BULL DOZER
HERTZ EQUIPMENT RENTAL SHEET FOR MEDIUM-SIZED BULL DOZER
QUINN COMPANY RENTAL SHEET FOR MEDIUM-SIZED BULL DOZER
CASE CONSTRUCTION EQUIPMENT RENTAL SHEET FOR MEDIUM-SIZED BULL DOZER
HFA PRICE QUOTE WORKSHEET FOR PORTABLE GPS SYSTEM
DRAFTING & SURVEYING SUPPLY CO. RENTAL SHEET FOR PORTABLE GPS SYSTEM
CALIFORNIA SURVEYING & DRAFTING SUPPLY, INC RENTAL SHEET FOR PORTABLE GPS SYSTEM
LANGHAM-MATHIS INSTRUMENT & COMPUTERS, INC. RENTAL SHEET FOR PORTABLE GPS SYSTEM

ARTICLE: SPECTRUM POSITIONING AND ATTRIBUTE COLLECTION SYSTEM, PAGE 1 OF 2
ARTICLE: SPECTRUM POSITIONING AND ATTRIBUTE COLLECTION SYSTEM, PAGE 2 OF 2

HFA PRICE QUOTE WORKSHEET FOR MEDIUM-SIZED TRACK LOADER
HERTZ EQUIPMENT RENTAL SHEET FOR MEDIUM-SIZED LOADER
QUINN COMPANY RENTAL SHEET FOR MEDIUM-SIZED LOADER
CASE CONSTRUCTION EQUIPMENT RENTAL SHEET FOR MEDIUM-SIZED LOADER
HFA PRICE QUOTE WORKSHEET FOR 4WD VEHICLES
HERTZ EQUIPMENT RENTAL SHEET FOR 4WD VEHICLES
ENTERPRISE RENT-A-CAR RENTAL SHEET FOR 4WD VEHICLES
BUDGET RENT-A-CAR RENTAL SHEET FOR 4WD VEHICLES


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4.0 UXO SAMPLING PLAN

4.1 General Operations

This sampling operation will be conduced in two phases: Grid and Boundary Location Survey Phase and UXO Surface/Subsurface Sweep and Characterization Phase. HFA will mobilize on site on or about January 3, 1994, and condua a UXO grid sampling of 16 specified sites comprising approximately 129 acres. The UXO Sweep and Characterization will be preceded by a limited mobilization December 6 to 17 to conduct surveying to establish site boundaries and sampling grids.

4.2 Grid and Boundary Survey

This survey will be conducted in December to establish the sampling grids in all site areas. The grid and boundary survey plan is at Appendix C and was forwarded under separate cover on November 24, 1993.

4.3 UXO Surface/Subsurface Sweep and Characterization

4.3.1 General

4.3.1.1 The conduct of surface/subsurface sweep and characterization will be prioritized as follows: Sites I and 6, 13, 2, 7 and 8, 18, 3, 20, 4, 5, 9, 10, 11, 19 and Trainfire Ranges. Search teams will be employed to optimize the areas swept in the above priority. The term sweep refers to both surface and subsurface sweep and follow-on excavation of subsurface contaas to determine whether the contract is UXO.

4.3.2 Surveying Boundaries and Establishing Search Grids

4.3.2.1 The boundaries will be determined using the information provided in the Scope of Work, the Fort Ord Grid and Boundary Survey Plan and discussions with the CEHND and Fort Ord representatives during the site visit. Boundaries of each area will be marked at the corners with stakes. Areas will be surveyed and plotted on a master Planimetric map.

4.3.2.2 Grids will be established within the boundaries of each area. Each grid will be identified with a numeric code. The size and layout of grids may vary, depending on the dimensions and layout of the area to be surveyed. Grids will generally be 100 ft. x 100 ft. with plastic stakes used as the anchor points for the corners and search lanes. Line will be laced over each plastic stake forming the boundaries and search lanes. The width of search lanes will not exceed 5 ft. in width. Contaas will be plotted using an X Y coordinate system measuring along the base lines of the grid.

4.3.2.3 Contacts will be initially plotted and recorded on pre-printed forms by the UXO Supervisor [see Appendix D]. The contacts recorded will be transposed each day to the master Planimetric map by the Project Manager (PM) or the Senior UXO Supervisor (SUXOS). The master Planimetric map will be maintained in the field headquarters facility of the site.

4.3.3 Surface Surveys

4.3.3.1 Each grid will be given a 100 % surface survey. Surface surveys are normally conduced simultaneously with the subsurface survey. UXO and UXO related material will be plotted and then removed. Areas which are saturated with large quantities of UXO or UXO components will be centrally marked and plotted as a unit.

4.3.3.2 Surface debris will receive a 100% inspection and will be segregated as UXO, UXO related, or

non-UXO scrap. Only UXO related scrap will be removed from the grid and transported to the Fort Ord Defense Reutilization Materials Office (DRMO). Scrap will be transported to DRMO by HFA personnel. UXO related scrap will be inspected and determined to be free of explosives by the SUXOs before it is turned over to Fort Ord DRMO as scrap.

4.3.3.3 UXO that has been determined to contain explosives or explosive residue and classified as safe to move will be transported to a Safe Holding Area (SHA) for later disposition. SHAs will be conveniently located within the boundaries of each site. In no case will SHA's be used to hold UXO longer than the normal work day; all UXO will be removed and disposed of at the end of each work day. UXO deemed unsafe to move will be detonated in place daily by HFA UXO personnel with explosives provided by Fort Ord.

4.3.3.4 HFA will notify Mr. Roy Durham (or his designee) of its intent to blow-in-place. This notification will take place at the end of each work day, not later than 1600 hours. Using the UXO Operations Check List, Appendix E, Mr. Durham will notify all necessary personnel. All operations must be completed prior to the completion of the workday.

4.3.4 Magnetometry and Geophysical Searches

4.3.4.1 All grids will receive a 100% subsurface search using government furnished Schonstedt Model GA-72CV Magnetometers. Contacts and anomalies will be marked with yellow flags for excavation and identification. Subsurface anomalies identified as UXO will be classified as safe to move or unsafe to move by the SUXOS and the CEHND Safety Specialist. UXO determined safe to move will be transported to a SHA for later disposal by HFA personnel. UXO determined unsafe to move will be marked with a red flag for in-place destruction at the end of the work day.

4.3.4.2 In order to coordinate with Fort Ord operations, all intrusive work will cease at 1600, unless otherwise directed by CEHND, to allow transfer of UXO and demolitions materials and to provide ample time to detonate those items that are unsafe to move.

4.3.4.3 Non-intrusive activities may continue until the end of the normal work day by personnel not involved in the transfer of UXO or demolitions.

4.3.4.4 UXO will be accounted for and identified and, if possible, M numbers will be obtained. UXO will, as a minimum, be identified as to their type by function.

4.3.4.5 HFA will complete 1348-2 forms as necessary to account for UXO scrap turned in to Fort Ord.

4.3.5 Restricted Areas

4.3.5.1 Restriaed Areas will be established at each work site, since the work sites are so large a single Restriaed Area is impractical.

4.3.5.2 The Restricted Area will encompass the area of activity and it will control access and egress. The area will be marked with yellow caution tape. Only HFA employees and CEHND Safety Representatives will be authorized to be within the Restriaed Area during UXO and demolition operations. The UXO Supervisor will be responsible for establishing and maintaining the integrity of the Restricted Area.

4.3.5.3 At least a 50m separation will be maintained between teams and other non-UXO personnel.

4.3.5.4 All persons entering and leaving the work site will do so by the established lanes of the Restriaed Area.

4.3.6 Personal Protective Equipment (PPE)

4.3.6.1 Personal Protective Equipment (PPE) will be maintained at a level deemed appropriate to protea UXO personnel, CEHND, and other workers. Normal work clothing will be worn and it will include long trousers, shirts, leather gloves, leather work boots (w/o steeltoes), and safety sunglasses. A hat is optional, but strongly recommended, for protection from the sun. Hardhats are not required unless a possible head injury could result from the use of heavy equipment.

4.3.7 Search Teams

4.3.7.1 There will be four search teams, each composed of two UXO Specialists, two Magnetometer Operators, and one UXO Supervisor. Each team will be under the direct supervision of the UXO Supervisor. All teams will be under the overall supervision of the SUXOS.

4.3.7.2 Search teams will be responsible for:

4.3.7.2.1 establishing and laying out the search lanes;

4.3.7.2.2 operating magnetometers and metal detectors;

4.3.7.2.3 plotting and recording surface UXO, UXO related materials, and subsurface UXO located during grid searches;

4.3.7.2.4 identifying and classifying UXO and UXO components;

4.3.7.2.5 conduaing explosive disposal procedures of UXO;

4.3.7.2.6 segregating and removing UXO scrap from each grid; and

4.3.7.2.7 transporting and disposing of UXO that is safe to move.

4.3.8 intrusive investigations

4.3.8.1 Excavations will only be performed by qualified UXO personnel (normally the UXO Supervisor and a UXO Specialist).

4.3.8.2 Subsurface contacts will be uncovered by hand. If the contra proves to be non-UXO, it will be removed and the hole rechecked with the magnetometer. If the hole is clean, it will be refilled and tamped. If the contact is a UXO, it will be classified safe to move or unsafe to move.

4.3.8.3 If the UXO is safe to move, it will be moved to a SHA and held there for transfer to Fort Ord's Range 36 for disposal by detonation.

4.3.8.4 If the UXO is considered unsafe to move, it will be marked with a red flag and destroyed in place at the end of the day along with other unsafe to move UXO located that day.

4.3.8.5 If a UXO is located during the site investigation, that site will be declared contaminated and will be abandoned unless otherwise directed by the CEHND Safety Representative.

4.3.9 Magnetometer Teams

4.3.9.1 Searches will be conducted by a team of two Magnetometer Operators supervised by a UXO Specialist.

4.3.9.2 Magnetometer Operators will search each grid, marking all contacts with a yellow flag.

4.3.9.3 Magnetometer Operators will not excavate or otherwise handle any UXO or UXO components.

4.3.10 Scrap Removal

Removal of non-UXO related scrap may be essential to successfully complete the subsurface magnetometer survey of each grid. If non-UXO scrap removal becomes necessary, the scrap will only be moved to an area clear of the grid so that it does not interfere with sweeping operations. Scrap is defined as metallic debris which is not contaminated with explosives and could be sold as scrap metal. The scrap could be made up of UXO related material as long as the case is opened to the atmosphere and no internal mechanical rupture could occur if the item were placed in a melting furnace and the item could be internally inspected to determine it does not contain explosives or explosive residue. **ONLY UXO RELATED SCRAP WILL BE REMOVED FROM THE GRID AND TURNED IN TO DRMO.**

4.3.10.1 All UXO scrap will be carefully inspected by the search team UXO Supervisor to ensure that it does not contain any explosives or explosive residue.

4.3.10.2 Only UXO scrap will be staged near the grid or search area from which it was removed. The estimated weight of scrap will be recorded for each grid.

4.3.10.3 A final inspection of the scrap will be made by the SUXOS and the Quality Control/Site Safety Officer (QC/SS) after which they will sign a certificate stating "that the property listed hereon has been inspected by me and, to the best of my knowledge and belief, contains no items of a dangerous nature." All material will be accounted for by completing DD Form 1348-2.

4.3.10.4 The scrap will be turned over to the Fort Ord DRMO. All material will be accounted for by completing a 1348-2.

4.3.11 Transportation of UXO/Demolition Materials

4.3.11.1 UXO which has been determined safe to move will be segregated by type, loaded into a truck certified and capable of carrying explosives and UXO with a non-metallic bed liner, blocked and braced as required, and transported to a designated SHA to be held for disposal by HFA personnel. Vehicles will be inspected and certified by Fort Ord ASP personnel.

4.3.11.2 UXO will be transported to the SHA by a designated UXO Specialist or the SUXOs and the QC/SS, whichever is free to do so. UXO may be transported by hand or vehicle, whichever is determined by the SUXOS or UXO Supervisor at the scene.

4.3.11.3 All movement of explosives and UXO will be escorted by either the SUXOS or the QC/SS.

4.3.11.4 All loads will be visually inspected by the QC/SS to ensure it is properly secured and safe to move. If in his opinion the material is improperly loaded, he shall cause whatever correaive action he deems necessary before he allows the load to move.

4.3.11.5 All demolition explosives and UXO will be inventoried and receipted for prior to transferring custody.

4.3.11.6 When transporting explosives or UXO, vehicles will not exceed 25 mph. In many areas a prudent speed may be less than 25 mph, in which case the driver may not exceed a safe and reasonable speed.

4.3.11.7 Blasting caps and high explosives will remain separated at all times during transport.

4.3.11.8 Vehicles hauling explosives will remain covered at all times, except when atonally loading or unloading, and a flame resistant tarpaulin will be used for this purpose.

4.3.11.9 Vehicles transporting explosives and UXO will be properly placarded.

4.3.12 Storage of Explosive and Demolition Materials

4.3.12.1 Fort Ord will provide all explosives and demolition materials for HFA personnel to perform in-place disposal of UXO, as well as demolition of all UXO that are determined safe to move. HFA will not be required to store, purchase, or issue explosives and demolition materials.

4.3.12.2 The SUXOS will record usage data of explosives and the quantities of UXO destroyed.

4.3.13 Final Surveying of Grid Locations

4.3.13.1 Final surveying and plotting of the locations of cleared grids and the locations of any UXO located during the course of these site operations will be plotted by HFA personnel using GPS. The coordinates will be recorded on Planimetric 1 to 300 maps provided by CEHND.

4.3.13.2 Surveys will begin as soon as an area is completed and will be an ongoing process until the project sites are completely documented. To accomplish this task, a two man team will be assigned to this task, these persons can be redirected assets from the clearing and grubbing team that will have finished their work.

4.3.14 Clearing and Grubbing

4.3.14.1 Some sites require extensive grubbing and clearing to be completed before UXO surveys can be conduced in them, others require lesser degrees of effort before they can be swept and cleared of UXO.

4.3.14.2 To this end, two teams of five laborers, each supervised by a UXO Specialist, will be employed to accomplish this task.

4.3.14.3 Two weeks are estimated to complete this effort. Upon completion, all laborers will be released. The UXO Specialist can be retained and used to survey and plot completed grids.

4.3.15 Demolition Operations

4.3.15.1 Demolition safety and operations will be conducted in accordance with the standard practices and procedures outlined in the U.S. Army Field Manual 5-250. During specific disposal operations, the on-site CEHND Safety Specialist's on-site copy of TM 60A series will be followed for placement of explosives and additional safety procedures. UXO will only be detonated after positive identification. Non-elearic procedures will be employed as the method of choice for all detonations. If a scenario is encountered that precludes in-place detonation requiring render safe procedures or a suspected chemical warfare or unknown UXO munitions are encountered, the CEHND Safety Specialist will be immediately notified and he will request EOD support.

4.3.15.1.1 Detonations will take place daily at approximately 1600 hours.

4.3.15.1.2 UXO that are safe to move will be transported to Range 36 for disposal by detonation.

4.3.11.1.3 In-place detonations and transportation of explosives and UXO will be coordinated with Mr. Roy Durham via radio or telephone in order that he may contact the required persons outlined in

the UXO Operations Check List.

4.3.15.2 Detonating UXO in place.

4.3.15.2.1 Detonations will occur daily at the end of each work day and/or at the completion of a site.

4.3.15.2.2 Detonations will occur only after all unnecessary personnel have left the area, road guards have been posted, and the required post personnel have been notified. Prior to conducting demolition, the SUXOS will check the area and available drawings to determine if there are any underground utilities that may be effected by a detonation.

4.3.15.2.3 The demolition team will be composed of one UXO Specialist and one UXO Supervisor, assigned by the SUXOS. Additional UXO personnel may be used at the discretion of the SUXOS if there are large quantities of UXO to detonate.

4.3.15.2.4 The remaining HFA UXO personnel will am as perimeter security as directed by the SUXOS or the QC/SS.

4.3.15.2.5 Notification of detonations will be made in accordance with Appendix E.

4.3.15.2.6 During detonations, a designated emergency vehicle will remain in the area.

4.3.15.2.7 Only the demolition team, the QC/SS, and the CEHND Safety Specialist will be permitted in the area where charges are being assembled and demolition operations are being conducted.

4.3.15.2.8 All demolition materials will be accounted for by the UXO Supervisor and reported to the SUXOS. Only the amount required to complete the day's operations will be requested from Fort Ord and transported to the site.

4.3.15.2.9 The area where demolition operations are being conduced will remain secured until the "all clear" is given by the SUXOS or the QC/SS.

4.3.15.2.10 After each detonation, the detonation points will be inspected by the UXO Supervisor and the QC/SS to ensure that a misfire, low order, or a kickout has not occurred.

4.3.15.2.11 All charges will be initiated non-electrically. Detonating cord trunk and branch lines will be used to link multiple shots.

4.3.11.2.12 A contingency plan for demolition operations must be conducted in populated or sensitive areas.

4.3.15.2.11.1 Fort Ord personnel will notify and conduct an evacuation, as required; all personnel will be evacuated to a safe location to be determined by Fort Ord authorities.

4.3.15.2.11.2 in the event off-post areas require evacuation, off-post authorities will be notified by Fort Ord Federal Law Enforcement personnel.

4.3.15.2.11.3 HFA will conduct demolition only after all personnel protection measures have been completed and reported to the PM and/or the SUXOS.

4.3.15.2.11.4 HFA will take property protective measures such as those outlined in FM 9-16. These may include, but are not limited to, sandbagging, tamping with earth, and barricading.

4.3.15.2.11.5 If none of these measures are deemed adequate, the CEHND Safety Representative will be contacted to request the services of the active duty EOD Detachment.

4.3.15.2.11.6 Evacuees will only be permitted to reenter the area after the demolition point has been inspected and the "all clear" has been given by the QC\SS.

4.3.16 Misfire Procedures

4.3.16.1 In accordance with FM5-250, in the event of a misfire, the following general procedures will be strictly adhered to.

4.3.16.1.1 The SUXOS will be notified of the time of the suspected misfire.

4.3.16.1.2 The SUXOS will notify the PM (if on site) and the CEHND Safety Representative. All other personnel will be notified of the event via radio and instructed to hold their positions until the "all clear" is given.

4.3.16.2 Non-Electric Misfires

4.3.16.2.1 The individual who placed the charge should investigate and correa any problems with the demolition.

4.3.16.2.2 After an attempt has been made to fire the charge, investigation of any detonation problem will be delayed for at least 30 minutes plus the burning time of the fuse. Under no circumstances will the demolition be approached before the 30 minute waiting time has elapsed.

4.3.16.2.3 For above ground misfires of charges primed with blasting caps, a primed, one-pound charge will be placed next to the misfired charge and detonated. Each misfired charge or charge separated from the firing circuit that contains a blasting cap requires a one pound charge for detonation. Scattered charges that contain blasting caps will not be touched, but destroyed in place.

4.3.16.2.4 For buried charges, the tamping will be removed to within one foot of the misfired charge. Depth checking will be performed constantly while digging to avoid striking the charge. When within one foot of the misfired charge, a primed, two-pound charge will be placed on top of the original charge and detonated. If digging over the new charge is impractical, a new borehole of the same depth will be dug alongside of the original hole, one foot away. A primed, two-pound charge will be placed in the new hole and detonated.

4.3.16.3 Detonating Cord Misfires

4.3.16.3.1 If detonating cord fails to function properly, the following actions will be taken.

4.3.16.3.1.1 A new blasting cap will be attached to the remaining detonating cord, with care taken to fasten it properly, and detonated.

4.3.16.3.1.2 Branch line will be treated in the same manner as noted above.

4.3.16.3.2 If detonating cord leading to the charge detonates but fails to function the charge, the following anions will be taken.

4.3.16.3.2.1 investigation will not occur until the charges have stopped burning (30 minutes if the charge is buried).

4.3.16.3.2.2 The charge will be re-primed and an attempt will be made to detonate the charge.

4.3.16.3.2.3 Scattered charges that do not contain blasting caps may be collected and detonated together.

4.3.16.3.2.4 Buried charges will be dug to within one foot of the charge and a primed, two-pound charge will be placed on top or to the side of the charge and detonated.

4.4 Site Specific Operations

The sites will be surveyed and cleared in the following sequence. Site operations will e conducted as outlined m paragraph 4.3.

4.4.1 Site 14 & 15, Naval Gunfire Range

4.4.1.1 This site is 305 acres along the southern boundary of the post. The area borders the race track at Laguna Seca and is used for parking on race day.

4.4.1.2 Approximately 40 acres will be randomly sampled. The survey team will sweep and clear 160 100' x 100' grids.

4.4.1.3 UXO located will be plotted by its position within the grid as well as the depth located.

4.4.2 Sites 1, 6, and 20

4.4.2.1 Site 1, Flame Thrower Range

4.4.2.1.1 The Flame Thrower Range is approximately seven acres m size. The grid coordinates 069590 place the center of area roughly in the adjacent Patton family housing area.

4.4.2.1.2 One acre will be sampled; the survey team will sweep and clear four grids.

4.4.2.1.3 Unless otherwise directed, search grids will be established and searched in the fenced depression noted in the archives report.

4.4.2.2 Site 6, Mine and Booby Trap Training Area

4.4.2.2.1 This site is approximately two acres in the vicinity of FR 067s9s and is to be 100% sampled.

4.4.2.2.2 The survey team will sweep and clear eight 100' x 100' grids

4.4.2.3 Site 20, Recoilless Rifle Area

4.4.2.3.1 The Recoilless Rifle Area is seven acres in the vicinity of FR 0s9ss9, of which three acres are to be sampled.

4.4.2.3.2 The survey team is to sample and clear 12 100' x 100' grids.

4.4.2.3.3 This area is bounded by Giggling Road, the Stillwell family housing area, and the commissary. The main gate is directly north of the site and state highway 1 is west of the area.

4.4.3 Sites 13A and 2

4.4.3.1 Site 13A, Mortar Range

4.4.3.1.1 Site 13A is located in the vicinity of FR 092561. Much of this area is located in or near the Abrams housing area and other populated areas.

4.4.3.1.2 Five acres are to be sampled and cleared in this area.

4.4.3.1.3 Survey teams will sweep and clear 20 100' x 100' grids.

4.4.3.1.4 This area is bordered on the south by a busy main thoroughfare which will require major traffic control if a UXO IS located.

4.4.3.2 Site 2, Chemical Training Area

4.4.3.2.1 Site 2 is also located in an area which is heavily traveled and populated. Site 2 was identified as a site which may contain CWM in the form of vials of a 10% solution of mustard and lewisiteThe vials are said to have been components of Chemical Agent Identification Sets (CAIS). With this in mind, special requirements for conduaing operations in this area will be placed in effect. Appendix F contains health and safety plans for this area and PPE necessary to protect personnel.

4.4.3.2.2 Site 2 is located in the vicinity of FR 075575 to 078577 between Fifth and Eighth Streets where Imjim Road intersects. The site is adjacent to the Abrams housing area and the post confinement facility.

4.4.3.2.3 The site is comprised of approximately 25 acres, of which 5 acres will be sampled. Twenty 100' x 100' grids will be swept and cleared.

4.4.3.2.4 If at anytime during the course of operations in this area HFA personnel locate a UXO which contains CWM or is suspected to contain CWM, they will cease operations and leave the area.

4.4.3.2.5 The UXO Supervisor will notify the PM, SUXOS, and the CEHND Safety Representative. The UXO Specialist will establish area security and maintain it until relieved by proper authorities.

4.4.3.2.6 Mr. Roy Durham will be notified, who will in turn notify the appropriate EOD Unit.

4.4.4 Sites 4A, B. & C, 7, 8, 13B and 18

4.4.4.1 Sites 4A, B. and C, CBR Training Areas

4.4.4.1.1 Site 4 is made up of approximately 20 acres in three widely separated areas located at FR082557, 091552, and 096568.

4.4.4.1.2 The acreage will be evenly divided into 1.6 acre plots and six 100' x 100' grids will be swept and cleared.

4.4.4.2 Site 7, Mine and Booby-Trap Area

4.4.4.2.1 Site 7 located in the vicinity of FR 091570 and consists of approximately four acres. This site will receive a 100% sampling and 16 100' x 100' grids will be swept and cleared.

4.4.4.2.2 This site was used as a training area for mines and booby-traps and may contain old practice landmines which will be difficult to identify. Any mines found in this area should be treated as live ordnance.

4.4.4.3 Site 8, Mine and Booby-Trap Area

4.4.4.3.1 Site 8 is similar to site 7. It is located in the vicinity of FR098568 and is approximately two acres. Both acres will be swept and cleared. Eight 100' x 100' grids will be completed in this area.

4.4.4.4 Site 13B, Mortar Range

4.4.4.4.1 Site 13B, a mortar range, is located in the vicinity of FR 087585 to 095561. This area has approximately 25 acres that require sampling. One hundred 100' x 100' grids will be swept and cleared.

4.4.4.4.2 This site is an extension of 13A and was used for mortar practice during the 40s and 50s. Only practice rounds were believed to have been used; however, it will be difficult to distinguish a live round from a practice round and all UXO will be treated as live until positively identified.

4.4.4.5 Site 18, Location of 100 lb. Bomb

4.4.4.5.1 Site 18 has been used for several purposes according to the archives report. It was once used as a training area for placing landmines. Currently, there is an obstacle course in the area. There is a reported 100 lb. bomb in the area with little information as to how it got there.

4.4.4.5.2 This site is approximately 15 acres located in the vicinity of FR 090567. Five acres are to be sampled and a total of 20 100' x 100' grids will be swept and cleared.

4.4.5 Sites 5, 9,11, and 19

4.4.5.1 Site 5, Area South of East Garrison

4.4.5.1.1 Site 5 is located on a ridge line generally south of the Pistol Range in the East Garrison area, in the vicinity of FR 133565. The area is approximately 30 acres of which seven acres are to be sampled. Twenty-eight 100' x 100' grids will be swept and cleared.

4.4.5.1.2 3.5 inch rockets have been discovered in this area—some reported to be in the branches of live oak trees. Archives indicate this area was not used as a rocket firing range and it is not known if the UXO located were live or practice. A tank sub caliber gunnery range did exist here some time in the past.

4.4.5.1.3 This area will require some limited grubbing and clearing to gain access to some of the grids. The extent of effort expended will depend on the actual location of the grids. It is expected to require about two days of effort.

4.4.5.2 Site 9, Mine and Booby-Trap Area

4.4.5.2.1 Site 9 is similar in nature to sites 6, 7, & 8. It was used for a mine and booby-trap training area. The area encompasses approximately two acres and will receive a 100% sampling. Eight 100' x 100' grids will be swept and cleared.

4.4.5.2.2 The site is located in the vicinity of FR 108544.

4.4.5.3 Site 11, Demolition Area

4.4.5.3.1 Site 11, a demolition training range, is located in the vicinity of FR 131548, and 134548. During the site visit, it was obvious that this area had been used for a grenade range or that grenades had been disposed of on this range; the area was littered with fragments of MK 2 hand grenades.

4.4.5.3.2 There are five acres to be sampled. A total of 20 100' x 100' grids will be swept and cleared.

4.4.5.3.3 Some limited clearing and grubbing will be necessary in this area. The center of the demo point will be scraped of two to four inches of the surface to remove surface fragment contamination after which the area graded will be checked with a magnetometer. If the area is "clean" and free of grenade fragments, it will be surveyed for UXO. If it is not "clean", another layer will be removed until it can be swept and cleared. It is estimated a dozer or front loader will be needed for about one week.

4.4.5.3.4 A general X pattern will be scraped across this area and the spoils will be pushed against the banked area of the site and stocked piled there. This material will be visually inspected as it is removed

and placed in stockpile for UXO and UXO components. The area scraped will be counted as part of the 20 grids and will be measured at the time the work is accomplished.

4.4.5.4 Site 19, Rifle Grenade Area

4.4.5.4.1 Site 19 was used as a rifle grenade range. It is located in the vicinity of FR 127548 the southern slope of the firing points. The site may also have been used for training personnel in the use of Fougas systems. A rifle grenade flare was located in this area during the site visit.

4.4.5.4.2 The site is approximately 20 acres and requires five acres to be sampled. Twenty 100' x 100' grids will be swept and cleared.

4.4.5.4.3 The area is densely covered with brush which must be cleared to gain access to the site and each of the grids will require clearing. It is estimated that brush removal will take approximately one week of dedicated effort by a crew of laborers.

4.4.6 Trainfire Ranges

4.4.6.1 The Trainfire Ranges comprise 915 acres along the beach area of Monterey Bay. Fifteen acres are to be sampled.

Three 100' x 100' grids will be located in the old temporary ASP, and three 100' x 100' grids will be searched in the company temporary storage areas. The remaining nine 100' x 100' grids will be randomly located throughout the range and magazine areas.

4.4.6.2 There is little evidence that this area was used for anything other than small arms training; however, other ordnance cannot be ruled out, and there is the possibility that unused ordnance may have been buried rather than returned to storage.

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8.0 MANAGEMENT

8.1 Work, Data and Cost Management Plan

The actual conduct the work is outlined in this WP. HFA has a supervisory staff of experienced professionals to manage all phases of the project. Each PM is versed in the use of Harvard Project Manager (HPM), a computer based project management tool, and Lotus 123, a spread sheet designed to manage numerical data. HPM provides graphic displays of tasks and milestones, as well as providing cost data, project milestones, and resource allocations. HPM provides actual cost and planned cost data enabling the PM to accurately track costs and work completion goals.

8.2 Project Schedule and Milestones

First Delivery Order Issued	10 Nov 1993
Site Visit	16 - 19 Nov 1993
Grid Survey Plan Submitted	24 Nov 1993
Work Plan - Submitted	6 Dec 1993
Grid Survey	6 Dec - 17 Dec 1994
Work Plan - Comments/Period	6 - 13 Dec 1993
Work Plan Final	17 Dec 1993
Mobilization	2 - 3 Jan 1994
Demobilization	3 - 4 Feb 1994
Draft Final Removal Report	1 Apr 1994
Final Removal Report	6 May 1994

8.3 Staffing/Resumes [see Appendix G]

8.3.1 Project Manager

Richard T. Thiel: Mr. Thiel is responsible for the effective day-to-day management of the project staff; direa communication and liaison with the client; technical approach and review of deliverables; management of resources, schedules, and budgets; and coordination among the general and technical support functions.

8.3.2 Senior UXO Supervisor

Stanley M. Ryley:Mr. Ryley is responsible for the day-to-day on-site management of UXO services and overall site safety. His responsibilities include coordination and direction of all UXO site operations.

8.3.3 QC/Site Safety Officer

Arthur R. Smith: Mr. Smith has the responsibility for Quality Control of all site aalmtles administered by HFA and required by the Corps of Engineers. He will be responsible to the Program Manager for project quality control, which includes administering the program, and coordinating direaly with the SIJXOS. Mr. Smith also has the responsibility for ensuring site safety and compliance with the safety provisions of the WP and APP. The QC/SS has the on-site responsibility and authority to modify and/or halt work, and to remove personnel from the site if working conditions which may affect on-site/off site safety and health change. The site QC/SS 15 the main contra for any on-site emergency. Except in an emergency, the Site Safety Officer may modify the approved APP only after consultation and concurrence of the HFA Program Manager, the CEHND Safety Representative, and the Contracting Officer.

8.3.5 UXO Supervisors

UXO Supervisors are responsible for their teams' operations, ensuring personnel compliance with safety and PPE requirements; monitoring working conditions and notification of the QC/SS or SUXOS of any unsafe condition; identifying OEW or UXO that are located within their team's operating zone; has the authority to stop operations in their zones if any unsafe am or condition exist until corrective action is taken.

Personnel requirements: (see Organizational Chart, Figure 3)

1 - Project Manager
1 - Senior UXO Supervisor
1 - QC/Safety Officer
4 - UXO Supervisors
10 - UXO Specialists(2 for supervising laborers)
8- Magnetometer Operators
10 - Laborers(for brush clearance)

Figure 3 Organizational Chart

8.4 Property Equipment Listing

All property and equipment (with the exception of explosives and demolition materials) will be secured in accordance with AR 190-51 and applicable Army Security Regulations.

8.4.1 Search/Grid Equipment

Nomenclature	Quantity
1. Schonstedt Model GA-72CV (government supplied)	8 ea
2. Ordnance Locator MK 26 MOD 0 Foerster Ferex Model L 4.021	1 ea
3. Plastic Pin Flags	
red	500 ea
yellow	1000 ea
4. Wood Survey Stakes, 36 in (for marking grid boundaries)	2000 ea
5. Stakes, Plastic 18 in.	250 ea
6. Hip-Chain Distance Measure with 1500 yard Lines #39050	2 ea
7. Replacement Line for Hip-Chain Orange 3000 Yards RL	150 rls
8. Vertical Stake Bag	4 ea
9. Enduro Rolatape MOD MM-34 (for plotting "hits")	2 ea
10. Carrying Case for Rolatape	2 ea
11. Handheld Compass	4 ea
12. Safety Harness	4 ea
13. 5/8 in. Climbing Rope	500 ft
14. Pulleys and Fairleads	4 ea

15. Sokkia GPS	1 set

8.4.2 Communications Equipment

Nomenclature	Quantity
1. Radio Portable Motorola MT 1000 (government furnished)	8 ea
2. Chargers for Portable Radios (government furnished)	8 ea
3. Cellular Telephone (lease or purchase locally)	2 ea
4. Landlines, Telephones	2 ea
5. Facsimile (FAX) Plain Paper	1 ea
6. Copy Machine	1 ea

8.4.3 Office Equipment

Nomenclature	Quantity
1. Computer, Laptop 486 150 meg HD with DOS 5.0 and Windows 3.1	1 ea
2. 14 in. VGA Monitor for Laptop	1 ea
3. Standard Keyboard for Laptop	1 ea
4. Laser Printer, HPII or Equivalent	1 ea
5. Desk(provided locally)	3 ea
6. Chairs, Desk	3 ea
7. Telephone Answering Machine	1 ea
8. Telephones	3 ea
9. File Cabinet, 2 Drawer Standard (provided locally)	1 ea

8.4.4 Office Supplies

Nomenclature	Quantity
1. Copy Paper (can be used for FAX, typing, computer)	1 cs
2. Miscellaneous Pens, Pencils, Markers, Grease Pencils, etc.	
3. Envelopes	100 ea
4. Pencil Sharpener	1 ea
5. Lined Yellow Legal Pads	25 ea
6. Grid Paper 1/4 in.	25 pads
7. Redi-Rite Sheet Holder	4 ea

8. Field Book	10 ea
9. Hole Punch, 2 & 3 Hole	1 ea
10. Surge Suppressor	3 ea
11. Loose Leaf Notebooks	12 ea
12. File Folders Hanging (Letter)	2 pkgs
13. Waste Baskets	4 ea
14. Trash Barrels	4 ea
15. Petty Cash Log	1 ea
16. Staplers w/Staples	4 ea
17. Tape and dispensers	3 ea
18. Miscellaneous Paper Clips, Thumb Tacks, Binder Clips	5 bxs ea
19. Rotary File, Index	1 ea
20. Staple Remover	3 ea

8.4 5 Field Equipment

Nomenclature	Quantity
1. Duct Tape	50 rls
2. 6-Mil Plastic	5 rls
3. Vehicle Mounted First Aid Kit	5 ea
4. Water Jug 5 gal.	4 ea
5. Ice Chest 123 qt	2 ea
6. Binoculars 6 x 35	2 pr
7. 300 ft Cloth Measuring Tape	2 ea
8. Barrier Tape "Caution" Yellow	100 rls
9. Stakes Wood Surveyors 48 in (for marking Exclusion Zones)	200 ea
10. Batteries "AA"	50 ea
11. Batteries "D"	12 ea
12. Paint Engineers Marking (fluorescent orange)	24 cns
13. Flag Bags (for marking flags)	4 ea
14. Burn Kits	4 ea
15. Eye Wash Kits	4 ea
16. Fire Extinguishers 1a 10bc	6 ea
17. Explosives Placards (Vehicle) (magnetic)	6 ea
18. Warning Signs (size and labeling to be determined	

later)	
19. Tape, Monofilament 1 in.	10 rls
20. Tape, masking 2 in.	10 rls
21. Tape, Electrical 3/4 in.	10 rls
22. Tape marking, Engineers (Red)	25 rls
23. Belts, Web	25 ea
24. Canteens w/Cover	22 ea
25. Fly, Nylon 12 x 12	2 ea
26. Insect repellent	25 cns
27. Sunblock	10 btls
28. Tool Box, General Hand Tools	2 ea
29. Video Camera VHS	1 ea
30. 35mm Camera w/28mm to 80mm Lens and Flash	1 ea
31. Polaroid Camera w/Flash	1 ea
32. Film 35mm	10 rls
33. Film Polaroid	10 pkgs
34. Video Tape VHS	10 ea
35. Porta John	2 ea
36. Chainsaw w/ 16 in cutting bar	2 ea
35. Chainsaw chaps	2 pr
36. Woodmans Hardhat	2 ea
37. Axe 3.5 lb w/36in handle	2 ea
38. Bush Hooks	4 ea
39. Stakes metal, 4ft (to be used for permanent markers)	400 ea
40. Tyvek (sizes lg, xlg, & xxlg)	3 cs ea
41. Hazmat booties, xlg	1 cs

8.4.6 Personal Protective Equipment

Nomenclature	Quantity
1. Gloves (leather, work)	22 prs
2. Rain Suite	22 sets
3. Safety Glasses (sun)	22 pr

8.4.7 Support Vehicles

Nomenclature	Quantity
1. Truck, Pickup 3/4 ton	

(4wd w/ bed liner)	2 ea
2. Truck, Pickup mid-size (4wd)	1 ea
3. Truck, pickup expanded cab 6 Passenger	6 ea

NOTE: Two additional 6 passenger trucks will be required for brush clearing crews for approximately two weeks. After that period, the requirement will drop to four each.

8.4.8 Explosives and Demolition Materials

Ft. Ord has agreed to provide, store and issue the high explosives and demolition materials to be used for disposal of all UXO. Below is listed the estimated quantity of explosives and materials HFA may require to conduct in Demolition.

Nomenclature	Quantity
1. Charge Demolition (1375-M023)	120 ea.
2. Blasting Caps (1375-M130)	50 ea
3. Fuze Lighters (1375-M766)	300 ea
4. Fuze, Blasting (1375-M670)	3000 ft
5. Crimpers, Blasting Cap	2 prs
6. Blasting Cap Boxes (non-electric and electric)	2 ea
7. Detonating Cord	2000 ft

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over the years, and is probably heavily contaminated with explosive residue and scrap metal (fragments). Currently, the only visible remains of this range are two blackened areas where armored vehicles sat as targets for Molotov Cocktails. The exact location of the demolition range could not be pinpointed, but is believed to have been in front of the vehicles (between vehicles and entrance road).

4. Site 4, CBR Training Areas
(vicinity FR 091552, FR 082557, and 096568)

Discussion: These facilities appear on 1957 and 1958 maps. Currently there is a gas chamber where soldiers test their masks for leaks at FR 091552. Tear gas agents like powdered or encapsulated CS and CN are used in these chambers. A U.S. Chemical Systems Laboratory document from 1983 states that classroom training took place in building 2820. As part of this training, minute quantities of mustard gas were used for familiarization. These were probaly part of the Chemical Agent Identification Sets, four of which, according to the document, were transferred to Edgewood Arsenal.

5. Site 5, South of East Garrison
(vicintity FR 133565)

Discussion: Recently, 3.5" rockets were discovered south of East Garrison. It was reported that they were found in the branches of the live oak trees growing at the top of the ridgeline just south of the pistol range. It is not known if they were dud-fired, and thus extremely dangerous, or simply discarded during training. No known range is or was laid out in this area for firing these rockets. However, a tank subcaliber gunnery range existed here at one time.

6. Sites 6, 7, 8, & 9, Mine and Booby Trap Training Areas
(vicinity FR 067595, 091570,097568, 108544 respectively)

Discussion: These sites appear on maps dating from 1956-57. It is possible that practice landmines and booby-traps may havfe been left behind, or never uncovered. Since a practice/inert mine that has been buried for many years is nearly impossible to distinguish from a live (HE) mine, any landmines found in these areas should be treated with extreme caution.

7. Site 10, Leary Hill & Elliot Hill Region
(current training areas K2 & K3).

Discussion: During walk-throughs of these areas, 8 Imm high explosive and 60mm illumination mortar rounds have been observed on the surface. It is not known from where these rounds might have been fired.

8. Site 11, Demolition training area
(vicinity FR 130548).

Discussion: Demolition ranges commonly are contaminated with explosive residue and scrap metal (fragments). It IS possible that chunks of high explosive which failed to detonate or burn could be found on the surface. These should be identified and destroyed by EOD-trained personnel only.

SFC Grimes, NCOIC of Range Control, stated that the area was an old EOD range. The exact location was unknown. Large portions of the area were burned off several years ago During a walk-through, pieces of 40mm training practice tracers were spotted.

9. Site 12, Picnic Canyon
(vicinity FR133538 south to 133530)

Discussion: Hand grenades, 37 mm gun, and 40 mm anti-aircraft projectiles have been located in this area. It is not known when this area might have been used, but since it is outside of the normal Impact area, it can be assumed that it was used during the pre-war or WWII era.

10. Site 13, Practice Mortar Ranges
(vicinity grid square FR 0958, and FR 087563 to 095561)

Note: Two areas, will revise map to show 13A & 13B

Discussion: These ranges were used for mortar practice during the 40's and 50's. They are believed to have only used prctice ammunition and sabot trainers.

11. Site 14, Pilarcitos Canyon & Lookout Ridge
(vicinity grid squares FR 1250 & 1251)

Discussion: This area contains 7" and 8" Naval gun rounds, which obviously overshot the impact area.

12. Site 15, Impact Area
(inland impact area)

Discussion: This enormous tract of land has been used for a wide variety of weapons &ring. It IS heavily contammated with conventional ordnance, and will be manpower intensive to do a surface clearance. Large areas will have to be burned off just to clear the surface. The following pages outline all known weapons and munitions that were fired or used on each range in the impact area.

Range #	Ordnance Found or Utilized
18	Small arms: 5.56mm, 7.62mm & .30 cal
19	Small arms: 5.56mm, 7.62mm & .30 cal
21	Small arms: 5.56mm, 7.62mm &.30 cat, 3.5" rkt
22	Small arms: 5.56mm, 7.62mm, .30 cal & .50 cat, 106 RR
23	Small arms, 40mm HE (M203), M18A1 Mine (Claymore)
23M	Dragon missiles (practice and HEAT), 4.2" Mortar
24	Small arms, 40mm Prac, 35mm Subcal
25	Small arms, 37mm Gun
26	Small arms, 2.36" Rkt, 3.5" Rkt, 37mm Gun, Mortars
27	Small arms
27A	Small arms, 37mm Gun, 20mm
28	Small arms, 40mm Prac, 60mm & 81mm Smoke
29	Small arms (machine gun), 20mm
30	Small arms up to .50 cat, Demolition charges, 20mm
30A	40mm HE (Mk19), 40mm HEDP, Smoke (M203)
31	Small arms; M72 LAW; Dragon; Hand grenades; Claymore; 75, 105, 40mm HE; Mortars; 7" & 8" Naval
32	57, 75, 106mm RR HEAT; 37mm Gun; Mortars; 40mm AAA

Note: Beach ranges are ranges 1-17 (listed as site # 22)

33	Demolition charges, 3.5" Rkt, 81mm Mortar, Bangalores
34	Mortars, Rifle grenades
35	40mm (linked, from helicopter), 3.5" Rkt, Mortars
35A	Small arms, TNT, 3.s" Prac
36	Hand grenades (frog), Claymores
37	2.36" & 35" Rkts, Rifle grenades, 57 & 75mm RR
38	Small arms, Rifle grenades
39	Small arms
40	3.5" Rkt, 60mm Mortar, Claymores
41	84mm AT-4 HEAT, 60mm Mortar
42	60, 81, 4.2" Mortars; 106mm RR, 2501b Bombs
43	60 & 81mm Mortars, 40mm HE (h4203), Hand grenades (frog), Banga LAW, Dragon
44	M72 LAW, 90mm RR, 84mm ATE, 35mm Subcal, M202 Flash, Dragon
45	40mm HE (M203), M202 Flash, 60mm Mortars (found deep)
46	Small arms, 40mm Prac
47	40mm (M203)
48	40mm HEDP (M203; M202 Flash; 60, 81, 4.2" & 4" Stokes Mortars (deep); pyrotechnics, 90mm RR

Mortars and howitzers have fired high explosive, white phosphorous, and illumination rounds. It is doubtful that toxic chemical munitions were ever fired, but cannot be discounted.

An M57A1 2501b GP horns was found in front of Ranges 4143, FR 087522. The bomb was low ordered. (See EOS Incident Report, Appendix C-3).

Concrete-filled 5001b bombs (6 to 8) have been found near Range 31, FR 092s06. Final count could not be verified.

It should be noted that 37mm projectiles have been found just inside the researvation boundary to the northeast of Laguna Seca (at Wolf Hill).

13. Site 16, 2.36" Rocket Moving Target Range
(vicinity FR 094538 to 100536).

Discussion: Only discovered 18 months ago, this area was saturated with 2.36" rockets, both HEAT and practice. There is a narrow guage railroad track where moving targets operated. Mr. Roy Durham stated that over 1000 rockets had already been destroed and about 400-soo were HEAT warheads. During a terrain walk, nearly a dozen rocket motors and components could still be seen within a small area.

14. Site 17, Anit-tank (AT) Practice Mine Area
(vicinity FR 155525, near Bldg. T-3992).

Discussion: SFC Grimes stated that he had been shown an inert training AT mine by an EOD sergeant

who pulled it out of the ground in this area. A brief walk through showed no sign of where this type of training took place.

15. Site 18, 100 lb. Bomb
(vicinity FR 090567, in the confidence course area).

Discussion: In the 1970's this area was a minefield practice area used to teach Trainees methods for locating landmines (mine and booby-trap area #1; see 6.2.6). Currently there is an obstacle course m the area. A map made by a Sergeant Beardsley, an EOD NCO stationed at Fort Ord for many years, shows a lOOIb bomb found m this area. There are two theories as to how it may have gotten here:

a. It was accidently jettisoned during bombing practice, or because of aircraft malfuntion. The South Parade Ground was used as an airfield in the past. If so, an aircraft approaching from the east could have ejected a bomb in this area. A 1949 aerial photo of the area shows that it was certainly not a bombing range.

b. The bomb was an EOD training aid left in place and forgotten. Mr. Durham stated that the area once contained aircraft fuselages for emergency and EOD training.

16. Site 19, Rifle Grenade Range
(vicinity FR127549, southern slope of the firing point at the top of the hill).

Discussion: A recent visit showed no evidence of this type of training to have taken place. A 1957 map 15 the only reference to this type of training in this area.

18. Mudhen Lake
(vicinity FR 135540, south of East Garrison).

Discussion: The fact that this area is a lake forces consideration as a possible dumping ground.

19. Site 22, Beach Ranges, Beachfront Area

Discussion: These ranges are known to be small arms ranges. Conclusive documentation or physical evidence showing these ranges to be used as anything else could not be found. However, it cannot be discounted that the only thing used on these ranges was small arms. Small arms ranges within the inland impact area are known to have had 3.5" rockets and 106 recoiless rifle ordnance utilized. A walk through of this area showed many lead bullets covering the sand dunes. There is also an ammunition storage area located on the beach near range 3. Amphibious training took plce at Fort Ord in the early 1940's, which would have occurred at the beach. Also, a 1947 map shows a much larger range fan extending from the coast out over the ocean than present maps.

ACREAGE ESTIMATES

Listed below are the acreage estimates for the above mentioned sites.

Site	Approximate Acreage
1	7
2	25
3	10
4	20
5	30
6	2
7	4

8	2
9	2
10	275
11	15
12	50
13	225, 30
14	500+
15	7500+
16	50
17	10-15
18	15
19	10-20
20	6+
21	15-20
22	915+

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Fort Ord

NPL, Base Closure 1991

Marina, California

Size: 28,039 acres (27,287 acres excess)

Mission: Formerly housed the 7th Light Infantry Division undergoing transition to support the Defense Language Institute currently at the Presidio of Monterey, California

HRS Score: 42.24; Placed on NPL in February 1990

IAG Status: Federal Facility Agreement signed in July 1990

Contaminants: VOCs, petroleum hydrocarbons, heavy metals, and pesticides

Media Affected: Groundwater and soil

Funding to Date: $63.2 million

CLEANUP BACKGROUND

Since 1917, Fort Ord has served primarily as a training and staging installation for infantry units. In July 1991, the BRAC Commission recommended that Fort Ord be closed and that the 7th Infantry Division be moved to Fort Lewis.

In FY87, a hydrogeological investigation identified the sanitary landfills at Fort Ord as potential sources of contamination for the city of Marina's backup drinking water supply well. In FY89, Remedial Investigation and Feasibility Study (RI/FS) activities were initiated for the landfills. In FY90, a Preliminary Assessment and Site Inspection (PA/SI) identified 61 sites at the installation. Site types include landfills, 200 Underground Storage Tanks (UST), motor pools, housing yards, a fire training area, an 8,000-acre impact area, and explosive ordnance disposal areas. Petroleum hydrocarbons and VOCs have migrated to groundwater.

Interim Actions at the installation have concentrated on removing limited areas of petroleum-contaminated soil. The installation has also completed a time-critical Removal Action involving the removal of 40 buried drums.

An installation-wide RI/FS was initiated in FY90. The Army accelerated site cleanups through the use of a hydropunch system for groundwater sampling. This process eliminated extensive drilling and installation of groundwater monitoring wells. Other acceleration techniques included use of mobile laboratory standard guidelines for field investigations to decrease the time spent on determining the number of soil samples necessary.

The installation also standardized the technology screening process. A "rolling Remedial Investigation" process was developed that allows a RI Phase II study to begin without the actual completion of the RI Phase I study. RI/FS activities for the installation have been completed one year ahead of schedule.

In FY93, the RI/FS activities for the landfills were completed. The installation worked closely with the EPA to complete a "plug in" no further action Record of Decision (ROD) which will streamline the cleanup process.

FY94 CLEANUP PROGRESS

In February, the Restoration Advisory Board (RAB) was formed. Members of the RAB were selected from various affected communities. The BRAC Cleanup Team (BCT) gave a series of workshops to orient RAB members to the RI/FS process and to acquaint them with the sites.

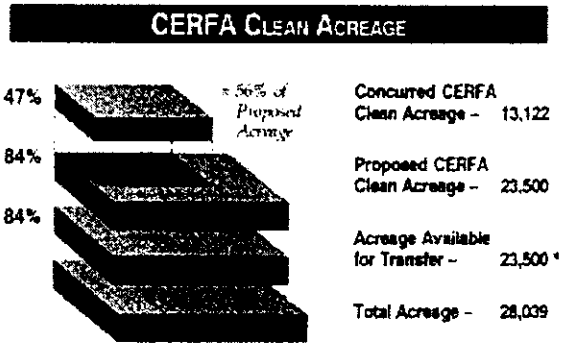
The decision-making process has been improved through distributing data summary packages before partnering meetings to allow regulatory agencies the time to review information in advance. Also, project managers from EPA and the state regulatory agency work exclusively on the installation cleanup. All regulatory agencies have been involved from the beginning in developing the work plans, particularly for the Ecological Risk Assessment.

In March , an interim ROD was completed and approved by the regulatory agencies. The ROD addresses areas of soil contamination at the installation through excavation, treatment, and disposal. In addition, the landfill ROD was signed by the regulatory agency and the Remedial Design was initiated. The draft installation-wide RI/FS was completed. The installation also completed the CERFA evaluation which identified 44 percent of the installation's property as being eligible for transfer and reuse.

An Interim Action involving the removal of about 4,000 cubic yards of contaminated soil for bioremediation at the Fritzsche Army Air Field Operable Unit (OU) was completed. Bioremediation of soil is being used at other sites at the installation.

PLAN OF ACTION

- Initiate cleanup for sites identified in base-wide RI/FS in FY96
- Begin groundwater extraction and treatment systems at landfills in FY95
- Sign a no action ROD for 18 sites and a ROD for the Fritzsche Army Air Field OU in mid FY95
- Submit an installation-wide ROD in FY96



* Environmental Condition of Property Categories 1-4

Fort Ord

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IAG Status:	Federal Facility Agreement signed in July 1990
Contaminants:	VOCs, petroleum hydrocarbons, heavy metals, and pesticides
Media Affected:	Groundwater and soil
Funding to Date:	$85.6 million

Estimated Cost to Completion (Completion Year): $181.6 million (FY50)

[Restoration Background] [FY95 Restoration Progress] [Plan of Action]

Restoration Background

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Interim actions at the installation have concentrated on removing limited areas of petroleum-contaminated soil. The installation has also completed a time-critical Removal Action involving the removal of 40 buried drums.

An installation-wide RI/FS was initiated in FY90. The Army accelerated site cleanups by using a hydropunch system to sample groundwater. This process eliminated extensive drilling and installation of groundwater monitoring wells. Other acceleration techniques included the use of mobile laboratory standard guidelines for field investigations. This approach decreased the time required to determine the number of soil samples needed.

The installation also standardized the technology screening process and developed a "rolling" RI process that allows a Phase II RI study to begin before actually completing the Phase I RI study. RI/FS activities for the installation have typically been completed 1 year ahead of schedule.

In FY94, a Restoration Advisory Board (RAB) and BRAC Cleanup Team were formed. An Interim Record of Decision (ROD) was completed to address areas of soil contamination through excavation, treatment, and disposal.

FY95 Restoration Progress

The installation held monthly RAB meetings. Outreach meetings were held in nearby communities to provide the public with information about the RAB and ongoing environmental restoration activities. A Community Relations Plan is being developed for the unexploded ordnance Removal Actions to ensure that information regarding the restoration process will be readily available to all concerned parties.

The installation-wide RI/FS was completed. RODs designating no further action were completed for eight sites. The facility was unable to complete no-action RODs for 18 sites as originally planned because: 1) some sites were not approved by the regulatory agencies for no further action; 2) the installation is still awaiting regulatory approval for some sites; and 3) issues at some sites need to be addressed before those sites can be approved. Forty acres involved in the transfer of 10 reuse parcels need further action. Interim actions at 10 sites included excavation of more than 4,000 cubic yards of soil contaminated with petroleum, metals, and pesticides. The installation began on-site treatment of the contaminated soil and plans to use the treated soil as fill material in the closure of the Fort Ord landfill. In addition, a groundwater treatment system was constructed for the Fort Ord landfill. A ROD was completed for the Fritzsche Army Air Field Operable Unit.

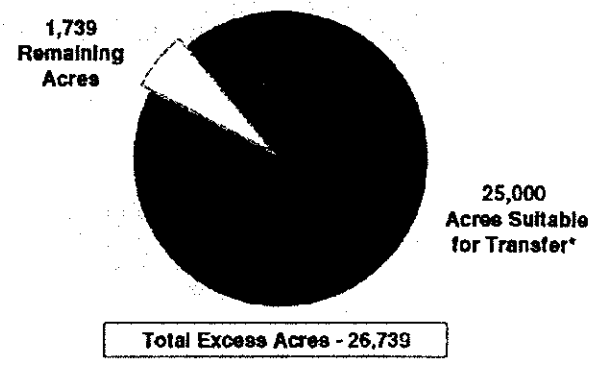
The installation conducted a pilot study at discrete sections of the Beach Trainfire Ranges. Field activities included removing more than 1,000 cubic yards of lead-contaminated soil, screening and treating screened soil to remove spent ammunition, and revegetating, regrading, and restoring dunes along the beach ranges. More than 50 cubic yards of spent ammunition were removed from site soils. Screened soils were treated on site in a mobile treatment unit.

In conjunction with the U.S. Fish and Wildlife Service (USFWS) and other concerned parties, the installation developed and implemented a Habitat Management Plan. This effort was conducted as part of the disposal and reuse Environmental Impact Statement to ensure protection of threatened and endangered species.

Plan of Action

- Draft Proposed Plan and installation-wide ROD for remedial investigation FY96
- Begin construction activities to cap landfills and continue operation of the groundwater treatment system in FY96
- Complete remaining interim actions in FY96
- Complete in a joint effort with USFWS to assess the effects of installation activities on Monterey Bay in FY97
- Transfer property parcels for reuse to the Bureau of Land Management and the Monterey Institute for Research in Astronomy in FY96

Property Environmentally Suitable for Transfer



*Acres suitable for transfer are those properties that fall into Environmental Condition of Property Categories 1-4 based on an EBS.

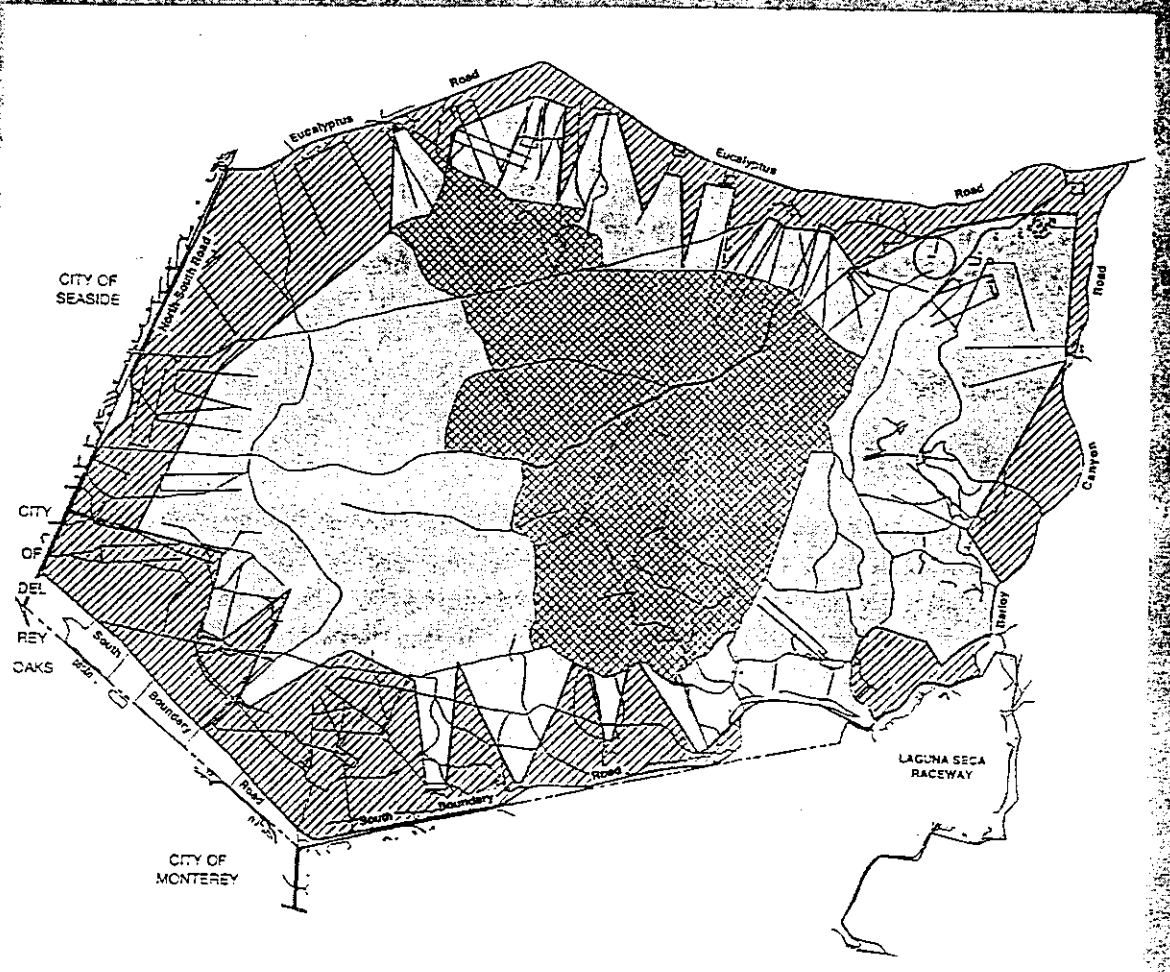
Appendix A Table of Contents | Volume 2 Table of Contents

Site Use Management Plan

for Land Transfer and Reuse of the

Multi-Range Area

Fort Ord, California



Prepared by:

U.S. Army and U.S. Department of Interior
Bureau of Land Management

July 1995

-Introduction

I am here today to talk about a cooperative effort between the Army, the Bureau of Land Management, the U.S. Army Corps of Engineers, Jones & Stokes Associates (my employer), and others to produce a Site Use Management Plan (or SUMP) for a deactivated training range at former Fort Ord. The outcome of this effort is that Ordnance and Explosive Waste clearance (OEW clearance) at Fort Ord will be effectively coordinated with proposed reuse of the property, and the Army will not be required to clear OEW from a significant portion of the range prior to transfer to another agency.

I would like to take this opportunity to acknowledge one of the authors of the SUMP, Dan McMindes from the U.S. Army Corps of Engineers, Sacramento District who put a significant amount of effort into the document but cannot be here today.

- Location / Setting

Slide - Regional Location

Fort Ord is a former Army installation located along the Pacific Ocean in northern Monterey County, California, approximately 100 miles south of San Francisco. The installation covers approximately 28,000 acres adjacent to the Monterey Bay. Surrounding local jurisdictions include Monterey County and the cities of Monterey, Marina, Seaside, Del Rey Oaks, and Sand City.

- History

Fort Ord was created in 1917 as Gigling Reservation. The reservation was renamed Camp Ord in 1933 and was used to drill the 11th Cavalry. In 1940 the 7th Infantry Division was stationed at the renamed Fort Ord, instigating an increase in facilities construction and training activity. During World War II, Fort Ord was again expanded and during the Korean War it was used as a basic and advanced training facility. The installation continued to be used for housing and training of troops, including the 7th Infantry Division (Light), until its closure in the early 1990s.

Slide - Map of the Location of the Multi-Range Area

In the southwest portion of former Fort Ord is the Multi-Range Area (MRA). The MRA covers approximately 8,000 acres and has been used in various capacities throughout Fort Ord's

history for live fire training exercises. Currently, the MRA contains over 30 ranges generally organized with firing points located along the perimeter roads and with target areas oriented toward the center of the MRA.

An Ordnance and Explosives Waste (OEW) Archives Search Report (ASR) describes the occurrence of OEW in the MRA. The MRA is known to have a wide variety of OEW with a highly varied spatial distribution.

Slide - Table with Ordnance on it

The MRA reportedly had been used since the early 1900s for ordnance training exercises, including offshore naval gunfire. Over the years, various types of ordnance have been used or found in the MRA, including hand grenades, mortars, rockets, mines, artillery rounds, and small arms rounds.

Slide - MRA Landscape; Western Side showing a hand grenade range

To give you an idea of the general conditions on the MRA, the western and central portions of the facility consist of low, rolling hills vegetated primarily with a low growing maritime chaparral community (a shrub community).

Slide - MRA Landscape; Eastern Side showing a range

In the eastern portions of the MRA, the terrain is more rugged. Hills were used as targets or backstops at many of the ranges. Vegetation is also dominated by maritime chaparral; however, the variety in this portion of the facility is typically more dense and grows to a greater height.

Both the maritime chaparral communities described are considered rare habitats and support several threatened, endangered, and rare species.

- BRAC mandate

Slide - Old Buildings

In 1991 the Department of the Army was directed to close Fort Ord under the 1991 BRAC. The Army determined that after the closure of Fort Ord, it would retain a POM annex to provide support to the Presidio of Monterey, and a small Reserve Center, leaving approximately 26,500 acres available for disposal.

In 1993 an Environmental Impact Statement for Disposal and Reuse of Fort was published. The associated Record of Decision then identified an anticipated reuse alternative based on the real estate screening process, local reuse planning, and market factors.

Slide - HMP Cover

As mitigation for impacts to biological resources associated with disposal and reuse of former Fort Ord, an Installation Wide Multi-Species Habitat Management Plan (or HMP) was prepared. The HMP also addresses predisposal actions such as OEW removal. The HMP provides guidelines for resource conservation, restoration, and monitoring both for the Army during predisposal actions and for specific land recipients during reuse.

- Goals for Future Use of Space

- Slide, closeup of MRA with Alternative 6Rm land uses

This slide shows uses included in the Record of Decision proposed for the MRA after disposal. Anticipated uses have recently been modified compared to those on this slide; however, the overall type and placement of uses have not changed substantially.

Most of the MRA will be transferred to the Bureau of Land Management (BLM) to be used as a natural resource management area with habitat preservation and management requirements as well as supporting recreational uses with controlled public access.

Other uses include a proposed recreational expansion area to be used for expansion of the Laguna Seca Raceway and additional parking during race events; a future highway realignment; light industrial use, school athletic facilities, and transportation corridors.

Parcels along the periphery of the MRA are proposed for business parks, office complexes, open space, and hotel sites.

- Problem (challenge)

Slide - Dud/Impact Area Sign

Once a reuse scenario was identified for the MRA, the challenge became determining a way to coordinate cleanup of the OEW with proposed activities after reuse, so that removal would be as efficient and cost-effective as possible while making areas safe for anticipated future uses.

Slide - Range Tower

This was especially important for BLM's natural resource management area as it covered the largest portion of the MRA (approximately 7,000 acres) and had the most flexibility in placement of uses.

- Solution (SUMP)

Objectives/Criteria

In April of 1995 the U.S. Department of the Army and BLM signed a memorandum of understanding that outlined the terms and conditions for the transfer of property at former Fort Ord. The memorandum required development of the Site Use Management Plan (SUMP) for the MRA.

-Slide of Purpose of the SUMP - MENTION DISCLAIMER FOR MISTAKES

The SUMP, as required by the MOU, has several purposes, including;

Delineating areas of high, medium and low OEW occurrence.

Within areas of medium or low OEW occurrence, identifying

- areas to be routinely occupied by BLM personnel, and
- the locations of maintenance roads, firebreaks suitable for use by motor vehicles, and footpaths.

Within areas of high OEW occurrence, identifying

- areas where OEW removal is cost prohibitive, and
- appropriate uses for high OEW occurrence areas

Remain consistent with the Multi-Species Habitat Management Plan.

Approach

Development of the SUMP was an iterative process, with several versions developed and reviewed by a team on a regular basis. Team members included;

- Slide of SUMP Team Members

U.S. Bureau of Land Management
U.S. Army Corps of Engineers, Sacramento District (the contracting office)
Presidio of Monterey
U.S. Army Corps of Engineers, Huntsville Division (OE removal contracting office)
U.S. Army Training and Doctrine Command (TRADOC)
Jones & Stokes Associates, Inc.(technical assistance and GIS mapping data)

The following are the key elements of the process used to develop the SUMP.

-Slide of Process for Developing the SUMP

Assemble the SUMP development team.

Obtain agreement on goals, methods, and schedule for the SUMP.

Collect existing data (OEW occurrence and density, GIS mapping data)

Meet on a regular basis to develop, review, and modify iterative drafts.

Invite comments from outside sources (Fort Ord Restoration Advisory Board and FORA).

- Status/Results

Slide - All Three Areas

One of the outcomes from the SUMP was the division of the MRA into four classifications of areas based on the density of OEW expected and expected future uses. These areas were identified as Unrestricted and Unrestricted BLM (joined together on this slide); Limited Access; and Restricted/Administration. The approximate distribution and density of OEW generally correlates with these use types (low density - unrestricted, medium density - limited access, high density - restricted/administration).

Determinations of low, medium, and high density were based on information gathered from the Archive Search Report, a visual inspection, and the Fort Ord basewide remedial investigation/feasibility study.

The boundaries defining these areas represent a rough estimate and may change based on future investigations. Any changes that do occur will be made based on agreement between the Army and BLM at the local level. Final standards for OEW clearance depth, based on future land use, will be approved by the Department of Defense Explosive Safety Board.

Slide - Unrestricted Areas

Unrestricted

These areas are on the perimeter of the MRA and are typically at or behind the firing points. They are located within the MRA but outside the lands to be transferred to BLM. Public access will be unrestricted upon clearance of ordnance. Anticipated future uses include urban, recreation, and transportation developments as described previously.

Unrestricted/BLM

These areas are in the same unrestricted zone, but will be transferred to BLM. Use will be unrestricted for BLM personnel.

Anticipated future uses include but are not limited to:

- construction of facilities (e.g., trail heads, signage, restrooms),
- habitat restoration (including the potential use of heavy equipment to reestablish natural contours), and
- maintenance of access routes (e.g. trails, roads, and fire roads used by BLM staff and the public)

Slide - Limited Access Areas

Limited Access

These areas are located within the core of the MRA but will be cleared to a level safe for only specific uses. They generally include old range areas, range safety fans, and other areas outside the high-impact area.

These areas will be cleared of OEW sufficient to permit pedestrian and other nonmotorized access. An existing system of fire roads and firebreaks will be cleared to a sufficient standard to allow annual maintenance with heavy equipment. These areas may be transferred with use restrictions that prohibit any surface disturbance or excavation outside the established system of fire roads and trails.

Anticipated future uses will not include new facilities. Signs and published use restrictions will be used to encourage the public to remain on the established trail system and to discourage public lingering and/or loitering in these areas beyond the time needed to traverse the trails. Future uses will include:

- recreation access (mountain bike, equestrian, and pedestrian use of a designated trail system),
- habitat restoration (BLM staff and cooperating agency personnel will conduct biological monitoring on foot at fixed transects throughout the area and apply herbicides to control non-native plants).

Slide - Restricted/Administrative Areas

Restricted/Administrative

The Restricted/Administrative areas are the primary target areas, where the density or hazard of OEW is expected to be greatest. Because of the presence, type, and quantity of OEW on the property, the Army and BLM agree that some areas may not be cleared. Clearance of these areas is currently considered cost prohibitive. However, if new technology allows further clearance actions in a cost effective manner, the Army and BLM would jointly seek funding for future clearances.

These areas will be off-limits for use by the public and restricted to use by BLM and cooperating agency staff who have been trained in OEW identification. The Army will construct an 8-foot-tall chain-link fence topped with barbed wire around the area. The fence will be maintained by BLM. A system of fire roads and firebreaks will be cleared within this area to allow access for fire suppression, controlled burning, habitat management and monitoring, and exotic weed control.

The restricted area will be bisected by a fire road/trail that will be open to public access. Both sides of this fire road/trail will be fenced as described above.

- Future

With the SUMP complete it will continue to be reviewed periodically and updated as necessary. As the plan is implemented the following sequence of events is expected to occur prior to transfer of MRA lands;

Slide - Transfer Sequence, Repeat Disclaimer for Mistakes

A. The Army will clear a system of existing trails, fire roads, and firebreaks.

B. The Army will fence the high-density area following existing roads.

C. The Army will retain the entire MRA until clearances are performed in accordance with the reuse scenarios described in this document.

D. The clearances will be completed within 5-10 years (depending on schedules and funding).

E. The Army will complete the habitat restoration requirements for disturbed areas before transfer. The transfer may occur before the Army habitat monitoring requirements are completed.

F. The transfer of the MRA to the BLM, including the fenced, high-density impact area, will occur upon completion of the Army's response actions to OEW.

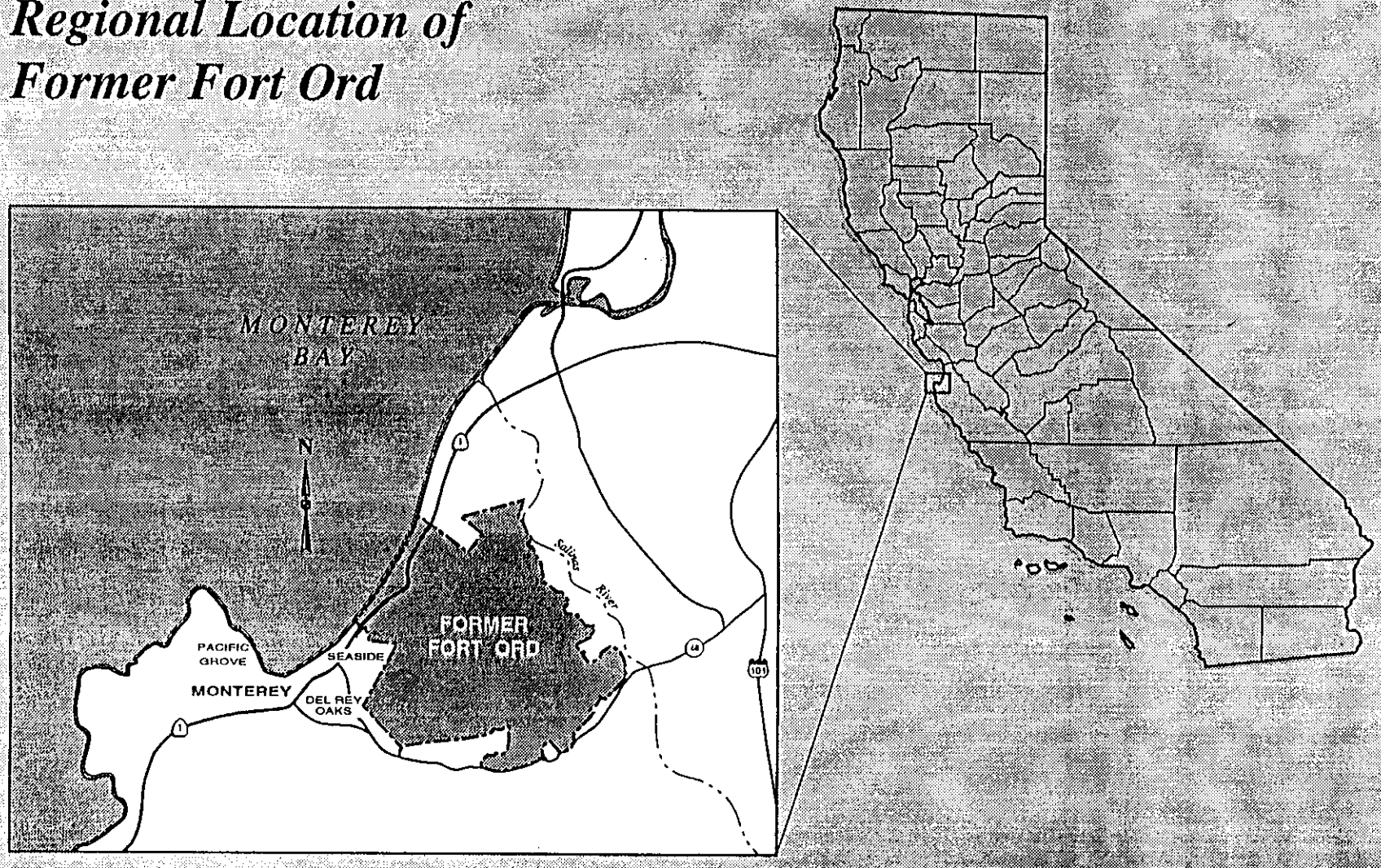
- Conclusion

Slide - Hand Grenade Range

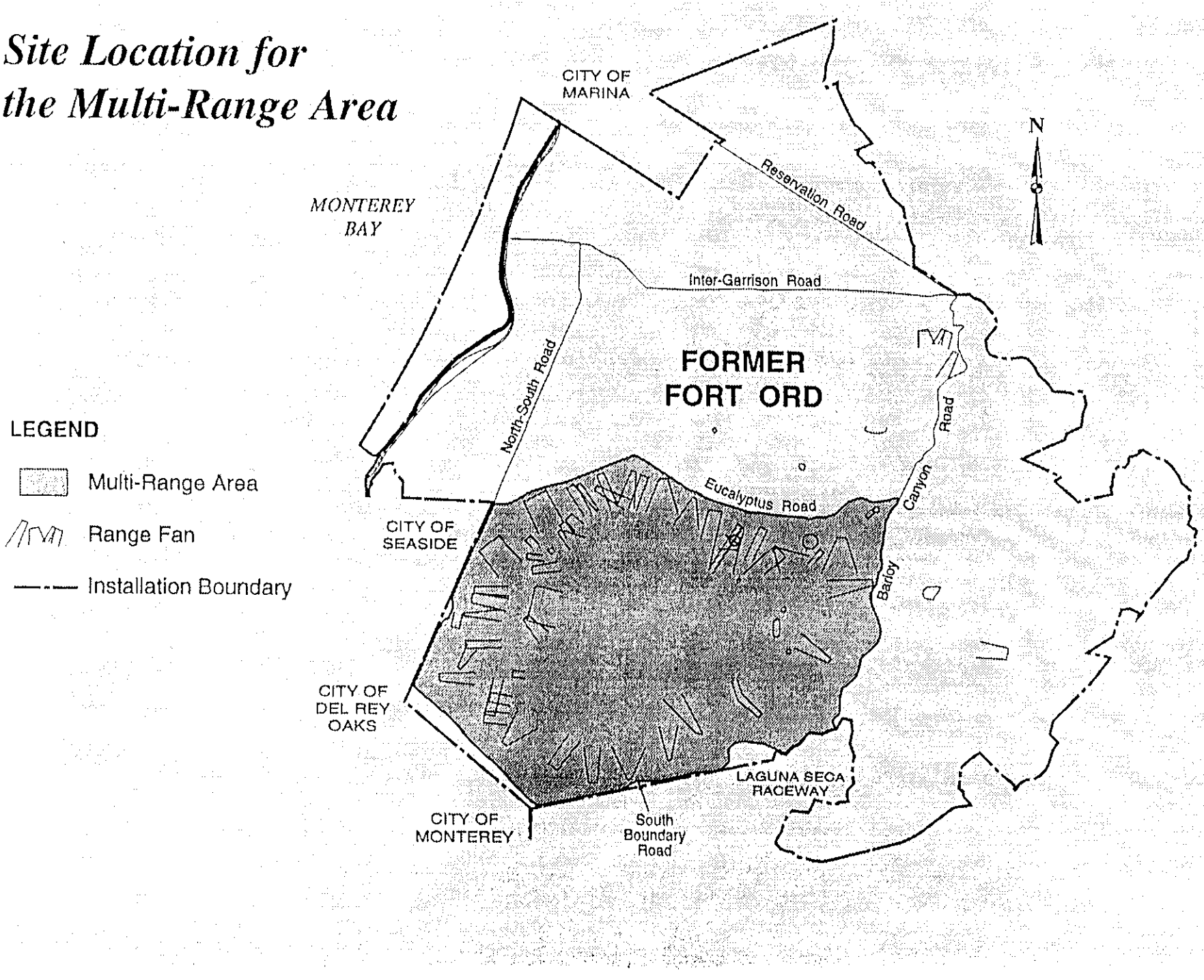
Upon completion of this last step the Army will be permitted to transfer the Restricted/Administration Areas while OEW is still present.

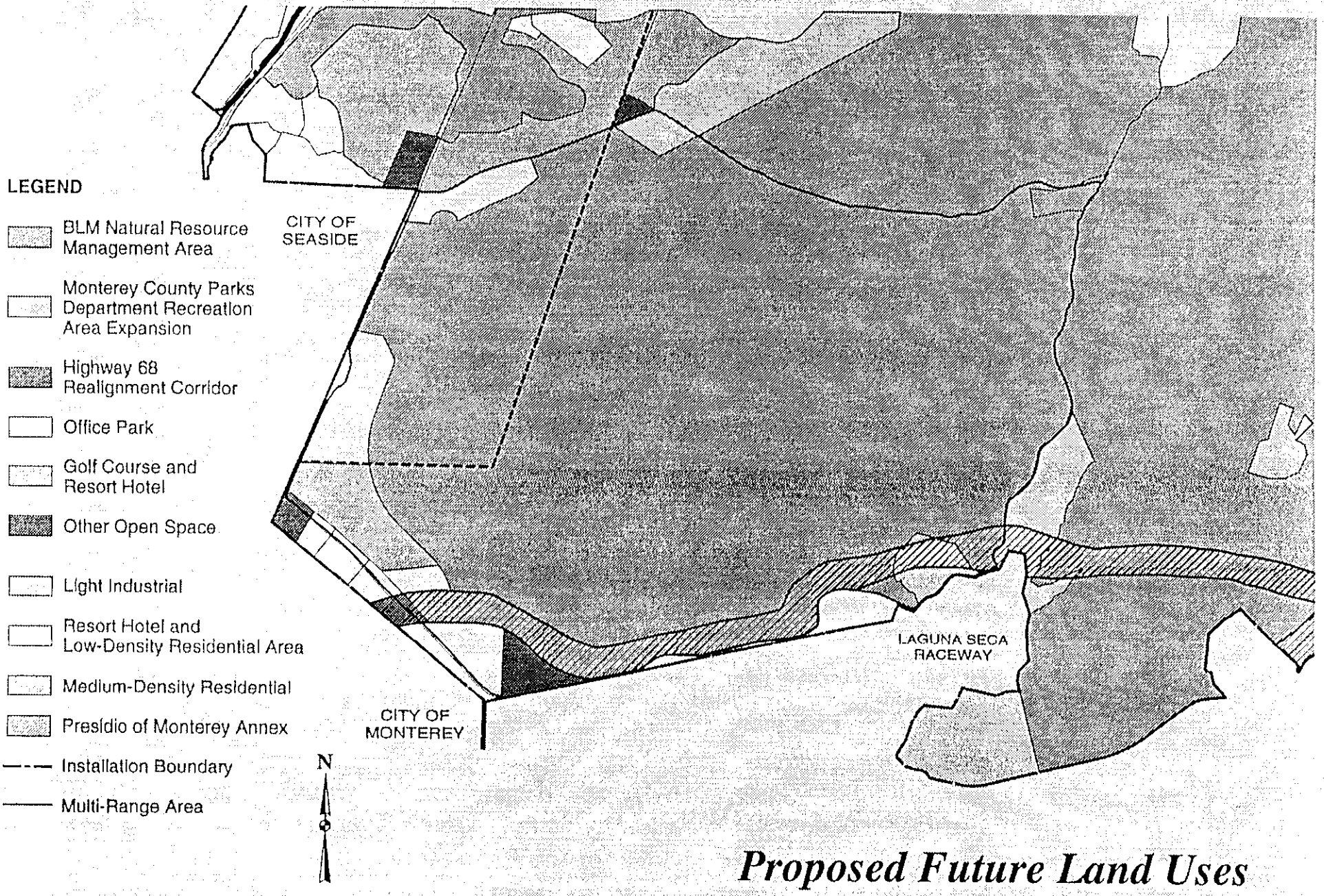
Shows what can occur when there is cooperation between sister federal agencies (BLM and Army)
Acknowledgment that saving any federal dollars is valuable
Cooperation between multiple agencies is possible when pre-agreed upon goals are determined
Determining uses which can coexist relatively easily with the presence of OEW greatly streamlines the process

Regional Location of Former Fort Ord

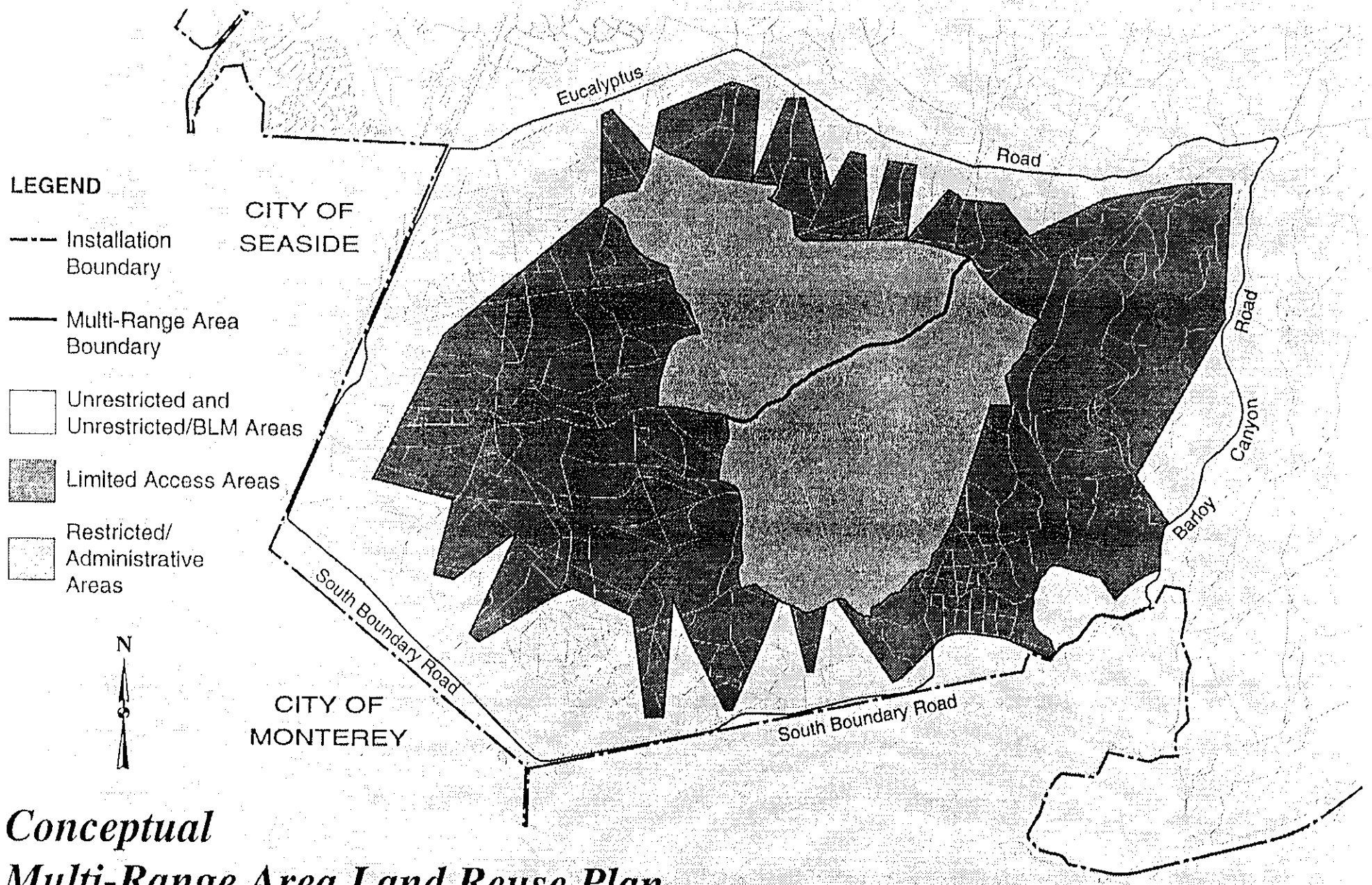


Site Location for the Multi-Range Area

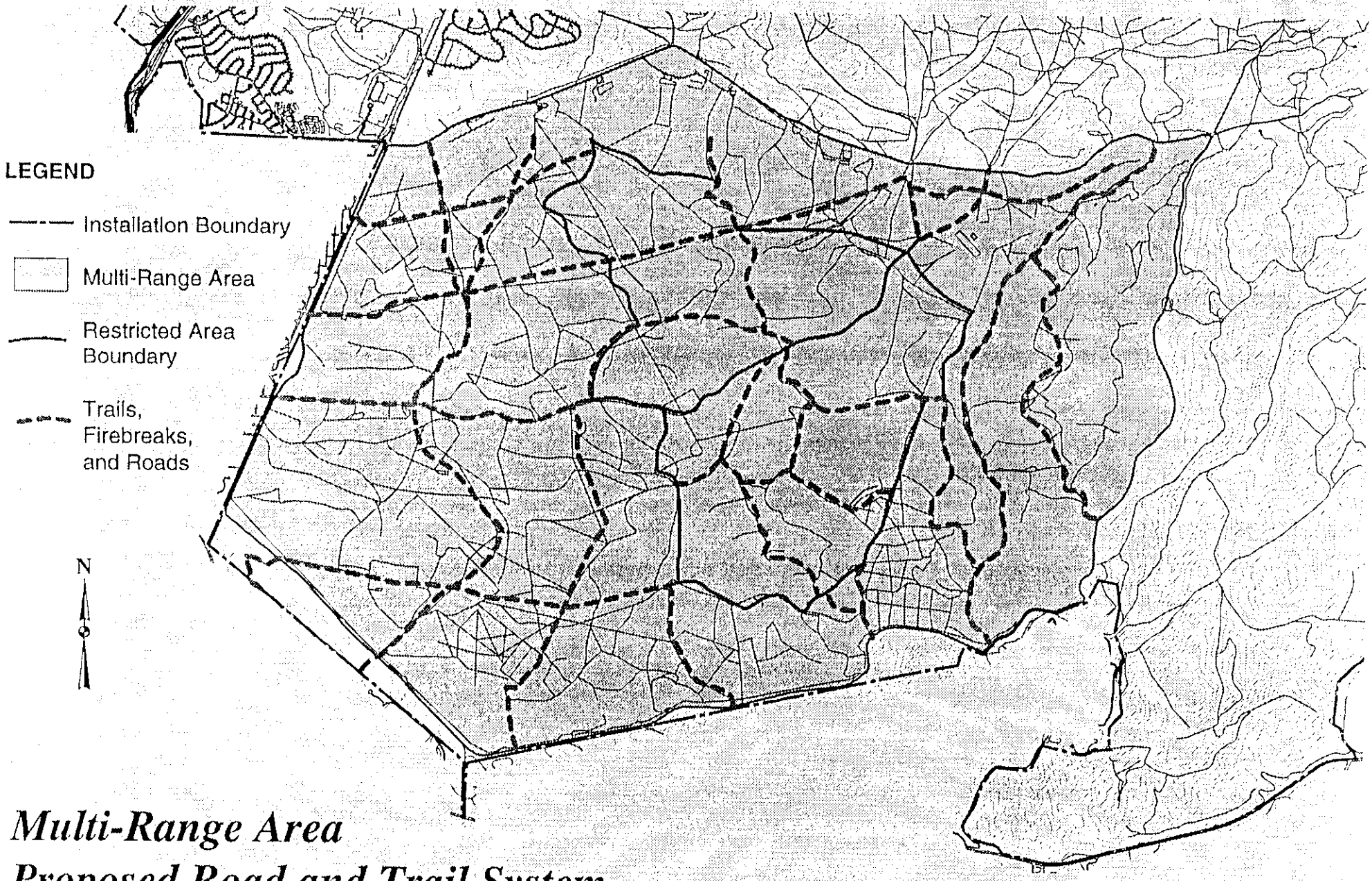




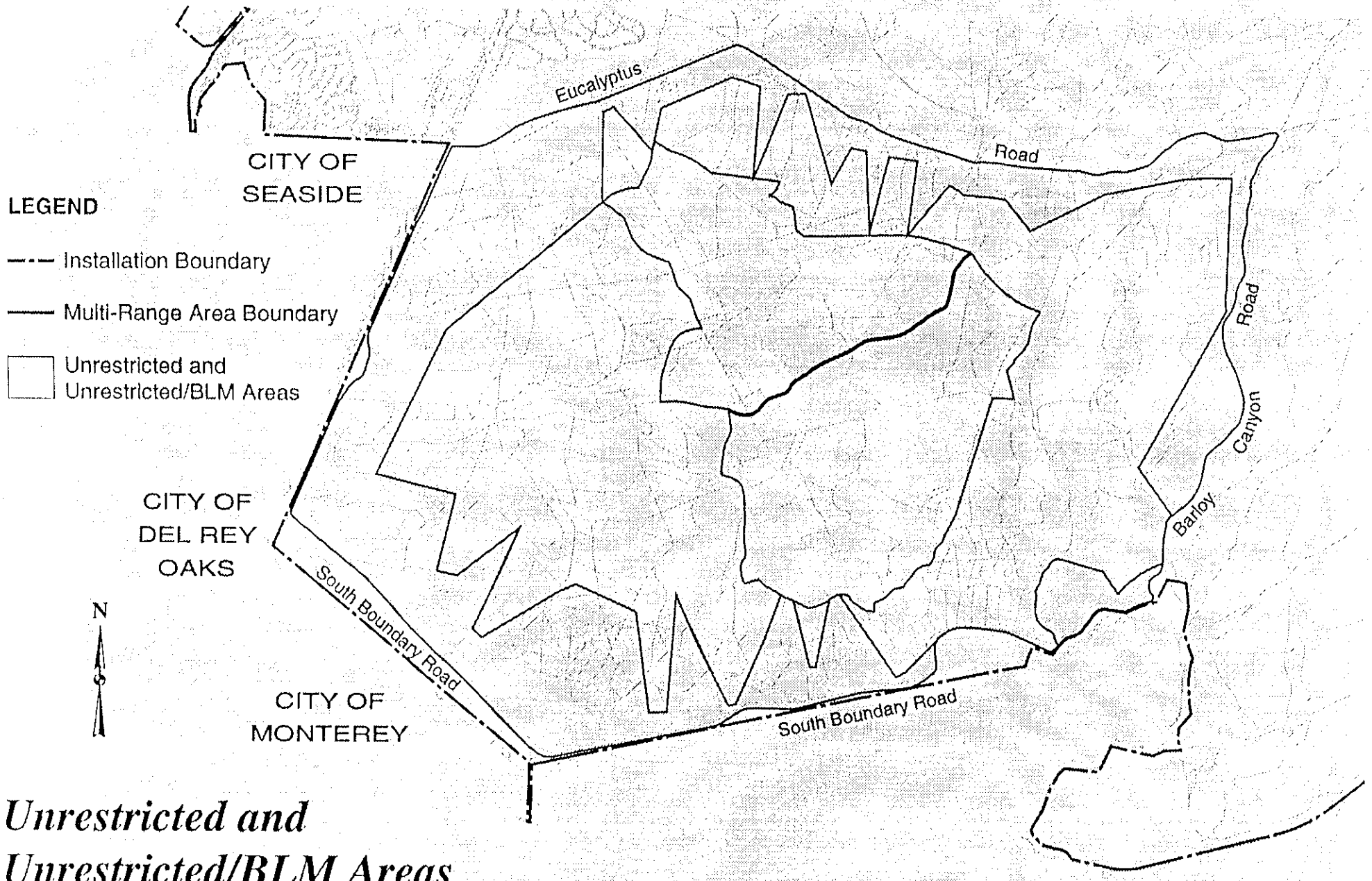
Proposed Future Land Uses



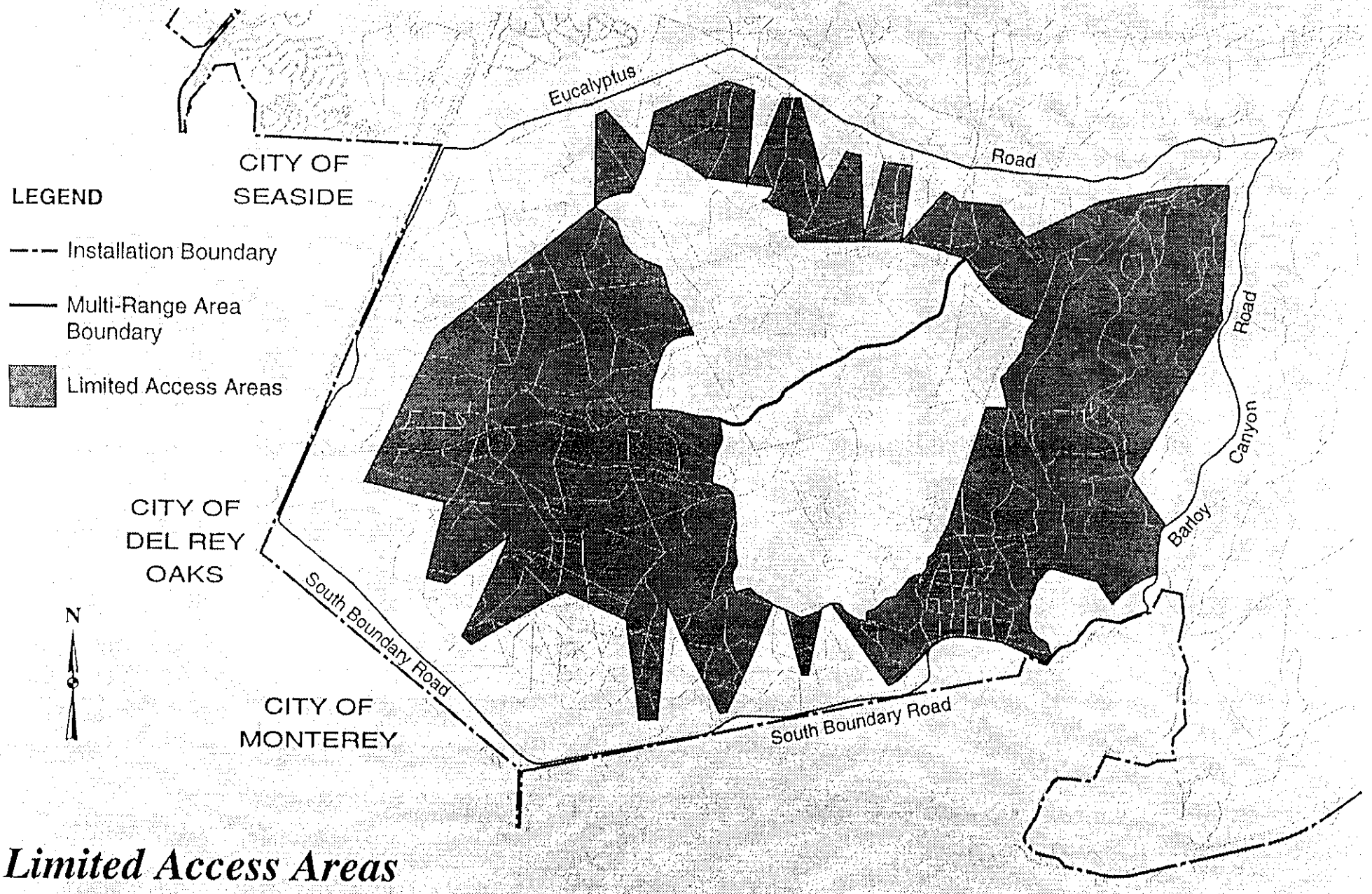
Conceptual Multi-Range Area Land Reuse Plan



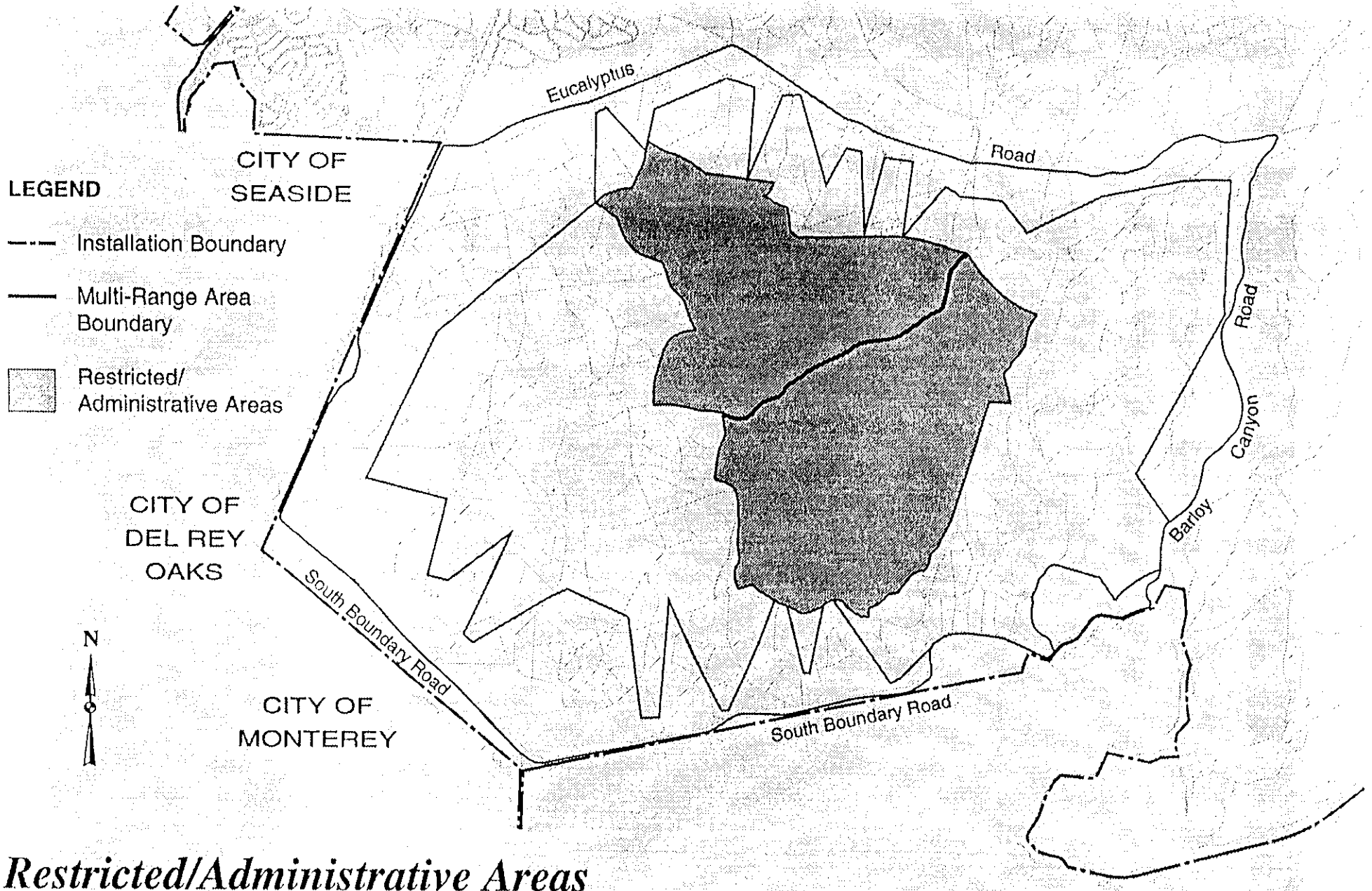
Multi-Range Area
Proposed Road and Trail System



Unrestricted and Unrestricted/BLM Areas



Limited Access Areas



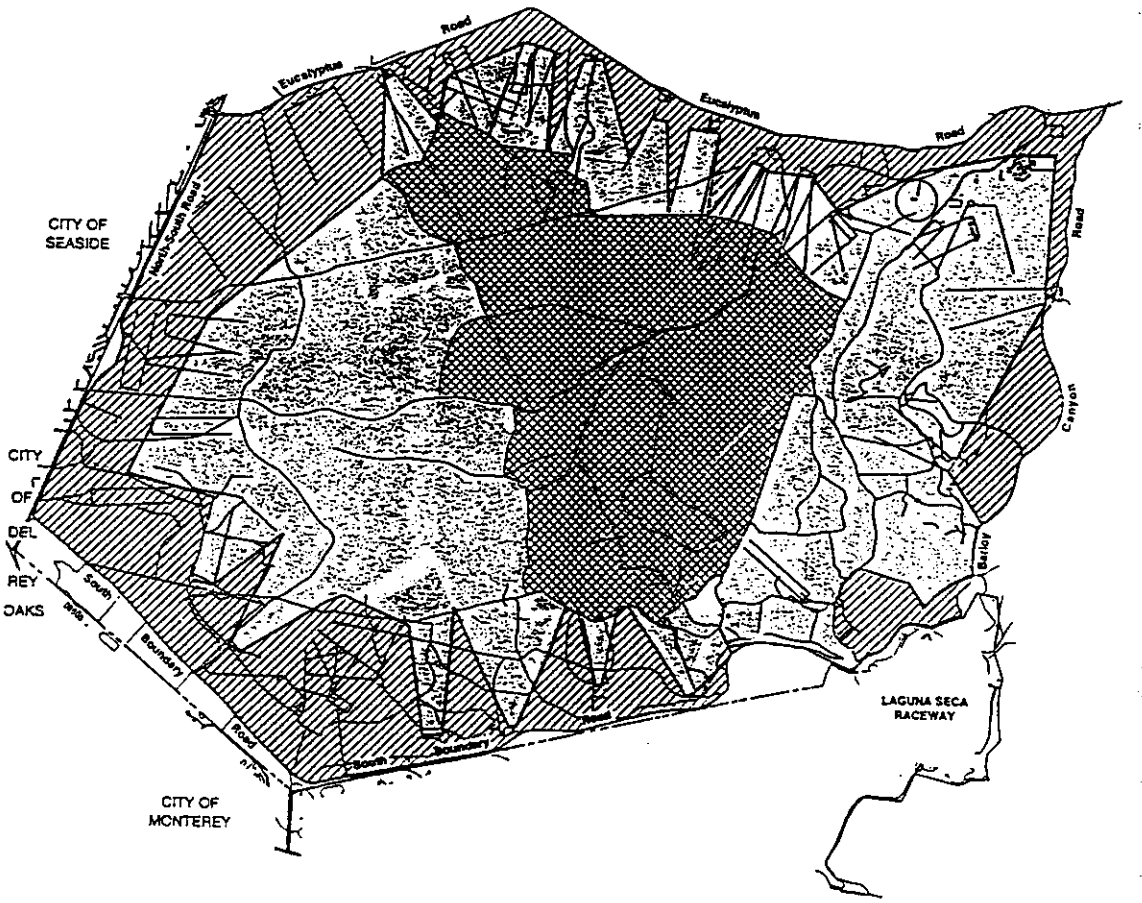
Restricted/Administrative Areas

Site Use Management Plan

for Land Transfer and Reuse of the

Multi-Range Area

Fort Ord, California



Prepared by:

U.S. Army and U.S. Department of Interior, Bureau of Land Management

July 1995

Site Use Management Plan for Land Transfer and Reuse of the Multi-Range Area in Former Fort Ord, California

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July 25, 1995

This document should be cited as:

U.S. Army Corps of Engineers and U.S. Bureau of Land Management 1995. Site use management plan for land transfer and reuse of the multi-range area in former Fort Ord, California. July 25, 1995. Sacramento, CA, and Hollister, CA. (JSA 95-134.) Sacramento, CA. Prepared for U.S. Army Corps of Engineers, Sacramento, CA.

Editorial and mapping assistance from Jones & Stokes Associates, Inc.

Table of Contents

List of Plates

Follows report

2.0 SITE DESCRIPTION

This section describes the site location and description (Section 2.1), the occurrence of ordnance and explosive waste (OEW) (Section 2.2), and the surrounding area (Section 2.3).

2.1 Site Location and Description

The MRA, including ranges 18 through 48, comprises approximately 8,000 acres located in the southwestern portion of former Fort Ord. The MRA is bounded by Eucalyptus Road to the north, Barloy Canyon Road to the east, South Boundary Road to the south, and North-South Road to the west. Ranges are generally organized with firing points located along the perimeter roads and with target areas oriented toward the center of the MRA (Plate 1).

The western and central portions of the MRA consist of low, rolling hills and closed depressions; the ground surface generally slopes to the west and northwest throughout most of the area. In the eastern portions of the MRA, the terrain is more rugged and consists of ridges rising up to 600 feet above the canyon bottom. Elevations range from approximately 900 feet above mean sea level (msl) in the southeast to approximately 200 feet above msl in the southwest. The ground surface between the firing lines and the targets is generally flat. Hills were used as targets or backstops at many of the ranges.

Approximately 7,000 acres of the MRA fall within the natural resource management area designated in the HMP. The remaining portion has been slated for urbanized redevelopment under the Fort Ord Base Reuse Plan.

2.2 Occurrence of Ordnance and Explosive Waste

OEW may include the following materials: bombs and warheads; guided and unguided ballistic missiles; artillery, mortar, and rocket ammunition; small arms ammunition; antipersonnel and antitank mines; demolition charges; pyrotechnics; grenades; containerized or uncontainerized high explosives and propellants; and similar or related items designed to cause damage to personnel or material. UXO is a subset of OEW that consists of unexploded bombs, warheads, artillery shells, mortar rounds, and chemical weapons.

The Fort Ord OEW Archives Search Report (ASR) describes the occurrence of OEW in the MRA (ASR Site 15). The MRA is known to have a wide variety of OEW with a highly varied spatial distribution. The MRA reportedly had been used since the early 1900s for ordnance training exercises, including offshore naval gunfire. Over the years, various types of ordnance have been used or found in the MRA, including hand grenades, mortars, rockets, mines, artillery rounds, and small arms rounds. Data summarizing the use of each of the ranges appear in the Basewide Remedial

Investigation/Feasibility Study, Fort Ord, California. The approximate distribution and density of UXO/OEW generally correlates with the type of future land use as depicted on Plate 3 (low density - unrestricted, medium density - limited access, high density - restricted/administration). Determinations of low, medium, and high density are based on information gathered from the ASR, a visual inspection, and the Fort Ord basewide remedial investigation/feasibility study.

2.3 Description of Surrounding Area

The western portion of the MRA is delineated by the boundary between former Fort Ord and the Cities of Seaside and Del Rey Oaks. The southern portion is delineated by the boundary between former Fort Ord and the Cities of Monterey and Del Rey Oaks and the Laguna Seca Raceway. Within former Fort Ord, the MRA is adjacent to military housing and undeveloped areas.

Former Fort Ord facilities within 4,000 feet of the MRA include military housing and community buildings, a school, a church to the northwest, and the former range control complex (currently occupied by BLM) within the MRA.

Situated outside former Fort Ord, but within 4,000 feet of the MRA, are portions of the Cities of Seaside, Del Rey Oaks, and Monterey. Facilities include the Monterey Peninsula Airport, Ryan Ranch Business Park, Laguna Seca Golf Course, Laguna Seca County Park and Raceway, and residential communities.

3.0 FUTURE LAND USE

This section describes the future land use for the Fort Ord MRA. The site use descriptions (Section 3.1) will be used to determine the Army requirements for transfer of the property. Schedules for clearance and release (Section 3.2) were developed to reflect the targeted completion dates for Army requirements. Section 3.3, "Future Documents and Plans", addresses the continuing responsibilities of BLM and the Army.

Anticipated future owners of land within the MRA are identified in the Fort Ord Base Reuse Plan, December 1994. The following is a list of these anticipated future owners (Plate 2):

A. BLM: Most of the MRA will be used as a natural resource management area with controlled public access.

B. Fort Ord Reuse Authority (Cities of Seaside and Del Rey Oaks): Parcels within, but along the periphery of, the MRA are proposed for business parks, office complexes, and hotel sites.

C. Monterey County Parks Department: Proposed recreational expansion to include additional parking space and the expansion of Turn 11 for Laguna Seca Raceway in the southeastern portion of the MRA.

D. York School: A parcel along the southern boundary of the MRA is identified for expansion of the existing school. The boundary shown for this parcel is based on the Public Benefit Conveyance Request received from the Federal Department of Education. The expansion is anticipated to include a cross-country track and playing field.

E. Monterey Peninsula Recreation and Park District: Areas have been identified for use as parks and open space.

F. California Department of Transportation: A parcel within, but along the southern perimeter of, the MRA is identified for the future realignment of Highway 68.

G. Monterey County: The parcel is proposed for light industrial use.

H. Monterey County: A transportation corridor will be designated to accommodate a new multilane road to connect Highway 68 with the former Fort Ord cantonment area.

3.1 Site Use Descriptions

BLM's primary management objective within the MRA is to protect and enhance natural habitats in accordance with the HMP. Compatible recreation uses will be accommodated. The following site use descriptions represent current expectations for future public and administrative uses within the MRA. In addition, Plate 3 visually depicts these areas. The definitions for the various areas are based on archival research and visual reconnaissance only. The boundaries defining these areas represent a rough estimate and may change based on future investigations. Any changes that do occur will be made based on agreement between the Army and BLM at the local level. Final standards for UXO clearance depth, based on future land use, will be approved by the Department of Defense Explosive Safety Board.

A. U - Unrestricted

Public access will be unrestricted upon clearance of ordnance. These areas are on the perimeter of the MRA and are typically at or behind the firing points used by military personnel during active use of the former Fort Ord. These areas are within the MRA but outside the lands to be transferred to BLM (Plate 2).

These areas will be cleared of UXO following the same standards applied to other parcels designated for development. They will be transferred with the same use restrictions that are being applied to development parcels outside the MRA.

Anticipated future uses include but are not limited to:

- urban development (e.g., business parks, office complexes, and hotel sites),
- recreation development (e.g., parks, open space, and school expansion), and
- transportation (e.g., expansion, renovation, and addition of transportation corridors).

B. UB - Unrestricted/BLM

These areas will be unrestricted for use by BLM personnel. These areas are on the perimeter of the MRA and are typically at or behind the firing points used by military personnel during active use of the former Fort Ord.

These areas will be cleared of UXO following the same standards applied to future BLM lands outside the MRA. They will be transferred to BLM with the same use restrictions that are being applied to parcels outside the MRA.

Anticipated future uses include but are not limited to:

- construction of facilities (e.g., trail head or interpretative facilities to include signing, restrooms),
- habitat restoration (potential use of heavy equipment to scarify the surface or reestablish natural contours), and
- maintenance of access routes (system of trails, roads, and fire roads used by administrative staff and the public) (Plate 4).

C. LA - Limited Access

These areas are limited to specific uses. These areas are located within the core of the MRA but will be cleared to a level safe for some uses. They generally include old range areas, range safety fans, and other areas outside the high-impact area.

These areas will be cleared of UXO sufficient to permit pedestrian and other nonmotorized access. An existing system of fire roads and firebreaks (Plate 4) will be cleared to a sufficient standard to allow annual maintenance of fire roads with heavy equipment. They may be transferred with use restrictions that prohibit any surface disturbance or excavation outside the established system of fire roads and trails.

Anticipated future uses will not include new facilities. Signs and published use restrictions will be used to encourage the public to remain on the established trail system and to discourage public lingering and/or loitering in these areas beyond the time needed to traverse the trails. Future uses will include:

- recreation access (mountain bike, equestrian, and pedestrian use of designated existing fire roads as a trail system to traverse the restricted area),
- notification uses (installation of signs pertaining to published use restrictions), and
- habitat restoration (BLM administrative staff and cooperating agency personnel will conduct biological monitoring on foot at fixed transects throughout the area; BLM administrative staff and public volunteers will apply herbicides to non-native plants, such as iceplant and pampas grass).

D. RA - Restricted/Administration

These areas are the high-impact areas and will be off-limits to untrained personnel. These areas will be off-limits for use by the public and restricted for use by BLM to trained persons only. The areas will be fenced by the Army, and the fence will be maintained by BLM. A system of fire roads and firebreaks will be cleared within this area to allow access for fire suppression and habitat

monitoring. These areas are the primary target areas, where the density or hazard of UXO is such that it is not deemed cost effective to remove UXO at present.

UXO clearance of the high-density impact area is not planned. If new technology allows further clearance actions in a cost effective manner, the Army and BLM would jointly seek funding for future clearances.

As part of existing UXO removal plans, fire roads and firebreaks will be cleared. Surface clearance within heavily disturbed range areas will occur. No brush removal will be necessary for clearance in these areas. The administrative area will be fenced with an 8-foot-tall chain-link fence topped with barbed wire. These areas may be transferred to BLM with restrictions that prohibit access except by BLM personnel and cooperating agency personnel who have been trained in UXO identification.

The restricted area will be bisected by a fire road/trail that will be open to public access (noted by a solid line on Plate 3). Both sides of this fire road/trail will be fenced as described above.

Anticipated future uses are restricted to:

- habitat monitoring (trained BLM administrative staff will conduct biological monitoring by walking the existing roads and breaks cleared for fire suppression; this monitoring may be conducted annually for 5 years after fires and then at 5- to 7-year intervals) and
- habitat enhancement (trained BLM administrative staff may apply herbicides to remove non-native plants and conduct burns to maintain the fire-adaptive habitat).

3.2 Schedules for Clearance and Release

Several transfer scenarios were studied. In developing the final scenario, alternatives for timing of transfer, transfer requirements, fencing and security, HMP and burn plan requirements, and funding were considered. The following scenario resulted from technical analysis, engineering evaluation, and consideration of available cost information.

Transfer Sequence

A. The Army will clear a system of existing trails, fire roads, and firebreaks.

B. The Army will fence the high-density area following existing roads.

C. The Army will retain the entire MRA until clearances are performed in accordance with the reuse scenarios described in this document.

D. The clearances will be completed within 5-10 years (depending on schedules and funding).

E. The Army will complete the habitat restoration requirements for disturbed areas before transfer. The transfer may occur before the Army habitat monitoring requirements are completed.

F. The transfer of the MRA to the BLM, including the fenced, high-density impact area, will occur upon completion of the Army's response actions to OEW.

3.3 Future Documents and Plans

Engineering Evaluations and Cost Analysis

The Engineering Evaluations and Cost Analysis (EECA) will be developed by the Army with input from the public and regulatory agencies. The EECA will be the final proposed plan on the Army's response actions to OEW at the former Fort Ord. It also may contain intrusive sampling results that will be used to better define the areas described in Section 3.1 and shown on Plate 3. Two elements of the public notification process are described below and will be developed during the EECA process. Additionally the EECA will determine the frequency of public and administrative review of the Army's OEW response actions. The review will include an assessment of new technologies that may be applicable to the treatment of restricted/administrative areas.

Community Education and Relations Plan

The Community Education and Relations Plan will be developed by the Army during the public notification process of OEW response. The plan will address the public's right to know, continuing and future education of visitors and users of the BLM area, and periodic updates of information.

Site Maintenance/Emergency Response Plan

The Site Maintenance/Emergency Response Plan will be developed by the Army and BLM during the public notification process of OEW response. The plan will address periodic site review, security requirements, changing reuse scenarios, and emergency notification and response.

4.0 REFERENCES

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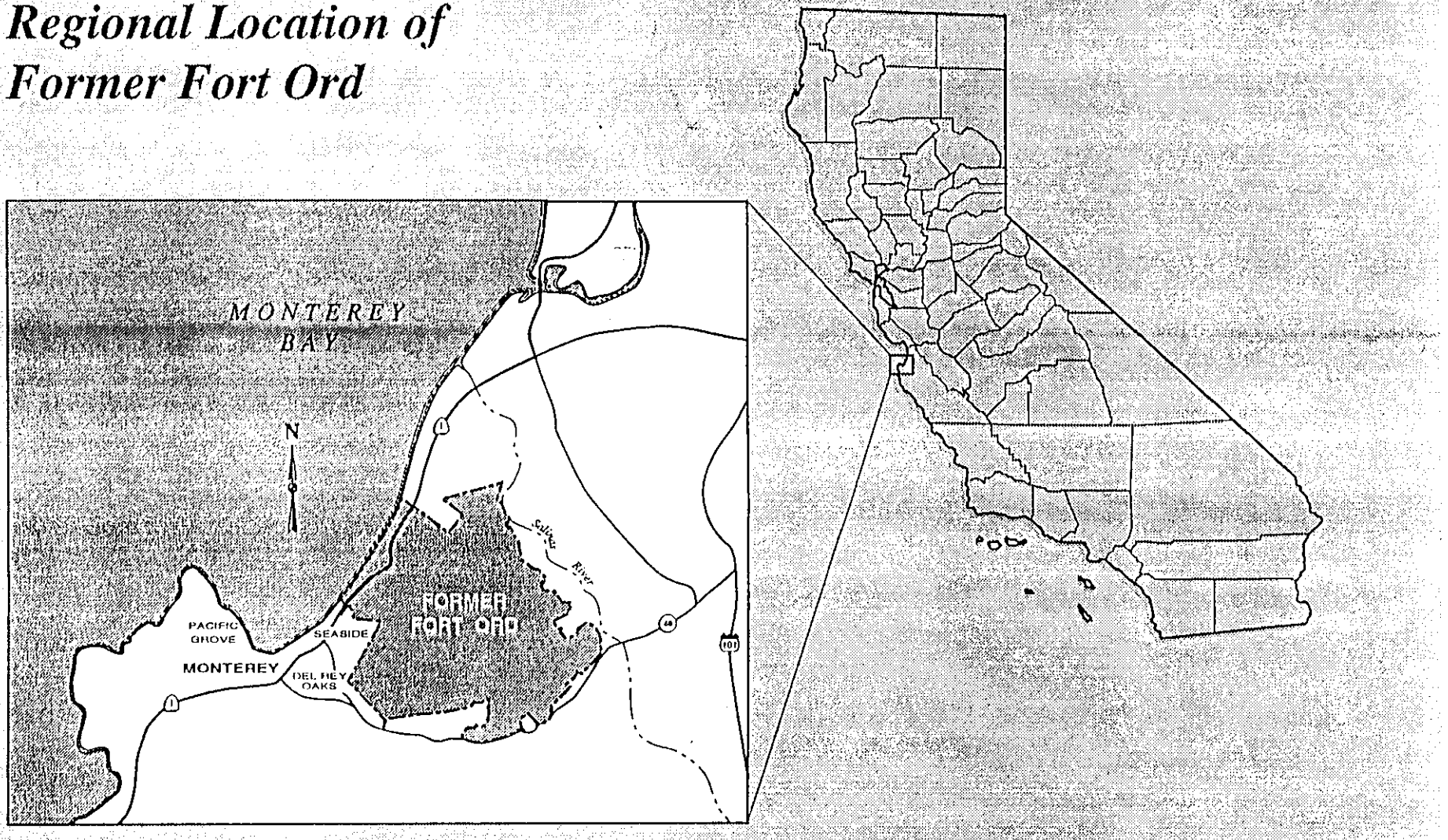
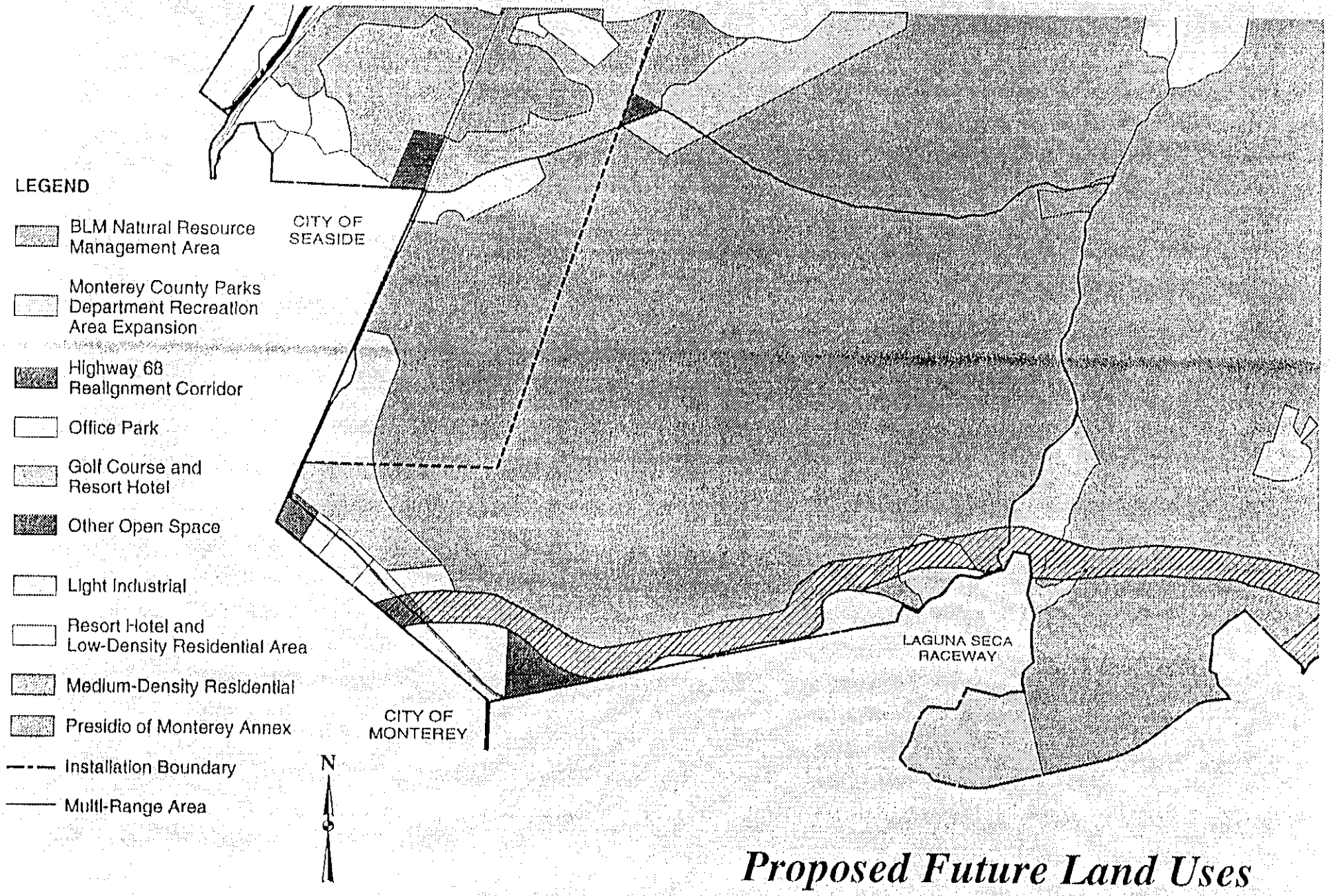
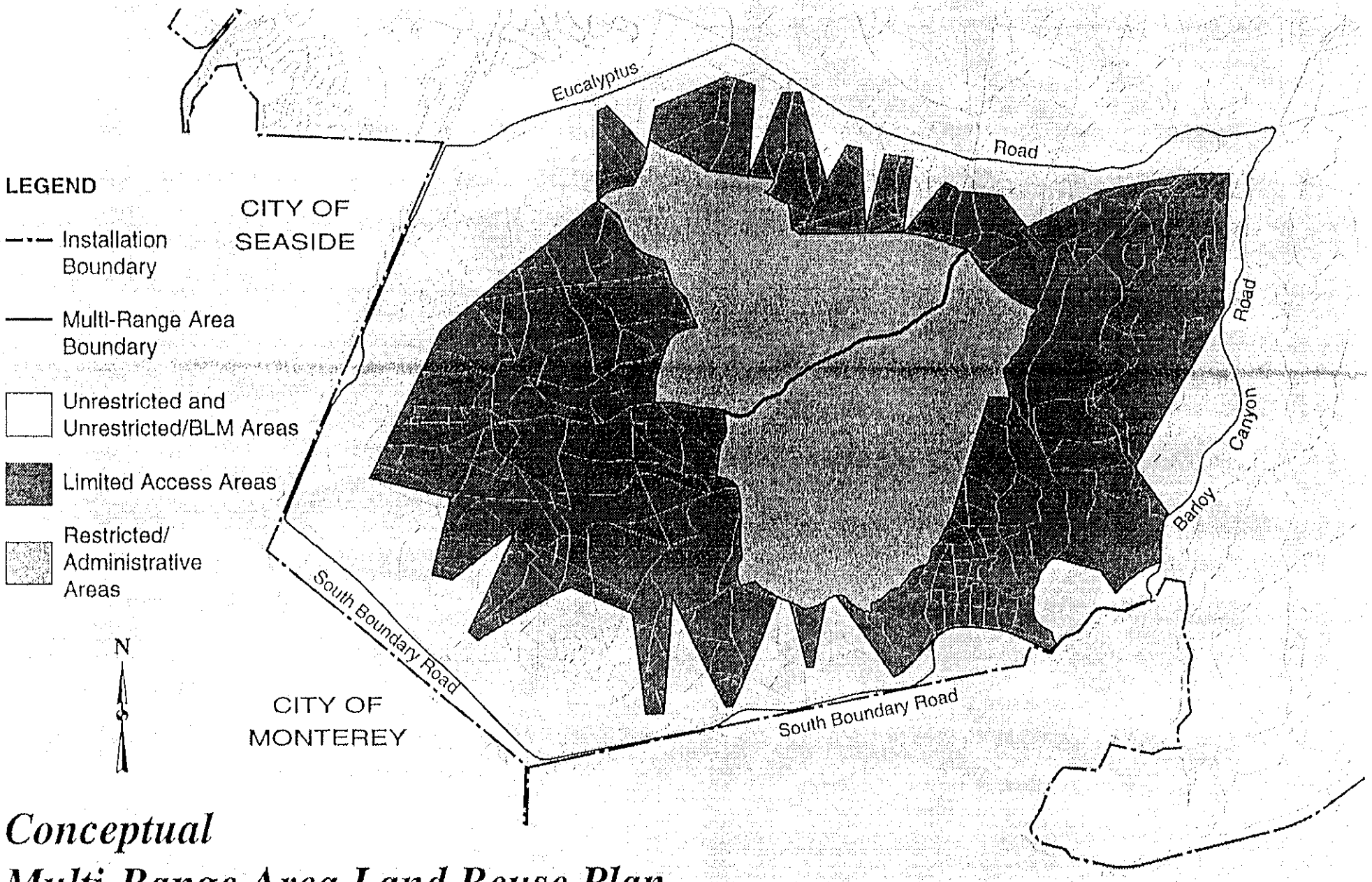
Regional Location of Former Fort Ord

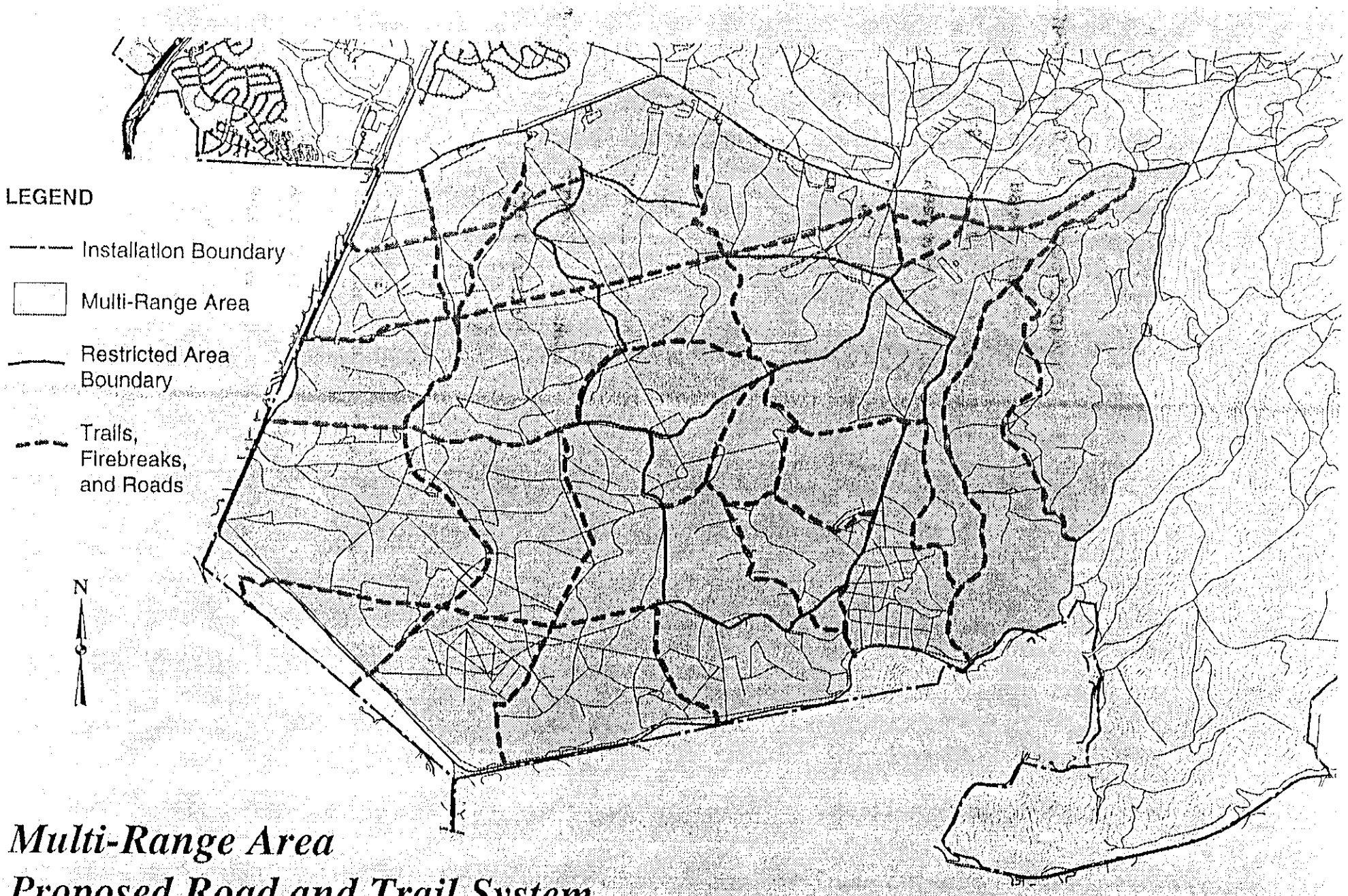




Proposed Future Land Uses



Conceptual Multi-Range Area Land Reuse Plan



Multi-Range Area
Proposed Road and Trail System